Department of Defense Fiscal Year (FY) 2023 Budget Estimates

April 2022



Army

Justification Book Volume 1c of 1

Research, Development, Test & Evaluation, Army

RDT&E – Volume I, Budget Activity 3

Army • Budget Estimates FY 2023 • RDT&E Program

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UNCLASSIFIED RESEARCH, DEVELOPMENT, TEST AND EVALUATION, ARMY APPROPRIATION LANGUAGE

For expenses necessary for basic and applied scientific research, development, test and evaluation, including maintenance, rehabilitation, lease, and operation of facilities and equipment, \$13,703,609,000.00 to remain available for obligation until September 30, 2024.

The FY 2023 Overseas Operations accounted for in the base budget are as follows:

Combat or direct combat support expenses that discontinue once combat operations end at major contingency location \$12,800,000.

In-theater and in-CONUS expenses that remain after combat operations cease and have been previously funded in OCO \$5,875,000.

COST STATEMENT

The following Justification Books were prepared at a cost of \$474,495.00: Aircraft (ACFT), Missiles (MSLS), Weapons & Tracked Combat Vehicles (WTCV), Ammunition (AMMO), Other Procurement Army (OPA) 1 – Tactical & Support Vehicles, Other Procurement Army (OPA) 2 – Communications & Electronics, Other Procurement Army (OPA) 3 & 4 - Other Support Equipment & Spares, Research, Development, Test and Evaluation (RDTE) for: Budget Activity 1, Budget Activity 2, Budget Activity 3, Budget Activity 4, Budget Activity 5A, Budget Activity 5B, Budget Activity 5C, Budget Activity 5D, Budget Activity 6, Budget Activity 7, and Budget Activity 8.

UNCLASSIFIED FY 2023 RDT&E, ARMY PROGRAM ELEMENT DESCRIPTIVE SUMMARIES Introduction and Explanation of Contents

1. **General.** The purpose of this document is to provide summary information concerning the Research, Development, Test and Evaluation, Army program. The descriptive summaries are comprised of R-2 (Army RDT&E Budget Item Justification – program element level), R-2A (Army RDT&E Budget Item Justification – project level), R-3 (Army RDT&E Cost Analysis), R-4 (Schedule Profile Detail) and R-5 (Termination Liability Funding for MDAPs) Exhibits, which provide narrative information on all RDT&E program elements and projects through FY 2022.

2. Relationship of the FY 2023 Budget Submitted to Congress to the FY 2022 Budget Submitted to Congress. This paragraph provides a list of program elements/projects that are major new starts, restructures, developmental transitions, and terminated programs. Explanations for these changes can be found in the narrative sections of the Program Element R-2A Exhibits.

<u>Budget Activity</u>	<u>OSDPE / Project</u>	<u>Project Title</u>
02	0602002A / DC4	Army Applied Innovation
02	0602002A / DC5	Team Ignite
02	0602141A / CI1	Advanced Armaments Lethality Technology
02	0602141A / CZ9	Foundational Hypersonic Weapons Research
02	0602144A / CV3	Engineer Enablers Maneuver, LOG, & Sustainment Apl
02	0602144A / DA1	SAFR Alternatives for Readiness Applied Research
02	0602145A / CU5	Platform Agnostic Armaments Applied Technology
02	0602146A / CU6	Adaptive Information Mediation and Analytics
02	0602146A / CV4	Pathfinder 3D Applied Technology
02	0602150A / CV7	High Energy Laser Direct Diode Apl Tech
02	0602150A / CV8	Vulnerability Modules for Multi-Domain Operations
02	0602150A / DA9	Radar Survivability through Dis Sensing Tech
02	0602180A / DA5	AI Enabled Talent Management Applied Research
02	0602180A / DA6	AI-Enabled Command and Coordination Apl Research
02	0602183A / CU7	Control & Autonomy for Tactical Superiority Tech
02	0602183A / CU8	Structures Tech for Enduring Efficient Resilience

New Start Programs:

02	0602183A / CU9	Systems Design Technology
02	0602184A / CV9	Technical-SAVVY Soldier Applied Research
03	0603025A / DA3	Army Advanced Innovation
03	0603040A / CN6	Predictive Maintenance Advanced Technology
03	0603040A / DA7	AI-Enabled Command and Coordination Adv Tech
03	0603041A / DA4	All Domain Convergence Engineering & Architectures
03	0603043A / CV1	Control & Autonomy for Tactical Superiority Adv
03	0603043A / CV2	Structures Platform Int Resilience & Efficiency
03	0603119A / CV5	Engineer Enablers Maneuver, LOG, & Sustainment Adv
03	0603119A / DA2	SAFR Alternatives for Readiness Advanced Tech
03	0603466A / CV6	Optimized High Energy Laser Source Adv Tech
03	0603466A / DB3	Radar Survivability through Dis Sensing Adv Tech
04	0604020A / DC8	Army Experimentation and Prototyping
05	0604641A / CF5	Robotic Combat Vehicle (BA5) NGCV-CFT
05	0604827A / S65	Platoon Power Generator
05	0 6 04854A / 516	Paladin/FAASV
06	0605235A / CQ4	Mid-Range Capability

Program Element/Project Restructures:

Budget		
<u>Activity</u>	Old OSDPE / Project: Title	<u>New OSDPE / Project</u>
02	0602143A / BE6: Reactive/Resp Surfaces & Matls-Soldiers & Sys	0602184A / CW9
02	0602146A / AO2: Stand-In Advanced RF Effects (STARE)	0602146A / AP5
02	0602146A / AR3: Intelligent Environmental Battlefield Awareness	0602182A / CX3
02	0602146A / AR7: Sensing in Contested Environments Technology	0602182A / CX5
02	0602146A / AR9: Persistent Geophysical Sensing-Infrasound Tech	0602182A / CX4
02	0602146A / AT2: Subterranean Detection and Monitoring Technology	0602182A / CX6
02	0602146A / AV7: Atmospheric Modeling and Meterological Technology	0602182A / CW2
02	0602146A / CK1: Assurred PNT Enabling Technologies	0602182A / CZ6
02	0602148A / AI9: Future UAS Engine Technology	0602183A / CW6

02	0602148A / AJ2: Next Generation Rotorcraft Transmission Technology	0602183A / CW8
02	0602148A / AJ6: Advanced Rotors Technology	0602183A / CW3
02	0602148A / AJ8: Experimental and Computational Aeromechanics Techn	0602183A / CW5
02	0602148A / AL2: High Performance Computing for Rotorcraft App Tech	0602183A / DC2
02	0602148A / AL4: High Speed and Efficient VTOL Vehicle Technology	0602183A / CW7
02	0602148A / AL5: Air Vehicle Structures and Dynamics Technology	0602183A / CW4
02	0602148A / AL8: Holistic Situational Awareness and Dec Making Tech	0602141A / CG4
02	0602150A / AD2: High Energy Laser (HEL) Enabling and Support Techn	0602150A / DC1
02	0602150A / AD3: Maneuver Air Defense Technology	0603466A / AD4
02	0602182A / CM9: Convergent CEMA Deception	0602182A / CZ7
03	0602145A / BJ9: Autonomous Mobility Tech	0603462A / BK1
03	0602146A / AM8: Protected SATCOM Technology	0603463A / AM9
03	0602148A / AK4: Multi-Role Small Guided Missile Technology	0603465A / AK5
03	0603463A / AR4: Intelligent Env Battlefield Awareness Adv Tech	0603042A / CX7
03	0603463A / AS9: Persistent Geophysical Sensing-Infrasound Adv Tech	0603042A / CX8
03	0603463A / AR8: Sensing in Contested Environments Adv Technology	0603042A / CX9
03	0603463A / AT3: Subterranean Detection and Monitoring Adv Technology	0603042A / CZ5
03	0603465A / AJ7: Advanced Rotors Advanced Technology	0603043A / CX1
03	0603043A / AJ3: Next Generation Rotorcraft Transmission Adv Technology	0603043A / CX2
03	0603043A / AL3: HPC for Rotorcraft Applications Adv Tech	0603043A / DC3
03	0603463A / AU2: Optimization of Geospatial Data for Visualization	0603463A / AT8
03	0603463A / AV1: GEOInt/Ops Logistics Integration-Planning Adv Tech	0603463A / AU4
03	0602147A / AF1: Long Range Maneuverable Fires (LRMF) Technology	0603464A / AF2
03	0603464A / AE8: Land-Based Anti-Ship Missile (LBASM) Advanced Tech	0603464A / CZ8
03	0603465A / CH6: Adapt & Resilnt Tach Autnmy Cont&Struct Adv Tech	0603043A / CV1
03	0603465A / CH6: Adapt & Resilnt Tach Autnmy Cont&Struct Adv Tech	0603043A / CV2
03	0603465A / CH8: UAS Survivability Advance Technology	0603465A / AK3
03	0603465A / CH8: UAS Survivability Advance Technology	0603465A / CG1
03	0602148A / BZ7: Future Vertical Lift Medical Technologies	0603465A / CJ5
04	0603466A / AD1: High Energy Laser Tactical Vehicle Demo Adv Tech	0604019A / BU9
04	0305251A / FA8: Cyberspace Operations Forces and Force Support	0305251A / DD3
04	0603801A / B47: Future Vertical Lift	0603801A / CS7
04	0604117A / FI4: Maneuver - Short Range Air Defense (M-SHORAD)	0604117A / CR9
04	0605054A / FI3: Rapid Capability Development and Maturation	0604117A / CR9
04	0604117A / FI4: Maneuver - Short Range Air Defense (M-SHORAD)	0604117A / CS1

0604644A / MR1: Mobile Intermediate Range Missile	0604135A / MR2
0604644A / MR1: Mobile Intermediate Range Missile	0604135A / MR3
0604644A / MR1: Mobile Intermediate Range Missile	0604135A / MR4
0604182A / HX1: Long Range Hypersonic Weapon	0604182A / HX3
0604182A / HX1: Long Range Hypersonic Weapon	0604182A / HX4
0604182A / HX1: Long Range Hypersonic Weapon	0604182A / HX5
0604182A / HX1: Long Range Hypersonic Weapon	0604182A / HX6
0604818A / EJ5: Mounted Computing Environment (MCE)	0604805A / 593
0605013A / T05: Army Business System Modernization Initiatives	0605013A / BY3
0608041A / CD1: Defensive Cyber - Software Prototype Devel	0605041A / XU3
0605042A / FA1: Manpack Radio	0605236A / CQ1
0605042A / FA2: Rifleman Radio (RR)	0605236A / CQ1
0605602A / 628: Developmental Test Technology & Sustainment	0605602A / FJ3
0605602A / 62C: Modeling and Simulation Instrumentation	0605602A / FJ3
0303142A / 456: MILSATCOM System Engineering	0303142A / CO7
0205778A / EG2: GMLRS Alternative Warheads	0205778A / EG3
	 0604644A / MR1: Mobile Intermediate Range Missile 0604644A / MR1: Mobile Intermediate Range Missile 0604644A / MR1: Mobile Intermediate Range Missile 0604182A / MR1: Long Range Hypersonic Weapon 0604182A / HX1: Long Range Hypersonic Weapon 0605013A / T05: Army Business System Modernization Initiatives 0605042A / FA1: Manpack Radio 0605042A / FA2: Rifleman Radio (RR) 0605602A / 628: Developmental Test Technology & Sustainment 0605602A / 620: Modeling and Simulation Instrumentation 0303142A / 456: MILSATCOM System Engineering 0205778A / EG2: GMLRS Alternative Warheads

Program Terminations (including transfers to Procurement and Sustainment):

<u>Budget</u>		
<u>Activity</u>	OSDPE / Project	<u>Project Title</u>
01	0601104A / CI9	University & Industry Rsch Ctrs / Strategic University Basic Research Alliance
02	0602141A / CJ6	Lethality Technology / Advanced Energetics for Missile Technologies
02	0602143A / BB9	Soldier Lethality Technology / Human Performance Tech for Mobility & Lethality
02	0602144A / CG5	Ground Technology / Ground Vehicle Sensor Concepts and Technologies
02	0602146A / AR1	Network C3I Technology / Robust, Resilient and Intelligent C3I Technology
02	0602150A / AD5	Air and Missile Defense Technology / Next Generation Fires Radar Technology
03	0603002A / MN3	Medical Advanced Technology / Immediate Cardiopulmonary Stabilization Adv Tech
03	0603002A / MN4	Medical Advanced Technology / Advanced Life Support Advanced Technology
03	0603002A / MN5	Medical Advanced Technology / Next Generation Blood Products Advanced Technology
03	0603002A / MN9	Medical Advanced Technology / Far Forward Behavioral Health Care Advanced Tech

03	0603463A / AN2	Network C3I Advanced Technology / Narrowband SATCOM Advanced Technology
03	0603466A / AD4	Air and Missile Defense Adv Technology / Maneuver Air Defense Advanced Technology
04	0604785A / DS4	Integrated Base Defense / Integrated Base Defense
05	0604854A / HB6	Artillery Systems EMD / Mobile 155MM Howitzer

3. Classification: This document contains no classified data. Appropriately cleared individuals can obtain further information on Classified/Special Access Programs by contacting the Department of the Army.

Department of the Army FY 2023 President's Budget Exhibit R-1 FY 2023 President's Budget Total Obligational Authority (Dollars in Thousands)

Apr 2022

Summary Recap of Budget Activities	FY 2021 (Base + OCO)	FY 2022 Enactment	FY 2023 Request
Basic Research	552,521	606,509	466,823
Applied Research	1,518,220	1,529,888	883,759
Advanced Technology Development	1,948,792	2,190,430	1,392,065
Advanced Component Development & Prototypes	3,589,313	3,818,276	4,098,749
System Development & Demonstration	2,979,946	3,254,230	4,031,334
Management Support	1,832,049	1,553,905	1,554,252
Operational Systems Development	1,719,691	1,466,180	1,188,403
Software and Digital Technology Pilot Programs	56,706	108,841	94,888
Total Research, Development, Test & Evaluation	14,197,238	14,528,259	13,710,273
Summary Recap of FYDP Programs			
General Purpose Forces	589,523	579,473	392,489
Intelligence and Communications	372,869	275,873	210,597
Research and Development	13,099,825	13,566,200	13,009,253
Central Supply and Maintenance	130,785	103,720	91,270
Administration and Associated Activities	253		
Classified Programs	3,983	2,993	6,664
Total Research, Development, Test & Evaluation	14,197,238	14,528,259	13,710,273

Department of the Army FY 2023 President's Budget Exhibit R-1 FY 2023 President's Budget Total Obligational Authority (Dollars in Thousands)

Apr 2022

Appropriation: 2040A Research, Development, Test & Eval, Army

Line <u>No</u>	Program Element <u>Number</u>	Item	Act	FY 2021 (Base + OCO)	FY 2022 Enactment	FY 2023 Request	s e c
1	0601102A	Defense Research Sciences	01	344,031	368,751	279,328	U
2	0601103A	University Research Initiatives	01	84,697	91,241	70,775	U
3	0601104A	University and Industry Research Centers	01	118,716	126,267	100,909	U
4	0601121A	Cyber Collaborative Research Alliance	01	5,077	5,067	5,355	U
5	0601601A	Artificial Intelligence and Machine Learning Basic Research	01		15,183	10,456	U
	Basic	c Research		552,521	606,509	466,823	
6	0602002A	Army Agile Innovation and Development-Applied Research	02			9,534	U
7	0602115A	Biomedical Technology	02	11,403	11,925		U
8	0602134A	Counter Improvised-Threat Advanced Studies	02	1,927	1,976	6,192	U
9	0602141A	Lethality Technology	02	117,484	91,626	87,717	U
10	0602142A	Army Applied Research	02	29,257	28,654	27,833	U
11	0602143A	Soldier Lethality Technology	02	201,511	205,058	103,839	U
12	0602144A	Ground Technology	02	159,358	216,550	52,848	U
13	0602145A	Next Generation Combat Vehicle Technology	02	258,341	245,525	174,090	U
14	0602146A	Network C3I Technology	02	202,256	164,804	64,115	U
15	0602147A	Long Range Precision Fires Technology	02	119,007	93,785	43,029	U
16	0602148A	Future Verticle Lift Technology	02	169,536	133,158	69,348	U
17	0602150A	Air and Missile Defense Technology	02	107,584	93,549	27,016	U
18	0602180A	Artificial Intelligence and Machine Learning Technologies	02		15,034	16,454	U
19	0602181A	All Domain Convergence Applied Research	02		25,967	27,399	U
20	0602182A	C3I Applied Research	02		12,406	27,892	U
21	0602183A	Air Platform Applied Research	02		6,597	41,588	U

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Department of the Army FY 2023 President's Budget Exhibit R-1 FY 2023 President's Budget Total Obligational Authority (Dollars in Thousands)

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Appropriation: 2040A Research, Development, Test & Eval, Army

Line <u>No</u>	Program Element <u>Number</u>	Item	Act	FY 2021 (Base + OCO)	FY 2022 Enactment	FY 2023 Request	s e c
22	0602184A	Soldier Applied Research	02		11,064	15,716	U
23	0602213A	C3I Applied Cyber	02	18,816	12,119	13,605	U
24	0602386A	Biotechnology for Materials - Applied Research	02		20,643	21,919	U
25	0602785A	Manpower/Personnel/Training Technology	02	20,399	18,701	19,649	U
26	0602787A	Medical Technology	02	101,341	120,747	33,976	U
	Appli	led Research		1,518,220	1,529,888	883,759	
27	0603002A	Medical Advanced Technology	03	95,146	137,804	5,207	U
28	0603007A	Manpower, Personnel and Training Advanced Technology	03	11,344	14,273	15 , 598	U
29	0603025A	Army Agile Innovation and Demonstration	03		22,231	20,900	U
30	0603040A	Artificial Intelligence and Machine Learning Advanced Technologies	03		909	6,395	U
31	0603041A	All Domain Convergence Advanced Technology	03		17,743	45,463	U
32	0603042A	C3I Advanced Technology	03		3,151	12,716	U
33	0603043A	Air Platform Advanced Technology	03		754	17,946	U
34	0603044A	Soldier Advanced Technology	03		890	479	U
35	0603115A	Medical Development	03	26,711	26,508		U
36	0603116A	Lethality Advanced Technology	03		8,066	9,796	U
37	0603117A	Army Advanced Technology Development	03	64,163	76 , 815	134,874	U
38	0603118A	Soldier Lethality Advanced Technology	03	154,161	152,369	100,935	U
39	0603119A	Ground Advanced Technology	03	196,055	280,490	32,546	U
40	0603134A	Counter Improvised-Threat Simulation	03	24,087	24,747	21,486	U
41	0603386A	Biotechnology for Materials - Advanced Research	03		53,736	56,853	U
42	0603457A	C3I Cyber Advanced Development	03	43,357	61,426	41,354	U

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Appropriation: 2040A Research, Development, Test & Eval, Army

Line <u>No</u>	Program Element <u>Number</u>	Item	Act	FY 2021 (Base + OCO)	FY 2022 Enactment	FY 2023 Request	S e C
43	0603461A	High Performance Computing Modernization Program	03	221,161	229,123	251,964	U
44	0603462A	Next Generation Combat Vehicle Advanced Technology	03	309,860	299,712	193,242	U
45	0603463A	Network C3I Advanced Technology	03	215,337	211,068	125,565	U
46	0603464A	Long Range Precision Fires Advanced Technology	03	177,142	141,909	100,830	U
47	0603465A	Future Vertical Lift Advanced Technology	03	220,334	261,880	177,836	U
48	0603466A	Air and Missile Defense Advanced Technology	03	173,244	145,826	11,147	U
49	0603920A	Humanitarian Demining	03	16,690	19,000	8,933	U
	Advar	ced Technology Development		1,948,792	2,190,430	1,392,065	
50	0603305A	Army Missle Defense Systems Integration	04	139,518	56,702	12,001	U
51	0603308A	Army Space Systems Integration	04	25,584	25,755	17,945	U
52	0603327A	Air and Missile Defense Systems Engineering	04	47,098	15,000		U
53	0603619A	Landmine Warfare and Barrier - Adv Dev	04	56,067	46,637	64,001	U
54	0603639A	Tank and Medium Caliber Ammunition	04	106,881	73,844	64,669	U
55	0603645A	Armored System Modernization - Adv Dev	04	130,485	164,328	49,944	U
56	0603747A	Soldier Support and Survivability	04	5,312	2,897	4,060	U
57	0603766A	Tactical Electronic Surveillance System - Adv Dev	04	182,400	113,365	72,314	U
58	0603774A	Night Vision Systems Advanced Development	04	15,179	62,820	18,048	U
59	0603779A	Environmental Quality Technology - Dem/Val	04	20,906	22,921	31,249	U
60	0603790A	NATO Research and Development	04	4,589	3,777	3,805	U
61	0603801A	Aviation - Adv Dev	04	694,296	1,178,460	1,162,344	U
62	0603804A	Logistics and Engineer Equipment - Adv Dev	04	15,287	11,055	9,638	U
63	0603807A	Medical Systems - Adv Dev	04	36,006	37,053	598	U

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Appropriation: 2040A Research, Development, Test & Eval, Army

Line <u>No</u>	Program Element <u>Number</u>	Item	Act	FY 2021 (Base + OCO)	FY 2022 Enactment	FY 2023 Request	s e c
64	0603827A	Soldier Systems - Advanced Development	04	23,905	25,925	25,971	U
65	0604017A	Robotics Development	04	92,401	80,525	26,594	U
66	0604019A	Expanded Mission Area Missile (EMAM)	04		27,872	220,820	U
67	0604020A	Cross Functional Team (CFT) Advanced Development & Prototyping	04			106,000	U
68	0604021A	Electronic Warfare Technology Maturation (MIP)	04	15,034			U
69	0604035A	Low Earth Orbit (LEO) Satellite Capability	04	21,850	19,638	35,509	U
70	0604036A	Multi-Domain Sensing System (MDSS) Adv Dev	04		50,548	49,932	U
71	0604037A	Tactical Intel Targeting Access Node (TITAN) Adv Dev	04		28,347	863	U
72	0604100A	Analysis Of Alternatives	04	9,714	10,091	10,659	U
73	0604101A	Small Unmanned Aerial Vehicle (SUAV) (6.4)	04	1,328	926	1,425	U
74	0604113A	Future Tactical Unmanned Aircraft System (FTUAS)	04	59,183	76,349	95 , 719	U
75	0604114A	Lower Tier Air Missile Defense (LTAMD) Sensor	04	308,805	297,629	382,147	U
76	0604115A	Technology Maturation Initiatives	04	141,109	132,561	269,756	U
77	0604117A	Maneuver - Short Range Air Defense (M-SHORAD)	04	5,776	39 , 376	225,147	U
78	0604119A	Army Advanced Component Development & Prototyping	04	167,990	189,483	198,111	U
79	0604120A	Assured Positioning, Navigation and Timing (PNT)	04	115,688	83 , 952	43,797	U
80	0604121A	Synthetic Training Environment Refinement & Prototyping	04	112,093	206,335	166,452	U
81	0604134A	Counter Improvised-Threat Demonstration, Prototype Development, and Testing	04	13,326	13,379	15,840	U
82	0604135A	Strategic Mid-Range Fires	04			404,291	U
83	0604182A	Hypersonics	04	841,666	315,131	173,168	U
84	0604403A	Future Interceptor	04		6,895	8,179	U
85	0604531A	Counter - Small Unmanned Aircraft Systems Advanced Development	04		19,148	35,110	U

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Department of the Army FY 2023 President's Budget Exhibit R-1 FY 2023 President's Budget Total Obligational Authority (Dollars in Thousands)

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Appropriation: 2040A Research, Development, Test & Eval, Army

Line <u>No</u>	Program Element <u>Number</u>	Item	Act	FY 2021 (Base + OCO)	FY 2022 Enactment	FY 2023 Request	S e C
86	0604541A	Unified Network Transport	04	39,192	35,172	36,966	U
87	0604644A	Mobile Medium Range Missile	04	88,100	286,445		U
88	0604785A	Integrated Base Defense (Budget Activity 4)	04	2,020	2,040		U
89	0305251A	Cyberspace Operations Forces and Force Support	04	50,525	55,895	55 , 677	U
	Advar	ced Component Development & Prototypes		3,589,313	3,818,276	4,098,749	
90	0604201A	Aircraft Avionics	05	7,011	6,654	3,335	U
91	0604270A	Electronic Warfare Development	05	56,624	30,840	4,243	U
92	0604601A	Infantry Support Weapons	05	89,497	79 , 339	66,529	U
93	0604604A	Medium Tactical Vehicles	05	8,213	9,524	22,163	U
94	0604611A	JAVELIN	05	5,983	7,094	7,870	U
95	0604622A	Family of Heavy Tactical Vehicles	05	22,254	28,445	50,924	U
96	0604633A	Air Traffic Control	05	3,383	4,405	2,623	U
97	0604641A	Tactical Unmanned Ground Vehicle (TUGV)	05			115,986	U
98	0604642A	Light Tactical Wheeled Vehicles	05	4,371	2,055		U
99	0604645A	Armored Systems Modernization (ASM) - Eng Dev	05	123,992	122,778	71,287	U
100	0604710A	Night Vision Systems - Eng Dev	05	52,959	43,417	62,679	U
101	0604713A	Combat Feeding, Clothing, and Equipment	05	2,734	1,658	1,566	U
102	0604715A	Non-System Training Devices - Eng Dev	05	27,013	26,514	18,600	U
103	0604741A	Air Defense Command, Control and Intelligence - Eng Dev	05	62,058	59 , 518	39,541	U
104	0604742A	Constructive Simulation Systems Development	05	9,779	22,240	29,570	U
105	0604746A	Automatic Test Equipment Development	05	5,375	8,807	5,178	U
106	0604760A	Distributive Interactive Simulations (DIS) - Eng Dev	05	7,605	12,453	8,189	U

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Department of the Army FY 2023 President's Budget Exhibit R-1 FY 2023 President's Budget Total Obligational Authority (Dollars in Thousands)

Appropriation: 2040A Research, Development, Test & Eval, Army

Line <u>No</u>	Program Element <u>Number</u>	Item	Act	FY 2021 (Base + OCO)	FY 2022 Enactment	FY 2023 Request	S e C
107	0604768A	Brilliant Anti-Armor Submunition (BAT)	05	20,175			U
108	0604780A	Combined Arms Tactical Trainer (CATT) Core	05	3,438			U
109	0604798A	Brigade Analysis, Integration and Evaluation	05	18,737	21,423	21,228	U
110	0604802A	Weapons and Munitions - Eng Dev	05	277,344	297,086	263,778	U
111	0604804A	Logistics and Engineer Equipment - Eng Dev	05	53 , 676	54,642	41,669	U
112	0604805A	Command, Control, Communications Systems - Eng Dev	05	10,674	20,107	40,038	U
113	0604807A	Medical Materiel/Medical Biological Defense Equipment - Eng Dev	05	48,285	44,400	5,513	U
114	0604808A	Landmine Warfare/Barrier - Eng Dev	05	9,239	29,137	12,150	U
115	0604818A	Army Tactical Command & Control Hardware & Software	05	126,676	155,017	111,690	U
116	0604820A	Radar Development	05	105,271	122,607	71,259	U
117	0604822A	General Fund Enterprise Business System (GFEBS)	05	15,428	15,979	10,402	U
118	0604823A	Firefinder	05	18,278			U
119	0604827A	Soldier Systems - Warrior Dem/Val	05	6,546	6,454	11,425	U
120	0604852A	Suite of Survivability Enhancement Systems - EMD	05	62,012	96,132	109,702	U
121	0604854A	Artillery Systems - EMD	05	36,187	25,000	23,106	U
122	0605013A	Information Technology Development	05	123,659	129,380	124,475	U
123	0605018A	Integrated Personnel and Pay System-Army (IPPS-A)	05	111,078	67,701	67,564	U
124	0605028A	Armored Multi-Purpose Vehicle (AMPV)	05	76,140	35,560		U
125	0605030A	Joint Tactical Network Center (JTNC)	05	15,671	16,350	17,950	U
126	0605031A	Joint Tactical Network (JTN)	05	30,540	28,905	30,169	U
127	0605033A	Ground-Based Operational Surveillance System - Expeditionary (GBOSS-E)	05	5,758			U
128	0605035A	Common Infrared Countermeasures (CIRCM)	05	29,770	16,630	11,523	U

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Appropriation: 2040A Research, Development, Test & Eval, Army

Line <u>No</u>	Program Element Number	Item	Act	FY 2021 (Base + OCO)	FY 2022 Enactment	FY 2023 Request	s e c
129	0605038A	Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV) Sensor Suite	05	4,669	7,618		U
130	0605041A	Defensive CYBER Tool Development	05	28,544	18,811	33,029	U
131	0605042A	Tactical Network Radio Systems (Low-Tier)	05	20,511	28,741	4,497	U
132	0605047A	Contract Writing System	05	22,025	20,960	23,487	U
133	0605051A	Aircraft Survivability Development	05	99,403	61,768	19,123	U
134	0605052A	Indirect Fire Protection Capability Inc 2 - Block 1	05	152,399	182,257	131,093	U
135	0605053A	Ground Robotics	05	12,010	16,360	26,809	U
136	0605054A	Emerging Technology Initiatives	05	294,366	226,802	185,311	U
137	0605143A	Biometrics Enabling Capability (BEC)	05		4,326	11,091	U
138	0605144A	Next Generation Load Device - Medium	05		15,397	22,439	U
139	0605145A	Medical Products and Support Systems Development	05	919	962		U
140	0605148A	Tactical Intel Targeting Access Node (TITAN) EMD	05		54,972	58,087	U
141	0605203A	Army System Development & Demonstration	05	177,501	122,175	119,516	U
142	0605205A	Small Unmanned Aerial Vehicle (SUAV) (6.5)	05	5,780	2,275	6,530	U
143	0605224A	Multi-Domain Intelligence	05		9,313	19,911	U
144	0605225A	SIO Capability Development	05		22,713		U
145	0605231A	Precision Strike Missile (PrSM)	05		188,452	259,506	U
146	0605232A	Hypersonics EMD	05		111,473	633,499	U
147	0605233A	Accessions Information Environment (AIE)	05		16,790	13,647	U
148	0605235A	Strategic Mid-Range Capability	05			5,016	U
149	0605236A	Integrated Tactical Communications	05			12,447	U
150	0605450A	Joint Air-to-Ground Missile (JAGM)	05	7,566	2,134	2,366	U

Department of the Army FY 2023 President's Budget Exhibit R-1 FY 2023 President's Budget Total Obligational Authority (Dollars in Thousands)

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Appropriation: 2040A Research, Development, Test & Eval, Army

Line <u>No</u>	Program Element <u>Number</u>	Item	Act	FY 2021 (Base + OCO)	FY 2022 Enactment	FY 2023 Request	S e C
151	0605457A	Army Integrated Air and Missile Defense (AIAMD)	05	213,956	159,873	265,288	U
152	0605531A	Counter - Small Unmanned Aircraft Systems Sys Dev & Demonstration	05		33,386	14,892	U
153	0605625A	Manned Ground Vehicle	05	162,390	202,320	589 , 762	U
154	0605766A	National Capabilities Integration (MIP)	05	7,670	13,454	17,030	U
155	0605812A	Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph	05	1,500	2,564	9,376	U
156	0605830A	Aviation Ground Support Equipment	05	1,413	1,201	2,959	U
157	0303032A	TROJAN - RH12	05	3,451	3,362	3,761	U
158	0303667A	Citizen Broadband Radio System	05	900			U
159	0303767A	AMBIT - Pre-Auctioned SRF	05	9,785			U
160	0304270A	Electronic Warfare Development	05	59,755	75,520	56,938	U
	Syste	em Development & Demonstration		2,979,946	3,254,230	4,031,334	
161	0604256A	Threat Simulator Development	06	41,487	61,422	18,437	U
162	0604258A	Target Systems Development	06	35,279	42,404	19,132	U
163	0604759A	Major T&E Investment	06	119,231	93,617	107,706	U
164	0605103A	Rand Arroyo Center	06	12,989	32,296	35,542	U
165	0605301A	Army Kwajalein Atoll	06	221,949	240,877	309,005	U
166	0605326A	Concepts Experimentation Program	06	46,847	79 , 585	87,122	U
167	0605502A	Small Business Innovative Research	06	369,715			U
168	0605601A	Army Test Ranges and Facilities	06	390,366	367,125	401,643	U
169	0605602A	Army Technical Test Instrumentation and Targets	06	81,829	59 , 253	37,962	U
170	0605604A	Survivability/Lethality Analysis	06	36,001	36,370	36,500	U
171	0605606A	Aircraft Certification	06	2,736	2,489	2,777	U

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Appropriation: 2040A Research, Development, Test & Eval, Army

Line <u>No</u>	Program Element Number	Item	Act	FY 2021 (Base + OCO)	FY 2022 Enactment	FY 2023 Request	S e C
172	0605702A	Meteorological Support to RDT&E Activities	06	6,360	6,521	6,958	U
173	0605706A	Materiel Systems Analysis	06	21,830	21,558	22,037	U
174	0605709A	Exploitation of Foreign Items	06	8,936	13,631	6,186	U
175	0605712A	Support of Operational Testing	06	54,116	55,122	70,718	U
176	0605716A	Army Evaluation Center	06	56,827	65,854	67,058	U
177	0605718A	Army Modeling & Sim X-Cmd Collaboration & Integ	06	2,478	2,633	6,097	U
178	0605801A	Programwide Activities	06	89,023	96,558	89,793	U
179	0605803A	Technical Information Activities	06	25,817	31,987	28,752	U
180	0605805A	Munitions Standardization, Effectiveness and Safety	06	50,648	63,042	48,316	U
181	0605857A	Environmental Quality Technology Mgmt Support	06	1,715	1,789	1,912	U
182	0605898A	Army Direct Report Headquarters - R&D - MHA	06	50,859	48,981	53,271	U
183	0606002A	Ronald Reagan Ballistic Missile Defense Test Site	06	74,089	80,921	90,088	U
184	0606003A	CounterIntel and Human Intel Modernization	06	5,200	5,363	1,424	U
185	0606105A	Medical Program-Wide Activities	06	18,973	39,041		U
186	0606942A	Assessments and Evaluations Cyber Vulnerabilities	06	6,496	5,466	5,816	U
187	0909999A	Financing for Cancelled Account Adjustments	06	253			U
	Manag	ement Support		1,832,049	1,553,905	1,554,252	
188	0603778A	MLRS Product Improvement Program	07	9,785	12,314	18,463	U
189	0605024A	Anti-Tamper Technology Support	07	8,436	8,868	9,284	U
190	0607131A	Weapons and Munitions Product Improvement Programs	07	24,666	35,828	11,674	U
191	0607134A	Long Range Precision Fires (LRPF)	07	100,146			U
192	0607136A	Blackhawk Product Improvement Program	07	8,300	14,773		U

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Appropriation: 2040A Research, Development, Test & Eval, Army

Line <u>No</u>	Program Element <u>Number</u>	Item	Act	FY 2021 (Base + OCO)	FY 2022 Enactment	FY 2023 Request	s e c
193	0607137A	Chinook Product Improvement Program	07	49,409	67 , 872	52,513	U
194	0607139A	Improved Turbine Engine Program	07	232,159	260,024	228,036	U
195	0607142A	Aviation Rocket System Product Improvement and Development	07	11,321	12,417	11,312	U
196	0607143A	Unmanned Aircraft System Universal Products	07	19,460	4,594	512	U
197	0607145A	Apache Future Development	07	52,502	10,067	10,074	U
198	0607148A	AN/TPQ-53 Counterfire Target Acquisition Radar System	07		47,752	62,559	U
199	0607150A	Intel Cyber Development	07	14,652	3,611	13,343	U
200	0607312A	Army Operational Systems Development	07	35,851	28,029	26,131	U
201	0607313A	Electronic Warfare Development	07		5,673	6,432	U
202	0607665A	Family of Biometrics	07	1,276	1,144	1,114	U
203	0607865A	Patriot Product Improvement	07	178,984	125,932	152,312	U
204	0203728A	Joint Automated Deep Operation Coordination System (JADOCS)	07	43,060	25,489	19,329	U
205	0203735A	Combat Vehicle Improvement Programs	07	213,726	280,107	192,310	U
206	0203743A	155mm Self-Propelled Howitzer Improvements	07	217,959	175,076	136,680	U
207	0203744A	Aircraft Modifications/Product Improvement Programs	07	11,261	10,000		U
208	0203752A	Aircraft Engine Component Improvement Program	07	80	132	148	U
209	0203758A	Digitization	07	4,351	3,903	2,100	U
210	0203801A	Missile/Air Defense Product Improvement Program	07	1,241	127	3,109	U
211	0203802A	Other Missile Product Improvement Programs	07	15,268	10,265	9,027	U
212	0205412A	Environmental Quality Technology - Operational System Dev	07	250	262	793	U
213	0205778A	Guided Multiple-Launch Rocket System (GMLRS)	07	72,817	60,733	20,180	U
214	0208053A	Joint Tactical Ground System	07	9,510	13,379	8,813	U

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Department of the Army FY 2023 President's Budget Exhibit R-1 FY 2023 President's Budget Total Obligational Authority (Dollars in Thousands)

Apr 2022

Appropriation: 2040A Research, Development, Test & Eval, Army

Line <u>No</u>	Program Element <u>Number</u>	Item	Act	FY 2021 (Base + OCO)	FY 2022 Enactment	FY 2023 Request	s e c
216	0303028A	Security and Intelligence Activities	07	23,367	24,531		U
217	0303140A	Information Systems Security Program	07	28,270	15,680	17,209	U
218	0303141A	Global Combat Support System	07	70,652	45,297	27,100	U
219	0303142A	SATCOM Ground Environment (SPACE)	07	18,002	15,222	18,321	U
222	0305179A	Integrated Broadcast Service (IBS)	07	382	5,430	9,926	U
223	0305204A	Tactical Unmanned Aerial Vehicles	07	38,151	8,410	4,500	U
224	0305206A	Airborne Reconnaissance Systems	07	28,858	24,460	17,165	U
225	0305208A	Distributed Common Ground/Surface Systems	07	40,771			U
226	0307665A	Biometrics Enabled Intelligence	07		2,066		U
227	0708045A	End Item Industrial Preparedness Activities	07	130,785	103,720	91,270	U
9999	99999999999	Classified Programs		3,983	2,993	6,664	U
	Opera	tional Systems Development		1,719,691	1,466,180	1,188,403	
228	0608041A	Defensive CYBER - Software Prototype Development	08	56,706	108,841	94,888	U
	Softwa	are and Digital Technology Pilot Programs		56,706	108,841	94,888	
Tota	Research,	Development, Test & Eval, Army		14,197,238	14,528,259	13,710,273	

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Army • Budget Estimates FY 2023 • RDT&E Program

Program Element Table of Contents (by Budget Activity then Line Item Number)

Appropriation 2040: Research, Development, Test & Evaluation, Army

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27	03	0603002A	Medical Advanced TechnologyVolume 1	c - 1
28	03	0603007A	Manpower, Personnel and Training Advanced Technology	; - 40
29	03	0603025A	Army Agile Innovation and Demonstration Volume 1c	; - 44
30	03	0603040A	Artificial Intelligence and Machine Learning Advanced Technologies Volume 1c	: - 52
31	03	0603041A	All Domain Convergence Advanced Technology	; - 62
32	03	0603042A	C3I Advanced Technology Volume 1c	; - 75
33	03	0603043A	Air Platform Advanced Technology Volume 1c	; - 89
34	03	0603044A	Soldier Advanced TechnologyVolume 1c -	- 104
35	03	0603115A	Medical Development Volume 1c -	- 109
36	03	0603116A	Lethality Advanced TechnologyVolume 1c -	- 117
37	03	0603117A	Army Advanced Technology DevelopmentVolume 1c -	- 125
38	03	0603118A	Soldier Lethality Advanced TechnologyVolume 1c -	- 126
39	03	0603119A	Ground Advanced Technology Volume 1c -	- 171
40	03	0603134A	Counter Improvised-Threat Simulation Volume 1c -	- 207
41	03	0603386A	Biotechnology for Materials - Advanced ResearchVolume 1c -	- 211
42	03	0603457A	C3I Cyber Advanced Development Volume 1c -	- 215

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Program Element Title Line # Budget Activity Program Element Number Page High Performance Computing Modernization Program...... Volume 1c - 228 43 03 0603461A Next Generation Combat Vehicle Advanced Technology......Volume 1c - 237 03 0603462A 44 03 0603463A 45 03 0603464A Long Range Precision Fires Advanced Technology......Volume 1c - 380 46 Future Vertical Lift Advanced Technology......Volume 1c - 400 47 03 0603465A 48 03 0603466A Air and Missile Defense Advanced Technology......Volume 1c - 455 49 03 0603920A

Appropriation 2040: Research, Development, Test & Evaluation, Army

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Program Element Table of Contents (Alphabetically by Program Element Title)

Program Element Title	Program Element Number	Line #	BA Page
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Air and Missile Defense Advanced Technology	0603466A	48	03 Volume 1c - 455
All Domain Convergence Advanced Technology	0603041A	31	03 Volume 1c - 62
Army Advanced Technology Development	0603117A	37	03 Volume 1c - 125
Army Agile Innovation and Demonstration	0603025A	29	03 Volume 1c - 44
Artificial Intelligence and Machine Learning Advanced Technologies	0603040A	30	03 Volume 1c - 52
Biotechnology for Materials - Advanced Research	0603386A	41	03 Volume 1c - 211
C3I Advanced Technology	0603042A	32	03 Volume 1c - 75
C3I Cyber Advanced Development	0603457A	42	03 Volume 1c - 215
Counter Improvised-Threat Simulation	0603134A	40	03 Volume 1c - 207
Future Vertical Lift Advanced Technology	0603465A	47	03 Volume 1c - 400
Ground Advanced Technology	0603119A	39	03 Volume 1c - 171
High Performance Computing Modernization Program	0603461A	43	03 Volume 1c - 228
Humanitarian Demining	0603920A	49	03 Volume 1c - 477
Lethality Advanced Technology	0603116A	36	03 Volume 1c - 117
Long Range Precision Fires Advanced Technology	0603464A	46	03 Volume 1c - 380
Manpower, Personnel and Training Advanced Technology	0603007A	28	03 Volume 1c - 40

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Program Element Title	Program Element Number	Line #	BA Page
Medical Advanced Technology	0603002A	27	03 Volume 1c - 1
Medical Development	0603115A	35	03 Volume 1c - 109
Network C3I Advanced Technology	0603463A	45	03 Volume 1c - 299
Next Generation Combat Vehicle Advanced Technology	0603462A	44	03 Volume 1c - 237
Soldier Advanced Technology	0603044A	34	03 Volume 1c - 104
Soldier Lethality Advanced Technology	0603118A	38	03 Volume 1c - 126

Exhibit R-2, RDT&E Budget Iten	n Justificat	tion: PB 202	23 Army							Date: Apri	2022	
Appropriation/Budget Activity 2040: Research, Development, Te Technology Development (ATD)	est & Evalua	ation, Army	I BA 3: Adva	anced	R-1 Program Element (Number/Name) PE 0603002A / Medical Advanced Technology							
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	95.146	137.804	5.207	-	5.207	4.129	3.088	2.029	2.028	0.000	249.431
814: NEUROFIBROMATOSIS (CA)	-	20.000	-	-	-	-	-	-	-	-	0.000	20.000
945: BREAST CANCER STAMP PROCEEDS	-	0.477	-	-	-	-	-	-	-	-	0.000	0.477
97T: NEUROTOXIN EXPOSURE TREATMENT (CA)	-	16.000	-	-	-	-	-	-	-	-	0.000	16.000
CJ3: Prophylactic for Endemic Diarrheal Diseases	-	-	4.009	-	-	-	-	-	-	-	0.000	4.009
MM2: <i>MEDICAL ADVANCE</i> TECHNOLOGY INITIATIVES (CA)	-	21.000	94.000	-	-	-	-	-	-	-	0.000	115.000
MM7: Enabling Med Cap to Support Dispersed OPS Adv Tech	-	2.913	3.232	0.749	-	0.749	0.852	1.030	1.030	1.030	0.000	10.836
MN3: Immediate Cardiopulmonary Stabilization Adv Tech	-	2.071	1.727	-	-	-	-	-	-	-	0.000	3.798
MN4: Advanced Life Support Advanced Technology	-	3.615	3.927	-	-	-	-	-	-	-	0.000	7.542
MN5: Next Generation Blood Products Advanced Technology	-	6.610	9.394	-	-	-	-	-	-	-	0.000	16.004
MN6: Blast & Head Impact Exposure Monitor Advanced Tech	-	1.878	1.546	1.168	-	1.168	-	-	-	-	0.000	4.592
MN7: Musculoskeletal Injury Screening Tool Adv Tech	-	3.274	1.664	1.276	-	1.276	0.759	0.822	0.481	0.481	0.000	8.757
MN9: Far Forward Behavioral Health Care Advanced Tech	-	1.080	0.283	-	-	-	-	-	-	-	0.000	1.363

Exhibit R-2, RDT&E Budget Iten	xhibit R-2, RDT&E Budget Item Justification: PB 2023 Army									Date: April	2022	
Appropriation/Budget Activity 2040: Research, Development, Te Technology Development (ATD)	est & Evalua	ation, Army	/ BA 3: <i>Adv</i>	anced	R-1 Progr PE 060300	am Elemen)2A <i>I Medic</i>	t (Number / al Advance	' Name) d Technolog	<i>ay</i>	<u>`</u>		
MO2: Traumatic Brain Injury (TBI) Treatment Adv Tech	-	4.649	10.667	-	-	-	-	-	-	-	0.000	15.316
MO4: Burn Recovery Optimization Advanced Technology	-	3.326	2.059	-	-	-	-	-	-	-	0.000	5.385
MO7: Improved Bone Repair Advanced Technology	-	1.564	1.069	-	-	-	-	-	-	-	0.000	2.633
MO8: Expeditionary Performance Nutrition Advanced Techn	-	2.062	1.936	0.175	-	0.175	0.728	0.163	0.163	0.163	0.000	5.390
MO9: Vaccines to Prevent Dengue Fever Advanced Tech	-	2.037	-	-	-	-	-	-	-	-	0.000	2.037
MP3: Phys Chem Toxicity Assessment Sys Adv Tech	-	2.590	2.291	1.839	-	1.839	1.790	1.073	0.355	0.354	0.000	10.292

A. Mission Description and Budget Item Justification

This Program Element (PE) matures and demonstrates advanced medical technologies including drugs, vaccines, medical diagnostic devices, measures for identification and vector control, and developing medical practices and procedures to effectively protect and improve the survivability of United States Forces across the entire spectrum of military operations. Tri-Service coordination and cooperative efforts are focused in four principal medical areas: Combat Casualty Care, Military Operational Medicine, Militarily Relevant Infectious Diseases, and Clinical and Rehabilitative Medicine. Starting in Fiscal Year 2020 (FY20), the principal area of Clinical and Rehabilitative Medicine is replaced with the area of Medical Assist Support Technologies.

Promising medical technologies are refined and validated through extensive testing, which is conducted in compliance with Food and Drug Administration (FDA) regulations for human medical products, and environmental protection agency (EPA) regulations for insect-control products that impact humans or the environment (e.g., repellents and insecticides). The FDA requires medical products to undergo extensive preclinical testing in animals and/or other models to obtain preliminary effectiveness and safety information before they can be tested in human clinical trials. Clinical trials are conducted stepwise: first to prove the product is safe in humans, second to demonstrate the desired effectiveness and optimal dosage (amount to be administered) in a small group human study, and third to demonstrate effectiveness in large, diverse human populations. Each successive phase includes larger numbers of human subjects and requires FDA cognizance prior to proceeding. Work conducted in this PE primarily focuses on late stages of technology maturation activities required to conduct safety and effectiveness clinical trials. Some high-risk technologies may require additional maturation with FDA guidance prior to initiating these clinical trials. Such things as proof of product stability and purity are necessary to meet FDA standards before entering later stages of testing and prior to transitioning into a formal acquisition program where large pivotal trials in diverse populations will be conducted for licensure. Activities in this PE may include completion of preclinical animal studies and small safety and effectiveness studies involving humans according to FDA and EPA requirements. Promising medical technologies that are not regulated by the FDA or EPA are modeled, prototyped, and tested in relevant environments.

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	
2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced	PE 0603002A I Medical Advanced Technology	
Technology Development (ATD)		

Blast research and research into maturing field rations in this PE are fully coordinated with the United States Army Combat Capabilities Development Command Soldier Center. This coordination enables improved body armor design and rations for Soldiers. Additionally, the activities funded in this PE are externally peer reviewed and fully coordinated with all Services as well as other agencies through the Joint Technology Coordinating Groups of the Armed Services Biomedical Research Evaluation and Management (ASBREM) Community of Interest (COI). The ASBREM COI, formed under the authority of the Assistant Secretary of Defense for Research and Engineering, serves to facilitate coordination and prevent unnecessary duplication of effort within the Department of Defense's biomedical research and development community, as well as its associated enabling research areas.

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) Science and Technology (S&T) focus areas and the Army Modernization Strategy.

Work in this PE is performed by: the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

ogram Change Summary (\$ in Millions)	<u>FY 2021</u>	FY 2022	FY 2023 Base	FY 2023 OCO	<u>FY 2023</u>	Total
Previous President's Budget	94.669	43.804	0.000	-		0.000
Current President's Budget	95.146	137.804	5.207	-		5.207
Total Adjustments	0.477	94.000	5.207	-		5.207
 Congressional General Reductions 	-	-				
 Congressional Directed Reductions 	-	-				
 Congressional Rescissions 	-	-				
 Congressional Adds 	-	94.000				
 Congressional Directed Transfers 	-	-				
Reprogrammings	0.477	-				
SBIR/STTR Transfer	-	-				
 Adjustments to Budget Years 	-	-	5.207	-		5.207
Congressional Add Details (\$ in Millions, and Inclu	udes General Redu	ctions)		Γ	FY 2021	FY 2022
Project: 814: NEUROFIBROMATOSIS (CA)				_	L. L. L.	
Congressional Add: Peer-reviewed Neurofibroma	tosis Research				20.000	-
			Congressional Add Subto	tals for Project: 814	20.000	-
Project: 97T: NEUROTOXIN EXPOSURE TREATME	ENT (CA)			-		
Congressional Add: Peer-reviewed Neurotoxin Ex	posure Treatment F	Parkinson's Res	search		16.000	-
			Congressional Add Subto	tals for Project: 97T	16.000	-

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army		Date: April 2022	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)	R-1 Program Element (Number/Name) PE 0603002A <i>I Medical Advanced Technology</i>		
Congressional Add Details (\$ in Millions, and Includes General Re	ductions)	FY 2021	FY 2022
Project: MM2: MEDICAL ADVANCE TECHNOLOGY INITIATIVES (CA))		
Congressional Add: Program Increase: Burn Care Training Curricul	lum	5.000	5.000
Congressional Add: Program Increase - Peer-Reviewed Military Bu	rn Research	10.000	10.000
Congressional Add: Program Increase: Advanced Hemostat Produced	cts	6.000	-
Congressional Add: Aerial Reconfigurable Embedded System		-	5.000
Congressional Add: Dengue Vaccine Development		-	6.000
Congressional Add: Hearing Protection for Communications		-	5.000
Congressional Add: Heat Stress on Female Service Members		-	2.000
Congressional Add: Optimizing Military Health and Performance		-	7.000
Congressional Add: Peer-Reviewed Neurofibromatosis Research		-	20.000
Congressional Add: Peer-Reviewed Parkinson's Research		-	16.000
Congressional Add: Rapid Vaccine Development		-	10.000
Congressional Add: Suicide Prevention with Focus on Rural, Remo	te, Isolated, and OCONUS Installations	-	3.000
Congressional Add: Trauma Immunology Research		-	5.000
	Congressional Add Subtotals for Project: M	M2 21.000	94.000
	Congressional Add Totals for all Proje	cts 57.000	94.000

Change Summary Explanation

Fiscal Year 2023 (FY23) funding increase reflects the fact that the FY22 President's Budget request did not include out-year funding.

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	vrmy							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progr PE 060300 <i>ogy</i>	am Elemen)2A <i>I Medic</i>	it (Number / al Advance	Name) d Technol	Project (N 814 / NEU	lumber/Name) IROFIBROMATOSIS (CA)		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
814: NEUROFIBROMATOSIS (CA)	-	20.000	-	-	-	-	-	-	-	-	0.000	20.00
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Congressional Interest Item fund The cited work is consistent with <u>B. Accomplishments/Planned F</u> Congressional Add: Peer-review	ing for Neu the Under : Programs (: wed Neurof	rofibromatos Secretary of in Millions bromatosis	bis research Defense fo <u>b)</u> Research	n. or Research	n and Engine	eering priori	ty focus are	as and the FY 2021	Army Mode	ernization S	trategy.	
FY 2021 Accomplishments: Pro Work executed by Army Futures	ogram Incre Command.	ase support	ed advance	ed research	ı on Neurofil	promatosis.						
					Congress	ional Adds	Subtotals	20.000	-	_		
<u>C. Other Program Funding Sum</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A	<u>nmary (\$ in</u>	<u>Millions)</u>										

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: Ap	oril 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progr PE 060300 <i>ogy</i>	am Elemen 02A <i>I Medic</i>	n t (Number al Advance	/ Name) d Technol	Project 945 / BF PROCE	(Number/N EAST CAN EDS	ame) ICER STAMF	D
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 202	6 FY 202	Cost To 7 Complete	Total Cost
945: BREAST CANCER STAMP PROCEEDS	-	0.477	-	-	-	-	-	-		-	- 0.000	0 0.477
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-		-	-	
A. Mission Description and Bud This Project receives funds as pro B. Accomplishments/Planned P	get Item J oceeds from rograms (1	ustification m the sale o \$ in Million	<u>i</u> f Breast Ca s)	ncer Stamp	DS.					FY 2021	FY 2022	FY 2023
Title: Breast Cancer Stamp Proce	eds	•								0.477	-	-
Description: This Project receive	s funds as	proceeds fr	om the sale	e of Breast (Cancer Star	nps.						
					Accomplis	shments/Pl	anned Pro	grams Sub	ototals	0.477	-	-
<u>C. Other Program Funding Sum</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A	mary (\$ in	<u>Millions)</u>										

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: Apri	I 2022		
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)ProjePE 0603002A / Medical Advanced Technol97T /ogyTREA				Project (N 97T / NEU TREATME	c t (Number/Name) NEUROTOXIN EXPOSURE ATMENT (CA)			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
97T: NEUROTOXIN EXPOSURE TREATMENT (CA)	-	16.000	-	-	-	-	-	-	-	-	0.000	16.000	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
Congressional Interest Item fundi The cited work is consistent with B. Accomplishments/Planned P	ing for Neur the Under S rograms (S	Totoxin Expo Secretary of in Millions	bsure Treatr Defense fo <u>s)</u>	ment. or Research	and Engine	eering priori	ty focus are	as and the FY 2021	Army Mode	ernization S	trategy.		
FY 2021 Accomplishments: Pro Treatment Parkinson's Research.	gram Increa	ase support	ed advance	nt Parkinsc ed research	on Neuroto	n xin Exposu	re	16.000	-				
					Congress	ional Adds	Subtotals	16.000	-	-			
<u>C. Other Program Funding Sum</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A	mary (\$ in	<u>Millions)</u>						<u>.</u>		-			

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	vrmy							Date: April	2022	
Appropriation/Budget Activity R-1 Program Element (Number/Name) Program Element (Number/Name) </th <th>Project (N CJ3 / Prop Diseases</th> <th colspan="4">oject (Number/Name) 13 <i>I Prophylactic for Endemic Diarrheal</i> seases</th>							Project (N CJ3 / Prop Diseases	oject (Number/Name) 13 <i>I Prophylactic for Endemic Diarrheal</i> seases				
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CJ3: Prophylactic for Endemic Diarrheal Diseases	-	-	4.009	-	-	-	-	-	-	-	0.000	4.009
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23), funding and mission in this project are realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0603115DHA, Project Code 373H.

A. Mission Description and Budget Item Justification

Demonstrate bacterial diarrheal prophylactic candidate safety, effectiveness, and pharmacokinetics through clinical trials in humans. Transition the prophylactic candidate to product developer in support of future FDA licensure.

Research is conducted in compliance with the United States Food and Drug Administration (FDA) regulations for medical products for human use.

Research is managed by the United States Army Medical Research and Development Command (USAMRDC) in coordination with the Naval Medical Research Center (NMRC). The Army is responsible for programming and funding all Department of Defense (DoD) naturally occurring infectious disease research requirements, thereby precluding duplication of effort within the Military Departments.

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the USAMRDC, Fort Detrick, MD.

Efforts in this Project support the Soldier portfolio and the principal area of Military Relevant Infectious Diseases.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Prophylactic for Endemic Diarrheal Diseases	-	3.863	-
Description: Demonstrate bacterial diarrheal prophylactic candidate safety, effectiveness, and pharmacokinetics through clinical trials in humans in support of future FDA licensure.			
FY 2022 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A <i>I Medical Advanced Technol</i> <i>ogy</i>	Project CJ3 / P Diseas	Project (Number/Name) CJ3 I Prophylactic for Endemic Diarrhea Diseases					
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023			
Will mature oral prophylactic candidates for the prevention of bacterial diar (COTS) products for prevention of bacterial diarrheal diseases; provide dat in humans for safety and effectiveness; demonstrate the candidates in hum bacterial diarrheal diseases.	rheal diseases; validate commercial off the shelf ta packages for the FDA to test suitable candidates nan clinical trials for safety and effectiveness agair	s nst						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding and mission realigned as part of US Army Medical Research and Agency in order to meet Congressional intent as outlined in NDAA 2019 (Stransferred to Program Element 0603115DHA, Project Code 373H.	Development Command transfer to the Defense H Section 711) and NDAA 2020 (Section 737). Fundi	lealth ng						
<i>Title:</i> SBIR/STTR Tax			-	0.146	-			
FY 2022 Plans: SBIR/STTR tax.								
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638.								
	Accomplishments/Planned Programs Sub	totals	-	4.009	-			
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>								
D. Acquisition Strategy N/A								

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: Apri	l 2022	
Appropriation/Budget Activity 2040 / 3 Prior FY 2					R-1 Program Element (Number/Name) PE 0603002A / Medical Advanced TechnolProject (N MM2 / MED TECHNOL					l umber/Name) DICAL ADVANCE LOGY INITIATIVES (CA)		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
MM2: MEDICAL ADVANCE TECHNOLOGY INITIATIVES (CA)	-	21.000	94.000	-	-	-	-	-	-	-	0.000	115.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

<u>Note</u>

Congressional increase for Peer-reviewed military burn research.

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Medical Advanced Technology Initiatives.

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 2021	FY 2022		
Congressional Add: Program Increase: Burn Care Training Curriculum	5.000	5.000		
FY 2021 Accomplishments: Program Increase supported advanced research on Burn Care Training Curriculum.				
Work executed by Army Futures Command.				
FY 2022 Plans: Congressional Interest Item funding provided for Burn Care Training Curriculum				
Congressional Add: Program Increase - Peer-Reviewed Military Burn Research	10.000	10.000		
FY 2021 Accomplishments: Program Increase supported advanced research on Peer-reviewed Military Burn Research.				
Work executed by Army Futures Command.				
FY 2022 Plans: Congressional Interest Item funding provided for Peer-Reviewed Military Burn Research				
Congressional Add: Program Increase: Advanced Hemostat Products	6.000	-		
FY 2021 Accomplishments: Program Increase supported advanced research on Advanced Hemostat Products.				
Exhibit R-2A, RDT&E Project Justification: PB 2023 Army				Date: April 2022
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Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/ PE 0603002A / Medical Advanced ogy	Name) I Technol	Project (N MM2 / MEL TECHNOL	umber/Name) DICAL ADVANCE OGY INITIATIVES (CA)
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	
Work executed by Army Futures Command.				
Congressional Add: Aerial Reconfigurable Embedded System		-	5.000	
FY 2022 Plans: Congressional Interest Item funding provided for Aerial Recor	figurable Embedded System			
Congressional Add: Dengue Vaccine Development		-	6.000	
FY 2022 Plans: Congressional Interest Item funding provided for Dengue Vac	cine Development			
Congressional Add: Hearing Protection for Communications		-	5.000	
FY 2022 Plans: Congressional Interest Item funding provided for Hearing Prot	ection for Communications			
Congressional Add: Heat Stress on Female Service Members	-	2.000		
FY 2022 Plans: Congressional Interest Item funding provided for Heat Stress	on Female Service Members			
Congressional Add: Optimizing Military Health and Performance		-	7.000	
FY 2022 Plans: Congressional Interest Item funding provided for Optimizing M	lilitary Health and Performance			
Congressional Add: Peer-Reviewed Neurofibromatosis Research		-	20.000	
FY 2022 Plans: Congressional Interest Item funding provided for Peer-Review	ed Neurofibromatosis Research			
Congressional Add: Peer-Reviewed Parkinson's Research		-	16.000	
FY 2022 Plans: Congressional Interest Item funding provided for Peer-Review	ed Parkinson's Research			
Congressional Add: Rapid Vaccine Development		-	10.000	
FY 2022 Plans: Congressional Interest Item funding provided for Rapid Vaccir	ne Development			
Congressional Add: Suicide Prevention with Focus on Rural, Remote, Isolate	ed, and OCONUS Installations	-	3.000	
FY 2022 Plans: Congressional Interest Item funding provided for Suicide Prev Remote, Isolated, and OCONUS Installations	ention with Focus on Rural,			
Congressional Add: Trauma Immunology Research		-	5.000	
FY 2022 Plans: Congressional Interest Item funding provided for Trauma Imm	unology Research			
	Congressional Adds Subtotals	21.000	94.000	

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A / Medical Advanced Technol ogy	Project (Number/Name) MM2 I MEDICAL ADVANCE TECHNOLOGY INITIATIVES (CA)
C. Other Program Funding Summary (\$ in Millions) N/A		
Remarks		
<u>D. Acquisition Strategy</u> N/A		

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	vrmy							Date: Apr	il 2022		
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)ProPE 0603002A / Medical Advanced TechnolMNogyDis					roject (Number/Name) IM7 I Enabling Med Cap to Support ispersed OPS Adv Tech			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
MM7: Enabling Med Cap to Support Dispersed OPS Adv Tech	-	2.913	3.232	0.749	-	0.749	0.852	1.030	1.030	1.030	0.000	10.836	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
future multi-purpose Vertical Tak various future multi- purpose VT User Device (EUD), such as the environment by assessing patier	e-Off and La OL UAS. Ma NETT Warr at conditions	anding (VTC atures and d ior system, to provide a	DL) unmanr lemonstrate to assist me adaptive ca	ned aircraft es an intellig edics with p re guideline	systems (U gent decisio atient asses es.	AS). Provide n-support ca ssment, triag	es a self-co apability tha ge, treatme	ntained me at can be op nt, and disp	dical modu erated on a osition in a	e capability an Army or Prolonged	adaptable Navy provid Field Care	to led End (PFC)	
<i>Title:</i> Medical Robotic and Auton	omous Syst	ems	21							2.913		-	
Description: This Task now inco a tele-monitored and remote-con using future multi-purpose VTOL purpose VTOL UAS. Research, o or Navy provided End User Devic treatment, and disposition in a Pf	prporates the trolled Com UAS. Providesign, and ce (EUD), su FC environm	e previous C bat Evacuat des a self-co prototype ar uch as the N nent by asse	Combat Eva ion Mission ontained me n intelligent IETT Warric essing patie	cuation Mis Module to edical modu decision-su or system, t nt conditior	ssion Module support me ule capabilit upport capa o assist me ns to provide	e Task. Res dical resupp y adaptable bility that ca dics with pa e adaptive c	earch, desi oly and casu to various in be opera tient asses are guidelir	gn and dev ualty evacua future multi- ted on an A sment, triag nes.	elop ation rmy e,				
Title: Develop Prototype Medical	Robotic an	d Autonomo	ous System	(Med-RAS))					-	3.120	0.749	
Description: Matures and demonstrates a tele-monitored and remote-controlled Combat Evacuation Mission Module to support medical resupply and casualty evacuation using future multi-purpose VTOL UAS. Provides a self-contained medical module capability adaptable to various future multi- purpose VTOL UAS. Matures and demonstrates an intelligent decision-support capability that can be operated on an Army or Navy provided EUD, such as the NETT Warrior system, to assist medics with patient assessment, triage, treatment, and disposition in a PFC environment by assessing patient conditions to provide adaptive care guidelines.									bort				
FY 2022 Plans: Will mature a self-contained Sem components to move from humar	ii-Autonomo n to semi-au	us Casualty itonomous,	Managem and fully au	ent Module tomate inte	(SACM2) for b	or integration oth tele-ope	n of medica erated and c	l capability closed-loop					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date:	Date: April 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A <i>I Medical Advanced Technol</i> <i>ogy</i>	Project (Numbe MM7 / Enabling / Dispersed OPS /	r/ Name) //ed Cap to Sup \dv Tech	oport	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023	
controlled remote patient monitoring and management systems and in-flight int and cyber security solutions for remote patient monitoring, remote supervision a management systems, and Virtual Health support for attending medics; demon System (STEPS) to implement the flight control constraints necessary to ensur- materiel during flight onboard unmanned or ?optionally-piloted? vehicles; optim includes an innovative patient handling system and a common vehicle interface means to rapidly reconfigure future vehicle platforms for MEDEVAC or CASEV, video and audio data collection for integrating Computer Vision and Natural Lan documentation of patient encounter and medic interventions.	erventions; provide communication infrastructure and control of semi-autonomous patient strate a Safe Transport and Evacuation Protoco e patient safety and protect sensitive medical nize a Multi-Mission Vehicle Interface which e (physical, electrical, and data links), providing AC missions; mature a hardware system to en inguage Processing technologies to automate	ire col g a able			
FY 2023 Plans: Mature the combat evacuation mission module (CEMM) and conceptual design Vehicle Interface (MMVI); demonstration the MMVI prototype with the Future V vehicle or an ?optionally-manned? aircraft and /or Squad Multi-purpose Equipm	ns and physical prototypes of the Multi-Mission ertical Lift prototype or technology demonstrat nent Transport unmanned ground vehicle.	or			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding decreased due to realignment of US Army Medical Research and Dev Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section transferred to Program Element 0602115DHA, Project Code 372G.	elopment Command transfer to the Defense H on 711) and NDAA 2020 (Section 737). Fundir	ealth Ig			
<i>Title:</i> SBIR/STTR Tax		-	0.112	-	
FY 2022 Plans: SBIR/STTR tax.					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638.					
	Accomplishments/Planned Programs Sub	totals 2.91	3 3.232	0.749	
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A					

xhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: April	2022	
Appropriation/Budget Activity 2040 / 3	Budget Activity R-1 Program Element (Number/Name) Project (Num PE 0603002A / Medical Advanced Technol ogy MN3 / Immedical Advanced Technol Stabilization /					umber/Nan ediate Carc n Adv Tech	n e) diopulmonar	у				
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
MN3: Immediate Cardiopulmonary Stabilization Adv Tech	-	2.071	1.727	-	-	-	-	-	-	-	0.000	3.798
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23), this Project is Eliminated.

A. Mission Description and Budget Item Justification

This Project covers development, pre-clinical and early-clinical demonstration, and transition of technologies for immediate pre-hospital hemorrhage detection and control and airway management. These technologies facilitate autonomous intubation and airway management in combat casualties with obstructed airways. This Project also demonstrates advanced technologies for use in forward areas to detect and control non-compressible internal bleeding, and demonstration of pain-relieving drugs that are safe for use during bleeding.

Promising efforts identified through Applied Research conducted under Program Element (PE) 0602787A (Medical Technology) / Project MM4 (Cbt Casualty Care Applied Rsch Technology) are further matured under this Project. Promising results identified under this Project are further matured under PE 0603807A (Medical Systems Advanced Development) / Project 836 (Field Medical Systems Advanced Development).

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Immediate Cardiopulmonary Stabilization Advanced Technology	2.071	-	-
Description: Development, preclinical and early-clinical demonstration, and transition of technologies that facilitate autonomous intubation and airway management in combat casualties with obstructed airways, as well as advanced hemostatic bandage candidates that augment the patient's blood clotting system and new tourniquet technologies suitable for prolonged use.			
Title: Tactical Combat Casualty Care Pharmaceuticals and Devices Cap Set 1	-	1.702	-
Description: Development, late-phase animal studies and early-clinical demonstration, and transition of technologies that facilitate autonomous intubation and airway management in combat casualties with obstructed airways, as well as advanced			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A / Medical Advanced Technol ogy	Proje MN3 / Stabili	ject (Number/Name) 3 I Immediate Cardiopulmonary bilization Adv Tech				
B. Accomplishments/Planned Programs (\$ in Millions)		[FY 2021	FY 2022	FY 2023		
hemostatic (arrest of bleeding) bandage candidates that correct the patient's b technologies suitable for prolonged use.	lood clotting system and new tourniquet						
<i>FY 2022 Plans:</i> Demonstrate most promising bleeding control intervention candidates for limb a of the torso to the extremities, i.e., the base of the neck, shoulder, axilla, perine mechanical testing, and provide best practices for bleeding control; engineer b injury models for demonstration of airway management technologies and device	and junctional bleeding (bleeding from a juncti eum, buttocks, gluteal area and the groin) thro attlefield-relevant manikin and employ large a ces.	on ugh nimal					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding and mission realigned as part of US Army Medical Research and Dev Agency in order to meet Congressional intent as outlined in NDAA 2019 (Secti transferred to Program Element 0603115DHA, Project Code 373H.	lealth ing						
Title: SBIR/STTR Tax		-	0.025	-			
FY 2022 Plans: SBIR/STTR tax.							
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638.							
	Accomplishments/Planned Programs Sub	ototals	2.071	1.727	-		
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A							

Exhibit R-2A, RDT&E Project Ju	ibit R-2A, RDT&E Project Justification: PB 2023 Army									Date: April 2022		
Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060300 <i>ogy</i>	am Elemen 02A / <i>Medica</i>	ent (Number/Name)Project (Number/Name)dical Advanced TechnolMN4 I Advanced Life Support AdvanceTechnologyTechnology				ranced	
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
MN4: Advanced Life Support Advanced Technology	-	3.615	3.927	-	-	-	-	-	-	-	0.000	7.542
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23), this Project is Eliminated.

A. Mission Description and Budget Item Justification

This Project covers development, demonstration, and transition of technologies that enable advanced life support under prolonged care scenarios, including life-support devices that provide lung and kidney functions in casualties with severe injuries and devices and clinical guidelines for the prevention of irreversible organ damage resulting from prolonged lack of blood circulation.

All research is conducted in compliance with Food and Drug Administration (FDA) requirements for licensure of medical products for human use.

Promising efforts identified through Applied Research conducted under Program Element (PE) 0602787A (Medical Technology) / Project MM4 (Cbt Casualty Care Applied Rsch Technology) are further matured under this Project. Promising results identified under this Project are further matured under PE 0603807A (Medical Systems Advanced Development) / Project 836 (Field Medical Systems Advanced Development).

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Battlefield Sustainment of Critical Organ Function Capability Set 1	3.615	3.797	-
 Description: Develop, demonstrate and transition technologies that enable advanced life support under prolonged field care scenarios: life-support devices that provide lung and kidney functions in casualties with severe injuries, and devices and clinical guidelines for the prevention of irreversible organ damage resulting from prolonged lack of blood circulation. FY 2022 Plans: Will perform preclinical validation studies of down selected Nitric oxide-release/Non-adhesive coating in extracorporeal life support (ECLS) circuit vs. immobilized heparin standard of care in advanced injury models; mature and demonstrate a single device and pump driven modular platform for lung and renal support that will carry out ECLS without systemic anticoagulation; 			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A / Medical Advanced Technol ogy	Project (Number/Name) MN4 / Advanced Life Support Advanced Technology				
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023	
demonstrate portable ECLS platform designed to improve blood oxygenation care community about the safety, feasibility and efficacy of this system in reduuse of mechanical ventilation in the critically ill.	through first in human study to inform the US c icing mechanical ventilator settings, and avoidi	ritical ng				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding and mission realigned as part of US Army Medical Research and Dev Agency in order to meet Congressional intent as outlined in NDAA 2019 (Sect transferred to Program Element 0603115DHA, Project Code 373H.	velopment Command transfer to the Defense H ion 711) and NDAA 2020 (Section 737). Fund	lealth ing				
Title: SBIR/STTR Tax			-	0.130	-	
FY 2022 Plans: SBIR/STTR tax.						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638.						
	Accomplishments/Planned Programs Sub	totals	3.615	3.927	-	
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A						

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: April	2022	
Appropriation/Budget Activity 2040 / 3		R-1 Program Element (Number/Name) Project (Number/Name) PE 0603002A / Medical Advanced Technol MN5 / Next Generation Bit ogy Advanced Technology					ne) n Blood Prod ,	ducts				
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
MN5: Next Generation Blood Products Advanced Technology	-	6.610	9.394	-	-	-	-	-	-	-	0.000	16.004
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

<u>Note</u>

In Fiscal Year 2023 (FY23), this Project is Eliminated.

A. Mission Description and Budget Item Justification

This Project covers technology development, pre-clinical and early-clinical demonstration, and transition of new blood products with increased shelf life and functionality. Cold-stored platelets, fibrinogen replacement technologies, and pharmaceuticals that protect and metabolically stabilize blood-deprived tissues and reverse impaired blood clotting subsequent to severe injury, will improve prompt hemorrhage control, mitigate effects of shock, and minimize sustainment requirements.

All research is conducted in compliance with Food and Drug Administration (FDA) requirements for licensure of medical products for human use.

Promising efforts identified through Applied Research conducted under Program Element (PE) 0602787A (Medical Technology) / Project MM4 (Cbt Casualty Care Applied Rsch Technology) are further matured under this Project. Promising results identified under this Project are further matured under PE 0603807A (Medical Systems Advanced Development) / Project 836 (Field Medical Systems Advanced Development).

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Next Generation Human-Derived Blood Replacement	6.610	9.275	-
Description: Develop, demonstrate in pre-clinical and early-clinical studies, and transition new blood products with increased shelf life and functionality including cold-stored platelets and biopharmaceutical technologies that stop life threatening bleeding, stabilize tissue metabolism, mitigate shock and restore normal blood clotting will improve prompt hemorrhage control and minimize sustainment requirements.			
FY 2022 Plans: Will perform preclinical studies and early clinical evaluations aimed at extending availability of whole blood, platelets, and plasma to all areas of the battlefield; comparatively demonstrate ability of promising cold-stored platelet additives to extend shelf life and			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022					
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A / Medical Advanced Technol ogy	Project (MN5 / Ne Advanced	Project (Number/Name) MN5 / Next Generation Blood Production Advanced Technology						
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2021	FY 2022	FY 2023				
maintain normal platelet function; validate engineered plasma in a small anima traumatic coagulopathy (a condition in which the blood's ability to form clots is validate currently available portable blood storage and transport containers une on blood function.	Il polytrauma model for ability to reverse acute impaired), prolong survival, and improve outco der a variety of environmental conditions for in	omes; npact							
FY 2022 to FY 2023 Increase/Decrease Statement: Funding and mission realigned as part of US Army Medical Research and Dev Agency in order to meet Congressional intent as outlined in NDAA 2019 (Secti transferred to Program Element 0603115DHA, Project Code 373H.	relopment Command transfer to the Defense H on 711) and NDAA 2020 (Section 737). Fund	lealth ing							
Title: SBIR/STTR Tax			-	0.119	-				
<i>FY 2022 Plans:</i> SBIR/STTR tax.									
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638.									
	Accomplishments/Planned Programs Sub	ototals	6.610	9.394	-				
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A									

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: Apri	il 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progr a PE 060300 <i>ogy</i>	am Elemen)2A / Medica	t (Number / al Advance	Name) d Technol	Project (N MN6 / Blas Monitor Ac	umber/Nai st & Head Ii lvanced Te	me) mpact Expo ch	sure
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
MN6: Blast & Head Impact Exposure Monitor Advanced Tech	-	1.878	1.546	1.168	-	1.168	-	-	-	-	0.000	4.592
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
blast and head impact. This capa The cited research is fully coordin Advanced Technology) and is ful The cited work is consistent with Strategy. Research in this Project is perfor	bility will he nated with F ly coordina the Under S med by the	Program Ele ted with othe Secretary of United State	degradation ment (PE) 0 er Services i Defense (R es Army Me	to Soldier of 602143A (n order to a esearch ar dical Rese	Soldier Leth avoid duplic nd Engineer arch and De	adiness and nality Techn ation of effo ring) science evelopment	l performan ology) and ort. e and techn Command	ce and enh compliment ology focus (USAMRD0	ance comba tary to PE 0 areas and C), Fort Detr	at power. 603118A (\$ the Army M rick, MD.	Soldier Leth	ality n
B. Accomplishments/Planned P	<u>rograms (</u>	\$ in Millions	<u>s)</u>						FY	2021 I	FY 2022	FY 2023
Title: Injury Criteria for Informing	the Develo	pment of Ne	w Tactical H	lead borne	Systems.					1.878	1.490	1.168
Description: This effort validates personal protection equipment, ve and emerging operational threats FY 2022 Plans: Finalize the validation and deliver cognitive status after a potential in supported mass criteria in dismou	injury risk ehicles) and (i.e., blast, Go/No Go njurious hea unted Soldie	assessment d strategies (blunt, ballis Readiness ad impact ar er environme	/guidance/ci (i.e., health l tic, and acce predictive al nd blast expo ents.	riteria that v nazard ass elerative). gorithm that osure has o	will inform the essments) f at will alert a occurred. Fi	he developn to protect th and inform u inalize the v	nent of tech e Soldier ag init leader/S alidation ar	nologies (i. gainst curre Soldier of id deliver he	e., ent ead			
FY 2023 Plans: Funding and mission realigned as Agency in order to meet Congres transferred to Program Element 0	s part of US sional inten 603115DH	Army Media It as outlined A, Project C	cal Researc I in National ode 373H.	h and Deve Defense A	elopment Co Authorization	ommand tra n Act 2019 (nsfer to the Sections 7	e Defense H 11,737). Fu	lealth Inding			
FY 2022 to FY 2023 Increase/De	ecrease Sta	atement:										

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A / Medical Advanced Technol ogy	Project (Number/ MN6 / Blast & Hea Monitor Advanced	osure	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
Funding decreased due to realignment of US Army Medical Research and De Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section transferred to Program Element 0603115DHA, Project Code 373H.	velopment Command to the Defense Health ion 711) and NDAA 2020 (Section 737). Fundi	ng		
Title: SBIR/STTR Tax		-	0.056	-
FY 2022 Plans: SBIR/STTR tax.				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638.				
	Accomplishments/Planned Programs Sub	totals 1.878	1.546	1.168
N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A				

Exhibit R-2A, RDT&E Project J	ustification	: PB 2023 A	Army							Date: Apri	il 2022	
Appropriation/Budget Activity 2040 / 3	thibit R-2A, RDT&E Project Justification: PB 2023 Army popopriation/Budget Activity 40 / 3 Prior Years FY 2021 FY 2022 N7: Musculoskeletal Injury - 3.274 1.664 Interview of RDT&E Articles - Interview of Rot			R-1 Program Element (Number/Name)ProjectPE 0603002A / Medical Advanced TechnolMN7 /ogyAdv Technol				Project (N MN7 / Mus Adv Tech	ect (Number/Name) 7 I Musculoskeletal Injury Screening Toc Tech			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
MN7: Musculoskeletal Injury Screening Tool Adv Tech	-	3.274	1.664	1.276	-	1.276	0.759	0.822	0.481	0.481	0.000	8.757
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
The cited research is fully coord Advanced Technology), and is f The cited work is consistent with Strategy. Research in this Project is perfo	inated with F ully coordina the Under S rmed by the	Program Ele ated with the Secretary of United Stat	ement (PE) (Army Train Defense (F es Army Me	0602143A (ing and Do Research ar edical Rese	(Soldier Letl octrine Com nd Engineer earch and D	nality Techn mand (TRA ring) science evelopment	ology) and DOC) and c e and techn Command	compliment other Servic ology focus (USAMRD0	ary to PE 0 es in order t areas and C), Fort Detr	603118A (\$ to avoid du the Army M rick, MD.	Soldier Leth plication of lodernizatic	ality effort. m
B. Accomplishments/Planned	Programs (\$ in Million	<u>s)</u>						FY	2021	FY 2022	FY 2023
Title: Leader and Medical Provid	der Tools to	Prevent and	Reduce M	usculoskele	etal Injury in	All Settings	6			3.274	1.029	1.276
Description: Project validates in following RTD in the Army training	n field enviro ng, operatior	nment strate	egies and te dical commu	chnologies inities to im	to reduce I prove Soldi	MSKI rates a ier readines	and improve s.	e outcomes				
<i>FY 2022 Plans:</i> Will provide follow-up data, data Army Training and Doctrine Con risk factors from validated field n	processing, nmand/Cente nusculoskele	and dissem er for Initial etal injury da	nination of N Military Train ata and begi	onsteroida ning (TRAD n transition	l Anti-inflam DOC/CIMT); i of an injury	matory Drug provide the risk capabi	gs (NSAIDs e most impo ility to TRAE) data to the rtant modifi)OC/CIMT.	e U.S. able			
<i>FY 2023 Plans:</i> Will validate and transition musc be performed in Program Eleme	uloskeletal i nt 0602787 <i>F</i>	njury risk gu A, Project M	iidelines to K4 (Leader	FRADOC-C Tools to Re	CIMT, compl educe Musc	lementary a uloskeletal	pplied resea Injury in All	arch efforts Settings).	will			
FY 2022 to FY 2023 Increase/D Funding change reflects planned	Decrease Sta d lifecycle of	atement: this effort.										
Title: Forward Neuro-Muscular S	Skeletal Injur	ry Assessme	ent to Redu	ce Unneces	ssary Evacu	ations				-	0.575	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		C	ate: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A <i>I Medical Advanced Technol</i> <i>ogy</i>	Project (Nu MN7 <i>I Musci</i> Adv Tech	nber/N uloskel	lame) etal Injury Sci	reening Tool
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2	021	FY 2022	FY 2023
Description: This program will validate solutions to accurately assess the seventraining and operational environments. This capability once transitioned will sh Soldier readiness and return to duty and limit unnecessary evacuations by accurately.	erity of acute, non-penetrating soft-tissue injuri- now proof of concept of a capability that will imp curately diagnosing and assessing musculoskel	es in rove etal			
<i>FY 2022 Plans:</i> Will validate field expedient bone imaging technologies; validate use of existing providers for use in the field; validate use of real-time handheld ultrasound to a limited training.	g handheld ultrasound technologies with limited assess soft tissue injury in the field by providers	use with			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding and mission realigned as part of US Army Medical Research and Dev Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section transferred to Program Element 0603115DHA, Project Code 373H.	velopment Command transfer to the Defense H ion 711) and NDAA 2020 (Section 737). Fundi	ealth ng			
Title: SBIR/STTR Tax			-	0.060	-
FY 2022 Plans: SBIR/STTR tax.					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638.					
	Accomplishments/Planned Programs Sub	otals	3.274	1.664	1.276
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A					

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	rmy							Date: Apri	l 2022	
Appropriation/Budget Activity 2040 / 3						R-1 Program Element (Number/Name) PE 0603002A / Medical Advanced Technol ogyProject (Number/Name) MN9 / Far Forward Behavioral Health C 						
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
MN9: Far Forward Behavioral Health Care Advanced Tech	-	1.080	0.283	-	-	-	-	-	-	-	0.000	1.363
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Starting in Fiscal Year 2023 (FY23), this Project is Eliminated and funds have been realigned to Program Element 0602787A (Medical Technology) / Project MK4 (Cbt Casualty Care Applied Rsch Technology).

A. Mission Description and Budget Item Justification

This Project will deliver a tested delivery system for behavioral health interventions oriented to far forward settings that will ensure the psychological readiness of Soldiers and safeguard their far forward readiness and performance in austere operating environments, under high intensity operational stressors.

The cited research is fully coordinated with Program Element (PE) 0602143A (Soldier Lethality Technology) and complimentary to PE 0603118A (Soldier Lethality Advanced Technology), and is fully coordinated with other Services in order to avoid duplication of effort.

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Far Forward Behavioral Health Care	1.080	0.273	-
Description: This effort will deliver a tested delivery system for behavioral health interventions oriented to far-forward settings that will ensure the psychological readiness of Soldiers and safeguard their far-forward readiness and performance in austere operating environments, under high intensity operational stressors.			
FY 2022 Plans: Will complete sleep leadership training data analyses demonstrating efficacy of training for improving sleep leadership and sleep behaviors and transition, a brief sleep leadership training module intended for Behavioral Health Officers (BHOs) or their equivalent to provide to unit leadership teams. The training module will be delivered to the United States (US) Army Medical Center of Excellence (MEDCoE) to be incorporated into training courses and to the Office of the Surgeon General (OTSG)			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A / Medical Advanced Technol ogy	Projec MN9 / Advan	t (Number/N Far Forward ced Tech	lame) Behavioral H	lealth Care
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2021	FY 2022	FY 2023
Behavioral Health Service Line (BHSL). Will optimize the sleep leadership train incorporating feedback to increase usability, feasibility, and impact of training.	ning by conducting interviews with BHOs and				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding and mission realigned as part of US Army Medical Research and Dev Agency in order to meet Congressional intent as outlined in NDAA 2019 (Sect transferred to Program Element 0603115DHA, Project Code 373H.	velopment Command transfer to the Defense F ion 711) and NDAA 2020 (Section 737). Fund	lealth ing			
<i>Title:</i> SBIR/STTR Tax			-	0.010	-
FY 2022 Plans: SBIR/STTR tax.					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638.					
	Accomplishments/Planned Programs Sub	ototals	1.080	0.283	-
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A					

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: Apri	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)Project (Number/Name)PE 0603002A / Medical Advanced TechnolMO2 / Traumatic Brain Injury (TBI)ogyTreatment Adv Tech							
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
MO2: Traumatic Brain Injury (TBI) Treatment Adv Tech	-	4.649	10.667	-	-	-	-	-	-	-	0.000	15.316
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

<u>Note</u>

Starting in Fiscal Year 2023 (FY23), funding and mission in this project are realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0603115DHA, Project Code 373H.

A. Mission Description and Budget Item Justification

This Project covers development, demonstration, transition of technologies for acute battlefield management of brain trauma, and maintains laboratory capability to perform these functions. Efforts include pre-clinical demonstration of drug therapy and resuscitation strategies for treatment of acute brain injury in the pre-hospital setting, biomarkers, diagnostics, and devices, as well as novel drug delivery technologies to facilitate administration of pharmaceuticals at or near the point of injury to protect the injured brain from further damage.

All research is conducted in compliance with Food and Drug Administration (FDA) requirements for licensure of medical products for human use.

Promising efforts identified through Applied Research conducted under Program element (PE) 0602787A (Medical Technology) / Project MM4 (Cbt Casualty Care Applied Rsch Technology) are further matured under this Project. Promising results identified under this Project are further matured under PE 0603807A (Medical Systems Advanced Development) / Project 836 (Field Medical Systems Advanced Development).

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Medical Research Development Command (USAMRDC), Fort Detrick, MD.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Drugs to Prevent and Treat Brain Injury (TBI)	4.649	10.418	-
Description: Develop, demonstrate, and transition technologies to treat combat-related brain injury. Technologies include drugs administered at or near the point of injury to treat combat-related brain injury while also stabilizing and protecting non-injured brain tissues, and novel drug delivery platforms that specifically target injured brain cells.			
FY 2022 Plans			

PE 0603002A: *Medical Advanced Technology* Army

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		C	Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A / Medical Advanced Technol ogy	Project (Nu MO2 I Traun Treatment A	mber/l natic B dv Tec	Name) rain Injury (TL h	B <i>I)</i>
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2	2021	FY 2022	FY 2023
Will evaluate a novel drug-releasing gel material designed for application at po brain injuries, protecting exposed brain tissue from further injury while simultan drugs directly to the injured brain; validate prehospital intranasal administration traumatic brain injury. Will continue studies to demonstrate effectiveness of ner following traumatic brain injury; optimize approaches to treating traumatic brain nerve agent.	int of injury that will safely seal open penetration neously releasing potent anti-inflammatory, ant n of drugs to preserve brain cell function follow w drugs developed to preserve brain cell funct n injured casualties, who have also been exposi-	ng ibiotic ng ion sed to	-		
FY 2022 to FY 2023 Increase/Decrease Statement: Funding and mission realigned as part of US Army Medical Research and Dev Agency in order to meet Congressional intent as outlined in NDAA 2019 (Secti transferred to Program Element 0603115DHA, Project Code 373H.	elopment Command transfer to the Defense H on 711) and NDAA 2020 (Section 737). Fundi	ealth ng			
Title: SBIR/STTR Tax			-	0.249	-
FY 2022 Plans: SBIR/STTR tax.					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638.					
	Accomplishments/Planned Programs Sub	totals	4.649	10.667	-
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A					

Exhibit R-2A, RDT&E Project Ju	stification:	: PB 2023 A	rmy							Date: April	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)Project (Nemotion)PE 0603002A / Medical Advanced TechnolMO4 / BurnogyAdvanced				umber/Name) n Recovery Optimization Technology			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
MO4: Burn Recovery Optimization Advanced Technology	-	3.326	2.059	-	-	-	-	-	-	-	0.000	5.385
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Starting in Fiscal Year 2023 (FY23), funding and mission in this project are realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0603115DHA, Project Code 373H.

A. Mission Description and Budget Item Justification

This Project covers technology development, demonstration, and transition of burn recovery optimization technologies, including diagnostic technology to predict skin graft success or failure, technologies to measure and predict burn wound healing rate and assess burn treatment effectiveness, and novel dressings that protect severe burn wounds from further injury and prevent inflammation and infection until definitive surgical burn care is available.

All research is conducted in compliance with Food and Drug Administration (FDA) requirements for licensure of medical products for human use.

Promising efforts identified through Applied Research conducted under Program Element (PE) 0602787A (Medical Technology) / Project MM4 (Cbt Casualty Care Applied Rsch Technology) are further matured under this Project. Promising results identified under this Project are further matured under PE 0603807A (Medical Systems Advanced Development) / Project 836 (Field Medical Systems Advanced Development).

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Medical Research Development Command (USAMRDC), Fort Detrick, MD.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Rapid Burn Injury Treatment and Return to Duty Capability Set 1	3.326	2.035	-
Description: Mature, demonstrate, and transition burn recovery optimization technologies. These include diagnostic technology to predict skin graft success or failure, and advanced dressings that contain anti-infective and anti-inflammatory agents for prehospital use to protect severe burn wounds from further injury, infection and inflammation for prolonged periods until definitive surgical wound care is provided.			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022						
Appropriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name) 2040 / 3 PE 0603002A / Medical Advanced Technol ogy MO4 / Burn Recovery Optimization								
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023			
FY 2022 Plans: Validate best approach for giving fluids to burn patients (by mouth or intravence new therapies to be deployed by medics at the point of injury to safely remove in order to prevent infection; validate two new anti-bacterial agents to provide in burn wounds; perform validation studies of a hand-held device designed to a measurement of the wound's size and depth.								
FY 2022 to FY 2023 Increase/Decrease Statement: Funding and mission realigned as part of US Army Medical Research and Dev Agency in order to meet Congressional intent as outlined in NDAA 2019 (Sect transferred to Program Element 0603115DHA, Project Code 373H.	velopment Command transfer to the Defense H ion 711) and NDAA 2020 (Section 737). Fund	lealth ing						
Title: SBIR/STTR Tax			-	0.024	-			
FY 2022 Plans: SBIR/STTR tax.								
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638.								
	Accomplishments/Planned Programs Sub	ototals	3.326	2.059	-			
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A								

xhibit R-2A, RDT&E Project Justification: PB 2023 Army											Date: April 2022		
Appropriation/Budget Activity 2040 / 3						am Elemen)2A <i>I Medic</i>	t (Number / al Advanced	Name) d Technol	Project (Number/Name) MO7 I Improved Bone Repair Advanced Technology				
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
MO7: Improved Bone Repair Advanced Technology	-	1.564	1.069	-	-	-	-	-	-	-	0.000	2.633	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

Note

Starting in Fiscal Year 2023 (FY23), funding and mission in this project are realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0603115DHA, Project Code 373H.

A. Mission Description and Budget Item Justification

This Project matures, demonstrates, and validates promising medical technologies and new clinical practices to improve outcomes following severe limb injuries involving complex bone fractures and injured surrounding soft tissues.

All research is conducted in compliance with Food and Drug Administration (FDA) requirements for licensure of medical products for human use.

Promising efforts identified through Applied Research conducted under Program Element (PE) 0602787A (Medical Technology), Project MM4 (Cbt Casualty Care Applied Rsch Technology), are further matured under this Project. Promising results identified under this Project are further matured under PE 0603807A (Medical Systems Advanced Development), Project 836 (Field Medical Systems Advanced Development).

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Limb Function Repair and Return to Combat Duty and Field Stabilization on Bone in Preparation for Evac	1.564	-	-
Description: Development, demonstration, and transition of technologies that improve outcomes, mobility and return to duty following severe limb injuries involving complex bone fractures and injured soft tissues.			
Title: Field Stabilization of Bone in Preparation for Evac	-	0.554	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022								
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A / Medical Advanced Technol ogy	Projec MO7 / Techno	t (Number/N Improved Bo blogy	lame) one Repair Ac	lvanced					
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023					
Description: Maturation, demonstration, and transition of technologies that im following severe limb injuries involving complex bone fractures and injured soft operations conditions.	ain									
FY 2022 Plans: Develop and demonstrate prototype noninvasive external fixation device for stabilization of lower extremity fractures with weight bearing support to enhance casualty mobility.										
FY 2022 to FY 2023 Increase/Decrease Statement: Funding and mission realigned as part of US Army Medical Research and Dev Agency in order to meet Congressional intent as outlined in NDAA 2019 (Secti transferred to Program Element 0603115DHA, Project Code 373H.	ealth ng									
Title: Limb Function Repair and Return to Combat Duty		-	0.496	-						
Description: Maturation, demonstration, and transition of technologies that im limb injuries involving complex bone fractures and injured soft tissues.	prove outcomes, and return to duty following s	evere								
FY 2022 Plans: Will validate local and regional antibiotic delivery strategies to achieve therape tourniquet induced ischemia (an inadequate blood supply to an extremity) in a reduces level of infection within an open wound distal to the tourniquet; demon medics in diagnosing acute extremity compartment syndrome (increased press leg or forearm. May require surgery and loss tissue or extremity).	tion of the									
FY 2022 to FY 2023 Increase/Decrease Statement: Funding and mission realigned as part of US Army Medical Research and Dev Agency in order to meet Congressional intent as outlined in NDAA 2019 (Secti transferred to Program Element 0603115DHA, Project Code 373H.	ealth ng									
Title: SBIR/STTR Tax		-	0.019	-						
FY 2022 Plans: SBIR/STTR tax.										
FY 2022 to FY 2023 Increase/Decrease Statement:										

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022					
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A / Medical Advanced Technol ogy	ment (Number/Name) edical Advanced TechnolProject (Number/Name MO7 I Improved Bone R Technology					
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2021	FY 2022	FY 2023		
Funding transferred in accordance with Title 15 USC ?638.							
	Accomplishments/Planned Programs Sub	ototals	1.564	1.069	-		
C. Other Program Funding Summary (\$ in Millions)							
N/A							
Remarks							
<u>D. Acquisition Strategy</u> N/A							

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	Army							Date: Apri	2022		
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)ProjPE 0603002A / Medical Advanced TechnolMO8ogyAdva					bject (Number/Name) 08 / Expeditionary Performance Nutrition vanced Techn			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
MO8: Expeditionary Performance Nutrition Advanced Techn	-	2.062	1.936	0.175	-	0.175	0.728	0.163	0.163	0.163	0.000	5.390	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
The cited research is fully coordin Advanced Technology), and is fu The cited research is consistent v Strategy. Research in this Project is perfor	nated with I Ily coordina with the Un med by the	Program ele ated with oth der Secretar	ment (PE) (ler Services ry of Defens es Army Me	0602143A (in order to se (Researc	Soldier Leth avoid dupli h and Engii arch and De	nality Techn cation of eff neering) sci evelopment	ology) and o ort. ence and te Command	compliment echnology fo (USAMRD)	tary to PE 0 ocus areas a C), Fort Det	503118A (S and the Arm rick, MD.	oldier Letha	ality zation	
B. Accomplishments/Planned P	Programs (\$ in Million	<u>s)</u>						FY	2021 F	Y 2022	FY 2023	
Title: Medical Strategies to Susta	in Soldier A	Alertness an	d Performa	nce in All S	ettings					2.062	1.929	0.175	
Description: Develop real-time, s metabolic and nutritional needs to FY 2022 Plans: Will continue validation of interven and operational settings, including electrical stimulation technologies sleep, as neurocognitive intervent sleep strategies. FY 2023 Plans:	specific, an o sustain So ntions to m g multi-dom s that provid tions for the	d individuali oldier physic itigate sleep nain battle so de direct cur e enhancem	zed interver al, mental, loss and fa cenarios. W rent to the b ent of recup	ntions to op and immun tigue and ir fill continue prain, in ado perative slee	timize ment ological per nprove indiv to demonst dition to aco ep and the o	al acuity an formance. vidual and te rate the utili ustic stimula developmen	d fatigue ar eam perforr ity and effec ation of brai at of operatio	nd manage nance in tra ctiveness of in patterns conally relev	aining f during ant				

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A / Medical Advanced Technol ogy	Project (Number/Name) MO8 / Expeditionary Performance Nutriti Advanced Techn						
B. Accomplishments/Planned Programs (\$ in Millions) Develop evidence-based recommendations for nutritional interventions in Sold dispersed and disaggregated operations to reduce physical, cognitive and psycicapability.	iers undergoing strenuous, high OPTEMPO, chological degradation and provide overmatch	FY	2021	FY 2022	FY 2023			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding decreased due to realignment of US Army Medical Research and Dev Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section transferred to Program Element 0603115DHA, Project Code 373H.	velopment Command to the Defense Health on 711) and NDAA 2020 (Section 737). Fund	ng						
<i>Title:</i> SBIR/STTR Tax <i>FY 2022 Plans:</i> SBIR/STTR tax.			-	0.007	-			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638.								
	Accomplishments/Planned Programs Sub	totals	2.062	1.936	0.175			
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A								

Exhibit R-2A, RDT&E Project Ju	rmy						Date: Apri	l 2022					
Appropriation/Budget Activity 2040 / 3						R-1 Program Element (Number/Name) PE 0603002A / Medical Advanced Technol ogyProject (MO9 / Va 					Number/Name) ccines to Prevent Dengue Fever d Tech		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
MO9: Vaccines to Prevent Dengue Fever Advanced Tech	-	2.037	-	-	-	-	-	-	-	-	0.000	2.037	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

A. Mission Description and Budget Item Justification

This Project covers technology development, demonstration and transition of a candidate vaccine for the prevention of Dengue fever caused by any of the four Dengue virus serotypes. The vaccine is intended to be effective in people with and without a prior history of Dengue infection. Research is conducted in compliance with Food and Drug Administration (FDA) regulations for medical products for human use.

Promising medical countermeasures identified in this Project are further matured under Program Element 0603807A (Medical Systems Advanced Development) / Project 808 (DoD Drug & Vacc Ad).

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Research is managed by the United States Army Medical Research and Development Command (USAMRDC) in coordination with the Naval Medical Research Center (NMRC). The Army is responsible for programming and funding all Department of Defense (DoD) naturally occurring infectious disease research requirements, thereby precluding duplication of effort within the Military Departments.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Vaccines to Prevent Dengue Fever Advanced Technology	2.037	-	-
Description: Perform Good Manufacturing Practice (GMP) manufacture of Dengue vaccine candidate. Demonstrate Dengue vaccine candidate safety, effectiveness, and pharmacokinetics in humans. Transition the Dengue vaccine candidate to product developer.			
Accomplishments/Planned Programs Subtotals	2.037	-	-
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A / Medical Advanced Technol	Project (Number/Name) MO9 / Vaccines to Prevent Dengue Fever
	ogy	Advanced Tech
D. Acquisition Strategy		
N/A		

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: April	2022		
Appropriation/Budget Activity 2040 / 3						R-1 Program Element (Number/Name) PE 0603002A / Medical Advanced Technol ogyProject (N MP3 / Phy 					lumber/Name) /s Chem Toxicity Assessment Sys		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
MP3: Phys Chem Toxicity Assessment Sys Adv Tech	-	2.590	2.291	1.839	-	1.839	1.790	1.073	0.355	0.354	0.000	10.292	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

A. Mission Description and Budget Item Justification

This Project covers the development of products and solutions that will protect and prevent degradation of Soldier health, readiness and performance from environmental stressors (heat, cold, altitude, and chemical toxicants) while conducting prolonged operations in Multi-Domain Operations (MDO). Develop algorithms and physiological models to inform unit leaders and Soldiers and provide actionable information and interventions to manage metabolic needs, maintain performance, and avoid non-battle injuries while operating in extreme environments.

This Project contains no duplication with any effort within the Military Departments and includes direct participation by other Services. The cited research is fully coordinated with Program Element (PE) 0602143A (Soldier Lethality Technology) and complimentary to PE 0603118A (Soldier Lethality Advanced Technology).

The cited research is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology, focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Solutions to Sustain Warfighter Performance in Extreme Environments	2.590	2.208	1.839
Description: Protect and prevent degradation of Soldier health, readiness and performance from environmental stressors (heat, cold, altitude, chemical toxicants) while conducting prolonged operations in the MDO. Develop algorithms and physiological models to inform unit leaders and Soldiers and provide actionable information and interventions to manage metabolic needs, maintain performance, and avoid non-battle injuries while operating in extreme environments.			
FY 2022 Plans: Will provide validated tools to sustain lethality and optimize performance and to prevent injuries related to multi-environmental stressors; optimize capability to improve performance and thermal comfort in hot environments using innovative cooling technology; deliver to advanced development mature and validated algorithms for exertional heat injury, acute mountain sickness, and cold-weather clothing selection; complete animal model to demonstrate capability to use real-time physiological data to			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A / Medical Advanced Technol ogy	e) Project (Number/Name) hnol MP3 I Phys Chem Toxicity Assessment S Adv Tech						
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023			
determine the extent to which an individual has been exposed to a toxic chemi to improve cold tolerance and comfort when operating in arctic conditions.	cal; begin validation of method for cold habitua	ation						
FY 2023 Plans: Will provide validated tools to sustain lethality and optimize performance and to stressors; optimize capability to improve performance and thermal comfort in h technology; deliver to advanced development mature and validated algorithms and cold-weather clothing selection; begin validation of method for cold habituation reduce frostbite when operating in arctic conditions; and conduct field validation monitoring (PSM) compression shirts.	o prevent injuries related to multi-environmenta not environments using innovative cooling for exertional heat injury, acute mountain sick ation to improve cold tolerance and comfort an n and acceptability of novel physiological statu	al ness, d is						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding decreased due to realignment of US Army Medical Research and Dev Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section transferred to Program Element 0603115DHA, Project Code 373H.	velopment Command to the Defense Health on 711) and NDAA 2020 (Section 737). Fund	ng						
Title: SBIR/STTR Tax			-	0.083	-			
<i>FY 2022 Plans:</i> SBIR/STTR tax.								
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638.								
	Accomplishments/Planned Programs Sub	totals	2.590	2.291	1.839			
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A								

Exhibit R-2, RDT&E Budget Item							Date: April	2022				
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)				anced	R-1 Program Element (Number/Name) PE 0603007A <i>I Manpower, Personnel and Training Advanced Technology</i>							
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	11.344	14.273	15.598	-	15.598	16.514	18.206	17.252	17.248	0.000	110.435
792: Personnel Performance & Training	-	11.344	14.273	15.598	-	15.598	16.514	18.206	17.252	17.248	0.000	110.435

A. Mission Description and Budget Item Justification

This Program Element (PE) matures and validates applied behavioral and social science technologies that enhance the Soldier Lifecycle (e.g., selection, assignment, training, leader development) and human relations (e.g. unit cohesion). These technologies provide advanced personnel measures that more fully assess potential and predict performance, behavior, attitudes, and resilience. These technologies also provide innovative and effective Talent Management methods to optimize individual and team performance to ensure the Army can meet mission requirements in uncertain and complex environments. This PE evaluates new selection measures, assignment methods, and performance metrics for individuals and units, assesses innovative training methods, and conducts scientific assessments to inform Human Capital policy and programs. Work in this PE will result in effective non-materiel solutions to help the Army adjust to changes in force size and structure, a variety of mission demands and contexts, challenges in human relations, and budgetary constraints.

Work in this PE complements and is fully coordinated with PE 0602785A (Manpower/Personnel/Training Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas, the Army Vision, the Army's Talent Management Strategy, and the Army Modernization Strategy

Work in this PE is performed by the United States Army Research Institute (ARI) for the Behavioral and Social Sciences in Ft. Belvoir, VA.

B. Program Change Summary (\$ in Millions)	<u>FY 2021</u>	<u>FY 2022</u>	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	11.344	14.273	0.000	-	0.000
Current President's Budget	11.344	14.273	15.598	-	15.598
Total Adjustments	0.000	0.000	15.598	-	15.598
Congressional General Reductions	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
Congressional Adds	-	-			
Congressional Directed Transfers	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	15.598	-	15.598

hibit R-2, RDT&E Budget Item Justification: PB 2023 Army	Date: April 2022
propriation/Budget Activity 40: Research, Development, Test & Evaluation, Army I BA 3: Advanced chnology Development (ATD)	R-1 Program Element (Number/Name) PE 0603007A <i>I Manpower, Personnel and Training Advanced Technology</i>
Change Summary Explanation	
FY 2023 funding increase reflects the fact that the FY 2022 President	's Budget request did not include out-year funding.

xhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: April	2022	
Appropriation/Budget Activity 2040 / 3	Budget Activity R-1 Program Element (Number/Name) Project (Num PE 0603007A / Manpower, Personnel and 792 / Person Training Advanced Technology 792 / Person						umber/Nan onnel Perfor	1e) rmance & Tr	raining			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
792: Personnel Performance & Training	-	11.344	14.273	15.598	-	15.598	16.514	18.206	17.252	17.248	0.000	110.435
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrate applied behavioral and social science technologies that enhance the Soldier Lifecycle (e.g., selection, assignment, training, leader development) and human relations (e.g., unit cohesion). These technologies provide advanced personnel measures that more fully assess potential and predict performance, behavior, attitudes, and resilience. These technologies also provide innovative and effective Talent Management methods to optimize individual and team performance to ensure the Army can meet mission requirements in uncertain and complex environments. This demonstrates new selection measures, assignment methods, and performance metrics for individuals and units; assesses innovative leader development and learning methods, and conducts scientific assessments to inform Human Capital policy and programs. Research will result in effective non-materiel solutions to help the Army adjust to changes in force size and structure, a variety of mission demands and contexts, challenges in human relations, and budgetary constraints.

Work in this Project complements PE 0602785A (Personnel Performance & Training Technology)

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering Science and Technology priority focus areas, the Army Vision, the Army People Strategy, the Army's Talent Management Strategy, and the Army Modernization Strategy.

Work is performed by the United States Army Research Institute (ARI) for the Behavioral and Social Sciences in Fort Belvoir, VA.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Talent Assessment and Development	11.344	13.865	15.598
Description: This effort optimizes and demonstrates innovative talent management approaches to provide the Army the flexibility to adapt to changes in force structure and recruiting environments. This effort matures Soldier selection measures, techniques, and tools to more fully assess Soldier potential and better predict behavior, attrition, Soldier performance, and team effectiveness. This effort also matures and demonstrates methods that develop and model Soldier talents/competencies longitudinally across a career.			
FY 2022 Plans: Will mature research to validate personnel assessment measures to improve selection and assignment by applying additional psychometric analyses to improve a Functional Area longitudinal assessment and assessments designed to predict Officer performance and continuance; mature and validate methods to develop critical leader competencies, such as mindfulness and			

PE 0603007A: *Manpower, Personnel and Training Advance...* Army

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	Project (Number/Name) 792 I Personnel Performance & Training				
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2021	FY 2022	FY 2023
strategic thinking competencies; mature research and collect data to demonstrative measurement tools.	ate psychometric validity of small unit perform	ance			
FY 2023 Plans: Will mature prototype assessment batteries to improve integrated personnel as mature and validate augmented assessment prototypes designed to automatic validate leader development methods for junior NCOs; optimize small unit performed assessment prototypes.	sessments for Officer selection and assignme ally generate personnel assessment content; ormance measurement tools.	nt;			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.					
Title: FY22 SBIR/STTR Transfer			-	0.408	-
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	totals	11.344	14.273	15.598
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A					

Exhibit R-2, RDT&E Budget Item	chibit R-2, RDT&E Budget Item Justification: PB 2023 Army									Date: April	2022	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)				R-1 Program Element (Number/Name) PE 0603025A <i>I Army Agile Innovation and Demonstration</i>								
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	-	22.231	20.900	-	20.900	23.055	24.106	32.900	30.136	0.000	153.328
CK8: Advanced Technology Development and Convergence	-	-	22.231	15.200	-	15.200	15.252	15.272	16.266	16.312	0.000	100.533
DA3: Army Advanced Innovation	-	-	-	5.700	-	5.700	7.803	8.834	16.634	13.824	0.000	52.795

A. Mission Description and Budget Item Justification

This Program Element (PE) funds the Army's goal of accelerating innovative solutions to achieve future force modernization. The Army is developing new ways of doing business to include strategic and "non-traditional" partnerships and working with traditional vendors in novel ways to allow for agile integration of leading-edge technology. Critical technologies that allow for technological superiority are increasingly dual-use or developed in academia-led partnerships that leverage cutting edge innovation. In an era of global competition, technological superiority requires agile and rapid innovation. Cross-cutting modernization initiatives leverage strategic partnerships foster an environment to bring knowledge and expertise to demonstrate breakthrough and innovative technologies that will benefit the warfighter. These collaborations bring new ways of doing business to demonstrate emerging technologies and systems with high payoff potential to address current technology shortfalls or future capability gaps and systems. This PE will also allow for exploration and adaptation of various technologies in the early stages of development enabling cost saving decisions in the procurement life-cycle by using the try, buy, decide model of identifying and investing in proof of technology demonstrations that the army can adapt and integrate. Leveraging other innovative mechanisms, to include accelerators, incubators, and other technology accelerants, to enhance innovation is part of the overall innovation strategy. Innovation includes not only hardware, and physical products but also software, software development, artificial intelligence (AI) and machine learning, all as stand-alone initiatives and as part of broader innovation to programs and technology development. Oversight from a newly created Innovation Board will evaluate internal and external constraints to implementation on the basis of Army modernization needs, Army standards and resources to inform an optimal technology investment strategy.

Research in this PE is closely coordinated with PE 0602002A (Army Agile Innovation and Development-Applied Research).

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

Research is performed by the United States Army Futures Command.

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Arm	ny			Date	: April 2022				
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3 Technology Development (ATD)	: Advanced	R-1 Program Element (Number/Name) PE 0603025A <i>I Army Agile Innovation and Demonstration</i>							
B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total				
Previous President's Budget	0.000	22.231	0.000	-	0.000				
Current President's Budget	0.000	22.231	20.900	-	20.900				
Total Adjustments	0.000	0.000	20.900	-	20.900				
 Congressional General Reductions 	-	-							
 Congressional Directed Reductions 	-	-							
 Congressional Rescissions 	-	-							
 Congressional Adds 	-	-							
 Congressional Directed Transfers 	-	-							
Reprogrammings	-	-							
SBIR/STTR Transfer	-	-							
 Adjustments to Budget Years 	-	-	20.900	-	20.900				

Change Summary Explanation

Fiscal Year 2023 (FY23) funding increase reflects the fact that the FY22 President's Budget request did not include out-year funding.

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022												
Appropriation/Budget Activity 2040 / 3				R-1 Program Element (Number/Name)IPE 0603025A / Army Agile Innovation and DemonstrationI				Project (Number/Name) CK8 I Advanced Technology Development and Convergence				
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CK8: Advanced Technology Development and Convergence	-	-	22.231	15.200	-	15.200	15.252	15.272	16.266	16.312	0.000	100.533
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Bud This Project aims to accelerate th nontraditional entities, such as ind technologies and systems with his to provide funding for advanced m Evaluation (RDT&E) appropriation The cited research is consistent w Research in this Project is perform	get Item Ju e Army's go dustry or the gh payoff p esearch/tec n. vith the Unc med by the	ustification bal of finding e newly esta otential to a chnology that der Secretar United Stat	g innovative ablished Arn ddress curre at has been ry of Defens es (US) Arm	and nontra ny Futures ent technol discovered e for Resea ny Futures (aditional sol Command a ogy shortfal in "Innovat arch and En Command.	utions to the Software Fa Is or future ion Days" th gineering p	e most diffic actory, bring capability g aat are fund riority focus	ult technolo new ways aps and sys ed across th areas and	ogical proble of doing bus stems. Addit ne Research the Army M	ems. Efforts siness to de tionally, this h, Developr odernizatio	to pair with emonstrate e project see nent, Test a n Strategy.	emerging ks nd

Research in this Project supports all Army Modernization Priorities.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023						
Title: Advanced Technology Development of Existing Commercial Technology	-	5.781	10.200						
Description: Advanced commercial development exists when direct investment leads to rapid technology applications and demonstration. The Army identifies existing technology to further develop and modify for Army use. Partnerships with industry both traditional and non-traditional, allow the Army to advance non-military commercial research and development investments through focused engagements resulting in commercial adaption and integration to address Army technology and modernization efforts. Initial nominal Army investment in proof of technology and technology demonstrations will expedite novel technologies shaping their development to meet Army requirements and expedite both component and complete system adaptation and integration.									
FY 2022 Plans: The Army enterprise will identify commercial solutions to technology problem areas focused on next generation combat vehicles, dismounted soldier lethality, power generation and storage, network and satellite support, and novel sensors and technologies. FY 2023 Plans:									
Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022									
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Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603025A <i>I Army Agile Innovation and</i> <i>Demonstration</i>	Project (Number/Name) CK8 / Advanced Technology Developm and Convergence							
B. Accomplishments/Planned Programs (\$ in Millions)	ſ	FY 2021	FY 2022	FY 2023					
The Army enterprise will identify commercial solutions to technology problem a dismounted soldier lethality, power generation and storage, infrastructure to en performance and Soldier readiness, AI and robotic enabled small units, networ technologies.	cles,								
FY 2022 to FY 2023 Increase/Decrease Statement: In Fiscal Year 2023 (FY23), funding for this effort was realigned from the Sub-Stask within this effort.	ce								
Title: Sub-System Component and Prototype Convergence			-	3.854	-				
Description: The Army investigates, develops, and integrates non-traditional of and prototype convergence seeks to develop or integrate one or more technolo subsystems towards a more complex solution. This task informs requirements where it is going and on what timeline confirming viability for incorporation into	ent er at,								
FY 2022 Plans: Will focus on subsystem component development and maturation of autonomo disjointed systems, remote predictive maintenance, component hardening (ag manned and unmanned vehicles, network and satellite technologies, and Soldi	us technologies focused on the integration of ainst cyber) of IT and communications system er exoskeletons.	s on							
FY 2022 to FY 2023 Increase/Decrease Statement: In FY23 funding for this effort is realigned to the Advanced Technology Develowithin this effort.	pment of Existing Commercial Technology tas	k							
Title: Experimentation and Development of Commercial Dual Use Technologie	9S		-	4.818	-				
Description: The Army seeks to connect with industry early in a technology?s development will connect with these non-traditional technologies to determine the military applications. Technology development will be conducted concurrently the used to understand proof-of-concept applicability for further Government initiation will be cultivated with technology aggregators such as In-Q-Tel to ensure a contract technologies to the Army.	and st ps on								
FY 2022 Plans:									
		I							

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603025A <i>I Army Agile Innovation and Demonstration</i>	er/Name) Project (Number/Name) ovation and CK8 / Advanced Technology Develo and Convergence					
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2021	FY 2022	FY 2023		
Will focus experimentation and development on intelligent connectivity betwee techniques.	n systems and novel sensors and sensor						
FY 2022 to FY 2023 Increase/Decrease Statement: In FY23 funding in this task is realigned to Project DA3 (Army Advanced Innov	ration) in this Program Element (PE).						
Title: Software Factory Advanced Software Development			-	4.721	5.000		
Description: As part of the novel Software Factory stood up by Army Futures address some of the most challenging software research problems that the Arm Process to rapidly mature experimental software for mobile technology, secure needs for Army-specific hardware platforms.	Command (AFC), Soldiers will be leveraged to my faces. Soldiers will adopt an Agile Develop authentication procedures, and other software	o ment e					
<i>FY 2022 Plans:</i> Will design, characterize, and mature software supporting Army wide hardware to quickly route Soldier created software to mobile devices in an iterative fashie secure DevOps environment.	e platforms; will develop and demonstrate the a on; and will integrate Soldier created software	ability into a					
FY 2023 Plans: Software Factory will integrate Soldier-created software closer to the tactical e field deployable capabilities. In FY23 Software Factory will add two new focus Modernization that include Lines of Effort Common Operating Environment, Co (MOSA), Robotics and Autonomous Systems, Soldier Situational Awareness a	dge using secure authentication procedures an areas for software development supporting A ommand Post, Modular Open Systems Approa and Synthetic Training.	nd rmy ich					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned life cycle of effort.							
Title: Demonstration and Development of Army Discovered Innovative Techno	blogies		-	2.246	-		
Description: The Army seeks to develop and demonstrate technology that dis domain fashion. This effort seeks to direct advanced research funding towards Innovation events such as Innovation Days funded by PE 0605054A (Emergin Capability Development and Maturation) or the Expeditionary Technology Sea Activities) / Project CC2 (Expeditionary Technologies).	play unique and innovative potential in a cross technologies that are discovered from Army g Technology Initiatives) / Project FI3 (Rapid rch effort in PE 0605803A (Technical Informat	ion					
FY 2022 Plans:							

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022								
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603025A <i>I Army Agile Innovation and</i> <i>Demonstration</i>	Project (Number/Name)ndCK8 / Advanced Technology Developsand Convergence						
B. Accomplishments/Planned Programs (\$ in Millions) Will develop and demonstrate unique solutions to Army wide problems leverag technology search events.	ing technology discovered through Army		FY 2021	FY 2022	FY 2023			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding is administratively realigned to Project DA3 (Army Advanced Innovatio (Army Agile Innovation and Development- Applied Research) / Project DC4 (Ar	on) within this same PE and also PE 0602002/ rmy Applied Innovation).	4						
<i>Title:</i> FY2022 SBIR/STTR Transfer			-	0.811	-			
Description: Funding transferred in accordance with Title 15 USC ?638								
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638								
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638								
	Accomplishments/Planned Programs Sub	ototals	-	22.231	15.200			
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A								

Exhibit R-2A, RDT&E Project Ju						Date: April	2022					
Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060302 <i>Demonstra</i>	am Elemen 25A / Army / ation	t (Number/ Agile Innova	Name) ation and	Project (Number/Name) DA3 / Army Advanced Innovation			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
DA3: Army Advanced Innovation	-	-	-	5.700	-	5.700	7.803	8.834	16.634	13.824	0.000	52.795
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

<u>Note</u>

This is a new start in FY 2023.

In Fiscal Year 2023 (FY23), this Project is a new start.

A. Mission Description and Budget Item Justification

This Project funds the Advanced Development portion of the Army Innovation Plan, the Army's investment strategy to rapidly accelerate innovative solutions to challenging Warfighter problems. This Project will provide the Army with the most advanced and cutting-edge solutions with the ability to adapt and integrate multidisciplinary innovative technologies by bridging the interfaces between internal and external efforts for a holistic entry into the acquisition pipeline at the most appropriate milestone. This Project also seeks to further develop and demonstrate these technologies in support of cross-domain operations, with emphasis on open/modular systems architecture and digital thread/engineering, and provide a pathway for entry into the acquisition process.

This Project is coordinated with PE 0602002A (Army Agile Innovation and Development-Applied Research) / Project DC4 (Army Applied Innovation).

Army Senior Leadership approves Army innovation projects prior to budget year programming based on priority, opportunity, and return on investment for the American taxpayer- ensuring that innovations have a high potential for filling capability gaps and transitioning.

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

Research in this Project is performed by the United States (US) Army Futures Command.

Research in this Project supports all Army Modernization Priorities.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Army Advanced Innovation	-	-	5.700
Description: The Army seeks to develop and demonstrate technology that display unique and innovative potential in a cross- domain fashion. This effort will serve as funding to rapidly transition disruptive and groundbreaking capabilities that fall outside of the normal acquisition pipeline.			
FY 2023 Plans:			

PE 0603025A: Army Agile Innovation and Demonstration Army

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603025A <i>I Army Agile Innovation and</i> <i>Demonstration</i>	Projec DA3 / A	Project (Number/Name) DA3 I Army Advanced Innovation			
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023	
Initiate a competitive process that selects technologies with a high be investigated in open systems and digital engineering architectu Technology efforts, or Research Development Testing & Evaluation the technology readiness level (TRL) at the end of the effort. The that support Army Modernization, to include cyber, Electronic War Autonomy, Communications, Position, Navigation and Timing, adv Platform integration.	n promise of advancing and accelerating capabilities to irres, prior to be transitioned either to further Science and on (RDTE) Budget Activity (BA) 6.4 funding, depending on Army Innovation Program will accept multiple new efforts fare, Sensors, Power and Energy, Artificial Intelligence and vancing Synthetic Training Environments; and Air and Grou	d Ind				
FY 2022 to FY 2023 Increase/Decrease Statement: In FY23, this project is a new start.						
	ototals	-	-	5.700		
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A						

Exhibit R-2, RDT&E Budget Item	I Justificat	ion: PB 202	23 Army							Date: April	2022	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)					R-1 Program Element (Number/Name) PE 0603040A <i>I Artificial Intelligence and Machine Learning Advanced Technologies</i>							
COST (\$ in Millions)	in Millions) Prior Years FY 2021 FY 2022 Base OCO Total FY 2024 FY 2025 FY 2026					FY 2027	Cost To Complete	Total Cost				
Total Program Element	-	-	0.909	6.395	-	6.395	7.759	12.675	8.813	9.070	0.000	45.621
CL1: AI Enhanced Intel Operations Advanced Technologies	-	-	0.371	1.424	-	1.424	1.353	5.715	2.071	2.070	0.000	13.004
CL6: ATR Using Multiple Cooperative Sensors Adv Tech	-	-	0.538	1.883	-	1.883	1.587	2.078	1.925	1.925	0.000	9.936
CN6: Predictive Maintenance Advanced Technology	-	-	-	2.311	-	2.311	3.779	3.843	3.777	3.776	0.000	17.486
DA7: AI-Enabled Command and Coordination Adv Tech	-	-	-	0.777	-	0.777	1.040	1.039	1.040	1.299	0.000	5.195

Note

Project CN6 (Predictive Maintenance Advanced Technology) and Project DA7 (AI-Enabled Command and Coordination Adv Tech) are New Starts in Fiscal Year 2023 (FY23).

A. Mission Description and Budget Item Justification

This Program Element (PE) will mature and demonstrate advanced technologies using artificial intelligence (AI) and machine learning (ML) to improve target recognition/ detection using multiple cooperative autonomous sensors, leader decision-making, and replication of tactical behaviors to enable autonomous capabilities for maneuver, predictive maintenance, talent management, Intel support for Operations, network and cybersecurity and medical support. The Army's Artificial Intelligence Integration Center (AI2C) will provide strategic guidance and coordination of these advanced research efforts in AI/ML across the Army Modernization enterprise.

Research in this PE contributes to the Army Science and Technology (S&T) portfolio and is fully coordinated with efforts in PE 0601601A (Artificial Intelligence Basic Research) and PE 0602180A (Artificial Intelligence Technologies)

The cited research is consistent with the Under Secretary of Defense for Research and Engineering S&T focus areas, the Army Modernization Strategy and the Joint Artificial Intelligence Center (JAIC).

Research in this PE is performed by the United States Army Futures Command (AFC).

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army	y			Date:	April 2022
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Technology Development (ATD)	Advanced	R-1 Program Ele PE 0603040A / A	ement (Number/Name) Artificial Intelligence and	Machine Learning Adv	vanced Technologies
B. Program Change Summary (\$ in Millions)	<u>FY 2021</u>	<u>FY 2022</u>	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	0.000	0.909	0.000	-	0.000
Current President's Budget	0.000	0.909	6.395	-	6.395
Total Adjustments	0.000	0.000	6.395	-	6.395
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
 Reprogrammings 	-	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	6.395	-	6.395

Change Summary Explanation

FY23 funding increase reflects the fact that the FY22 President's Budget request did not include out-year funding.

Exhibit R-2A, RDT&E Project	Justification	: PB 2023 A	Army							Date: Apri	l 2022	
Appropriation/Budget Activity 2040 / 3		R-1 Progr PE 060304 chine Lear	am Elemen 40A I Artifici ming Advan	t (Number i al Intelligen ced Techno	Project (N CL1 / AI El Advanced	Project (Number/Name) CL1 I AI Enhanced Intel Operations Advanced Technologies						
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CL1: AI Enhanced Intel Operations Advanced Technologies	-	-	0.371	1.424	_	1.424	1.353	5.715	2.071	2.070	0.000) 13.004
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
The cited research is consistent the Army Intelligence, Surveillar Research in this Project suppor Research in this Project is perfo	t with the Arm nce, and Rec ts the Army S prmed by the	ny Moderniz connaissance Science and United Stat	zation Strate ce (ISR) Tas I Technolog	egy and is s k Force. y Lethality I ny Futures	Supported an Portfolio an Command.	nd coordinat	ted with the	Army Intel	Community nter (JAIC).	, Army Futu	ures Comm	and, and
B. Accomplishments/Planned	Programs (\$ in Million	<u>s)</u>						FY	2021 F	FY 2022	FY 2023
Title: AI Enhancements for Pror	netheus									-	0.357	0.622
Description: Prometheus is an tactical levels. This effort will ma collection and hard-to-spot indic higher-value work of determining FY 2022 Plans: Maturation of AI algorithms for a management; will improve AI co	umbrella of c ature and der ations and w g if a given le uutomated de illection man	capabilities nonstrate cr arnings (I& ead represe etection of a agement an	to support s omputer visi W) to suppo nts a valid tl dversarial o id tasking ca	ensor to sh ion and dee int targeting nreat. bjects of inf apability, au	ooter auton ep learning o , allowing h terest and a tomate Al v	nation for the capabilities t uman intellig utomated in vorkflows, a	e strategic, to automati gence analy telligence o nd docume	operational cally triage ysts to do th collection nt repeatab	, and data le			
processes for deploying AI capa	ibilities to me	et Army ne	eds.									
FY 2023 Plans:												

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022						
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603040A <i>I Artificial Intelligence and Ma</i> <i>chine Learning Advanced Technologies</i>	Project (Number/Name) CL1 <i>I AI Enhanced Intel Operations</i> <i>Advanced Technologies</i>					
Ibit R-2A, RDT&E Project Justification: PB 2023 Army propriation/Budget Activity R-1 Program Element (Number/Name) 0 / 3 PE 6003040A / Artificial Intelligence and M. chine Learning Advanced Technologies Accomplishments/Planned Programs (\$ in Millions) demonstrate that the algorithms matured on this project can generate artificial data, and that this artificial data is realist ugh to train an Al system in place of real data. Will validate the full methodology on a military-related problem where the term will generate artificial data and use that artificial data to re-train a military Al-system like Prometheus. 2022 to FY 2023 Increase/Decrease Statement: reased funding will be used to mature and demonstrate algorithms for automated object detection and automated intellige exiption: will address a ?multi-INT? fusion problem and demonstrate how Al algorithms can fuse data from various mil ligence systems via simulated testing. 2023 Plans: demonstrate the ablity of the algorithm to fuse data from various military intelligence systems (ARCANE series, Prome ATR-MCAS) in a simulated test. Will then demonstrate the algorithm performing fusion of real-world intelligence data to roved target confirmation over what can be provided by any single Al-enabled sensor. Will work with product owners of SHOT systems to exploit the fusion algorithm and the required data pipelines. 2022 to FY 2023 Increase/Decrease Statement: a effort inititates in FY23		FY 2021	FY 2022	FY 2023			
Will demonstrate that the algorithms matured on this project can ger enough to train an AI system in place of real data. Will validate the fir system will generate artificial data and use that artificial data to re-training	nerate artificial data, and that this artificial data is realistic ull methodology on a military-related problem where the ain a military AI-system like Prometheus.						
FY 2022 to FY 2023 Increase/Decrease Statement: Increased funding will be used to mature and demonstrate algorithm collection management, building on effort ending mid-year FY23 in F this same PE.	ns for automated object detection and automated intelliger Project CL2 (AI Enhanced Intel Operations Technologies)	nce in					
Title: Intelligence Fusion for Targeting		-	-	0.802			
Description: Will address a ?multi-INT? fusion problem and demon intelligence systems via simulated testing.	strate how AI algorithms can fuse data from various milita	iry					
FY 2023 Plans: Will demonstrate the ability of the algorithm to fuse data from various and ATR-MCAS) in a simulated test. Will then demonstrate the algorimproved target confirmation over what can be provided by any sing and SHOT systems to exploit the fusion algorithm and the required of	eus, how TAN						
FY 2022 to FY 2023 Increase/Decrease Statement: This effort initiates in FY23.							
Title: SBIR/STTR Transfer		-	0.014	-			
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638							
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638							
	Accomplishments/Planned Programs Sub	otals -	0.371	1.424			
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A							
DE 0000000. Artificial Intelligence and Machine Last							

PE 0603040A: *Artificial Intelligence and Machine Lear...* Army Volume 1c - 55

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: April	2022	
Appropriation/Budget Activity 2040 / 3		R-1 Program Element (Number/Name)ProjePE 0603040A I Artificial Intelligence and MaCL6 Ichine Learning Advanced TechnologiesSense					ct (Number/Name) ATR Using Multiple Cooperative ors Adv Tech					
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CL6: ATR Using Multiple Cooperative Sensors Adv Tech	-	-	0.538	1.883	-	1.883	1.587	2.078	1.925	1.925	0.000	9.936
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
and collaborate through shared p missions. This Project also comp Project CL7 (ATR Using Multiple The cited research is consistent v Research in this Project supports Research in this Project is perfor	erception o olements an Cooperativ with Under \$ the Army \$ med by the	the optical of fully coor ve Sensors Secretary of Science and United Stat	l, thermal, a dinates with App Tech). f Defense fo I Technolog es (US) Arn	nd electron the applied or Research y Lethality I ny Futures	nagnetic spe d research i n and Engine Portfolio and Command.	ectrums to f n Program I eering priori d the Joint A	Ind, identify Element (PE ity focus are Artificial Inte	, geo-locate E) 0602180, eas and the Iligence Ce	e, and track A (Artificial Army Mode nter (JAIC).	targets duri Intelligence	ng reconnar Technologi trategy.	ssance es) /
B. Accomplishments/Planned P	rograms (in Million	<u>s)</u>						FY	2021 F	Y 2022	FY 2023
Title: Collaborative Target Detect	tion and Tra	icking								-	0.519	1.365
Description: This effort will matu will cooperatively conduct a zone electro optical-infrared (EO-IR) set	re and dem recon to ide ensors.	onstrate an entify, geolo	Al-enabled ocate, and tr	scalable te ack threats	eam of autor s using on-b	nomous air oard electro	and ground onic intellige	vehicles th nce (ELINT	at) and			
FY 2022 Plans: Will refine and mature the Al-enal technologies that uses ELINT ser	FY 2022 Plans: Will refine and mature the AI-enabled target recognition architecture to classify threats at the tactical edge; will integrate novel technologies that uses ELINT sensing to enhance sensing and tracking during zone reconnaissance.											
FY 2023 Plans: Will mature and optimize the three Will integrate sensors to detect an improve interfaces with the cloud voice recognition, and demonstra FY 2022 to FY 2023 Increase/De	at, terrain, a nd geo-loca environmer ting a 100% ecrease Sta	and percepti te radio em nt by integra b cloud-base atement:	ion architect issions to in ating ATR-N ed data pipe	ture for mai fluence sea ICAS with I eline with lir	neuver and arch areas a ntegrated V nkages to C	threat class and accelera ïsual Augmo OEUS/cARI	ification at t ate target lo entation Sys MY on IL5.	he tactical (calization, \ stem (IVAS)	edge. Vill)			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603040A <i>I Artificial Intelligence and Ma</i> <i>chine Learning Advanced Technologies</i>	Project (Number/Name) la CL6 I ATR Using Multiple Cooperative Sensors Adv Tech				
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023	
Increased funding will mature the ability for unmanned vehicles to self-identify among unmanned and manned teams for verification.	and geo-locate targets and share target data					
Title: COEUS Advanced Technology			-	-	0.518	
FY 2023 Plans: Will optimize ATR-MCAS through the use of COEUS, a modular software platf	orm (cloud native).					
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> This effort is a new effort in Fiscal Year 2023 (FY23).						
Title: SBIR/STTR Transfer			-	0.019	-	
<i>FY 2022 Plans:</i> Funding transferred in accordance with Title 15 USC ?638						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638						
	Accomplishments/Planned Programs Sub	totals	-	0.538	1.883	
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A						

Exhibit R-2A, RDT&E Project Ju						Date: April	2022					
Appropriation/Budget Activity 2040 / 3	R-1 Progra PE 060304 <i>chine Lear</i>	am Elemen 10A / Artifici ning Advan	t (Number/ al Intelligen ced Technol	Name) ce and Ma logies	Project (Number/Name) CN6 / Predictive Maintenance Advanced Technology							
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CN6: Predictive Maintenance Advanced Technology	-	-	-	2.311	-	2.311	3.779	3.843	3.777	3.776	0.000	17.486
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

<u>Note</u>

This is a new start in FY 2023.

This is a New start Project in Fiscal Year 2023 (FY23).

A. Mission Description and Budget Item Justification

This Project matures and demonstrates artificial intelligence (AI) and machine learning (ML) tools and capabilities to predict and analyze maintenance status for emerging and legacy aviation and ground platforms. Will extract maintenance data from databases and sensor data and make inferences of missing data via virtual simulations and improve and provide AI data capture and other AI tools for enterprise maintenance resource planning for military aviation and ground vehicles. Platforms of focus will be prioritized by cost and value to Army missions and include the UH60, AH64, CH47, Stryker, and Abrams. Each platform will be sequentially evaluated both at the appropriate component (i.e. engine health) and fleet level. This Project matures and demonstrates the use of predictive maintenance to increase fleet operational readiness through reduced downtime by preventing critical failure during missions, maximizing availability to combatant commands. Results from the Project will also be used to inform a robust Army wide predicative maintenance platform that will accelerate the pace of innovation for this problem set. This platform includes data engineering, pipelines, AI development eco-system, and application delivery. All outcomes will be used to inform requirements and technical architectures for modernization efforts of next generation aviation and ground systems both manned and unmanned.

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

Research in this Project supports the Army Science and Technology Ground Portfolio and the Joint Artificial Intelligence Center (JAIC).

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: PMx Platform Data Management and Integrated Environment Refinement	-	-	2.311
Description: Will mature and optimize a predictive maintenance (PMx) cloud-based environment, mature and validate data collection/aggregation techniques, and demonstrate and validate a data architecture and the data pipelines to a cloud-based environment.			
FY 2023 Plans:			

PE 0603040A: *Artificial Intelligence and Machine Lear...* Army

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		[Date: A	pril 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603040A <i>I Artificial Intelligence and Ma</i> <i>chine Learning Advanced Technologies</i>	Project (Number/Name) a CN6 I Predictive Maintenance Advar Technology Technology					
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2	2021	FY 2022	FY 2023		
This effort will mature and demonstrate the integrated development, security, Will provide the capability to aggregate data at the point of the maintenance a the aggregated data to a scalable, cloud-based data management environme architecture and initiate scaling to ground-based systems.	and operations (DevSecOps) PMx environmen activity and establish multiple pipelines to transit ent. Will exploit the cloud-based data manageme	t. ion ent					
FY 2022 to FY 2023 Increase/Decrease Statement: This is a new start in FY23.							
	Accomplishments/Planned Programs Sub	totals	-	-	2.311		
Remarks D. Acquisition Strategy N/A							

Exhibit R-2A, RDT&E Project Ju							Date: April	2022				
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603040A I Artificial Intelligence and Ma chine Learning Advanced TechnologiesProject (N DA7 I AI-E 					lumber/Name) Enabled Command and ion Adv Tech		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
DA7: AI-Enabled Command and Coordination Adv Tech	-	-	-	0.777	-	0.777	1.040	1.039	1.040	1.299	0.000	5.195
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is a new start in FY 2023.

This is a New start Project in Fiscal Year 2023 (FY23).

A. Mission Description and Budget Item Justification

This Project matures and demonstrates solutions for Artificial Intelligence (AI)-enabled Command and Coordination that provide timely understanding and application of the commander's intent. This Project improves sensor-to-shooter and course of action development timelines by developing algorithms, software, and hardware to efficiently capture, transport, process, and convey complex battlefield data into user friendly, streamlined, interfaces. This Project also exploits advances in the application of game theory to explore hypothetical operational scenarios that inform mission planning. These technologies will optimize mission command and network capabilities to fully realize AI on the battlefield.

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

Research in this Project supports Program Executive Office (PEO) Command Control Communications-Tactical (C3T).

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: AI-Enhanced Battle Damage Assessment	-	-	0.777
Description: Will mature and demonstrate game theory-based sensor-to-shooter optimization to assign available sensors to assess effects based on target and engagement type (target acquisition to terminal effects) and incorporate the capabilities into aided target recognition using mobile cooperative autonomous sensors (ATR-MCAS) and Prometheus. ATR-MCAS utilizes data from multiple sensors and and artificial intelligence technology to identify threat targets for engagement with various weapons systems. Prometheus is a system that utilizes artificial intelligence (AI) technologies to identify targets of interest from overhead satellite images. FY 2023 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: /	April 2022					
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603040A <i>I Artificial Intelligence and Ma</i> <i>chine Learning Advanced Technologies</i>	Project (Number/ DA7 I AI-Enabled Coordination Adv	roject (Number/Name) A7 I AI-Enabled Command and pordination Adv Tech					
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023				
ATR-MCAS and Prometheus technologies will be improved to provide additi to identify threats and then assess effects based on the target and engagem sensor to shooter problem and will be used as a foundation for AI-enhanced	onal, autonomous sensor options that can be use nent type. This represents the simplest form of th I operational maneuver.	ed						
FY 2022 to FY 2023 Increase/Decrease Statement: This is a new start in FY23.								
	Accomplishments/Planned Programs Sub	totals -	-	0.777				
N/A Remarks D. Acquisition Strategy N/A								

Exhibit R-2, RDT&E Budget Item	Justificat	i on: PB 202	23 Army								Date: April 2022		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)					R-1 Program Element (Number/Name) PE 0603041A <i>I All Domain Convergence Advanced Technology</i>								
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
Total Program Element	-	-	17.743	45.463	-	45.463	50.805	83.081	88.320	88.297	0.000	373.709	
CL9: Collab Battlefield Networked Leth Sys Adv Tech	-	-	8.871	12.365	-	12.365	-	-	-	-	0.000	21.236	
CM2: Collaborative Convergence Adv Tech Development	-	-	0.444	5.182	-	5.182	4.652	19.394	20.016	20.011	0.000	69.699	
CM8: Convergence Battlefield Integration	-	-	8.428	9.162	-	9.162	26.912	43.214	47.825	47.812	0.000	183.353	
DA4: All Domain Convergence Engineering & Architectures	-	-	-	18.754	-	18.754	19.241	20.473	20.479	20.474	0.000	99.421	

Note

Project DA4 (All Domain Convergence Engineering & Architectures) is a New Start Project in Fiscal Year 2023 (FY23).

A. Mission Description and Budget Item Justification

The Program Element (PE) executes research as part of a campaign of learning to assess feasibility of technologies in an operational environment, learning from early failure and re-scope research to improve speed of response, scalability, interoperability and range of engagement. This program element will deliver integration of technologies from sensor to shooter in near real-time, from tactical to strategic level, taking a system design approach in support of All Domain Situational Awareness (CJADC2). It will enable optimal lethal and non-lethal effects across all domains using artificial intelligence and machine learning to improve how we recognize threats, augment and enhance leader decision-making, replicate tactical behaviors to enable autonomous capabilities, and design system engineering architectures to validate interoperability of technologies.

Work in this PE complements PE 0603465A (Future Vertical Lift Advanced Technology) and PE 0603462A (Next Generation Combat Vehicle Advanced Technology).

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

Research is performed by the United States Army Futures Command.

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Arm	ny			Date:	April 2022				
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3 Technology Development (ATD)	: Advanced	R-1 Program Element (Number/Name) PE 0603041A <i>I All Domain Convergence Advanced Technology</i>							
B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total				
Previous President's Budget	0.000	17.743	0.000	-	0.000				
Current President's Budget	0.000	17.743	45.463	-	45.463				
Total Adjustments	0.000	0.000	45.463	-	45.463				
 Congressional General Reductions 	-	-							
 Congressional Directed Reductions 	-	-							
 Congressional Rescissions 	-	-							
 Congressional Adds 	-	-							
 Congressional Directed Transfers 	-	-							
Reprogrammings	-	-							
SBIR/STTR Transfer	-	-							
 Adjustments to Budget Years 	-	-	45.463	-	45.463				

Change Summary Explanation

FY23 funding increase reflects the fact that the FY 2022 President's Budget request did not include out-year funding.

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	Army							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)ProjePE 0603041A / All Domain Convergence ACL9 /dvanced TechnologyAdv T					umber/Na ab Battlefie	me) Id Networke	d Leth Sys
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CL9: Collab Battlefield Networked Leth Sys Adv Tech	-	-	8.871	12.365	-	12.365	-	-	-	-	0.000	21.236
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
The cited research is consistent Research in this Project is perfor Research in this Project supports Research in this Project is done	with the Und med by the s Next Gene	der Secreta United Stat eration Com	ry of Defens es (US) Arn bat Vehicle, ogram Elemo	e for Resent Tactical N Futures	arch and Er Command. etwork, Futi 02181A (Al	ngineering p ure Vertical I Domain Co	riority focus Lift, and Lo	ng Range F	the Army M Precision Firesearch).	emanty arc lodernizatio res Army M	on Strategy.	n Priorities.
B. Accomplishments/Planned F	Programs (S	in Million	<u>s)</u>						FY	2021	FY 2022	FY 2023
Title: Distributed Lethality Archite	ecture									-	3.170	3.731
Description: This effort provides systems to network fires for a mo Matures and demonstrates distrib FY 2022 Plans: Will develop a fires and air space Will provide Al-enhanced digital of coordination and delivery to reduce	a decision unted/dismo outed archite coordinatic collaborative ce sensor to	aid architec ounted and ecture and o on systems t e targeting c o shooter tin	ture that wil tactical ope data transmi to support A apability, ai nelines.	l integrate v ration cente ssion for se l-based de r space and	with current er capability ensor to sho cision aids i d fires de-co	and future s for Combin poter to optin in a network onfliction, as	sensors and led Arms M mize effects red lethality well as fire	d weapon aneuvers. s-based WT architectur es planning,	'Р. e.			
FY 2023 Plans: Will mature fires and air space co effects delivery using decision air data to include speed of platform reduce sensor to shooter timeline	oordination s ds for air an . Will demor es.	systems tha d ground as nstrate distri	t demonstra sets. Will m ibuted archi	te four-dim ature AI-er tecture and	lension (4-D hanced cap l optimized)) de-conflic bability train weapon targ	tion and sp ed on terrai get pairing c	eed of asse in and ballis capability to	ets for stic			
FY 2022 to FY 2023 Increase/De	ecrease Sta	atement:										

PE 0603041A: *All Domain Convergence Advanced Technolo...* Army

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603041A <i>I All Domain Convergence A</i> <i>dvanced Technology</i>	Project (Number/Name) CL9 / Collab Battlefield Networked Leth Sys Adv Tech				
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2021	FY 2022	FY 2023	
Program funding increase is part of planned efforts to mature and de	emonstrate the integrated decision aid architecture capab	ility.				
Title: Integrated Sensor to Shooter System			-	3.372	3.592	
Description: Demonstrates software that ingests intelligence, sense lower echelons for sensor to shooter integration. Integrates software systems to execute fires missions based on decision aids? recommended and the sense of	or cueing, tasking and target hand off data from/to higher e on combat platforms to enable on-board sensor and we endations with minimal operator input.	and apon				
FY 2022 Plans: Will integrate CBNLS with intelligence systems for theatre-net centric to execute fires at the tactical edge. Support demonstrations with Armulti-domain fires.	c geolocation data while tying current and emerging wea rmy?s system of systems joint fires architecture to enable	oons 9				
FY 2023 Plans: Will mature integration with intelligence systems and current and em the tactical, operational and strategic levels. Will demonstrate integra Will demonstrate role-based software running on combat platforms to Warfighters' fires and effects based on decision aids' recommendation	nerging weapons systems and platforms for Fires execution ation with joint fires architecture enabling multi-domain fir o joint Tactical Operations Center (TOC) at scale, to enal ons.	on at es. ble				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.						
Title: Fires Synchronization			-	2.005	5.042	
Description: Provides real-time, joint airspace integration between a airspace for emerging long range munitions. Matures and demonstration autonomous engagement using prior knowledge and real-time sense	airspace users and fires at various echelons to de-conflic ates algorithms for modeling adversary behavior for or data.	t				
FY 2022 Plans: Will forecast future threat positions using advanced AI algorithms to based on available long range fires for a large number of nodes and courses of action using reinforcement learning, intuitive role based h algorithms for larger data sets.	identify the optimal required airspace to be coordinated distributed entities. These AI algorithms will provide pote numan?machine interfaces as well as game theory based	ential				
FY 2023 Plans: Will demonstrate direct/indirect joint fires planning and course of action commander based on enemy common operating picture and friendly	ion analysis and provide multiple recommendations to the assets. Will mature AI-enhanced algorithms capability to	9				

PE 0603041A: *All Domain Convergence Advanced Technolo...* Army

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603041A <i>I All Domain Convergence A</i> <i>dvanced Technology</i>	Project (N CL9 / Coll Adv Tech	lumber/N ab Battle	mber/Name) Battlefield Networked Leth Sys		
B. Accomplishments/Planned Programs (\$ in Millions)		F	(2021	FY 2022	FY 2023	
autonomous engagements.	algorithms for modeling adversary behaviors fo	r				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase reflects increased effort on the synchronization of fires and e	execution of autonomous engagements.					
Title: SBIR/STTR Transfer			-	0.324	-	
Description: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638						
	Accomplishments/Planned Programs Sub	totals	-	8.871	12.365	
C. Other Program Funding Summary (\$ in Millions) N/A Remarks N/A D. Acquisition Strategy N/A						

Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060304 dvanced T	am Elemen 41A I All Doi Technology	t (Number/ main Conve	Name) ergence A	Project (N CM2 / Colla Developme	umber/Nar aborative C ent	ne) Convergence	e Adv Tech
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CM2: Collaborative Convergence Adv Tech Development	-	-	0.444	5.182	-	5.182	4.652	19.394	20.016	20.011	0.000	69.699
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
 A. Mission Description and Bud This Project develops and integra This is accomplished using adapt Project includes development of a Additionally, this Project will deve simulation necessary to enable m to shooter dominance. The cited research is consistent w Research in this Project is perform Research in this Project supports Army Modernization Priorities. Research in this Project is done in 	get Item Ju ates critical ive data fus advanced m lop the sca nission com with the Und med by the Next Gene n coordinati	ustification Project Cor sion and tas nethods for lable archite mand in mu der Secreta United Stat eration Com	ivergence to k allocation processing ecture soluti liti-domain o ry of Defens es (US) Arn bat Vehicle	echnologies algorithm t and informa ons necess operations. se for Resea ny Futures Long Rang ent (PE) 06	and the are o support th ation extrac sary to facili Also, the Pr arch and Er Command. ge Precisior 02181A (All	chitecture th ne developm tion for miss tate tactical roject will sh ngineering p n Fires, Air a I Domain Co	arough whic bent of Artifi sion oriented data collect ape early p riority focus and Missile	h the Projec cial Intellige d tasks in su tion, moven rograms to areas and Defense, Ta Applied Re	et Converge ence (Al) de upport of tao nent, proces accelerate t the Army M actical Netw search).	nce techno cision supp ctical decisi ssing, storag echnologie	logies will c oort agents. on makers. ge and mod s and achie on Strategy. uture Vertica	operate. This leling and eve sensor
B. Accomplishments/Planned P	rograms (§	in Million	<u>s)</u>						FY	2021 F	Y 2022	FY 2023
Title: Air and Missile Defense Join	nt Kill Chair	n Decision S	Support Mod	teling and S	Simulation					-	0.428	-
<i>Description:</i> Demonstrate interop Kill Chain Air and Missile Defense FY 2022 Plans:	perability of scenarios	in support o	erceptor, sei of Multi-Don	nsor, and fir nain Operat	e control er ions (MDO)	nabling tech).	nology cont	ribution to .	Joint			
Will demonstrate enabling missile fidelity models within the integrate	technology d air and m	/ in user def nissile defer	ined Joint k se simulati	(ill Chain Ai on architect	r and Missil ture.	le Defense s	cenarios by	/ employing	high			
FY 2022 to FY 2023 Increase/De	ecrease Sta	atement:										

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army

Date: April 2022

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022					
Appropriation/Budget Activity 2040 / 3	Project (Number/ CM2 I Collaborativ Development	Name) /e Convergence Adv Tech				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023		
Funding in this effort is realigned to the task Joint Kill Web Experimentati	on within this same Project.					
Title: Effects in the Joint Kill Web		-	-	5.182		
Description: Virtually demonstrate kinetic and non-kinetic actions in a contribute of the seeks to ensure that the Army can readily contribute to the Joi electromagnetic domains in an integrated and coordinated fashion.	ontested, Multi-Domain environment at all echelons. int Force in the land, air, maritime, cyber, space, and					
FY 2023 Plans: Integrate, demonstrate and conduct virtual experimentation on the effects contribution to the Joint Kill Chain. This effort will be coordinated with the a multi-service effort.	s of kinetic and non-kinetic effectors to support the A Defense Advanced Research Project Agency as par	rmy's t of				
FY 2022 to FY 2023 Increase/Decrease Statement: Increase in funding is required to experiment and virtually demonstrate convironment.	omplicated joint warfighting concepts in an All-Domai	n				
Title: SBIR/STTR Transfer		-	0.016	-		
Description: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638						
	Accomplishments/Planned Programs Subt	otals -	0.444	5.182		
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> N/A <u>D. Acquisition Strategy</u> N/A						

Exhibit R-2A, RDT&E Project J	ustification	: PB 2023 A	Army							Date: Apri	2022		
Appropriation/Budget Activity 2040 / 3					R-1 Progr PE 060304 dvanced T	am Elemen 41A <i>I All Do</i> Technology	it (Number / main Conve	Name) ergence A	Project (N CM8 / Con	bject (Number/Name) 8 / Convergence Battlefield Integration			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
CM8: Convergence Battlefield Integration	-	-	8.428	9.162	-	9.162	26.912	43.214	47.825	47.812	0.000	183.353	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
representative MDO scenarios d The cited research is consistent Research in this Project is perfor Research in this Project supports Research in this Project is done	with the Un rmed by the s Next Gene in coordination	al field expender der Secreta United Stat eration Com tion with Pro	riments. ry of Defens tes (US) Arn bat Vehicle	se for Rese ny Futures , Tactical N ent (PE) 06	arch and Er Command. letwork, and	ngineering p I Future Ver I Domain Co	priority focus tical Lift Arm	areas and ny Modernia Applied Re	the Army M zation Priori	lodernizatio	n Strategy.		
B. Accomplishments/Planned I	Programs (\$ in Million	<u>s)</u>						FY	2021 F	Y 2022	FY 2023	
Title: Convergence Ground Platf	form System	n Integration	l							-	6.063	5.639	
Description: Integration of groun effort matures and demonstrates shooter targeting time, increase n FY 2022 Plans: Will develop Convergence integra autonomous tactical behaviors, A platforms. Will also mature and of analytics to inform requirements	nd efforts in ground veh real-time ba ation and as Al-enabled o demonstrate for both pre	direct supp hicle technol ttlefield und ssessment of decision sup e ground vel sent and fut	ort of maturi ogies as an erstanding a capability wi port agent, hicle integra	ing and der integrated and ensure th networke and data m tion, multi-j and comba	monstrating system and communica ed aided targ nanagement platform net t military ve	Project Cor I system of s ations across get detection technologie work communications	nvergence c systems to r s all echelor n and recog es on multip unication ar	apabilities. reduce sens ns. jnition, le ground nd perform	This sor to				
MDO environment. FY 2023 Plans:								, .					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603041A <i>I All Domain Convergence A</i> <i>dvanced Technology</i>	e) Project (Number/Name) ce A CM8 / Convergence Battlefield Integra					
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2021	FY 2022	FY 2023		
Will develop integration and assessment capability with networked aided target behaviors, AI-enabled decision support agent, and data management technolog demonstrate additional ground vehicle integration, multi-platform, multi-service, analytics to inform requirements for both present and future tactical and comba in an MDO environment.	t detection and recognition, autonomous tactic gies on multiple ground platforms. Will mature , multi-national network communication and pe at military vehicles against a complex moving e	al and erform nemy					
FY 2022 to FY 2023 Increase/Decrease Statement: Decrease due to leveraging integration efforts from previous year.							
Title: Convergence Aviation Platform Integration			-	2.057	2.487		
Description: Integration of Aviation/Future Vertical Lift efforts in direct support Convergence capabilities. Focus is on integration of capabilities such as geo-lo aviation assets, air to ground situational awareness and target data exchange, tactical and teaming behaviors, synchronized data management, and efficient of	of maturing and demonstrating Project ocation and identification of targets from Army exchange of unmanned asset control, advanc usage of air lethality assets.	ed					
<i>FY 2022 Plans:</i> Will integrate individual capabilities developed under Full Spectrum Targeting er of hidden and decoy targets, sensor fusion), multiple simultaneous engagement autonomously, Advanced Teaming (supervised autonomous mission command Integrated Mission Equipment (platform-agnostic architecture for various science each other) in support of Project Convergence (PC) capability demonstrations. on technology maturity and applicability to overall PC kill chain scenarios in the	effort (detection, recognition and identification nt technologies (MSET) to engage targets ds, various payloads), XM915 20 mm cannon, ce and technology (S&T) efforts integrated with Will select for integration from listed efforts ba e demonstration.	and า ased					
<i>FY 2023 Plans:</i> Will integrate additional and updated capabilities developed under Full Spectru identification of hidden and decoy targets, sensor fusion), MSET to engage targ autonomous mission commands, various payloads), XM915 20mm cannon, an architecture for S&T efforts integrated with each other) in support of capability of	m Targeting effort (detection, recognition and gets autonomously, Advanced Teaming (super d Integrated Mission Equipment (platform-agn demonstrations.	vised ostic					
FY 2022 to FY 2023 Increase/Decrease Statement: Increase in funding allows for additional capabilities to be validated and integra	ted onto the platforms in preparation for PC23						
Title: Convergence Joint and Multinational Integration			-	-	1.036		
Description: Integration with Joint and Multi-National Partner technologies to concepts.	demonstrate cross domain capabilities and						

PE 0603041A: *All Domain Convergence Advanced Technolo...* Army

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022					
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603041A <i>I All Domain Convergence A</i> <i>dvanced Technology</i>	Projec CM8 /	ect (Number/Name) I Convergence Battlefield Integration						
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023				
FY 2023 Plans: Integrate technologies and data architectures between Army, Joint, and Multi-N	National Partners.								
FY 2022 to FY 2023 Increase/Decrease Statement: Increase in funds necessary to ensure that technologies can be seamlessly int partners for demonstration in Project Convergence.	egrated with sister Services and international								
Title: SBIR/STTR Transfer			-	0.308	-				
Description: Funding transferred in accordance with Title 15 USC ?638									
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638									
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638									
	Accomplishments/Planned Programs Sub	ototals	-	8.428	9.162				
C. Other Program Funding Summary (\$ in Millions) N/A Remarks N/A D. Acquisition Strategy N/A									

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: April	2022		
Appropriation/Budget Activity 2040 / 3				R-1 Program Element (Number/Name)ProjecPE 0603041A / All Domain Convergence ADA4 / Advanced Technology& Arch					Project (N DA4 / All D & Architect	ct (Number/Name) All Domain Convergence Engineering hitectures			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
DA4: All Domain Convergence Engineering & Architectures	-	-	-	18.754	-	18.754	19.241	20.473	20.479	20.474	0.000	99.421	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

<u>Note</u>

This is a new start in FY 2023.

This is a New Start Project in Fiscal Year 2023 (FY23).

A. Mission Description and Budget Item Justification

This Project enables critical engineering and architecture support to all Army modernization priorities as the Army pursues convergence. Full development of mature system and system of systems level architectures ensure objective and data-driven analyses can be performed on new Army technologies and modernization efforts. Development of digital engineering products for new Army technologies currently under development enable digital analyses and assessments to be performed rapidly and repeatedly prior to full scale field tests like Project Convergence.

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

Research is performed by the United States (U.S.) Army Futures Command and subordinate organizations.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Engineering for Architectures	-	-	13.754
Description: The engineering and architecture project provides critical systems engineering and codesigning of systems at the design phase in a digital engineering environment to improve performance and integration. This includes development and integration of architecture and engineering products from system level to a full system of systems level, models and simulations, software engineering, and other key efforts to support senior leader decisions.			
FY 2023 Plans: Will integrate system and system of system level architectures to represent current design of the Army Modernization Priority systems in a model-based architecture to conduct analysis on how systems within the six Army Modernization Priorities provide an integrated solution in Multi-Domain Operations. Will perform analysis through modeling and simulation to inform Project Convergence and generate design engineering artifacts to inform the development of systems.			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603041A <i>I All Domain Convergence A</i> <i>dvanced Technology</i>	Proje DA4 / & Arcl	ct (Number/N All Domain C hitectures	r/ Name) Convergence Engineering		
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2021	FY 2022	FY 2023	
This Project is a new start for FY23.						
Title: Technology Integration Analysis for Army Modernization Priorities			-	-	2.000	
Description: Conduct independent assessments of the feasibility, scalability a all-domain convergence environment. Primary focus will be to develop and ass to support trade studies and decision making across the Army Modernization F demonstration efficacy.	nd interoperability of technologies evaluated in sess architectures, develop models and simula Priority technologies, and evaluation of planned	i an tions				
FY 2023 Plans: Will conduct independent assessments of modernization priorities, Project Constudies, and M&S development in support of modernization priorities and Project	ivergence planning support, senior leader directed convergence.	cted				
FY 2022 to FY 2023 Increase/Decrease Statement: This Project is a new start for FY23.						
Title: Army Capability Architecture Development and Integration Environment	(ArCADIE)		-	-	3.000	
Description: ArCADIE will develop and demonstrate the Army?s authoritative data and tools. This effort develops ArCADIE enhancements, architectures, ar development, and S&T efforts in support of Army modernization.	cloud-based data source for Army Architecture nd dashboards to enable experimentation, cap	es, ability				
FY 2023 Plans: Will enhance the classified and unclassified cloud-based environment providing capabilities to ensure relevant and timely data and artifacts as part of Model Baintegration across Army Modernization Priorities. Will develop intelligent graphic architecture data and artifacts to support Model Based Systems Engineering.	g architecture development and analytical ased Systems Engineering efforts to support ical interfaces that allow visibility of integrated					
FY 2022 to FY 2023 Increase/Decrease Statement: This Project is a new start for FY23.						
	Accomplishments/Planned Programs Sub	totals	-	-	18.754	
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>						

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603041A <i>I All Domain Convergence A</i> <i>dvanced Technology</i>	Project (Number/Name) DA4 I All Domain Convergence Engineering & Architectures
D. Acquisition Strategy		
N/A		

Exhibit R-2, RDT&E Budget Item	n Justificat	ion: PB 202	23 Army							Date: April	2022	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)					R-1 Program Element (Number/Name) PE 0603042A / C3I Advanced Technology							
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	-	3.151	12.716	-	12.716	16.409	23.092	17.152	16.837	0.000	89.357
CN3: Network Enabling University Adv Development	-	-	3.151	3.993	-	3.993	4.013	3.902	3.564	3.563	0.000	22.186
CX7: Intelligent Env Battlefield Awareness Adv Tech	-	-	-	4.892	-	4.892	6.368	10.601	7.528	3.883	0.000	33.272
CX8: Persistent Geophysical Sensing-Infrasound Adv Tech	-	-	-	2.334	-	2.334	2.623	3.113	2.068	2.587	0.000	12.725
CX9: Sensing in Contested Environments Adv Technologies	-	-	-	1.082	-	1.082	1.099	2.067	-	-	0.000	4.248
CZ5: Subterranean Detection and Monitoring Adv Tech	-	-	-	0.415	-	0.415	1.266	1.421	1.421	1.919	0.000	6.442
DB5: Enabling Long Standoff 3D (ELS3D) Adv Tech*	-	-	-	-	-	-	1.040	1.988	2.571	4.885	0.000	10.484

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2023

A. Mission Description and Budget Item Justification

This Program Element (PE) matures, demonstrates, optimizes, and validates Network Command, Control, Communications, and Intelligence (C3I) technologies through the integration of future equipment and systems that improve overmatch and meet mission needs in the future operating environments. This PE provides mid-to-long term tactical C3I capabilities (e.g. networking, cyber, electronic warfare, Positioning, Navigation, and Timing (PNT), space, persistent surveillance) based upon promising technologies that address emerging and future threats, and includes research critical and unique to the Army and DoD. Efforts focus on advanced maturation and demonstration of materials, technologies, methodologies and systems that span the range from electronics, protective technologies, electronic warfare, and mission support capabilities such as situational awareness. These efforts directly inform and transition key capabilities to Army programs of record that support the Army modernization priorities.

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

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

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Arn	Date:	April 2022			
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3 Technology Development (ATD)	: Advanced	R-1 Program El PE 0603042A / 0	ement (Number/Name) C3I Advanced Technology	/	
B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	0.000	3.151	0.000	-	0.000
Current President's Budget	0.000	3.151	12.716	-	12.716
Total Adjustments	0.000	0.000	12.716	-	12.716
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
 Reprogrammings 	-	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	12.716	-	12.716

Change Summary Explanation

Fiscal Year 2023 (FY23) funding increase reflects the fact that the FY22 President's Budget request did not include out-year funding.

Exhibit R-2A, RDT&E Project J	ustification	: PB 2023 A	Army							Date: Apri	2022	
Appropriation/Budget Activity 2040 / 3		R-1 Program Element (Number/Name) Proje PE 0603042A / C3I Advanced Technology CN3 Deve Deve					ject (Number/Name) 3 I Network Enabling University Adv velopment					
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CN3: Network Enabling University Adv Development	-	-	3.151	3.993	-	3.993	4.013	3.902	3.564	3.563	0.000	22.186
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
This Project matures and demon This Project accelerates advance network security, advanced tean modernization in next generation Research in this Project will lead selected Universities. Research in this Project complet The cited research is consistent Research in this Project is perfor	ed technolo ning and open n Network and to emergin ments Progr with the Un rmed by the	anced Netw gies originat erations in a nd Assured g technolog ram Elemen der Secreta United Stat	ting from ex Global Pos Positioning ies in areas t (PE) 0602 ry of Defens es Army Fu	and, Control stramural re- sitioning Sy: , Navigatior of strategic 182A (C3L se for Rese stures Comr	I, Communi search in ac stem (GPS) n, and Timin c importance Applied Res arch and Er mand.	cations, and cademia, wi degraded o g (APNT) s e to the Arm search) / Pro	I Intelligence II enable inte or denied er ystems. ny in commu oject CN4 (N riority focus	e (C3I) tech elligent netw nvironment. unications a letwork Ena areas and	nologies int works, self-s This Projec nd networki abling Unive the Army M	to future eq sensing/self to also acce ing, by enga ersity Applie lodernizatio	uipment an -healing ne lerates the aging comp ed Researcl on Strategy.	d systems. twork, Army etitively n).
B. Accomplishments/Planned F	Programs (\$ in Million	<u>s)</u>	1.1					FY	2021 F	Y 2022	FY 2023
<i>Description:</i> Mature and integra corruption, and/or attacks and to <i>FY 2022 Plans:</i> Will mature, demonstrate and inte edge computer processing platfo optimize and demonstrate distrib computing nodes and edge comp	te advanced execute op egrate adva rms, edge s uted learnin puting Al/ML	d intelligent erational mi inced capab sensing syst ig under priv solutions fo	network sol ssions secu ilities in Al/l ems, space /acy and res or network-o	Metworks utions with arely and rel ML, predicti or persiste source cons driven intell	autonomou liably. Ive analytics ent surveillar straints and igence; den	s or self-ser s, cyber, intence applicat their comm nonstrate int	nsing intellig elligent data ions and oth unication be telligent mul	integration ner technolo tween ti-modal	ny , ogies;		0.301	0.400

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: /	April 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603042A / C3I Advanced Technology	Project (N CN3 / Netv Developme	j ect (Number/Name) 3 I Network Enabling University Adv velopment					
B. Accomplishments/Planned Programs (\$ in Millions) communications with improved reliability, efficiency, localization and effectiven and biosensor solutions) for intelligent network credentialing and access.	ess; and integrate senor technologies (biomet	ic FY	2021	FY 2022	FY 2023			
FY 2023 Plans: Will continue maturation of artificial intelligence and machine learning (AI/ML) s analytics software, intelligent data integration software, edge computer process technologies; Will demonstrate these algorithms on simulator software built to topologies and positions that are produced in on-field situations, as well as Arm	software for Network technologies, predictive sing platforms, edge sensing systems, and oth emulate tactical networks using the network ny experimental platform/devices.	er						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.								
Title: Advanced Real-Time Tactical Networks			-	1.262	1.300			
 Description: Develop tactical network technology platforms consisting of a flee autonomous reconnaissance mission in a relevant environment. FY 2022 Plans: Will develop, demonstrate and integrate Artificial Intelligence/Machine Learning holistic network functionalities to support advanced navigation/routing and autoperception and situational awareness for collaborative Ground and Air autonomin uncertain environments and challenging situations; and integrate mature technology 	et of ground and air vehicles that will perform a g Autonomy-related algorithms with improved pnomous reconnaissance mission. Will use sha nous systems, and advanced teaming operation hnologies with/to experimental Ground and Air	ared ons						
 FY 2023 Plans: Will continue to develop, and integrate Artificial Intelligence/Machine Learning holistic network functionalities, overlay for reliably supporting tactical cyberphysiand computation networks for advanced teaming operations. Will demonstrate components and continue to integrate mature technologies with/to experimenta development and prototyping. Will mature algorithms for collaborative RF sens and demonstrate on Army network testbeds. FY 2022 to FY 2023 Increase/Decrease Statement: 	Autonomy-related algorithms with improved sical systems over unreliable communication cache network with information reuse across al Ground and Air platforms for accelerated ing and inference for distributed tactical netwo	rks						
Funding change reflects planned lifecycle of this effort.								
<i>Title:</i> Advanced Sensors and Non-GPS PNT Systems			-	1.413	2.293			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	D	Date: April 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603042A / C3I Advanced Technology	Project (Number/Name) CN3 I Network Enabling University Adv Development				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2)21	FY 2022	FY 2023	
Description: Develop advanced sensors with enhanced signal processing soft electronic and kinetic attacks relative to GPS, and that can provide matured Po in disrupted, degraded or denied Global Positioning System (GPS) environment	ware/algorithms to improve assurance agains sitioning, Navigation and Timing (PNT) technorts.	both logy				
FY 2022 Plans: Will design, fabricate, and integrate GPS signal integrity monitoring sensors an in disrupted, degraded or denied GPS environments; and develop, mature, den atomic timing modules, advanced vision, radar, or other Global Navigation Sate that are computationally and physically lightweight.	d reporting systems to enhance Soldier aware nonstrate, and integrate technologies involving ellite System (GNSS)-independent PNT solution	ness I ns				
<i>FY 2023 Plans:</i> Will continue to design, fabricate, and integrate GPS signal integrity monitoring to enhance Soldier awareness in disrupted, degraded or denied GPS environm detection, characterization and geolocation. Will mitigate effects of threats on S	global and tactical sensors and reporting systems and inform regarding local threat emitter soldier PNT solution.	ems				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase will support the development and integration of integrity moni threat on Soldier PNT solutions.	toring tactical sensors and to mitigate the effe	cts of				
Title: SBIR/STTR Transfer			-	0.115	-	
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638						
	Accomplishments/Planned Programs Sub	otals	-	3.151	3.993	
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A						

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: April	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progr a PE 060304	am Elemen 12A / C3/ Ac	t (Number / lvanced Te	Name) chnology) Project (Number/Name) gy CX7 I Intelligent Env Battlefield Awareness Adv Tech			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CX7: Intelligent Env Battlefield Awareness Adv Tech	-	-	-	4.892	-	4.892	6.368	10.601	7.528	3.883	0.000	33.272
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23), this Project is realigned from Program Element (PE) 0603463A (Network C3I Advanced Technology) Project AR4 (Intelligent Env Battlefield Awareness Adv Tech).

A. Mission Description and Budget Item Justification

This Project optimizes and demonstrates technologies to allow Soldiers to maneuver faster around or through existing environmental (urban/industrial) conditions and physical landscape constraints. This effort matures and demonstrates web modules/software tools delivering crucial geo-chemical resources and advanced knowledge of geo-environmental infrastructure to mission planners. This Project delivers critical technologies that provide situational awareness for multi-source intelligence, particularly for anti-access/area denied (A2/AD) outside the continental United States (OCONUS) sites.

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

Research is performed at the United States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

This research complements Program Element (PE) 0602182A (C3I Applied Research) / Project CX3 (Intelligent Env Battlefield Awareness Apl Tech).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Arctic Threats Demonstrations	-	-	1.123
Description: This effort matures and demonstrates visualization tools which enable geospatial decisions based on anticipated physical threats, hazards and dependencies posed by terrain and weather extremes in cold regions.			
FY 2023 Plans: Will integrate weather models into high resolution remotely sensed terrain data platform demonstrating terrain state changes such as freeze/thaw, snowmelt, and ice vulnerability to aid in preventing risks to operational effectiveness and efficiency in cold regions.			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding realigned from PE 0603463A (Network C3I Advanced Technology) / Project AR4 (Intelligent Env Battlefield Awareness Adv Tech).			
Title: Geo-Forensics for Reconnaissance Exploitation	-	-	1.022

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603042A / C3I Advanced Technology	Project CX7 / Ir Adv Tec	ect (Number/Name) ' I Intelligent Env Battlefield Awareness Tech			
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023	
Description: This effort provides unique terrestrial patterns to describe and precological information associated with anti-access/area denial (A2/AD) sites fr	redict the geological, biological, and overall rom the continental United States (CONUS) and	alogs.				
FY 2023 Plans: Will demonstrate geospatial platform implementation of geo-forensic predictive and predict soil provenance.	e framework to geo-locate unknown soil sample	es				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding realigned from PE 0603463A (Network C3I Advanced Technology) / R Adv Tech).	Project AR4 (Intelligent Env Battlefield Awarene	ess				
Title: Predictive Geographic Information Systems (GIS) Mapping (physical) De	emonstration		-	-	1.646	
Description: This effort reduces the impact of unknown and changing terrain datasets and overlays of terrain obstacles producing a high-fidelity map that in and permafrost/ice data.	conditions by automating the integration of disp ntegrates soil composition, vegetation, hydrolog	oarate y,				
<i>FY 2023 Plans:</i> Will prototype, validate, and integrate geospatial tools describing geophysical	models in a unified geospatial framework.					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding realigned from PE 0603463A (Network C3I Advanced Technology) / R Adv Tech).	Project AR4 (Intelligent Env Battlefield Awarene	ess				
Title: Hydrology Mapping Demonstrations			-	-	0.491	
Description: This effort matures and demonstrates data tools and models to s that accurately show hydrologic/soil moisture threats (soil, hydrology, and snor capabilities.	support high-fidelity battlefield overlay maps w/ice) not captured by current terrain mapping					
FY 2023 Plans: Will demonstrate existing hydrologic and watershed tools and integrate applied in the Predictive GIS platform.	d research products (data, models, and algorith	ims)				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding realigned from PE 0603463A (Network C3I Advanced Technology) / R Adv Tech).	Project AR4 (Intelligent Env Battlefield Awarene	ess				
Title: Vegetation Property Demonstrations			-	-	0.610	

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date:	April 2022										
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603042A <i>I C3I Advanced Technology</i>	Project (Number/Name) CX7 I Intelligent Env Battlefield Awareness Adv Tech										
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023								
Description: Funding is realigned from PE 0603463A Project AR6 (Understan	ding the Environment as a Threat Adv Tech).											
<i>FY 2023 Plans:</i> Will generate datasets and demonstrate models that identify global-scale fores	t ecotones that inform regional planning.											
FY 2022 to FY 2023 Increase/Decrease Statement: Funding realigned from PE 0603463A (Network C3I Advanced Technology) / F Adv Tech).	Project AR4 (Intelligent Env Battlefield Awaren	ess										
	Accomplishments/Planned Programs Sub	ototals -	-	4.892								
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A												
Exhibit R-2A, RDT&E Project Justification: PB 2023 Army											2022	
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Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)Project (Number/Name)PE 0603042A / C3I Advanced TechnologyCX8 / Persistent Geophysical Ser Infrasound Adv Tech						sing-	
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CX8: Persistent Geophysical Sensing-Infrasound Adv Tech	-	-	-	2.334	-	2.334	2.623	3.113	2.068	2.587	0.000	12.725
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project is realigned from Program Element (PE) 0603463A (Network C3I Technology) / Project AS9 (Persistent Geophysical Sensing-Infrasound Adv Tech).

A. Mission Description and Budget Item Justification

This Project matures and demonstrates kitted hardware and software solutions that persistently monitor (through non-line-of-sight sensing including infrasound) critical infrastructure conditions and threat activities in dynamic battlefields. These technologies provide near real time data collection, processing, and alerts of infrastructure go/no-go condition required for maneuver planning. This Project also matures and demonstrates methodologies to assign maneuver relevant engineering attributes to geospatial feature data such as bridge load classification, road condition, and bathymetry. These technologies are critical to providing increased situational awareness leading to faster decision making and informing battlefield and maneuver operations.

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

Research is performed at the United States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

This research complements PE 0603042A (C3I Applied Research) / Project CX4 (Persistent Geophysical Sensing-Infrasound Apl Tech).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Battlefield Intelligence by Geophysical Sensing (BIGS) Demonstration	-	-	2.334
Description: This effort matures and demonstrates geophysical and geo-sensing technologies to persistently assess battlefield elements to include infrastructure (algorithm refinements) and additional sources of interest, such as explosive and fires events and various threats. Optimization of the array sensors and geometry to improve array performance for new sources of interest while reducing logistics will also be matured and demonstrated. New detection and classification signal processing algorithms will be validated throughout the life of the task in a phased demonstration schedule.			
FY 2023 Plans:			

Appropriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name) 2040 / 3 PE 0603042A / C3/ Advanced Technology CX8 / Persistent Geophysical Sen Infrasound Adv Tech B. Accomplishments/Planned Programs (\$ in Millions) FY 2021 FY 2022 Will validate and demonstrate classification algorithms of sources of interest as determined by stakeholders and provide software updates; Will utilize a military user assessment to evaluate alternate array geometry for feedback loop. FY 2021 FY 2022 FY 2022 to FY 2023 Increase/Decrease Statement: Funding realigned from PE 0603463A (Network C3I Technology) / Project AS9 (Persistent Geophysical Sensing-Infrasound Adv Tech). Accomplishments/Planned Programs Subtotals - C. Other Program Funding Summary (\$ in Millions) N/A Remarks N/A Accomplishments/Planned Programs Subtotals - D. Acquisition Strategy N/A N/A N/A N/A	Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022						
B. Accomplishments/Planned Programs (\$ in Millions) FY 2021 FY 2021 Will validate and demonstrate classification algorithms of sources of interest as determined by stakeholders and provide software updates; Will utilize a military user assessment to evaluate alternate array geometry for feedback loop. FY 2021 FY 2021 FY 2021 FV 2021 OF 7 2033 Increase/Decrease/Statement: Funding realigned from PE 0603463A (Network C3I Technology) / Project AS9 (Persistent Geophysical Sensing-Infrasound Adv Tech). - - C. Other Program Funding Summary (\$ in Millions) N/A - - Remarks D. Acquisition Strategy - - N/A N/A - -	Appropriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name) 2040 / 3 PE 0603042A / C3I Advanced Technology CX8 / Persistent Geop Infrasound Adv Tech Infrasound Adv Tech									
Will validate and demonstrate classification algorithms of sources of interest as determined by stakeholders and provide software updates; Will utilize a military user assessment to evaluate alternate array geometry for feedback loop. FY 2022 to FY 2023 Increase/Decrease Statement: Funding realigned from PE 0603463A (Network C3I Technology) / Project AS9 (Persistent Geophysical Sensing-Infrasound Adv Tech). - C. Other Program Funding Summary (\$ in Millions) - - N/A Remarks - D. Acquisition Strategy N/A	B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023					
FY 2022 to FY 2023 Increase/Decrease Statement: - Funding realigned from PE 0603463A (Network C3I Technology) / Project AS9 (Persistent Geophysical Sensing-Infrasound Adv - Accomplishments/Planned Programs Subtotals - - C. Other Program Funding Summary (\$ in Millions) N/A - N/A Remarks - - D. Acquisition Strategy N/A	Will validate and demonstrate classification algorithms of sources of inter updates; Will utilize a military user assessment to evaluate alternate arra	rest as determined by stakeholders and provide soft by geometry for feedback loop.	ware							
Accomplishments/Planned Programs Subtotals C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A	FY 2022 to FY 2023 Increase/Decrease Statement: Funding realigned from PE 0603463A (Network C3I Technology) / Projec Tech).	ct AS9 (Persistent Geophysical Sensing-Infrasound	Adv							
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A		Accomplishments/Planned Programs Sub	ototals -	-	2.334					
	<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A									

Exhibit R-2A, RDT&E Project Ju						Date: Apri	l 2022					
Appropriation/Budget Activity 2040 / 3						R-1 Program Element (Number/Name)Project (Number/Name)PE 0603042A / C3I Advanced TechnologyCX9 / Sensing in Contested Env Adv Technologies						onments
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CX9: Sensing in Contested Environments Adv Technologies	-	-	-	1.082	-	1.082	1.099	2.067	-	-	0.000	4.248
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year (FY) 2023, this Project is realigned from Program Element (PE) 0603463A (Network C3I Advanced Technology) Project AR8 (Sensing in Contested Environments Adv Tech).

A. Mission Description and Budget Item Justification

This Project matures and demonstrates advanced sensor technologies that characterize hazards posed to warfighters by non-weaponized biological hazards in subterranean environments. Demonstrations of adaptive commercial off the shelf sensor technologies on existing unmanned ground vehicles (UGV) platforms to gather end-user feedback. The capabilities resulting from this project provide Soldiers the capability to understand biological hazards present in subterranean environments and take necessary steps to mitigate or avoid these threats.

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

Work is performed at the U.S. Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

This work complements PE 0602182A (C3I Applied Technology) Project CX5 (Sensing in Contested Environments Technologies).

FY 2021	FY 2022	FY 2023
-	-	1.082
	FY 2021	FY 2021 FY 2022

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603042A / C3I Advanced Technology	Proje CX9 / Adv 7	Project (Number/Name) CX9 I Sensing in Contested Environments Adv Technologies					
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023			
Funding realigned from PE 0603463A (Network C3I Advanced Technology) Pr Tech).	oject AR8 (Sensing in Contested Environment	s Adv						
	Accomplishments/Planned Programs Sub	totals	-	-	1.082			
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A								

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army											2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)Project (Number/Name)PE 0603042A / C3I Advanced TechnologyCZ5 / Subterranean Detection an Monitoring Adv Tech						ne) etection and	1
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CZ5: Subterranean Detection and Monitoring Adv Tech	-	-	-	0.415	-	0.415	1.266	1.421	1.421	1.919	0.000	6.442
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23), this Project is realigned from Program Element (PE) 0603463A (Network C3I Advanced Technology) / Project AT3 (Subterranean Detection and Monitoring Adv Tech).

A. Mission Description and Budget Item Justification

This Project validates and demonstrates advanced subterranean monitoring and vulnerability assessment technologies providing mobile and man-portable solutions to enhance survivability and threat awareness during urban operations and negate enemy subterranean operation advantage. This Project also optimizes and demonstrates enhanced technologies to detect tunnels and tunneling activity in complex and varied environments. These capabilities are critical to provide greater situational awareness of the subterranean domain and enhanced survivability for the Soldier.

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

Research is performed at the United States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

This research complements PE 0602182A (Network C3I Enabling Technologies) / Project CX6 (Subterranean Detection and Monitoring Apl Tech).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Cavity Assessment in Variable Environments-Subterranean (CAVES) Demonstrations	-	-	0.415
Description: This effort validates and demonstrates an integrated suite of tunnel detection and perimeter security systems for application in variable terrain, and complex geologic environments, such as mountains, and hard rock geology common in the western pacific.			
FY 2023 Plans: Will validate which legacy tunnel detection systems will be evaluated in demonstrations in FY24 in hard rock geology.			
FY 2022 to FY 2023 Increase/Decrease Statement: In Fiscal Year 2023, funding realigned from Program Element 0603463A (Network C3I Advanced Technology) / Project AT3 (Subterranean Detection and Monitoring Adv Tech).			
Accomplishments/Planned Programs Subtotals	-	-	0.415

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022										
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603042A / C3I Advanced Technology	Project (Number/Name) CZ5 I Subterranean Detection and Monitoring Adv Tech								
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>										
<u>D. Acquisition Strategy</u> N/A										

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army											Date: April 2022		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)					R-1 Program Element (Number/Name) PE 0603043A / Air Platform Advanced Technology								
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
Total Program Element	-	-	0.754	17.946	-	17.946	18.557	20.486	17.036	15.635	0.000	90.414	
CL4: Air Platform Enabling University Adv Development	-	-	0.754	1.251	-	1.251	1.361	1.455	1.157	1.157	0.000	7.135	
CV1: Control & Autonomy for Tactical Superiority Adv	-	-	-	1.140	-	1.140	1.248	1.247	1.144	1.143	0.000	5.922	
CV2: Structures Platform Int Resilience & Efficiency	-	-	-	3.124	-	3.124	3.343	5.109	6.507	5.110	0.000	23.193	
CX1: Advanced Rotors Advanced Tech	-	-	-	2.618	-	2.618	2.645	2.669	2.670	2.669	0.000	13.271	
CX2: Next Generation Aviation Transmission Adv Tech	-	-	-	4.389	-	4.389	4.455	4.450	-	-	0.000	13.294	
DC3: HPC For Army Aviation Concepts	-	-	-	5.424	-	5.424	5.505	5.556	5.558	5.556	0.000	27.599	

Note

In Fiscal Year 2023 (FY23), Project CV1 (Control & Autonomy for Tactical Superiority Adv) and Project CV2 (Structures Platform Int Resilience & Efficiency) are New Start Projects.

Project CX1 (Advanced Rotors Advanced Tech) is a realignment from Program element (PE) 0603465A (Future Vertical Lift Advanced Technology) / Project AJ7 (Advanced Rotors Advanced Technology).

Project CX2 (Next Generation Aviation Transmission Adv Tech) is a realignment from PE 0603465A (Future Vertical Lift Advanced Technology) / Project AJ3 (Next Generation Rotorcraft Transmission Adv Tech).

Project DC3 (HPC For Army Aviation Concepts) is a realignment from PE 0603465A (Future Vertical Lift Advanced Technology) / Project AL3 (Next Generation Rotorcraft Transmission Adv Tech).

A. Mission Description and Budget Item Justification

This Program Element (PE) undertakes advanced technology efforts that support and enable the overall Army Aviation portfolio in general, and the Army's modernization priority for Future Vertical Lift (FVL). Vital and enduring research into advanced technologies is conducted pertinent to the air portfolio that supports mid-to-long

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 A	'ny			Date:	April 2022
Appropriation/Budget Activity		R-1 Program El	ement (Number/Name)	 	
2040: Research, Development, Test & Evaluation, Army I BA	3: Advanced	PE 0603043A / A	Air Platform Advanced 1	- echnology	
Technology Development (ATD)					
term requirements in contested operational environments an	d technologies that	at have broad app	lication to FVL moderniz	zation, as well as overa	all Army and specific
Department of Defense (DoD) aviation needs.					
Research in this PE contributes to the Army Science and Te	chnology (S&T) ai	r systems portfolio	and is fully coordinate	d with efforts in PE 060)2148A (Future Vertical Lift
Technology), PE 0603465A (Future Vertical Lift Advanced Technology)	echnology) and P	E 0602183A (Air F	Platform Applied Resear	rch).	
	connology) and r	2 0002 1007 (7 1		011).	
The cited research is consistent with the Under Secretary of	Defense for Rese	arch and Enginee	ring S&T focus areas a	nd the Army Moderniza	ation Strategy.
		-	-		
Research in this PE is performed by the United States Army	Futures Comman	d (AFC).			
B. Program Change Summary (\$ in Millions)	<u>FY 2021</u>	<u>FY 2022</u>	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	0.000	0.754	0.000	-	0.000
Current President's Budget	0.000	0.754	17.946	-	17.946
Total Adjustments	0.000	0.000	17.946	-	17.946
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
Congressional Adds	-	-			
 Congressional Directed Transfers 	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	17.946	-	17.946

Change Summary Explanation

FY23 funding increase reflects the fact that the FY 2022 President's Budget request did not include out-year funding.

Exhibit R-2A, RDT&E Project Ju							Date: April	2022				
Appropriation/Budget ActivityR-1 Program Elem2040 / 3PE 0603043A / Airnology							t (Number/ tform Adva	Name) nced Tech	Project (N CL4 / Air P Developme	umber/Nan latform Ena	ne) abling Univer	rsity Adv
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CL4: Air Platform Enabling University Adv Development	-	-	0.754	1.251	-	1.251	1.361	1.455	1.157	1.157	0.000	7.135
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project focuses on experimentation and demonstration of advanced technologies originating from extramural applied research in academia pertaining to navigation/ routing, autonomous robotic vehicles, artificial intelligence and machine learning as applied to aerial mobility and maneuver, holistic survivability, teaming, integrated mission systems, air-launched effects, and other innovative air enabling applied research technologies, that will accelerate the Army modernization in next generation aerial vehicles. This Project will mature and integrate advanced efforts to focus more on mid to far-term Army modernization priorities while also maintaining delivery of near-term technologies fundamental to the modernization priorities. This effort conducts and demonstrates advanced technology efforts arising from academic research in all areas of strategic importance to Army Aviation in artificial intelligence / machine learning (AI/ML), autonomous teaming systems, survivability, aeromechanics, advanced vertical take-off and landing (VTOL) design & concepts, flight dynamics, vibration & noise control, propulsion, human factor engineering and structures and materials, etc., by bringing competitively selected Universities with research and development teams into Technical Alliances. The Project will continuously experiment with methods to identify, demonstrate and transition novel technology from entities that might not otherwise collaborate with the Department of Defense (DoD), with the end goal of accelerating the adoption of cutting-edge applied research technology for the warfighter in the Army aviation portfolio.

Research in this Project supports the Army Modernization Priority Future Vertical Lift and the overall aviation portfolio.

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

Research in this Project is performed by the United States (US) Army Futures Command.

Research in this Project is done in coordination with and transitions to Program Element (PE) 0603465A (Future Vertical Lift Advanced Technology) and PE 0603119A (Ground Advanced Technology), and is also coordinated with its sister project in PE 0602148A (Future Vertical Lift Technology) and PE 0602183A (Air Platform Applied Research).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Advanced Teaming	-	0.320	-
Description: Demonstrate and integrate capabilities to self-organize and coordinate large teams of unmanned vehicles participating in long-term reconnaissance operation using distributed command/control architectures despite communication delays and/or failures and showcasing resilience to wide-area jamming.			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022					
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603043A <i>I Air Platform Advanced Tech</i> <i>nology</i>	Project (Number/I CL4 / Air Platform Development	Project (Number/Name) CL4 I Air Platform Enabling University Adv Development					
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023				
<i>FY 2022 Plans:</i> Will further mature and demonstrate decentralized self-organization a heterogeneous autonomous assets deployed inside contested envirous change in mission priorities. Will integrate and provide decentralized planning, sensing and control tools that reside inside the entire vehicle scalable approaches for perception to allow for rapid evaluation and	AI/ML algorithms among large team of unmanned onments that are robust to emerging threats, lost links, o interactions that will provide knowledge bases, reasonin the team and mobile computational resources. Will implei recognition of previously detected landmarks	r ig, ment						
FY 2022 to FY 2023 Increase/Decrease Statement: Realigned funds to new task "Vertical Lift Advanced Technologies" ir	n this Project.							
Title: Coordinated Air-Ground Vehicle Maneuvering	0.407	-						
 Description: Demonstrate and integrate a technology prototype platform consisting of a fleet of ground and air vehicles that will perform an autonomous reconnaissance mission in a relevant environment. FY 2022 Plans: Will demonstrate level coordinated landing/take-off of unmanned aerial system from stationary platform near ground vehicle in simulations. Will further mature and deploy software for air-ground coordination software support autonomous reconnaissance. Will integrate and demonstrate coordination strategies for autonomous ground and air vehicles to perform tactical reconnaissance. 								
mission.								
FY 2022 to FY 2023 Increase/Decrease Statement: Realigned funds to new task "Vertical Lift Advanced Technologies" in	n this Project.							
Title: Vertical Lift Advanced Technologies		-	-	1.251				
Description: Conduct advanced development within academia to material emerging technologies.	ature and integrate Vertical Lift research of promising an	d						
FY 2023 Plans: Will mature and integrate emerging technologies in areas of autonon advanced VTOL design & concepts, flight dynamics, vibration & nois structures & materials.	nous teaming systems, survivability, aeromechanics, e control, propulsion, human factor engineering and							
FY 2022 to FY 2023 Increase/Decrease Statement:								

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date	: April 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603043A <i>I Air Platform Advanced Tech</i> <i>nology</i>	Project (Numb CL4 / Air Platfo Development	e r/Name) m Enabling Univ	versity Adv
B. Accomplishments/Planned Programs (\$ in Millions)		FY 202	FY 2022	FY 2023
Combined tasks "Advanced Teaming" and "Coordinated Air-Ground Vehicle N Technologies"	Maneuvering" from FY22 to "Vertical Lift Advan	ced		
Title: SBIR/STTR Transfer			- 0.027	-
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638				
	Accomplishments/Planned Programs Sub	totals	- 0.754	1.251
N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A				

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: April	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060304 nology	am Elemen I3A / Air Pla	t (Number/ tform Adva	Name) nced Tech	e) Project (Number/Name) Tech CV1 I Control & Autonomy for Tactical Superiority Adv			tical
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CV1: Control & Autonomy for Tactical Superiority Adv	-	-	-	1.140	-	1.140	1.248	1.247	1.144	1.143	0.000	5.922
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

<u>Note</u>

This is a new start in FY 2023.

This is a New Start Project in Fiscal Year 2023 (FY23).

A. Mission Description and Budget Item Justification

This Project will deliver advanced flight controls, autonomy technologies, and new handling qualities criteria are implemented and tested in a realistic environment to demonstrate their functionality and increase their technical readiness level (TRL). This Project also delivers demonstrated and matured flight controls and autonomy technologies at TRL 6 to transition partners.

Research in this Project is fully coordinated with Program Element (PE) 0602183A (Air Platform Applied Technology).

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Adaptive Tactical Autonomy and Control (ATAC) Technology Demonstration	-	-	1.140
Description: Mature, integrate, and demonstrate advanced flight control technologies and state-of-the-art autonomy algorithms that provide Future Vertical Lift (FVL) aircraft with enhanced maneuverability and agility, reduced cognitive workload, improved survivability through damage tolerance, and the ability to operate on an autonomy spectrum from piloted to fully autonomous and exploit degraded environments as a force multiplier.			
FY 2023 Plans: Will demonstrate advanced high-speed flight control algorithms within the flight-envelop-limits of Army flying laboratories. Will demonstrate control strategies for seamless hand-off from pilot to autonomous system, and back, for optionally piloted operations.			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	April 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603043A <i>I Air Platform Advanced Tech</i> <i>nology</i>	Project (I CV1 / Col Superiorit	Project (Number/Name) CV1 I Control & Autonomy for Tactical Superiority Adv			
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2021	FY 2022	FY 2023	
Will collaborate with the original equipment manufacturers (OEM?s criteria and Mission Task Elements (MTE).	s) to mature and flight test new high-speed handling qualiti	es				
FY 2022 to FY 2023 Increase/Decrease Statement: This is a New Start in FY23.						
	Accomplishments/Planned Programs Sub	totals	-	-	1.140	
N/A Remarks D. Acquisition Strategy N/A						

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: April	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060304 nology	am Elemen 13A <i>I Air Pla</i>	t (Number/ tform Advai	Name) nced Tech	Project (N CV2 / Stru Efficiency	umber/Nan ctures Platfe	ne) orm Int Resi	lience &
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CV2: Structures Platform Int Resilience & Efficiency	-	-	-	3.124	-	3.124	3.343	5.109	6.507	5.110	0.000	23.193
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is a new start in FY 2023.

This is a New Start Project in Fiscal Year 2023 (FY23).

A. Mission Description and Budget Item Justification

This Project will ensure a continuous stream of transition-ready critical structures advanced technologies for improvement of performance (via weight efficiency and multifunctionality for parasitic weight avoidance) and resilience (survivability, sustainment, and operational availability).

Research in this Project is fully coordinated with Program element (PE) 0602183A (Air Platform Applied Technology).

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

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

		FT 2022	FY 2023
Title: Adaptive Resilient Engineered Structures (ARES)	-	-	3.124
Description: Mature, integrate, and demonstrate advanced structures technologies providing performance, survivability, and sustainment benefits with broad applicability across platform scale and role, enabling mission success for manned/unmanned Future Vertical Lift (FVL) platforms in the contested environment of multi-domain operations.			
<i>FY 2023 Plans:</i> Will further mature, test, and integrate advanced structures technologies, quantifying their contribution to improved efficiency, performance, survivability, and sustainment (reliability and availability). Will leverage trade study results to design an integrated demonstration exploiting the synergy of technologies including weight-saving, fatigue-tolerant, affordable, multifunctional, and damage-tolerant configurations for primary and secondary structure.			
FY 2022 to FY 2023 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: A	pril 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603043A <i>I Air Platform Advanced Tech</i> <i>nology</i>	Project CV2 / St Efficienc	ect (Number/Name) I Structures Platform Int Resilience & iency			
B. Accomplishments/Planned Programs (\$ in Millions)		I	FY 2021	FY 2022	FY 2023	
This is a New Start in FY23.						
	Accomplishments/Planned Programs Sub	totals	-	-	3.124	
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>						
D. Acquisition Strategy						
N/A						

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: April	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603043A <i>I Air Platform Advanced Tech</i> <i>nology</i>				Project (N CX1 / Adva	Project (Number/Name) CX1 I Advanced Rotors Advanced Tech		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CX1: Advanced Rotors Advanced Tech	-	-	-	2.618	-	2.618	2.645	2.669	2.670	2.669	0.000	13.271
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project is administratively realigned from:

Program Element (PE) 0603465A / Future Vertical Lift Advanced Technology

* Project AJ7 / Advanced Rotors Advanced Technology

A. Mission Description and Budget Item Justification

This Project investigates Future Vertical Lift (FVL) and other Army and Department of Defense (DoD) advanced drive train technologies that increase performance and double current drivetrain life cycles while improving their reliability and maintainability.

Research in this Project is fully coordinated with PE 0602183A (Air Platform Applied Technology).

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: High Speed Highly Efficient Rotors	-	-	2.618
Description: This effort demonstrates full scale, integrated rotor system technologies through the assessment of alternative designs aimed to satisfy future capability needs for aviation and FVL increased system durability, efficiency, speed, range, and payload. Potential technologies include: integrated high speed, low drag rotor technologies for high speed configurations; interactional aerodynamics tailoring between rotor and body & auxiliary lift/ propulsors; light weight, low volume, efficient and high authority electro-mechanical actuators (EMAs); reliable and robust actuators/hubs/controls for Independent Blade Control (IBC)/ swashplateless rotors; active/passive flow control; and automated track and balance.			
FY 2023 Plans: Will complete fabrication of demonstration hardware. Will conduct rotor blade and hub structural testing. Will conduct full scale whirl test planning. FY 2022 to FY 2023 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022								
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603043A <i>I Air Platform Advanced Tech</i> <i>nology</i>	Projec CX1 /	Project (Number/Name) CX1 / Advanced Rotors Advanced Tech					
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2021	FY 2022	FY 2023			
In FY23 this effort is realigned from PE 0603465A (Future Vertical Advanced Technology).	Lift Advanced Technology) / Project AJ7 (Advanced Rotors	s						
	Accomplishments/Planned Programs Sub	totals	-	-	2.618			
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A								

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: April	2022	
Appropriation/Budget Activity R-1 Program Element (Number 2040 / 3 PE 0603043A / Air Platform Advance nology PE				t (Number/ tform Adva	Name) nced Tech	ame) Project (Number/Name) ced Tech CX2 I Next Generation Aviation Transmission Adv Tech						
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CX2: Next Generation Aviation Transmission Adv Tech	-	-	-	4.389	-	4.389	4.455	4.450	-	-	0.000	13.294
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project is administratively realigned from: Program Element (PE) 0603465A / Future Vertical Lift Advanced Technology

* Project AJ3 / Next Generation Rotorcraft Transmission Adv Tech

A. Mission Description and Budget Item Justification

This Project develops and ground demonstrates variable-speed advanced transmission technologies that can be matured and integrated into the development of Future Vertical Lift (FVL) platforms and other Army and Department of Defense (DoD) aviation systems.

Research in this Project is fully coordinated with PE 0602183A (Air Platform Applied Technology).

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: High Reduction Ratio Transmission (HRT)	-	-	4.389
Description: This effort will mature and demonstrate the technologies necessary for development, design, fabrication, and testing of a high reduction-ratio transmission in two stages or less (60:1 reduction ratio) with high efficiency and improved reliability against corrosion and seal leakage. Technology demonstrations from this effort will be applicable to FVL platforms.			
<i>FY 2023 Plans:</i> Will perform component level fabrication, assembly, and risk reduction testing of transmission technologies that produces a 60:1 reduction ratio two-stage gearbox design for significant weight and volume reduction enabling extended range and component life while improving reliability and reducing life-cycle costs for manned and unmanned applications.			
FY 2022 to FY 2023 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: /	April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name)FPE 0603043A / Air Platform Advanced Tech0nology7	Name)Project (Number/Name)nced TechCX2 I Next Generation AviationTransmission Adv Tech		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
In FY23 this effort is realigned from PE 0603465A (Future Vertic Rotorcraft Transmission Adv Tech).	cal Lift Advanced Technology) / Project AJ3 (Next Generation			
	Accomplishments/Planned Programs Subto	tals -	-	4.389
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A				

Exhibit R-2A, RDT&E Project Ju	xhibit R-2A, RDT&E Project Justification: PB 2023 Army									Date: April	2022	
Appropriation/Budget Activity R-1 Program Element (Numb 2040 / 3 PE 0603043A / Air Platform Ac nology PE					t (Number/ tform Advai	Name) nced Tech	Project (Number/Name) DC3 I HPC For Army Aviation Concepts			ncepts		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
DC3: HPC For Army Aviation Concepts	-	-	-	5.424	-	5.424	5.505	5.556	5.558	5.556	0.000	27.599
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23), this Project is realigned from Program Element (PE) 0603465A (Future Vertical Lift Advanced Technology) / Project AL3 (HPC for Rotorcraft Applications Adv Tech).

A. Mission Description and Budget Item Justification

This Project develops and demonstrates the use of high-fidelity computational fluid dynamics for Future Vertical Lift (FVL) platforms through the utilization of Department of Defense (DoD) High- Performance Computing (HPC) and software tools for cutting-edge modeling and simulation, as well as adding software capabilities for workflow automation and design space exploration. Efforts in this Project are also applicable to the family of FVL and Future Unmanned Aircraft System (FUAS) platforms.

Work in this Project is fully coordinated with PE 0602183A (Air Platform Applied Research).

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

Research is performed by the United States (US) Army Engineer Research and Development Center and coordinated with US Army Futures Command.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Engineered Resilient Systems (ERS) for Army Aviation	-	-	2.359
Description: This effort supports Future Vertical Lift by exploiting advancements in physics-based software tools to provide rapid engineering analysis of proposed rotorcraft platforms, providing high-fidelity computational modeling of candidate Future Attack Reconnaissance Aircraft (FARA) platforms during the FARA down-selection, increasing the speed of simulations by automating simulation setup and execution on DoD HPC systems, and maturing and demonstrating the use of advanced machine learning techniques for aviation datasets to inform both the development of FVL systems and current operations.			
FY 2023 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603043A <i>I Air Platform Advanced Tech</i> <i>nology</i>	Project (Number/I DC3 / HPC For An	Project (Number/Name) DC3 I HPC For Army Aviation Concepts				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023			
Will provide automated tools and plugins to evaluators to support FARA / Futur evaluations. Will expand computational modeling and optimization efforts to include material and acoustic considerations.	e Long-Range Assault Platforms (FLRAA) des clude additional domains, e.g., advanced rotor	ign					
FY 2022 to FY 2023 Increase/Decrease Statement: In Fiscal Year (FY) 2023, this effort is realigned from Program Element (PE) 06 Technology) / Project AL3 (HPC for Rotorcraft Applications Adv Tech).	03465A (Future Vertical Lift Advanced						
Title: Advanced Computational Technologies for Army Aviation		-	-	3.065			
Description: This effort supports FVL by utilizing advanced machine-assisted of choose resilient platform variants. Advanced computational techniques will level computational testbeds in support of testing and evaluation. Increase high accur optimize platforms for all operational environments and mission scenarios. Proceedidate FARA, FLRAA, and FTUAS platforms to support acquisition decision	design algorithms to explore design spaces an erage automated design processes to expand uracy physics in modeling and simulation to ovide multi-fidelity computational models of n-makers.	d					
<i>FY 2023 Plans:</i> Will couple engineering design evaluation with simulated mission scenario perfective evaluation. Will expand computational modeling capability to secret and/or abore evaluate the usability of physics-informed machine learning methods and approximately systems.	ormance for mission-effectiveness design ve secured high-performance computing. Will baches to impact design and analysis of rotorc	raft					
FY 2022 to FY 2023 Increase/Decrease Statement: In Fiscal Year (FY) 2023, this effort is realigned from Program Element (PE) 06 Project AL3 (HPC for Rotorcraft Applications Adv Tech).	03465A (Future Vertical Lift Advanced Techno	ology)					
	Accomplishments/Planned Programs Sub	otals -	-	5.424			
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A							

Exhibit R-2, RDT&E Budget Iten	chibit R-2, RDT&E Budget Item Justification: PB 2023 Army							Date: April 2022				
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)			R-1 Program Element (Number/Name) PE 0603044A / Soldier Advanced Technology									
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	-	0.890	0.479	-	0.479	1.208	3.891	4.131	3.921	0.000	14.520
CN8: Soldier Enabled University Advanced Development	-	-	0.890	0.479	-	0.479	0.584	2.852	2.779	2.778	0.000	10.362
CW1: Technical-SAVVY Soldier Advanced Research*	-	-	-	-	-	-	0.624	1.039	1.352	1.143	0.000	4.158

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2023

A. Mission Description and Budget Item Justification

This Program Element (PE) matures, optimizes, and validates applied research technologies to demonstrate improved capabilities and systems that advance Soldier and Squad lethality-overmatch and Soldier performance beyond those technologies planned within the Soldier Lethality Cross-Functional Team. Advanced technology research efforts focus on the maturation and integration of broad capabilities and systems that span a range of technical areas to address enduring Soldier needs. These efforts transition outputs to existing and emerging systems in support of continuing enhancement of Soldier capabilities. This PE will fund civilian salaries for inhouse researchers/scientists and program managers collaborating with external subject matter experts in academia and industry who are leaders in these technology research areas.

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

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

B. Program Change Summary (\$ in Millions)	FY 2021	<u>FY 2022</u>	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	0.000	0.890	0.000	-	0.000
Current President's Budget	0.000	0.890	0.479	-	0.479
Total Adjustments	0.000	0.000	0.479	-	0.479
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
Congressional Adds	-	-			
 Congressional Directed Transfers 	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	0.479	-	0.479

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)	R-1 Program Element (Number/Name) PE 0603044A <i>I Soldier Advanced Technology</i>	
Change Summary Explanation Fiscal Year 2023 (FY23) funding increase reflects the fact that the FY2	22 President's Budget request did not include out-year fund	ding.
DE 0603044A: Soldier Advanced Technology	NCLASSIFIED	

Exhibit R-2A, RDT&E Project Ju	xhibit R-2A, RDT&E Project Justification: PB 2023 Army									Date: April	2022	
Appropriation/Budget Activity R-1 Progra 2040 / 3 PE 060304 ogy ogy					-1 Program Element (Number/Name) E 0603044A / Soldier Advanced Technol gy Development					Advanced		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CN8: Soldier Enabled University Advanced Development	-	-	0.890	0.479	-	0.479	0.584	2.852	2.779	2.778	0.000	10.362
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project leverages advanced technological innovations from academia to accelerate the optimization and demonstration of improved capabilities and systems that advance Soldier and Squad lethality-overmatch and Soldier performance and meet mission needs in the future operating environments. This Project funds collaborative, enduring advanced extramural university-based maturation and demonstration of technologies and brings together competitively selected universities with Army research teams into Technical Alliances. This Project will focus efforts on mid- to far-term Army modernization priorities while also maintaining delivery of near-term technologies critical to supporting the modernization priorities. The technical scope of this Project includes the optimization, maturation and demonstration of overarching Soldier-centric technologies including human systems integration, simplified synthetic training environments, advanced protective materials, power and energy, Warfighter endurance, robotics, as well as other innovative Soldier enabled advanced research technologies that will accelerate the Army modernization in Synthetic Training Environment, and Soldier Lethality. This Project conducts advanced research and development leading to potential emerging technologies in areas of strategic importance to the Army in Soldier capabilities related to increased protection, performance, agility, situational awareness, and lethality. This Project will also continuously strive to engage and collaborate with entities that might not otherwise collaborate with the Department of Defense (DoD) to demonstrate and provide novel Soldier-centric technologies for accelerating the adoption of emerging technologies for the Warfighter in the Army Soldier portfolio.

Research in this Project supports the Army Modernization Priorities of Synthetic Training Environment and Soldier Lethality, and the overall Soldier science and technology (S&T) portfolio.

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

Research in this Project is performed by the United States (US) Army Futures Command.

Research in this Project complements and supports transitions from Soldier Enabling University Applied Research in Program Element 0602184A (Soldier Applied Research).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Advanced Soldier Performance and Training	-	0.574	0.479
Description: Mature and demonstrates Soldier capabilities related to increased protection, performance, agility, situational awareness, training, and lethality.			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: /	April 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603044A / Soldier Advanced Technol ogy	Project (Number / CN8 / Soldier Ena Development	Name) bled University	/ Advanced
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<i>FY 2022 Plans:</i> Further mature and integrate reliable monitoring and assessment to digital/wireless biomarkers and biosensors; comprehensive automatenvironments are highly trustworthy, reliable, and usable.	echnologies for the health and readiness of Warfighters thr ated testing framework to guarantee that synthetic training	ough		
<i>FY 2023 Plans:</i> Down-select, optimize, and validate with Soldier input mobile monit identify conditions that might impede peak Soldier performance and	oring technologies, including digital/wireless biosensors, to d enable Warfighter readiness.	,		
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects the realignments to Program Element (PE Enabling University Adv Development).) 0603116A (Lethality Advanced Technology) / CG2 (Letha	lity		
Title: Soldier Advanced Materials for the Integrated Combat Platfor	m	-	0.284	-
Description: Optimize and mature advanced materials and electro through integrated combat platform.	nics that are standardized to the Soldier and their equipme	ent		
<i>FY 2022 Plans:</i> Mature Soldier electronics technology and optimize server process detection capabilities. Mature and demonstrate advanced materials materials, for increased protection, power, and wireless technology platform.	ing to enable real-time data/video analytics and faster targ s, such as flexible, energy storage, self-healing and super to further integrate with the Soldier and Squad combat	et		
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects the realignments to PE 0603116A (Lethali Adv Development).	ty Advanced Technology) / CG2 (Lethality Enabling Univer	sity		
Title: SBIR/STTR Transfer		-	0.032	-
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638				
	Accomplishments/Planned Programs Subt	otals -	0.890	0.479

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603044A <i>I Soldier Advanced Technol</i> <i>ogy</i>	Project (Number/Name) CN8 / Soldier Enabled University Advanced Development
C. Other Program Funding Summary (\$ in Millions) N/A Remarks		
<u>D. Acquisition Strategy</u> N/A		

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army									Date: April 2022			
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)				R-1 Program Element (Number/Name) PE 0603115A / Medical Development								
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	26.711	26.508	-	-	-	0.000	0.000	0.000	0.000	0.000	53.219
EB3: HIV Medical Development	-	26.711	26.508	-	(53.219

A. Mission Description and Budget Item Justification

This Program Element (PE) funds the Military Human Immunodeficiency Virus (HIV) Research Program and the following medical research efforts: Walter Reed Army Institute of Research (WRAIR) Vaccine Production research, Underbody Blast (UBB) research, and Deployed Warfighter Protection. Funding also supports the Medical Operational Data System (MODS), Pharmacovigilance Defense Application System (PVDAS), Mobile HealthCare Environment (MHCE), and the Civilian Authorized Salaries and Other Operational Requirements programs.

The Military HIV Program supports the research and development to develop candidate HIV vaccines, to assess safety and effectiveness in human subjects and to protect military personnel from risks associated with HIV infection.

The WRAIR Vaccine Production Facility research Project supports the development and licensure of vaccines and relevant biologics critical to the global health of our Warfighters serving domestically or abroad in compliance with Food and Drug Administration (FDA) regulations.

The UBB Testing medical research Project provides funds to establish a scientific and statistical basis for evaluating skeletal injuries to vehicle occupants during ground vehicle UBB events. Areas of interest to the Secretary of Defense are medical research that provides an understanding of the human response and tolerance limits and injury mechanisms needed to accurately predict skeletal injuries to ground combat vehicle occupants caused by UBB events. This enhanced understanding will support the establishment of an improved capability to conduct Title 10 Live Fire Test and Evaluation and to make acquisition decisions.

The Deployed Warfighter Protection program Armed Forces Pest Management Board provides for the development of new or improved protection of military personnel from insects and tick vectors of disease pathogens.

The MODS, PPVDAS, and MHCE identify, explore and demonstrate key technologies to overcome medical and military unique technology barriers.

The Civilian Authorized Salaries and other operational requirements provide funding for authorized civilian workforce performing medical research, development, acquisition management and oversight that support the medical research, development, test, and evaluation (RDTE) programs at the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, Maryland.

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 A	Date:	Date: April 2022					
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA Technology Development (ATD)	3: Advanced	R-1 Program Element (Number/Name) PE 0603115A / Medical Development					
B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total		
Previous President's Budget	26.711	26.521	0.000	-	0.000		
Current President's Budget	26.711	26.508	0.000	-	0.000		
Total Adjustments	0.000	-0.013	0.000	-	0.000		
 Congressional General Reductions 	-	-					
 Congressional Directed Reductions 	-	-					
 Congressional Rescissions 	-	-					
 Congressional Adds 	-	-					
 Congressional Directed Transfers 	-	-					
Reprogrammings	-	-					
SBIR/STTR Transfer	-	-					
FFRDC Transfer	-	-0.013	-	_	_		

Change Summary Explanation

Fiscal Year 2023 (FY23) funding increase reflects the fact that the FY22 President's Budget request did not include out-year funding.

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army											2022	
Appropriation/Budget Activity 2040 / 3				R-1 Program Element (Number/Name) PE 0603115A / Medical Development				Project (Number/Name) EB3 / HIV Medical Development				
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
EB3: HIV Medical Development	-	26.711	26.508	-	-	-	-	-	-	-	0.000	53.219
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Military Human Immunodeficiency Virus (HIV) Research Program develops vaccine candidates, to assess their safety and effectiveness in human subjects, and to protect military personnel from risks associated with HIV infection. All HIV technology development is conducted in compliance with United States Food and Drug Administration (FDA) regulations. This program is jointly managed through an Interagency Agreement between the United States Army Medical Research and Development Command (USAMRDC) and the National Institute of Allergy and Infectious Diseases. The cited work is also consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology focus areas.

The Walter Reed Army Institute of Research (WRAIR) Vaccine Pilot Bioproduction Facility (PBF) is the Department of Defense (DOD) only facility capable of producing good manufacturing practices (GMP) quality biologic products for use in early phase clinical trials. The mission of the WRAIR PBF is to support the development and licensure of vaccines and relevant biologics critical to the global health of our Warfighters serving domestically or abroad in compliance with United States FDA regulations. This project supports vaccine development efforts of strategic importance to the DoD, including Service medical research and development programs, those of other DoD organization such as the Defense Threat Reduction Agency and the Defense Advanced Research Projects Agency, and pandemic bio preparedness for emerging infectious disease threats in the Global Health Security Agenda.

The Underbody Blast (UBB) Testing medical research project will provide new data on the biomechanics of human skeletal response that occurs in an attack on a ground combat vehicle, it will provide better protection to mounted warriors from the effects of underbody blast caused by landmines or improvised explosive devices (IEDs). The data will provide a biomedical basis for the development of a Warrior-representative blast test manikin (the Warrior Injury Assessment Manikin or WIAMan project) and the required biomedically-valid injury criteria that can be used in Title 10 Live Fire Test and Evaluation (LFT&E) to characterize dynamic events, the risk of injury to mounted warriors, and to support acquisition decisions. The data produced by this project will be used to satisfy a critical need for a scientifically valid capability for analyzing the risk of injury caused by UBB.

The Deployed Warfighter Protection project, the Armed Forces Pest Management Board (AFPMB), plans to develop new or improved protection for ground forces from disease-carrying insects. The focus of this program is to develop new or improved systems for controlling insects that transmit malaria, dengue, chikungunya and other emerging infectious diseases under austere, remote, and combat conditions; understand the physiology of insecticidal activity to develop new compounds with greater specific activity and/or higher user acceptability; examine existing area repellents for efficacy and develop new spatially effective repellent systems useful in military situations; develop new methods or formulations for treating cloth to prevent vector biting; and expand the number of active ingredients and formulations of public health pest pesticides, products and application technologies available for safe, and effective applications. The AFPMB partners with the President's Malaria Initiative and the World Health Organization Global Malaria Program to lead development of new tools for insect-borne disease prevention.

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: A	pril 2022						
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name)ProjePE 0603115A / Medical DevelopmentEB3	ect (Number/N I HIV Medical	lame) Development					
The Medical Operational Data System (MODS) deploys modernized data visual MODS provides Army leadership with a responsive and reliable human resource civilian medical and support personnel. MODS provide Tri-Service support through the service support the service support the service support through the service	lization capabilities to enhance Army Unit and Indiv ce and readiness information management data sys ugh applications such as Electronic Profile, Behavio	idual Medical tem for all cate oral Health, an	Readiness Re egories of mil d Medical Ed	eporting. itary and ucation.				
The Pharmacovigilance Defense Application System (PVDAS) provides military providers Defense Patient Safety reports from the FDA after a drug's release to market. The program identifies, explores, and demonstrates key information technologies to overcome medical and military unique technology barriers.								
The Mobile HealthCare Environment (MHCE) is the capability of secure, bidirectional messaging and data exchange between patients, providers and clinics using any electronic device. The program identifies, explores, and demonstrates key information technologies to overcome medical and military unique technology barriers.								
The Civilian Authorized Salaries and Other Operational requirements provide for acquisition management and oversight that support the medical research, dever Research and Development Command (USAMRDC), Fort Detrick, Maryland.	unding for authorized civilian workforce performing relopment, test, and evaluation (RDTE) programs at	nedical resear the United Sta	rch, developm tes Army Meo	nent, dical				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023				
Title: HIV Medical Development		7.909	7.833	-				
Description: The Military HIV Research Program aims to mature candidate HIV effectiveness in human subjects, and to protect the military personnel from risks also include development of monoclonal antibody candidates to address HIV ris operations. This project determines one or more prevention countermeasure cardown-selection studies in large animal models and conducts human clinical tria safety and immunogenicity (ability to invoke an immune response), and contributed	/ vaccines, to validate their safety and s associated with HIV infection. These activities sk to the blood supply in large scale combat indidates that are optimized through pre-clinical ls in Africa, Asia and the United States to test for utes to early proof of concept efficacy testing.							
FY 2022 Plans: Military Health Research Program will complete a human trial evaluating multi- the Army?s lead adjuvant, determining a lead protein boost vaccine candidate f administration of vaccines can elicit stronger antibody responses; determine wh are the best for safety, immune responses and manufacturing; demonstrate Go generation subtype B mosaic vaccine candidates, informed by results from trial	dose vaccine regimens with the optimized dose of for further development; determine whether rapid nich formulations of the leading Army adjuvant od Manufacturing Practice manufacture of next s in large animal models.							
FY 2022 to FY 2023 Increase/Decrease Statement: Funding and mission realigned as part of US Army Medical Research and Deve Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section transferred to Program Element 0603115DHA, Project Code 373H.	elopment Command transfer to the Defense Health on 711) and NDAA 2020 (Section 737). Funding							
Title: WRAIR Vaccine Production Facility Research		8.189	8.107	-				

xhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022								
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603115A / Medical Development	Name) Project (Number/Name) ent EB3 / HIV Medical Development						
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023			
Description: The WRAIR Vaccine Pilot Bioproduction Facility (PBF) will focus of transition through production of early phase (1/2a) clinical materials from varied recombinant proteins, monoclonal antibodies, Ribonucleic Acid (RNA) and deox expand collaborative partnerships for product development that meet DoD required discovery efforts of new products for development; and (c) initiate and extend s (Government and industry) to develop/co-develop potential new biologic approximations.	on advanced technology development and I platforms, such as live virus, conjugates, xyribonucleic acid (DNA) approaches that: (a) irements; (b) open active intramural-based trategic partnerships with external collaborate aches to pandemic disease preparedness.	ors						
FY 2022 Plans: The WRAIR Pilot Bioproduction Facility is a support function for novel S&T prog the development of vaccine products into early phase (1/2a) clinical trials. Fold FY21 the PBF will focus on fostering partnerships with both internal and externa production efforts to support transfer of 6.1-6.3 budget activities for DoD and ex technology maturation and risk reduction of medical countermeasures for throug and effectiveness of candidate vaccines to support the warfighter.	grams from across MRDC and the DoD to adv owing full operational capability establishment al stakeholders to continue vaccine and biolog ternal stakeholders. These efforts will align t gh early phase (1/2a) clinical trials to assess	vance in gic o the safety						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding and mission realigned as part of US Army Medical Research and Deve Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section transferred to Program Element 0603115DHA, Project Code 373H.	elopment Command transfer to the Defense H on 711) and NDAA 2020 (Section 737). Fund	lealth ing						
Title: Underbody Blast Testing			1.274	-	-			
Description: The UBB Testing will provide an understanding of the biomechan vehicle UBB event involving a landmine or improvised explosive device (IED), a a Warrior-representative blast test manikin and associated biomedically-validate dynamic events and injury risks for Live Fire Test and Evaluation (LFT&E) crew development efforts to better protect Warriors from UBB threats.	ics of skeletal injuries that occur in a combat and the biomedical basis for the development ed injury criteria that can be used to characte survivability assessments and vehicle	of rize						
Title: Deployed Warfighter Protection			6.347	6.303	-			
Description: The Deployed Warfighter Protection program will mature new or in disease-carrying insects and ticks.	mproved tools to protect deployed forces from	n						
FY 2022 Plans: The Deployed Warfighter Protection program continues early translational researce deployed forces from biting ticks, mosquitoes and other insects which transmit I Forces Pest Management Board (AFPMB) continues to inform the development	arch for the development of novel tools that p lethal and force degrading diseases. The Arm t of performance requirements and necessary	rotect ied / test						

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603115A / Medical Development	Project (EB3 / H/	Project (Number/Name) EB3 / HIV Medical Development			
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2021	FY 2022	FY 2023	
and evaluation plans to determine a candidate product's capabilities and limitat RNAi insecticides targeting specific vector species) and personal bite protection and area repellents) will be developed for further testing in operationally relevant	ions. Novel vector control capabilities (incluent n tools (including new uniform fabric technolo nt environments.	ling gies				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding and mission realigned as part of US Army Medical Research and Deve Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section transferred to Program Element 0603115DHA, Project Code 373H.	elopment Command transfer to the Defense on 711) and NDAA 2020 (Section 737). Fund	Health ling				
Title: Medical Operational Data System			1.868	1.909	-	
Description: The Medical Operational Data System is the Army's authoritative (IMR) reporting, and supports Army Global Medical Force Readiness (GMFR) tresponsibilities to recruit, retain, pay and train the Army Medical Force.	data source for Individual Medical Readines o include the Army Surgeon General Title X	5				
FY 2022 Plans: MODS will complete the Engineering Process needed for required modifications Planning Data Platform to support the Army's evolving business/operational rec Force.	on of the					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding and mission realigned as part of US Army Medical Research and Deve Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section transferred to Program Element 0603115DHA, Project Code 373H.	elopment Command transfer to the Defense on 711) and NDAA 2020 (Section 737). Fund	Health ling				
Title: Pharmacovigilance Defense Application System			0.224	0.304	-	
Description: The PVDAS provides military providers Defense Patient Safety remarket.	ports from the FDA after a drug's release to					
FY 2022 Plans: Pharmacovigilance Defense Application System will demonstrate modifications thus eliminating the need for its own data warehouse, to give the application ac increasing capability and capacity to conduct drug studies and analyses. The r prescribing practices in the Military Healthcare System (MHS) at reduced total of FY 2022 to FY 2023 Increase/Decrease Statement:	to directly access to military healthcare data cess to the most up-to-date information while esults will optimize drug-use safety and impr cost of ownership (TCO).	bases, e also ove				

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: A	oril 2022					
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603115A / Medical Development	Projec EB3 /	Project (Number/Name) EB3 / HIV Medical Development				
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2021	FY 2022	FY 2023		
Funding and mission realigned as part of US Army Medical Research and Deve Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section transferred to Program Element 0603115DHA, Project Code 373H.	elopment Command transfer to the Defense H on 711) and NDAA 2020 (Section 737). Fund	lealth ing					
Title: Mobile Health Care Environment			0.238	0.331	-		
Description: The Mobile HealthCare Environment matures and demonstrates to bidirectional messaging and data exchange between patients, providers and cli	technologies to support the capability of secur inics using any electronic device.	re,					
FY 2022 Plans: Will continue device and data integration with backend records databases. Der requirements analysis, programming, and validation of secure chat, video and f expansion completed for data integration.	mand in these areas requires extensive file sharing capabilities within the platform						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding and mission realigned as part of US Army Medical Research and Deve Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section transferred to Program Element 0603115DHA, Project Code 373H.	elopment Command transfer to the Defense H on 711) and NDAA 2020 (Section 737). Fund	lealth ing					
Title: Civilian Authorized Salaries and Other Operational Requirements			0.662	0.753	-		
Description: Funding is provided to the USAMRDC for Medical Research Development of the payroll of civilians as well as nominal operating expensions.	elopment Acquisition (RDA) Management and se	ł					
FY 2022 Plans: Will fund civilian salaries and associated expenses (supplies, equipment, travel regulatory, clinical monitoring and data support for the Special Immunization Pr non-licensed vaccines under FDA oversight to personnel at risk of exposure to	l, etc.) at USAMRDC. Funding also provided ogram as necessary. This program will provided selected infectious diseases.	le					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding and mission realigned as part of US Army Medical Research and Deve Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section transferred to Program Element 0606105DHA, Project Code 376B.	elopment Command transfer to the Defense H on 711) and NDAA 2020 (Section 737). Fund	lealth ing					
<i>Title:</i> SBIR/STTR Tax			-	0.968	-		
FY 2022 Plans: SBIR/STTR tax.							
FY 2022 to FY 2023 Increase/Decrease Statement:							

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603115A / Medical Development	e) Project (Number/Name) EB3 / HIV Medical Development					
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023		
Funding transferred in accordance with Title 15 USC ?638.							
	Accomplishments/Planned Programs Subt	otals	26.711	26.508	-		
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A Remarks							
<u>D. Acquisition Strategy</u> N/A							

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army									Date: April 2022			
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)				R-1 Program Element (Number/Name) PE 0603116A / Lethality Advanced Technology								
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	-	8.066	9.796	-	9.796	14.361	15.493	12.415	10.382	0.000	70.513
CG2: Lethality Enabling University Adv Development	-	-	6.981	7.653	-	7.653	8.556	8.080	8.517	8.515	0.000	48.302
CH5: Terminal Effects Against Critical Targets Adv Tech	-	-	1.085	2.143	-	2.143	4.002	5.139	1.026	1.867	0.000	15.262
DB2: Future Armaments Scalable Technologies*	-	-	-	-	-	-	1.803	2.274	2.872	-	0.000	6.949

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2023

A. Mission Description and Budget Item Justification

Work done in this Program Element (PE) matures technologies, methodologies, and models required to enable next generation lethality. The PE focuses on: lethal mechanism technologies for projectiles and warheads that provide revolutionary capability to defeat Tier 1 adversary vehicle and body armors; selection of propulsion and energetic materials and technology to validate novel energetic materials concepts to exploit controllable energy release for future gun/missile systems; scalable effects for mixed target defeat while simultaneously decreasing warhead mass; experimentation of materials solutions for improvement of weight and volume efficiency, lethal effects and sustainability for the warfighter in the Army of today and beyond; and multiple pathways to enhance lethal effects by investigating synergistic effects of novel micro warheads using advanced materials.

This PE continues to mature and demonstrate technology developed under PE 0602141A (Lethality Technology).

Work in this PE complements PE 0603118A (Soldier Lethality Advanced Technology), PE 0603462A (Next Generation Combat Vehicle Advanced Technology), PE 0603464A (Long Range Precision Fires Advanced Technology), 0603465A (Future Vertical Lift Advanced Technology), and 0603466A (Air and Missile Defense Advanced Technology).

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

Research in this PE is performed by the United States (US) Army Futures Command (AFC).

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Arr	Date:	Date: April 2022					
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3 Technology Development (ATD)	3: Advanced	R-1 Program Element (Number/Name) PE 0603116A / Lethality Advanced Technology					
B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total		
Previous President's Budget	0.000	8.066	0.000	-	0.000		
Current President's Budget	0.000	8.066	9.796	-	9.796		
Total Adjustments	0.000	0.000	9.796	-	9.796		
 Congressional General Reductions 	-	-					
 Congressional Directed Reductions 	-	-					
 Congressional Rescissions 	-	-					
Congressional Adds	-	-					
 Congressional Directed Transfers 	-	-					
Reprogrammings	-	-					
SBIR/STTR Transfer	-	-					
 Adjustments to Budget Years 	-	-	9.796	-	9.796		

Change Summary Explanation

Fiscal Year 2023 (FY23) funding increase reflects the fact that the FY22 President's Budget request did not include out-year funding.
Exhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: April	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)Project (Number/Name)PE 0603116A / Lethality Advanced TechnolCG2 / Lethality Enabling UniversityogyDevelopment						1e) ng University	y Adv
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CG2: Lethality Enabling University Adv Development	-	-	6.981	7.653	-	7.653	8.556	8.080	8.517	8.515	0.000	48.302
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Project leverages advanced developments and technological innovations from academia, of lethal directed energy, laser diagnostics and accelerated design of future hypersonics and their scramjet engine combustion, deep learning and novel materials of importance to the Army, by maturing developments and performs demonstrations focused on getting technology to the warfighter more quickly. This Project exploits advanced research and development efforts to focus more on mid to far-term Army modernization priorities while also maintaining delivery of near-term technologies critical to the Long Range Precision Fires and Air and Missile Defense. This Project focuses on maturation and demonstration of various advanced technologies originating from extramural applied research in academia pertaining to lethal directed energy, laser diagnostics, future hypersonic glide body and scramjet propulsor design, deep learning, novel materials, and expansion of the Ballistic, Aero-Optics and Materials (B.A.M.) range applied to lethality. This effort validates advanced research and performs demonstrations leading to potential emerging technologies in areas of strategic importance to the Army in directed energy, future hypersonic glide body design, deep learning and novel materials, etc., by bringing competitively selected Universities with research and development teams into Technical Alliances.

Work in this Project supports the Army Modernization Priority Long Range Precision Fires and Air and Missile Defense.

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

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

This work is done in coordination with PE 0620141A (Lethality Technology), PE 0602147A (Long Range Precision Fires), PE 0603464A (Long Range Precision Fires Advanced Technology), and PE 0603466A (Air and Missile Defense Advanced Technology)

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Laser Diagnostics for Hypersonics and Directed Energy	-	2.144	2.208
Description: This effort matures laser diagnostics to assess turbulence and boundary layer transition, leading to validation of hypersonic flight models and enhanced directed energy system effectiveness and range through improved targeting, prediction and beam control.			
FY 2022 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date:	April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603116A <i>I Lethality Advanced Technol</i> <i>ogy</i>	Project (Number CG2 / Lethality Er Development	/Name) nabling Univers	sity Adv
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
Will mature a suite of laser diagnostics for hypersonic ground testing and modelaser propagation. Advanced development to inform the expansion of the Ballist testing and evaluation of hypersonic and directed energy systems.	els to predict effects of atmospheric turbulence stic, Aero-Optics and Materials (BAM)) range fo	on Dr		
FY 2023 Plans: Will continue to mature a suite of laser diagnostics for hypersonic ground testin turbulence on laser propagation. Develop capabilities to capture time volumetr development to inform the expansion of the BAM range for testing and evaluat	ng and models to predict effects of atmospheric ic gas density hypersonic flow imagery. Advan ion of hypersonic and directed energy systems	c ced s.		
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.				
Title: Turbulence and Transition Modeling and Validation for Hypersonic Vehic	cles	-	2.789	2.718
Description: This effort matures modeling turbulence and transition for hypers hypersonic glide bodies and systems through modeling and sub scale testing.	sonic vehicles to accelerate design of future			
FY 2022 Plans: Will accelerate and mature the design and advancement of hypersonic glide be modeling. Reduce flight test risk through modeling and sub scale wind tunnel t development to inform the expansion of the Ballistic, Aero-Optics and Material aerothermodynamic performance at hypersonic speeds.	odies and systems through turbulence and trar esting of effects of new design features. Advar s (B.A.M.) range for testing and evaluation of	nsition nced		
FY 2023 Plans: Will continue to accelerate and mature the design and advancement of hypers and transition modeling. Will mature boundary layer transition code development scale wind tunnel testing of effects of new design features. Advanced development Optics and Materials (B.A.M.) range for testing and evaluation of aerothermody	onic glide bodies and systems through turbule ent. Reduce flight test risk through modeling an ment to inform the expansion of the Ballistic, A ynamic performance at hypersonic speeds.	nce d sub ero-		
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.				
Title: Novel Materials for Extreme Environments		-	0.737	0.800
Description: This effort matures and validates computational and multiscale n effects of hypervelocity impacts (HVIs) and offer thermal protection.	nodels of high strain rate materials to mitigate t	he		
FY 2022 Plans:				

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	D	Date: April 2022					
Appropriation/Budget Activity 2040 / 3	et Activity R-1 Program Element (Number/Name) Proje PE 0603116A / Lethality Advanced Technol CG2 ogy Deve						
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2	021	FY 2022	FY 2023		
Will mature and validate critical high temperature materials and characterizatio thermal protection systems to defeat emerging threats from hypersonic weapor energy impacts through material layering and unique structures.	n testing and analysis capability for the design ns. Provide protection overmatch from high ki	of netic					
FY 2023 Plans: Will continue to mature and validate critical high temperature materials and chardesign of thermal protection systems to defeat emerging threats from hyperson materials. Provide protection overmatch from high kinetic energy impacts through	aracterization testing and analysis capability fo nic weapons. Mature numerical algorithms of s gh material layering and unique structures.	⁻ the elect					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.							
Title: Intelligent Hypersonics and Other Missile Defense Systems			-	1.057	1.927		
Description: This effort matures and validates hypersonic vehicle flight system adapt to changing conditions and become more lethal. Integration of air and mis systems and their instrumentation, simulation, and stimulation.	ns with deep learning neural networks that can issile defense (AMD) command and control (C	2)					
<i>FY 2022 Plans:</i> Will validate ablation characteristics and the semi-autonomous synthetic flight of learning and deep neural network tools for hypersonic vehicle geometries. Will simulation, and stimulation prototype capability for prototype development, and (AMD) C2 systems.	control systems performance utilizing machine integrate robust and extensible instrumentatio operational testing of air and missile defense	n,					
<i>FY 2023 Plans:</i> Will validate ablation characteristics and the semi-autonomous synthetic flight of learning and deep neural network tools for hypersonic vehicle geometries. Will scramjet propulsor with transpiration fuel delivery system for high-speed project instrumentation, simulation, and stimulation prototype capability for prototype d systems.	control systems performance utilizing machine fabricate and mature axisymmetric prototype tiles. Will integrate robust and extensible levelopment, and operational testing of AMD C	2					
FY 2022 to FY 2023 Increase/Decrease Statement:							
The increased funding provides to develop an optimally designed scramjet propoundary layer mixing enhancement to reduce aerodynamic drag, increase impound munitions.	pulsor that leverages transpiration fuel supply pact velocity and extend range of precision stri	and ke					
Title: SBIR/STTR Transfer			-	0.254	-		
FY 2022 Plans:							

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	April 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603116A / Lethality Advanced Technol ogy	/Name) Project (Number/Name) ed Technol CG2 I Lethality Enabling Univers Development					
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2021	FY 2022	FY 2023		
Funding transferred in accordance with Title 15 USC ?638							
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638							
	Accomplishments/Planned Programs Sub	ototals	-	6.981	7.653		
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A							

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	Army							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3		R-1 Program Element (Number/Name)ProjePE 0603116A / Lethality Advanced TechnolCH5 / TargetogyTarget					e ct (Number/Name) I Terminal Effects Against Critical ets Adv Tech					
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CH5: Terminal Effects Against Critical Targets Adv Tech	-	-	1.085	2.143	-	2.143	4.002	5.139	1.026	1.867	0.000	15.262
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
The cited research is consistent Research in this Project is perfor Command (AFC). Research in this Project complem	with the Uno med by the nents PE 06	der Secreta United Stat	ry of Defens es (U.S.) Er ethality Tecl	se for Rese ngineer Res nnology) / F	arch and Er search and Project CF8	ngineering p Developme (Terminal E	nt Center (E	areas and RDC) in co	the Army M pordination v Targets Tec	lodernizatio with U.S. A h).	on Strategy.	
B. Accomplishments/Planned F	Programs (S	in Million	<u>s)</u>						FY	2021	FY 2022	FY 2023
Title: Advanced Terminal Effects	Demonstra	tion								-	1.045	2.143
<i>Description:</i> Demonstrates and tool to support Long Range Preci <i>FY 2022 Plans:</i> Provide engineering codes for bla algorithms for Battle Damage Ass	provides a p sion Fires (l ast effects a sessment (E	predictive ca LRPF) wear gainst struc 3DA) tools.	apability for coneering o tures and c	terminal eff n critical str ritical targe	fects and lef ructural and ts and will d	hality and a geological emonstrate	a fast runnin targets of in damage de	g engineeri terest. etection	ng			
FY 2023 Plans: Will demonstrate and provide high and provide and integrate steel pr	h fidelity an enetration a	d fast-runnii Ilgorithms fo	ng runway c or army mur	ratering too itions on c	ols for dama ritical target	age predictio sets into we	on of Army F eapon effec	Fires muniti ts code.	ons;			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase reflects the planned lifecycle of this effort to demonstrate and provide technologies completed in PE 0602141A (Lethality Technology) / Project CF8 (Terminal Effects Against Critical Targets Tech).												
Title: FY 2022 SBIR/STTR Trans	fer									-	0.040	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603116A / Lethality Advanced Technol ogy	Project CH5 / 7 <i>Targets</i>	(Number/N Terminal Effe Adv Tech	Vame) ects Against C	Critical
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	ototals	-	1.085	2.143
N/A Remarks N/A D. Acquisition Strategy N/A N/A					

Exhibit R-2, RDT&E Budget Ite	em Justifica	tion: PB 202	23 Army							Date: April	2022	
Appropriation/Budget Activity 2040: Research, Development, Technology Development (ATD)	Test & Evalu	ation, Army	/ BA 3: <i>Adv</i>	anced	R-1 Progr PE 06031 ²	am Elemen 17A I Army /	t (Number / Advanced 7	Name) Technology	Developme	nt		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	64.163	76.815	134.874	-	134.874	141.342	152.643	100.027	74.852	0.000	744.716
BS2: Army Advanced Technology Development	-	64.163	76.815	134.874	-	134.874	141.342	152.643	100.027	74.852	0.000	744.716
into system prototypes for field Efforts develop proof of technol	experiments ogical feasib	and/or tests	in a simula	ited enviror subsystem FY 2021	and compo	nent operat	bility that ma	ay lead to fu se	ull system do	evelopment C O	and prototy	oing. tal
Previous President's Bu	daet	<u>107</u>		62 663	76.8	15	0.0	00		-	0.0	00
Current President's Bud	aet			64.163	76.8 ⁻	15	134.8	74		-	134.8	74
Total Adjustments				1.500	0.00	00	134.8	74		-	134.8	74
Congressional	General Red	ductions		-		-						
Congressional	Directed Re	ductions		-		-						
 Congressional 	Rescissions			-		-						
 Congressional 	Adds			-		-						
 Congressional 	Directed Tra	Insfers		-		-						
 Reprogrammir 	igs			1.500		-						
• SBIR/STTR Tr	ansfer			-		-						
 Adjustments to 	Budget Yea	irs		-		-	134.8	74		-	134.8	74

Change Summary Explanation

Fiscal Year 2023 (FY23) funding increase reflects the fact that the FY22 President's Budget request did not include out-year funding.

Exhibit R-2, RDT&E Budget Iten	n Justificat	t ion: PB 202	23 Army							Date: April	2022	
Appropriation/Budget Activity 2040: Research, Development, Te Technology Development (ATD)	anced	R-1 Program Element (Number/Name) PE 0603118A / Soldier Lethality Advanced Technology										
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	154.161	152.369	100.935	-	100.935	92.336	93.015	107.234	115.561	0.000	815.611
AY5: Soldier Squad Small Arms Armaments Advanced Tech	-	9.797	11.447	6.516	-	6.516	6.622	6.615	6.616	6.615	0.000	54.228
AY7: Small Arms Fire Control Advanced Technology	-	13.315	13.094	3.066	-	3.066	2.564	-	-	-	0.000	32.039
AY9: Body Armor & Integrated Headborne Advanced Tech	-	9.520	7.704	8.112	-	8.112	8.211	10.666	10.589	10.563	0.000	65.365
AZ6: Soldier Signature Management Advanced Technology	-	1.605	2.969	3.084	-	3.084	3.116	3.131	3.132	3.132	0.000	20.169
BB3: Dismounted Soldier Survivability Equip/Tech Integ	-	1.238	3.026	3.458	-	3.458	3.522	3.518	3.519	3.518	0.000	21.799
BB6: Physical Augmentation: Adv Tech for Field Demo	-	2.865	-	-	-	-	-	-	-	-	0.000	2.865
BB8: Soldier Centric Advanced Technology	-	5.622	5.292	2.391	-	2.391	1.880	-	-	-	0.000	15.185
BC1: Human Performance AdvTech for Mobility & Lethality	-	12.207	13.944	9.415	-	9.415	6.986	7.374	7.325	7.321	0.000	64.572
BC4: Soldier Decision Making&Comms Performance AdvTech	-	1.925	-	-	-	-	-	-	-	-	0.000	1.925
BC8: Training Advanced Technology (Other than STE)	-	4.140	2.993	7.078	-	7.078	7.650	10.289	23.443	31.277	0.000	86.870
BC9: Adv Soldier Sensors/ Displays AdvTech for Dismounts	-	8.738	13.151	25.963	-	25.963	27.040	26.606	28.425	28.937	0.000	158.860
BD7: Soldier Sys Interfaces/ Integration-Sensor AdvTech	-	9.110	8.374	8.535	-	8.535	8.196	8.590	9.311	9.309	0.000	61.425
BD9: Soldier & Sm Unit Tactical Energy AdvTech	-	6.041	3.171	4.189	-	4.189	4.269	4.520	4.518	4.517	0.000	31.225

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army										Date: April 2022			
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)					R-1 Program Element (Number/Name) PE 0603118A <i>I Soldier Lethality Advanced Technology</i>								
BE2: Joint Service Combat Feeding Advanced Technology	-	2.367	2.424	1.988	-	1.988	2.019	2.016	2.121	2.120	0.000	15.055	
BE5: Personnel & Airdrop Safety Advanced Technology	-	5.707	6.879	6.484	-	6.484	6.603	6.668	7.306	7.304	0.000	46.951	
BE9: STE Advanced Technology	-	14.764	13.401	10.656	-	10.656	3.658	3.022	0.929	0.948	0.000	47.378	
BS8: Soldier Lethality Advanced Technology	-	45.200	44.500	-	-	-	-	-	-	-	0.000	89.700	

A. Mission Description and Budget Item Justification

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

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

This PE is directly aligned to the Soldier Lethality and STE Modernization Priorities.

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

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 A	rmy			Date	: April 2022	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA Technology Development (ATD)	3: Advanced	R-1 Program E PE 0603118A /	lement (Number/Name) Soldier Lethality Advance	ed Technology		
B. Program Change Summary (\$ in Millions)	<u>FY 2021</u>	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023	Total
Previous President's Budget	151.370	107.966	0.000	-		0.000
Current President's Budget	154.161	152.369	100.935	-	10	0.935
Total Adjustments	2.791	44.403	100.935	-	10	0.935
 Congressional General Reductions 	-	-				
 Congressional Directed Reductions 	-	-				
Congressional Rescissions	-	-				
Congressional Adds	-	44.500				
Congressional Directed Transfers	-	-				
Reprogrammings SPIP/STTP Transfor	2.791	-				
Adjustments to Budget Vears	-	-	100 035		10	0 035
FFRDC Transfer	-	-0.097	-	-	10	-
Congressional Add Details (\$ in Millions, and Incl	udes General Re	ductions)		ſ	FY 2021	FY 2022
Project: BS8: Soldier Lethality Advanced Technology	/					
Congressional Add: Program Increase - Advance	d Al/AA Analytics	for Modernization	and Readiness	-	10.000	10.000
Congressional Add: Program Increase - Small Ar	ms Fire Control A	dvanced Technolo	gy		8.000	8.000
Congressional Add: Program Increase: Advanced	l Technology for N	laneuver Support	and Protection	_	10.000	-
Congressional Add: Program Increase - Military E	ngineering Techn	ology for Infield W	/aste		2.000	-
Congressional Add: Program Increase - Flexible	LED Lighting for T	Tents and Shelters	3		5.200	-
Congressional Add: Program Increase				_	10.000	-
Congressional Add: Ferrium Steel for Improved F	ersonal Protective	e Equipment		_	-	5.000
Congressional Add: Human Machine Teaming					-	4.000
Congressional Add: Impact Attenuation Materials	for Limb Protection	on			-	1.500
Congressional Add: Soldier Situational Awarenes	s				-	8.000
	Resupply				-	8.000
Congressional Add: Squad Operations Advanced	, coouppij					
Congressional Add: Squad Operations Advanced		C	Congressional Add Subto	tals for Project: BS8	45.200	44.500

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)	R-1 Program Element (Number/Name) PE 0603118A <i>I Soldier Lethality Advanced Technology</i>	
Change Summary Explanation Fiscal Year 2023 (FY23) funding increase reflects the fact that the FY22	2 President's Budget request did not include out-year fund	ling.

Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)ProjePE 0603118A / Soldier Lethality AdvancedAY5 /TechnologyArma					roject (Number/Name) Y5 I Soldier Squad Small Arms rmaments Advanced Tech		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AY5: Soldier Squad Small Arms Armaments Advanced Tech	-	9.797	11.447	6.516	-	6.516	6.622	6.615	6.616	6.615	0.000	54.228
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
This Project demonstrates individ Warfighter in support of the Army' is based upon the Joint Service S The cited research is consistent w This Project complements work de Research in this Project is perform	ual and cre s Soldier L mall Arms vith the Und one in Prog ned by the	w-served w ethality Moo Master Plan der Secretar gram Eleme United State	eapon desig lernization p i (JSSAMP) y of Defens nt (PE) 0602 es Army Fut	ons and tec priority and and the Jo e for Resea 2143A (Sole ures Comn	all of the Se int Capabili arch and En dier Lethalit nand (AFC)	nat ennance ervices. All v ties Integrat gineering p vy Technolog	work is led b ion Develop riority focus gy) / AY6 (S	g capabilitie by the Joint oment Syste areas and coldier Squa	s and surviv Service Sm em's Small / the Army M id Small Arr	ability of tr all Arms Pr Arms Analy odernizatio ns Armame	e dismount ogram (JSS ses. n Strategy. ents Techno	ed SAP) and logy).
B. Accomplishments/Planned P	rograms (\$	in Millions	<u>s)</u>						FY	2021 F	Y 2022	FY 2023
Title: Small Arms Technology Der	nonstratior	1								2.900	4.720	6.516
Description: This effort matures a ammunition and weapon system to supports the Joint Warfighter's sm levels and confidence of design fu	and demon echnologie all arms ca nctionality	strates the f s for integra pability nee in advanceo	Next Genera tion into live ds as well a d operating s	ation Family fire demor s validates scenarios.	y of Ammun nstrations. I small arms	ition by opti t refines we s weapon sy	mizing sma apon syster stem techn	ll arms n integration plogy readir	n and ness			
FY 2022 Plans: Will mature and demonstrate technological advancements of small arms systems in relevant environments; mature and demonstrate automated target recognition and engagement technologies, signature reduction devices, technologies and evaluations for legacy and Next Gen weapons, ammunition design optimizations for novel targets, augmented weapon system controllability, and advanced optical systems with machine learning algorithms for technology insertions into emerging systems identified by the Joint Warfighters.												
FY 2023 Plans: Will validate small arms system/su targets; optimize automated target evaluations for legacy and next ge	ubsystem m t recognitio eneration w	nodels in rel n and engag eapons; imp	evant envirc gement tech prove perfor	onments to inologies, s mance of: a	ensure opti signature rec ammunition	mal perform duction devi for novel ta	nance again ices, and te irgets; augn	st relevant chnologies nented weat	and			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army

Date: April 2022

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / Soldier Lethality Advanced Technology	Project (Number/Name) AY5 I Soldier Squad Small Arms Armaments Advanced Tech				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023		
system controllability and maintainability, and advanced optical syste technology insertions into current and emerging systems identified b	ems with machine learning algorithms; demonstrate potent y the Joint Warfighter.	ial				
FY 2022 to FY 2023 Increase/Decrease Statement: Increase provides for further maturation of prior Applied Research in demonstrations and transitions to the Program Managers focused of environments in the areas of remote powered armament systems, in supporting technologies, signature reduction technologies, and small	vestments into Technical Readiness Level (TRL) 6 techno n dismounted Soldier improvements in denied and austere icreased probability of hit, Next Generation Soldier Weapo I arms lethality increases.	logy n				
Title: Next Generation Family of Ammo		6.897	6.309	-		
Description: This effort matures and demonstrates the next general through integration into new weapon systems that will provide an inc	tion of small arms live training ammunition by optimizing it creased level of lethality.					
FY 2022 Plans: Will improve performance of initial base technologies of the combat demonstrate capability as fully functional projectiles. Ammunition eff	tracer and reduced range tracer concepts to validate and ort aligned with the Next Generation Squad Weapon (NGS	W).				
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> Fiscal Year 2022 (FY22) is the final year of execution for this task.						
Title: FY2022 SBIR/STTR Transfer		-	0.418	-		
Description: Funding transferred in accordance with Title 15 USC ?	638					
<i>FY 2022 Plans:</i> Funding transferred in accordance with Title 15 USC ?638						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638						
	Accomplishments/Planned Programs Subto	tals 9.797	11.447	6.516		
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A						
PE 0603118A: Soldier Lethality Advanced Technology	UNCLASSIFIED					

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3		R-1 Program Element (Number/Name)ProPE 0603118A / Soldier Lethality AdvancedAY7TechnologyTech					oject (Number/Name) 7 I Small Arms Fire Control Advanced chnology					
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AY7: Small Arms Fire Control Advanced Technology	-	13.315	13.094	3.066	-	3.066	2.564	-	-	-	0.000	32.039
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
This Project matures and demons longer ranges in all operational er Long Range Precision Fires mode The cited research is consistent v This Project complements work d Research in this Project is perform	strates fire nvironment ernization p vith the Uno one in Prog med by the	control and t s and to me priorities. der Secretar gram Eleme United State	targeting se et the capa ry of Defens nt (PE) 060 es Army Fu	ensor techno bility needs se for Rese 2143A (Sol tures Comr	ologies and of Army Sc arch and Er Idier Lethalit mand (AFC)	techniques ience and T ngineering p ty Technolog	to improve Fechnology riority focus gy) / AY8 (S	targeting a Soldier Let areas and Small Arms	nd lethality hality, Next the Army M Fire Contro	n order to Generatior Iodernizatio	maintain ove n Combat Ve on Strategy. gy).	ermatch at ehicle, and
B. Accomplishments/Planned P	rograms (S	5 in Millions	5)						FY	2021	FY 2022	FY 2023
Title: Small Arms Fire Control Adv	vanced Teo	chnology	<u>.</u>							13.315	11.310	-
Description: This effort will matur targeting and lethality, and mainta FY 2022 Plans: Will complete maturation of digital configuration; execute technology and target cueing capabilities; opt (ENVG-B), Integrated Visual Augr integration for fire support and dis relevant environments.	re and dem in overmat weapon si demonstra imize capa mentation S mounted so	onstrate fire ch at longer ght fire cont ations in rele bility to enal System (IVA cout operatio	e control and ranges in a rol system evant enviro ble seamles S), and New ons; demor	d targeting s all environm prototypes; mments to s as integration to Generation instrate multi	sensor tech nents. demonstrat support syst on with Enha on Squad W ifunction pre	nologies an te final digita tem optimiza anced Night /eapon (NG ecision targe	d technique al weapon s ation of targ Vision Gog SW); comp eting capab	es to improv sight let handoff lgle-Binocu lete prototy ilities in mili	/e lar pe tary			
FY 2022 to FY 2023 Increase/De Task ends in Fiscal Year 2022 (F	e crease Sta Y22)	atement:										
Title: Advanced Fire Control Tech	I									-	1.306	3.066

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date:	April 2022						
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A <i>I Soldier Lethality Advanced</i> <i>Technology</i>	e) Project (Number/Name) ced AY7 I Small Arms Fire Control Advanced Technology							
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023					
Description: This effort will mature and demonstrate fire control and targeting stargeting and lethality, and maintain overmatch at longer ranges in all environments of the stargeting and lethality.	sensor technologies and techniques to improve nents.								
FY 2022 Plans: Will mature and demonstrate technologies of integrated circuit boards to improve and reduced power consumption	ve performance and reliability under pyro-shoc	5							
FY 2023 Plans: Will mature machine vision databases for target recognition, to include optimiza approach for demonstration of platform architecture; improve internal communic demonstrate integration of augmented reality and polymer optic components for	ation for dismounted weapon identification; vali cation to include the use of open source stand r future live fire capability demonstration.	date ards;							
FY 2022 to FY 2023 Increase/Decrease Statement: Increase in FY 2023 is due to natural task execution ramp up from requirement demonstrations.	s generation to tech maturation and								
Title: FY2022 SBIR/STTR Transfer		-	0.478	-					
Description: Funding transferred in accordance with Title 15 USC ?638									
<i>FY 2022 Plans:</i> Funding transferred in accordance with Title 15 USC ?638									
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638									
	Accomplishments/Planned Programs Subt	otals 13.31	5 13.094	3.066					
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A									

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022													
Appropriation/Budget Activity 2040 / 3						R-1 Program Element (Number/Name) PE 0603118A / Soldier Lethality Advanced Technology				Project (Number/Name) AY9 I Body Armor & Integrated Headborne Advanced Tech			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
AY9: Body Armor & Integrated Headborne Advanced Tech	-	9.520	7.704	8.112	-	8.112	8.211	10.666	10.589	10.563	0.000	65.365	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
A. Mission Description and Bud	aet Item J	ustification											

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

This Project supports Force Protection capability demonstrations for Soldiers and Small Units and demonstrated technologies from this effort transition to various Program Executive Office (PEO) Soldier programs.

This Project complements work done in Program Element (PE) 0602143A (Soldier Lethality Technology) / AZ2 (Body Armor & Integrated Headborne Technology).

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Body Armor and Integrated Headborne Advanced Technology	9.520	7.422	8.112
Description: This effort focuses on maturing, integrating and demonstrating personal protective capabilities against ballistic, blast, and directed energy threats as well as the development and demonstration of Soldier worn platform architectures to optimize the integration of personal protective equipment and Soldier lethality enabling technologies. Demonstrates advanced test methods to validate personal protective equipment performance enhancements against current and emerging small arms, fragmentation, and blast threats from anti-personnel munitions. The objective of these technology development efforts is to significantly increase Soldier lethality by enhancing the protective capabilities and reducing sub-system and system-level weight of individual protective equipment to reduce the Soldier burden and increase survivability.			
FY 2022 Plans: Will exploit state of the art high performance ballistic materials for body armor against small arms threats to provide trade space analysis regarding art of the possible to Army stakeholders and inform future requirements for torso protection against small arms threats; Exploit novel and emerging processing techniques and latest developmental materials for combat helmets to assess state			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / Soldier Lethality Advanced Technology	Project (Number/I AY9 / Body Armor Advanced Tech	Name) & Integrated I	Headborne
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
of the art helmet performance against small arms threats and inform future Design power and data interface architectures for combat helmets to deve headborne technology; Develop communication headset subsystems with integrate preliminary enhanced audio capabilities to provide hearing prote	e protection requirements for Army combat helmets; elop common interface design standards for Soldier new wireless down links to the individual radio and ction and situational awareness cues.			
FY 2023 Plans: Will mature designs for personnel body armor against classified small arm without increasing the weight of armor material required; exploit anti-persor against near-peer munition capabilities to further the optimization of persor munitions; mature novel fabric constructions integrated in the Soldier com power and data interface architectures for combat helmets to develop con technology; optimize the integration of communication headset subsystem demonstrate enhanced audio capabilities to provide hearing protection an eye protection capability with enhanced fragmentation performance and s	is threat that increase body armor protection capabil onnel munitions to characterize Soldier survivability onal body armor against high energy fragmenting bat protective ensemble for ballistic protection; matu mon interface design standards for Soldier headbor is with wireless down links to the individual radio and d situational awareness cues; demonstrate integrate ituational awareness.	ities re ne d		
Funding change reflects planned lifecycle of this effort.				
Title: FY2022 SBIR/STTR Transfer		-	0.282	-
Description: Funding transferred in accordance with Title 15 USC ?638				
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638				
	Accomplishments/Planned Programs Subte	otals 9.520	7.704	8.112
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A				

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: April	2022	
Appropriation/Budget Activity 2040 / 3						R-1 Program Element (Number/Name)Project (PE 0603118A / Soldier Lethality AdvancedAZ6 / SolTechnologyAdvanced				Jumber/Name) dier Signature Management I Technology		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AZ6: Soldier Signature Management Advanced Technology	-	1.605	2.969	3.084	-	3.084	3.116	3.131	3.132	3.132	0.000	20.169
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project optimizes, matures and demonstrates advances in novel materials, technologies, techniques, and applications increasing the capabilities of camouflage, concealment, and deception against known and emerging sensor threats. These technologies will produce proof of concept systems that decrease the probability of detection and targeting by peer and near-peer adversaries, enabling freedom of movement of semi-independent and dispersed formations, and increase protection of high-valued assets. This Project will demonstrate disruptive Camouflage, Concealment and Deception technologies, supporting expeditionary maneuver in the Multi-Domain Battle Environment to open and retain windows of advantage.

Research in this Project supports key Army needs and leverages/complements the technical research of several Program Elements (PEs) and Projects to include PE 0602143A (Soldier Lethality Technology) / BB4 (Dismounted Soldier Survivability Materials), Project AZ5 (Soldier Protection Technology - Vulnerability), Project AZ9 (Soldier Protection Advanced Tech - Detectability); PE 0601102A (Defense Research Sciences; and PE 0602145A (Next Generation Combat Vehicle Technology) / Project BI2 (Sensor Protection Technology).

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Soldier Camouflage, Concealment and Decoys Demonstration	1.605	2.861	3.084
Description: This effort demonstrates innovative camouflage, concealment, and deception technologies for the dismounted Soldier to defeat advanced current and emerging adversary Intelligence, Surveillance and Reconnaissance (ISR) threats and to reduce the probability of detection and identification across the electromagnetic spectrum. Matures physics-based models for material and system performance that support probability of detection metrics in the multi-domain operational environment, assisting to close the capability gap between current camouflage, concealment, and deception technologies and defeating enemy sensorial capabilities in future operating environments. FY 2022 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: /	Date: April 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / Soldier Lethality Advanced Technology	Project (Number/ AZ6 / Soldier Sign Advanced Techno	Name) ature Manage ^{logy}	ment	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023	
Will optimize down- selected textile coatings and functional garment designs for inconspicuously transfer Soldier thermal emissions away from the Soldier?s bo from battlefield thermal sensors while integrating other key garment performance demonstrate additional topical applications using engineered optical materials w (i.e., face, hands) from thermal sensors; collect imagery data of Soldiers and so sensor threats in multiple bands of the electromagnetic spectrum to assess high newly developed aided target detection techniques against Soldier camouflage detectability capability gaps against emerging threat sensors and sensor platfor	r Soldier clothing and individual equipment to dy to reduce the probability of Soldier detection ce requirements; continue to mature and within binder agents to conceal exposed skin quad formations against ground and aerial hest impact improvement opportunities; apply and concealment capabilities to assess Soldie rm.	r			
FY 2023 Plans: Will mature materials specifically designed to reduce the radar cross section of detection by ground surveillance radar threats; integrate and demonstrate pass capability into the Soldier?s equipment to provide early threat detection and wa and squad formations against ground and aerial sensor threats to validate grou electromagnetic spectrum against sensor threats to assess high impact camour and demonstrate aided target detection algorithms and provide vulnerability and capabilities to support continued assessment of Soldier signature capability gap	rs				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.					
Title: FY2022 SBIR/STTR Transfer		-	0.108	-	
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Subt	otals 1.605	2.969	3.084	
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>					

Exhibit R-2A, RDT&E Project Justification: PB 2023 A	Army	Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Na PE 0603118A / Soldier Lethality Adv Technology	ame) Project (Number/Name) vanced AZ6 I Soldier Signature Management Advanced Technology
0. Acquisition Strategy	·	
N/A		

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: April 2022		
Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060311 Technolog	am Elemen 8A / Soldie 19	t (Number/ r Lethality A	Imber/Name)Project (Number/Name)hality AdvancedBB3 I Dismounted Soldier SurvivableEquip/Tech Integ				
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BB3: Dismounted Soldier Survivability Equip/Tech Integ	-	1.238	3.026	3.458	-	3.458	3.522	3.518	3.519	3.518	0.000	21.799
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Dismounted Soldier Survivability Equipment and Technology Integration	1.238	2.915	3.458
Description: This effort matures and integrates multifunctional protective materials, sub-components, and systems for field demonstrations to significantly increase the survivability of Soldiers through their multi-functional clothing and individual protective equipment. This effort also demonstrates and validates tradeoff analyses in sub-component and system-level designs of ballistic, blast, signature management and integrated protection clothing and equipment technologies.			
FY 2022 Plans: Will mature and optimize the systems engineering architecture, framework and physical demonstrator units that demonstrate integrated body-worn Soldier survivability technologies for Soldier user assessments in support of the Combat Protective Ensemble (CAPE) program; validate combat ensemble components that address gaps in extremities protection, thermal management, and moisture control through optimizing operational clothing and individual equipment for (1) temperate to extreme cold climates and (2) temperate to extreme heat and high humidity environments; exploit recent advancements in power and data transfer mechanisms to mature multiple candidate modular load management systems integrating body-worn power and			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / Soldier Lethality Advanced Technology	Projec BB3 / Equip/	t (Number/N Dismounted Tech Integ	lame) Soldier Surviv	vability	
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2021	FY 2022	FY 2023	
data distribution to optimize the Soldier system integration of body-worn individ level weight reduction and enhanced ergonomics to greatly improve Soldier ab demonstrate maturing candidate camouflage and concealment materials from I a focus on visible through infrared bands of the electromagnetic spectrum; valid materials for integrated and modular ballistic and blast protection from PE 0602 personnel munitions and small arms threats.	e and vith nce anti-					
FY 2023 Plans: Will demonstrate an improved load-management system that integrates body-v distribution network, hydration system, and torso protection to greatly improve a enhancements in the combat ensemble that provide greater situational awaren extreme cold environments and (2) temperate to extreme heat and high humidi to shoot, move and communicate; perform Soldier user assessments of integra materials from PE 0602143A (Soldier Lethality Technology) and modular ballist Lethality Technology) against anti-personnel munitions and small arms threats optimized systems-engineering architecture for Soldier ensembles in support o	vorn individual equipment, power and data Soldier lethality and maneuverability; mature ess of battlefield threats in (1) temperate to ty environments to optimize Soldier readiness ation of matured camouflage and concealment tic and blast protection from PE 0602143A (So to evaluate compatibility with matured and f the CAPE program.	oldier				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding changes reflect planned life cycle of effort.						
Title: FY2022 SBIR/STTR Transfer			-	0.111	-	
Description: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638						
Fy 2022 to Fy 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638						
	Accomplishments/Planned Programs Sub	totals	1.238	3.026	3.458	
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>						

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A <i>I Soldier Lethality Advanced</i> <i>Technology</i>	Project (Number/Name) BB3 / Dismounted Soldier Survivability Equip/Tech Integ		
D. Acquisition Strategy				
N/A				

Exhibit R-2A, RDT&E Project J	ustification	: PB 2023 /	Army							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)ProjectionPE 0603118A / Soldier Lethality AdvancedBB6TechnologyField				Project (I BB6 / Phy Field Den	ect (Number/Name) I Physical Augmentation: Adv Tech for Demo		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BB6: Physical Augmentation: Adv Tech for Field Demo	-	2.865	-	-	-	-	-	-	-	-	0.000	2.865
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
The cited research is consistent Research in this Project is performed B. Accomplishments/Planned Title: Wearable Assistive Device Description: This effort demons survivability, speed, and strength performance, and integration wit benefit from leveraging industry environments.	er and logis with the Un rmed by the Programs (es Advanced trates wears h, as well as h Soldier clo investments	tics sustainr der Secreta United Stat <u>\$ in Million</u> I Technolog able physica system me othing and ir and determ	ment task p ry of Defen tes Army Fu <u>s)</u> y for Feld D al augmenta trics such a ndividual eq nine if these	erformance se for Rese utures Com emo ation device s power co uipment (C systems effective systems eff	earch and Ei mand (AFC s to validate nsumption a IE). Results nhance Sole	ngineering p). e Soldier me and duratior s will demon dier mobility	etrics such a n, actuator a strate if the and lethalit	s areas and as endurand nd controlle Army will y in operat	the Army F ce, er ional	Modernizati Y 2021 2.865	on Strategy. FY 2022 -	FY 2023 -
					Accompli	shments/P	lanned Pro	grams Sub	ototals	2.865	-	-
C. Other Program Funding Sur N/A Remarks D. Acquisition Strategy N/A	nmary (\$ in	<u>Millions)</u>										

Exhibit R-2A, RDT&E Project Ju							Date: April	2022				
Appropriation/Budget Activity 2040 / 3				R-1 Program Element (Number/Name) Project (Number/Name) PE 0603118A / Soldier Lethality Advanced BB8 / Soldier Centric Advanced Technology Description					n e) Advanced Te	echnology		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BB8: Soldier Centric Advanced Technology	-	5.622	5.292	2.391	-	2.391	1.880	-	-	-	0.000	15.185
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates an optimized training systems to enable effective training and provide increased levels of Soldier proficiency and readiness. This Project matures and demonstrates Soldier centric technologies for the Soldier/Squad virtual environment to support the Army's Synthetic Training Environment (STE). The STE is the next generation holistic collective training capability that will train units where they will fight, with whom they will fight with, and in complex operational environments to include dense urban and sub-terrain; within the entire range of combined arms maneuver tasks in support of Multi-Domain Operations. The Soldier/ Squad virtual environment combines and integrates several individual Soldier and Squad training capabilities, STE Squad Capability (SSC), Weapon Skill Development (WSD), Joint Fires Training (JFT), and Use of Force (UoF), into a single capability that can be conducted simultaneously or individually and enable physical movement/ exertion related to the execution of Soldier/Marine individual and Squad collective training tasks. The STE will provide the realistic repetitions necessary to fight 25 bloodless battles before the first battle.

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: STE Soldier/Squad Virtual Trainer	5.622	5.099	2.391
Description: This effort matures and demonstrates a common battle drill squad-level mixed reality based system that allows for the rapid conduct and repetition of squad-level training. The training system will make it possible to conduct diverse, repeatable and effective training without extensive training infrastructure. This effort matures and demonstrates novel and realistic training environments that provide increased levels of proficiency and readiness through immersive training scenarios conducted at the point of need.			
FY 2022 Plans: Will mature device agnostic camera and tracking technologies required for dynamic occlusion to successfully perform in all potential training environments; validate technologies that enhance immersion (haptic suits, three-dimensional (3D) sound,			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: A	Date: April 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / Soldier Lethality Advanced Technology	Project (Number/ BB8 / Soldier Cent	Name) tric Advanced	Technology	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023	
etc.) for Soldier training in mixed reality environments; improve performance of processing technologies and deep learning algorithms using markerless tracking	f weapon tracking algorithms by utilizing better ng.				
FY 2023 Plans: Will demonstrate the performance of agnostic camera and tracking technologie daylight training environments successfully; improve individual Soldier position Soldier interfaces (e.g., haptic suits, 3D sound, acoustics, etc.) for individual Sol	es required for dynamic occlusion to perform in - and orientation-tracking; demonstrate multi-m oldiers in live training environments.	nodal,			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding decrease supports shift to long-term objectives of merging live and sy	nthetic training.				
Title: FY2022 SBIR/STTR Transfer		-	0.193	-	
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	totals 5.622	5.292	2.391	
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A					

Exhibit R-2A, RDT&E Project Ju	xhibit R-2A, RDT&E Project Justification: PB 2023 Army I										2022	
Appropriation/Budget Activity 2040 / 3				R-1 Program Element (Number/Name)Project (Number/Name)PE 0603118A / Soldier Lethality AdvancedBC1 / Human Performance ATechnologyMobility & Lethality					n e) ance AdvTe	ch for		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BC1: Human Performance AdvTech for Mobility & Lethality	-	12.207	13.944	9.415	-	9.415	6.986	7.374	7.325	7.321	0.000	64.572
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Soldier/Squad Performance Metrics for Lethality	5.152	4.468	-
Description: This effort validates and matures technologies, methodologies, and human performance models to demonstrate increased Soldier and Small Unit mobility & lethality to achieve overmatch. The effort validates and integrates human performance sensors, models, and design guidance into training/education, test and evaluation, and materiel. The results of this work will allow			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022									
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / Soldier Lethality Advanced Technology	Project (BC1 / Hu Mobility &	c t (Number/Name) Human Performance AdvTech for ty & Lethality						
B. Accomplishments/Planned Programs (\$ in Millions) the Army to develop equipment, systems and training devices that maximize th in multi-domain operations.	3. Accomplishments/Planned Programs (\$ in Millions) the Army to develop equipment, systems and training devices that maximize the close combat Soldier and small unit performant in multi-domain operations.								
<i>FY 2022 Plans:</i> Will demonstrate an instrumented test bed (squad Situational Training Exercise of Soldier and small unit mobility and lethality; utilizing the test bed, demonstrat performance measures, measures of performance, and squad measures of effort repeatability and reliability; train and validate predictive performance algorithms selected machine learning performance algorithms developed in PE 0602143A human performance datasets (such as the 72-hr mission field study).	e lane and Shoot House) for the evaluation te the linkages between individual technical fectiveness under controlled conditions to optir s in relevant environments; demonstrate down (Soldier Lethality Technology) in multidimens	nize 1- ional							
FY 2022 to FY 2023 Increase/Decrease Statement: This effort ends in Fiscal Year 2022 (FY22).									
Title: Operational Unit Partnership and Soldier Touch Point			7.055	8.965	9.415				
Description: This effort optimizes innovation through Science and Technology rapid iteration, concept maturation, integration, validation of laboratory findings in response to operational unit demand signal. This effort streamlines demonst for near term DOTMLPF solutions, enabling faster delivery of materiel and non Soldier input. This body of work allows validated, empirical, assessment of any of the Soldier architecture to inform future acquisition investments, training, and	ing in gies tion ct is part								
FY 2022 Plans: Will conduct small and large scale field studies to fully mature dataset to train a and analyze findings and data sets from expert and novice units performing mit tactical environments; provide and advance a front end solution to access and performance data visualization tools to increase situational awareness and improvements.	and validate human performance algorithms ssion essential tasks in realistic, constructive visualize database elements; demonstrate hu prove decision making.	man							
FY 2023 Plans: Will conduct field and simulation studies to validate prediction models (previous relevant environments/scenarios under realistic operational states (e.g., high s etc.) in order to evaluate the correspondence between predictions and perform effectiveness of enhancement strategies on close combat performance outcom	sly trained with human performance data) in tress, thermal load, dehydration, sleep restrict ance outcomes; conduct field studies testing t nes and readiness.	on, he							
FY 2022 to FY 2023 Increase/Decrease Statement:									

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / Soldier Lethality Advanced Technology	Project (BC1 / Hu Mobility 8	: (Number/Name) Iuman Performance AdvTech for [/] & Lethality			
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2021	FY 2022	FY 2023	
Funding change reflects planned lifecycle of this effort.						
Title: FY2022 SBIR/STTR Transfer			-	0.511	-	
Description: Funding transferred in accordance with Title 15 USC ?638						
<i>FY 2022 Plans:</i> Funding transferred in accordance with Title 15 USC ?638 <i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> Funding transferred in accordance with Title 15 USC ?638						
	Accomplishments/Planned Programs Sub	ototals	12.207	13.944	9.415	
N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A						

Exhibit R-2A, RDT&E Project Ju					Date: April	2022						
Appropriation/Budget Activity 2040 / 3	Activity R-1 Program Element (Number/Name) Project (Number/Name) PE 0603118A / Soldier Lethality Advanced BC4 / Soldier Decision / Technology Performance AdvTech					n e) n Making&C	omms					
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BC4: Soldier Decision Making&Comms Performance AdvTech	-	1.925	-	-	-	-	-	-	-	-	0.000	1.925
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Human System Integration Demonstration	1.925	-	-
Description: This effort provides early front end analysis and assessment for HSI in Army systems acquisition to influence Advanced Technology Development and prototype design specifications. Research findings translate into performance-based design specifications and human performance analyses for use in the Army's requirements definition process, training development, and materiel acquisition process. Results of these efforts provide quantified, data-driven analysis on the value of applying HSI early in Army technology development and systems acquisition and are transitioned to technology developers, evaluators, and other Advanced Technology Development stakeholders to include the Future Vertical Lift and Air Missile Defense Program Offices, TRADOC, and the ATEC.			
Accomplishments/Planned Programs Subtotals	1.925	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Justification: PB 2023 Army Date: April 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A <i>I Soldier Lethality Advanced</i> <i>Technology</i>	Project (Number/Name) BC4 / Soldier Decision Making&Comms Performance AdvTech			
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>					
<u>D. Acquisition Strategy</u> N/A					

Exhibit R-2A, RDT&E Project J	ustification	: PB 2023 A	rmy							Date: Apri	l 2022	
Appropriation/Budget Activity 2040 / 3			R-1 Program Element (Number/Name)ProPE 0603118A / Soldier Lethality AdvancedBCTechnologythat				Project (N BC8 / Trair than STE)	Project (Number/Name) 3C8 I Training Advanced Technology (Other than STE)				
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BC8: Training Advanced Technology (Other than STE)	-	4.140	2.993	7.078	-	7.078	7.650	10.289	23.443	31.277	0.000	86.870
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
This Project matures and demonstrates advanced training technologies in support of the Army's need for simulations that accurately replicate and realistically represent the effects of current and future weapons systems during live and synthetic training. Integration of the live and synthetic environments into a single synthetic training environment will modernize the current Live Training Environment and allow fair fight engagements across all training environments and training devices. This Project complements work done in Program Element (PE)0602143A (Soldier Lethality Technology) / Project BC7 (Training Technology (Other than STE). The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy. Research in this Project is performed by the United States Army Eutures Command (AEC)												
B. Accomplishments/Planned	Programs (\$ in Millions	<u>s)</u>						FY	2021 I	TY 2022	FY 2023
Title: STE: Live Training Applica	itions		<u>.</u>							4.140	2.884	-
Description: This effort exploits technology to demonstrate enhanced fidelity of live training systems and develops future live training capabilities for conducting force-on-force, combined arms exercises to enhance readiness at Army home stations and Combat Training Centers.												
FY 2022 Plans: Will mature and demonstrate software algorithms that calculate weapon orientation or position for direct or indirect fire weapons based on a number of different sensor inputs (e.g. inertial, computer vision, Light Detection and Ranging (LIDAR)); improve the size, weight, and power consumption of the Weapon Orientation Module; demonstrate a matured position tracking capability suitable for crew served indirect fire weapons.												
FY 2022 to FY 2023 Increase/D Funding change reflects a shift in technologies necessary to enabl	Decrease Sta n research fo e more reali	atement: ocus from th stic live-synt	e near term hetic trainir	developmong where ar	ent of the S	TE capabilit s needed wit	ies to the su	upport st.				
Title: Advanced Processing Tec	hnologies fo	r Live Traini	ng							-	-	3.969

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	pril 2022					
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / Soldier Lethality Advanced Technology	ame)Project (Number/Name)IvancedBC8 / Training Advanced Technology (Other than STE)				
B. Accomplishments/Planned Programs (\$ in Millions)		F١	2021	FY 2022	FY 2023	
Description: This effort will improve technologies that reduce the computation weight) associated with training dismounted Soldiers in live training environme Such live training use-cases require virtual ballistic flyout calculations, casualty (e.g., munition impacts).	al burden, latency, and power consumption (b nts that leverage simulated tactical engageme assessment, and visualization of terminal effe	attery ents. ects				
<i>FY 2023 Plans:</i> Will demonstrate methods to couple lethality, vulnerability, and terrain models ballistic flyout and casualty assessment models that reduce weight and function account for truncated calculation space, data compression, parallelization, 3D smart RF network packet routing.	with real-world sensors to generate realistic vi nal impacts to the Soldier; validate architectur terrain tiling, high-speed commercial hardware	rtual es to e, and				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects a shift in research focus from the near term developm capabilities to the support technologies necessary to enable more realistic live- lower cost.	ent of the Synthetic Training Environment (ST -synthetic training where and when it is neede	E) d with				
Title: Synthetic Cyberspace Effects for Training			-	-	3.109	
Description: This effort matures, demonstrates, and validates a data exchang architecture to propagate those cyberspace effects across Live, Virtual and Co training environments for collective training.	e model for cyberspace effects and a brokerin Instructive models and simulations within distri	ig ibuted				
FY 2023 Plans: Will mature cyberspace data model and effects brokering architecture to incorp Positioning System (GPS) effects for Brigade-level collective training; validate exercises to leverage for data collection and demonstration.	porate cyber, electronic warfare, and Global multi-domain use-cases and identify large-sca	le				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort to progress into advance Electromagnetic Activities (CEMA) Effects Modeling and Simulation task in PE (Training Technology (Other than STE)).	ed technology development from the Cyberspa 0602143A (Soldier Lethality Technology) / BC	ace C7				
Title: FY2022 SBIR/STTR Transfer			-	0.109	-	
Description: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 Plans:						

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: A	pril 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / Soldier Lethality Advanced Technology	Project (Number/Name) BC8 I Training Advanced Technology (Oth than STE)			
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023	
Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Subt	otals 4.140	2.993	7.078	
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022												
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603118A <i>I Soldier Lethality Advanced</i> <i>Technology</i>				Project (Number/Name) BC9 I Adv Soldier Sensors/Displays AdvTech for Dismounts			/s
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BC9: Adv Soldier Sensors/ Displays AdvTech for Dismounts	-	8.738	13.151	25.963	-	25.963	27.040	26.606	28.425	28.937	0.000	158.860
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures, optimizes, and demonstrates fully digital sensor systems, architectures, and interfacing capabilities to fuse sensors, and network situational understanding information and targeting capabilities to enable maintained mounted and dismounted visual advantage, increased situational awareness, decreased fratricide, and decreased response times to all threats in all environments.

Research in this Project supports the Army Science and Technology Soldier Lethality, Next Generation Combat Vehicle, and Future Vertical Lift Army Modernization priorities.

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

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Advanced Soldier Sensors/Displays Advanced Technology for Dismounts	8.738	12.671	25.963
Description: This effort will mature and demonstrate low cost Soldier-borne situational understanding systems with greater fidelity for improved maneuver and lethality, as well as integrates automated target cueing to increase probability of recognition/ identification and tracking of threats in all environments.			
FY 2022 Plans: Will improve performance of augmented reality (AR) systems for mounted/mechanized infantry interactions by providing heading corrections and providing self-location to infantry within a combat vehicle; mature sensor systems and integrate with command and control systems for information sharing capabilities between dismounted and mounted Soldiers on a tactical vehicle platform; mature novel sensor payloads with enhanced processing to improve detection, localization and notification capabilities required			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	April 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name)FPE 0603118A / Soldier Lethality AdvancedETechnologyA	Project (Number/Name) 3C9 / Adv Soldier Sensors/Displays AdvTech for Dismounts				
B. Accomplishments/Planned Programs (\$ in Millions) FY 2021 FY 2022						
for improved situational awareness against all threats; optimize performance framerates required for dismounted hostile fire detection; mature opto-acous hostile fire detection.	d					
FY 2023 Plans: Will mature advanced infrared sensors leveraging emerging multiple sensor borne sensor systems; mature covert eye tracking, parallax correction and generation of digital sensor and head mounted display capabilities for dism improve performance of optics detection capability against concealed infrar platform use; optimize sensor approaches enabling low false alarms, stand accuracy; demonstrate AR systems for mounted infantry interactions with h a combat vehicle while on the move; optimize sensor systems integrated w sharing capabilities between dismounted and mounted Soldiers on a tactica on representative platforms; optimize sensor payloads and processing app localization and notification capabilities on smaller aerial platforms enabling optimize performance of image processing techniques to improve threat de dismounted hostile fire detection; validate optical and acoustic techniques to	nin t or on.					
FY 2022 to FY 2023 Increase/Decrease Statement: Increase represents funding for technology maturation needed to leverage them into critical dismounted Soldier systems.	breakthroughs in sensors and sensor fusion and inj	ect				
Title: FY2022 SBIR/STTR Transfer		-	0.480	-		
Description: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638						
	Accomplishments/Planned Programs Subto	tals 8.738	13.151	25.963		
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>						
xhibit R-2A, RDT&E Project Justification: PB 2023 Ar	Date: April 2022					
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Appropriation/Budget Activity 040 / 3	R-1 Program Element (Number/Name) PE 0603118A / Soldier Lethality Advanced Technology	Project (Number/Name) BC9 I Adv Soldier Sensors/Displays AdvTech for Dismounts				
. Acquisition Strategy N/A						

Exhibit R-2A, RDT&E Project Ju	hibit R-2A, RDT&E Project Justification: PB 2023 Army									Date: April	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) Project (Number/Name) PE 0603118A / Soldier Lethality Advanced BD7 / Soldier Sys Interfaces/Integ Technology Sensor AdvTech				ne) rfaces/Integ	ration-		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BD7: Soldier Sys Interfaces/ Integration-Sensor AdvTech	-	9.110	8.374	8.535	-	8.535	8.196	8.590	9.311	9.309	0.000	61.425
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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

The cited research 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).

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Soldier System Interfaces & Integration (Sensor Advanced Technology)	9.110	8.068	8.535
Description: This effort will integrate battlefield and body-worn sensors and mature data-fusion algorithms to provide the dismounted Small Unit leader with clear, actionable information to make well informed, rapid, tactical decisions. This effort will mature and integrate advanced dismounted Soldier robotic and autonomous systems technologies to demonstrate autonomous navigation, manned-unmanned teaming, and networked reconnaissance to improve Soldier lethality, situational awareness, and survivability during tactical operations.			
FY 2022 Plans: Will mature and integrate Small Unit leader planning and decision tools, human performance algorithms and visualization tools, and Soldier equipment sensing algorithms and user interfaces; conduct field demonstrations of integrated Soldier sensor systems with Nett Warrior and the Integrated Visual Augmentation System (IVAS) in relevant field environments to validate performance			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date:	April 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / Soldier Lethality Advanced Technology	Project (Number BD7 / Soldier Sys Sensor AdvTech	roject (Number/Name) D7 I Soldier Sys Interfaces/Integration- censor AdvTech				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023			
and operation; demonstrate advanced autonomous tactical Small Unmanned A avoidance, fast flight, nighttime navigation, target detection) on representative validate the performance and operation of the technologies; mature technologie found in an infantry squad basic load for the Multi Domain Operations (MDO) b	Aerial Systems (SUAS) capabilities (ie. collision military platforms in relevant field environments es to enable hasty resupply of consumable iter pattlespace.	s to ns					
FY 2023 Plans: Will mature and demonstrate Small Unit leader planning tools with the IVAS to integrate human performance, Soldier equipment, and remote sensing capabili awareness & understanding during distributed operations; conduct field demon IVAS, Soldier Lethality, and other Army systems in relevant operational enviror mature autonomous tactical algorithms for Army SUAS (e.g., nighttime navigat integrate them on military relevant platforms; demonstrate SUAS autonomy cap the performance and operation of the technologies; integrate and demonstrate driven decisions for emergency and routine resupply at the tactical edge while FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.	enhance tactical decision making; mature and ties with IVAS to enhance Soldier situational estrations of Sensored Soldier technologies with ments to validate performance and functionali- ion, perch and stare, landing site selection) and pabilities in relevant field environments to valid small unit logistical planning tools that support conducting cross domain maneuver.	n ty; d ate data					
<i>Title:</i> FY2022 SBIR/STTR Transfer		-	0.306	-			
Description: Funding transferred in accordance with Title 15 USC ?638							
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638							
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638							
	Accomplishments/Planned Programs Subt	otals 9.11	8.374	8.535			
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A							

xhibit R-2A, RDT&E Project Justification: PB 2023 Army D							Date: April	2022				
Appropriation/Budget Activity 2040 / 3		R-1 Program Element (Number/Name) Project (Number/Name) PE 0603118A / Soldier Lethality Advanced BD9 / Soldier & Sm Unit Taction Technology AdvTech				ne) nit Tactical E	nergy					
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BD9: Soldier & Sm Unit Tactical Energy AdvTech	-	6.041	3.171	4.189	-	4.189	4.269	4.520	4.518	4.517	0.000	31.225
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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

The cited research 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).

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Dismounted Soldier Power and Energy	3.141	3.055	4.189
Description: This effort matures, integrates, and demonstrates advanced Soldier P&E technologies that are used to power the dismounted Soldier and small unit's command and control, communications, computers, and sensor devices during tactical operations. This work will result in the Army being able to provide the power and energy the future Soldier requires to operate effectively, while doing so at a reduced physical burden.			
<i>FY 2022 Plans:</i> Will mature, integrate, and demonstrate technologies for increasing the run-time of rechargeable battery technologies for the Soldier?s weapon, body, or helmet electronics; conduct field demonstrations to validate the performance and operation of batteries to support operational Soldier materiel; mature, integrate, and demonstrate novel power management technologies for transferring power efficiently between electronic components resident on the Soldier?s head, body, or weapon; mature and demonstrate Soldier power generation technologies for recharging batteries during a Platoon Level dismounted mission.			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name)PrPE 0603118A / Soldier Lethality AdvancedBITechnologyAdvanced	o ject (Number/I 99 / Soldier & Sn vTech	Name) n Unit Tactical	l Energy
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
Will optimize technologies to efficiently transfer power between the com- recharge the weapon battery during dismounted operations; mature tech density of Soldier carried rechargeable batteries; mature Soldier carried and improve compatibility with Soldier equipment; conduct field demons Soldier and Squad power technologies; mature and validate a Soldier we measure power and energy metrics during Soldier field evaluations.	formal wearable battery and the Soldier?s weapon to hnologies to improve the safety and increase the energy power generators to increase efficiency, reduce weight, strations to validate the performance and operation of yorn, portable data-acquisition system to accurately			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects anticipated efforts to mature more efficient powincreasing power demand on the Soldier.	ver generators for the Soldier and Squad to meet the			
Title: Sustainment Technologies for Expeditionary Power		2.900	-	-
Description: Sustainment Technologies for Expeditionary Power (STE solve some of the toughest Army problems statements for projecting Ar STEP utilizes a cohort approach to rapidly identify promising solutions t experts and Soldiers in the field.	P) is an innovation approach to engaging with industry to my energy sources into an expeditionary environment. hat industry offers and pairs them with Army subject mat	er		
Title: FY2022 SBIR/STTR Transfer		-	0.116	-
Description: Funding transferred in accordance with Title 15 USC ?63	8			
<i>FY 2022 Plans:</i> Funding transferred in accordance with Title 15 USC ?638				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638				
	Accomplishments/Planned Programs Subtot	ils 6.041	3.171	4.189
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A				

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	Army							Date: Apri	l 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progr PE 060312 Technolog	am Elemen 18A / Soldie gy	t (Number/ r Lethality A	Name) Advanced	Project (N BE2 / Join Advanced	umber/Nai t Service C Technology	ne) ombat Feec ⁄	ling
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BE2: Joint Service Combat Feeding Advanced Technology	-	2.367	2.424	1.988	-	1.988	2.019	2.016	2.121	2.120	0.000	15.055
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
biological contaminants in foods, of Defense (DoD) program, with This Project matures and demon Technology). The cited research is consistent v Research in this Project is perfor	and reduce oversight an strates rese with the Uno med by the	e the logistic nd coordinat earch done i der Secretat United Stat	s burden to tion provide n Program ry of Defens es Army Fu	e enable ser d by the Do Element (P se for Rese utures Comr	mi-independ DD Combat E) 0602143 arch and Er mand (AFC)	dent operation Feeding Re A (Soldier L ngineering p	ons. The An search and ethality Tec	my serves a Engineerin chnology) / areas and	as the Exec g Board. Project BE3 the Army M	utive Agent 3 (Joint Sen 1odernizatio	for this Dep vice Comba	partment t Feeding
B. Accomplishments/Planned P	Programs (in Million	<u>s)</u>						FY	2021 I	FY 2022	FY 2023
Title: Joint Service Combat Feed	ing Advanc	ed Technolo	ogy Demon	stration						2.367	2.335	1.988
Description: This effort matures performance, decrease risk of ex enable semi-independent operation FY 2022 Plans:	and demon posure to cl ons.	strates com nemical and	bat ration a biological	ind field fee contaminan	ding techno ts in foods,	ologies to op and reduce	otimize Warf the logistic:	ighter s burden to				
Will validate critical limits for mult deployable biosensor detection p battlefield; demonstrate baseline independent operations; validate Radiological Nuclear (CBRN) thre ration components to ensure nutr harvester performance to decreas during heating and sterilization pr <i>FY 2023 Plans:</i>	ispectral im latforms for Close Com decontamir eats; validat ient retentic se logistical ocessing m	aging to ide multiple pa bat Assault nation agent e effects of on during pro- burdens in lethods to e	ntify potent thogens in t Ration effe performan cycling tem ocessing ar multi-doma nhance rati	ial quality d food matrice ct on Warfig ce on ration peratures a nd prolonge in operation on heating	egradation es to reduce ghter physic n packaging and process d storage; v ns; and valid efficiency.	of ration cor e risk of food al performa in support of ing method validate sma date conduc	mponents; c d-borne illne nce to enab of Chemical s on nutrien ill scale atm tive materia	ptimize fiel ess on the le semi- Biological t compound ospheric w lls performa	d- ds in ater ance			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / Soldier Lethality Advanced Technology	Project (BE2 / Jo Advance	ect (Number/Name) I Joint Service Combat Feeding anced Technology				
B. Accomplishments/Planned Programs (\$ in Millions)		F	FY 2021	FY 2022	FY 2023		
Will demonstrate field-deployable biosensor detection platforms for multiple pa borne illness on the battlefield; validate effect of Close Combat Assault Ration independent operations; optimize commercially available surface treatment cho to improve force health protection; demonstrate stability and safety of membra load; continue optimization of small scale atmospheric water harvester perform to decrease logistical burdens in multi-domain operations; and mature and den provide targeted nutrition-on-demand for optimal physical performance.	thogens in food matrices to reduce risk of food on Warfighter physical performance to enable emicals for mobile field feeding kitchen surface ne concentrate technology to reduce combat nance using an environmental chamber technic nonstrate additive manufacturing technology to	- semi- ss jue					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding realigned to PE 0602143A (Soldier Lethality Technology) / Project BE Funding decrease will enable future maturation and demonstration of combat r	3 (Joint Service Combat Feeding Technology) ation and field feeding technologies.						
Title: FY2022 SBIR/STTR Transfer			-	0.089	-		
Description: Funding transferred in accordance with Title 15 USC ?638							
<i>FY 2022 Plans:</i> Funding transferred in accordance with Title 15 USC ?638							
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638							
	Accomplishments/Planned Programs Sub	totals	2.367	2.424	1.988		
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A							

Exhibit R-2A, RDT&E Project Ju							Date: April	2022				
Appropriation/Budget Activity 2040 / 3		R-1 Program Element (Number/Name) Project (Number/Name) PE 0603118A / Soldier Lethality Advanced BE5 / Personnel & Airdrop S Technology Technology				ne) drop Safety	Advanced					
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BE5: Personnel & Airdrop Safety Advanced Technology	-	5.707	6.879	6.484	-	6.484	6.603	6.668	7.306	7.304	0.000	46.951
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

Research in this Project supports key Army needs and complements the technical research in Program Element (PE) 0602143A (Soldier Lethality Technology) / Project BR9 (Personnel & Airdrop Safety Technology). This Project also complements research done in the Science & Technology Precision, Navigation and Timing Modernization priority.

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Personnel & Airdrop Safety Advanced Technology	5.707	6.628	6.484
Description: This effort matures and demonstrates parachute materials and designs, precision guidance, navigation software and hardware, tracking sensors, and safety devices to increase the accuracy of delivering cargo to remote locations and/or complex terrains in global positioning system (GPS) denied environments. This effort also provides technologies that increase safety during personnel insertions into theaters of operation. This effort supports capability demonstrations for mitigating the Army's challenge of overburdened Soldiers through the use of tactical aerial resupply technologies, as well as supporting Anti-Access/Area Denial (A2/ AD) and manned-unmanned teaming (MUM-T) operational concepts by demonstrating airdrop from non-traditional platforms.			
	·	·	

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022							
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / Soldier Lethality Advanced Technology	Project (Number/I BE5 / Personnel & Technology	Name) Airdrop Safet	y Advanced				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023				
Will optimize heavy equipment airdrop system performance to minimize altitude demonstrate capabilities to airdrop up to at least 50,000 lbs through live airdrop advancements in high altitude insertion technology that facilitate extended offse Next Generation Static Line parachute systems and demonstrate effectiveness optimize the design of an autonomously guided powered aerial resupply system standoff capability compared to conventional guided airdrop systems.	e loss and increase system reliability. Will b testing from a C-17 aircraft. Will demonstrate et insertions in GPS denied conditions. Will ma in Immediate Response Force (IRF) mission. n with a minimum of tenfold increase in horizo	e ature Will ntal						
FY 2023 Plans: Optimize and demonstrate integration of low-cost suite of guidance, navigation, and control sensors, to enable robust positioning estimates in GPS denied conditions; demonstrate and validate sensor integration on an autonomously guided aerial resupply system, in operationally relevant environment; incrementally mature and demonstrate autonomous technologies on personnel infiltration/exfiltration systems (PIES) in live environment, with both dependent and autonomous controls; demonstrate Next Generation Static Line (NGSL) advancements in control authority in a live environment that reflects IRF challenges.								
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.								
Title: FY2022 SBIR/STTR Transfer		-	0.251	-				
Description: Funding transferred in accordance with Title 15 USC ?638								
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638 FY 2022 to FY 2023 Increase/Decrease Statement:								
Funding transferred in accordance with Title 15 USC ?638		1-1-L- 5-707	0.070	0.404				
	Accomplishments/Planned Programs Sub	totais 5.707	6.879	6.484				
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>								
<u>D. Acquisition Strategy</u> N/A								

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army								Date: April	2022			
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) Project (Number/Name) PE 0603118A / Soldier Lethality Advanced BE9 / STE Advanced Technology			n e) Technology				
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BE9: STE Advanced Technology	-	14.764	13.401	10.656	-	10.656	3.658	3.022	0.929	0.948	0.000	47.378
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: STE Training Management Tool	3.371	3.187	2.897
Description: This effort matures and demonstrates STE-relevant tools and technologies that automatically adapt training to the learner's skill level, conduct intelligent after action reviews, automate team training assessments, and enable the visualization of and interaction with a Mixed Reality Common Operating Picture of the battlespace.			
FY 2022 Plans: Will exploit the association between squad level performance measures for individuals and teams and optimize how to best provide instructors with data to assess their performance and readiness; mature generalized intelligent tutoring framework allowing for both individual and team tutoring capabilities within synthetic training environments; demonstrate a team competency			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name)Project (Number/Name)PE 0603118A / Soldier Lethality AdvancedBE9 / STE Advanced TechnologyTechnologyTechnology					
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2021	FY 2022	FY 2023	
tracking capability that utilizes Department of Defense learning architecture support large-scale simulations with synthetic training environments and mis	standards; validate battlespace visualization tool sion command decision making.	s to				
FY 2023 Plans: Will demonstrate the integration of automated performance measures from be in a team-competency tracking architecture that uses Department of Defense measure squad-level competencies for integration into the STE; exploit hum that visualizes competency acquisition over time and across multiple training between competency tracking architecture and visualization tools for small-u Operations mission planning and mission command at higher echelons.	both live and simulated small-unit training events e standards; optimize models and algorithms to an-performance data and demonstrate dashboar g interactions; mature and demonstrate the integr unit after-action review and for Multi-Domain	ds ation				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects the planned lifecycle of this effort through a shift in STE capabilities to longer term research supporting training of multi-domain	research focus from the near-term development operations on complex, data-intensive battlefield	of the s.				
Title: STE One World Terrain			2.816	2.805	4.294	
Description: This effort matures and demonstrates tools and methods that i terrain and environmental data needed to support mission rehearsal and trait through the Army network and usable by all simulation trainers. This effort al (including megacities and subterranean) of the operational environment and environments.	mprove the speed, fidelity and delivery of synthe ning in a representation of the globe, fully access so matures and develops complex representatio the Multi-Domain battlefield in synthetic training	tic sible ns				
<i>FY 2022 Plans:</i> Will demonstrate processes, tools and software for surface level feature class artifacts to support OWT application spaces for the resulting modernized thre attribution deficiencies for OWT; demonstrate runtime implementation optimis suitable for application-specific needs; improve methods to procedurally corr data model specification to support traditional and non-traditional application.	sification and extraction for material and terrain ee-dimensional (3-D) terrain products; improve zations to rapidly assemble tailored terrain datas rect or validate 3-D terrain data; optimize the OW domains	ets T				
FY 2023 Plans: Will demonstrate processes, tools and software for surface indentation, class artifacts supporting the ability to access, explore, modify, and retrieve 3-D corprocesses and standards to balance the tradespace of enterprise (unconstrated)	sification and extraction for material and terrain ontent from the OWT 3-D Foundational Data; est nined) vs. point-of-need (constrained) terrain nee	ablish ds				

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022							
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / Soldier Lethality Advanced Technology	Project (Number/Name) BE9 / STE Advanced Technology					
B. Accomplishments/Planned Programs (\$ in Millions)		FY 202	FY 2022	FY 2023			
conforming to network design and constraint space such as how much conter automation across the 3-D terrain generation pipeline to accelerate ground-true	nt should be pre-loaded vs. on-demand; demon uth 3-D content delivery.	strate					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase will provide and demonstrate processes and tools that could training use-cases.	d enable OWT content and applications beyond						
Title: STE Training Simulation Software		5.7	6.950	3.465			
Description: This effort matures and demonstrates technologies that support configuration and scalability technologies for collective training. In addition, m the synthesis of robust military behaviors that enable the scaling of STE collect of Need through the exploitation of emerging computing and networking techn integrating components (models, behaviors, data, etc.) of the Training Simula	Multi-Domain Operations modeling and simula atures and demonstrates technologies that allow ctive training configurations and delivery to the nologies that optimize computing architectures f tion Software (TSS).	tion w Point or					
FY 2022 Plans: Will mature and demonstrate the integration of simulation architecture techno data, etc.) to be dynamically integrated to support collective training use case ready behavior models from authoritative sources to facilitate reuse and reduc Operational Environment (OE) models in support of emerging TSS gaps from emerging AI techniques to represent military behaviors against OE modeling	viors, Ē-						
<i>FY 2023 Plans:</i> Will demonstrate dynamic integration of STE-simulation components (models training use case featuring local and distributed simulation; mature and demo Areas, Structures, Capabilities, Organizations, People, Events [ASCOPE]/Pol Infrastructure- Physical environment and Time [PMESII-PT]) to enhance the r simulations.	, behaviors, data, etc.) in a point-of-need collec nstrate Operational Environment models (e.g., litical, Military, Economic, Social, Information, representation of Multi-Domain Operations in Ar	tive- my					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects a shift in research focus from the near-term developer supporting training of multi-domain operations on complex, data-intensive bat	ment of the STE capabilities to longer-term rese tlefields.	arch					
<i>Title:</i> Weapons Effects for STE		0.8	51 -	-			
Description: This effort matures and demonstrates structural weapon effects to integrate within the Army?s STE. This effort provides One World Terrain within the Army?s STE.	and projectile penetration models and algorithm th accurate representation of the effects of threa	ns at					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / Soldier Lethality Advanced Technology	Project (N BE9 / STE	e ct (Number/Name) I STE Advanced Technology			
B. Accomplishments/Planned Programs (\$ in Millions)		F۱	′ 2021	FY 2022	FY 2023	
weapons (such as small arms, projectiles, indirect fire, and improvised explosiv vulnerabilities in the battlespace.	ves device attacks) and display of realistic					
Title: Live Training Thin Client Engagement and Casualty Assessment			1.974	-	-	
Title: FY2022 SBIR/STTR Transfer			-	0.459	-	
Description: Funding transferred in accordance with Title 15 USC ?638						
<i>FY 2022 Plans:</i> Funding transferred in accordance with Title 15 USC ?638 <i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> Funding transferred in accordance with Title 15 USC ?638						
	Accomplishments/Planned Programs Sub	totals	14.764	13.401	10.656	
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A						

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	Army							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3				R-1 Program Element (Number/Name)PPE 0603118A / Soldier Lethality AdvancedBTechnologyT				Project (N BS8 / Solo Technolog	Project (Number/Name) BS8 / Soldier Lethality Advanced Technology			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BS8: Soldier Lethality Advanced Technology	-	45.200	44.500	-	-	-	-	-	-	-	0.000	89.70
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Bud Congressional Interest Item fund The cited work is consistent with	Iget Item J ing provide the Under S	ustification d for Soldier Secretary of	<u>n</u> r Lethality A f Defense fo	dvanced To or Research	echnology. n and Engin	eering priori	ity focus are	eas and the	Army Mode	ernization S	trategy.	
B. Accomplishments/Planned P	Programs (\$ in Million	<u>s)</u>					FY 2021	FY 2022]		
Congressional Add: Program In	crease - Ac	lvanced Al/	AA Analytic	s for Moder	rnization and	d Readiness	S	10.000	10.000			
FY 2021 Accomplishments: Con Readiness.	nducted ad	vanced rese	earch in Adv	anced AI/A	A Analytics	for Modern	ization and					
Work executed by Army Futures	Command.											
FY 2022 Plans: Congressional In and Readiness	iterest Item	funding pro	ovided for A	dvanced Al	/AA Analytic	cs for Mode	rnization					
Congressional Add: Program In	crease - Sr	nall Arms Fi	ire Control A	Advanced T	Fechnology			8.000	8.000			
FY 2021 Accomplishments: Con	nducted ad	vanced rese	earch in Sm	all Arms Fi	re Control A	dvanced Te	echnology.					
Work executed by Army Futures	Command.											
FY 2022 Plans: Congressional In	terest Item	funding pro	vided for Si	mall Arms F	Fire Control	Advanced 7	Technology					
Congressional Add: Program In	crease: Ad	vanced Tec	hnology for	Maneuver	Support and	d Protection		10.000	-			
FY 2021 Accomplishments: Con Work executed by Army Futures (nducted ad Command.	vanced rese	earch in Mai	neuver Sup	port and Pr	otection.						
Congressional Add: Program In	crease - Mi	litary Engin	eering Tech	nology for	Infield Wast	е		2.000	-			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/I PE 0603118A / Soldier Lethality A Technology	Name) dvanced	Project (Number/Name) BS8 / Soldier Lethality Advanced Technology	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	
FY 2021 Accomplishments: Conducted advanced research in Military Engine Waste.				
Work executed by Army Futures Command.				
Congressional Add: Program Increase - Flexible LED Lighting for Tents and	Shelters	5.200	-	
FY 2021 Accomplishments: Conducted advanced research in Flexible LED L	ighting for Tents and Shelters.			
Work executed by Army Futures Command.				
Congressional Add: Program Increase		10.000	-	
FY 2021 Accomplishments: Conducted advanced research in Soldier Lethalit				
Work executed by Army Futures Command.				
Congressional Add: Ferrium Steel for Improved Personal Protective Equipme	nt	-	5.000	
FY 2022 Plans: Congressional Interest Item funding provided for Ferrium Stee Equipment	I for Improved Personal Protective			
Congressional Add: Human Machine Teaming		-	4.000	
FY 2022 Plans: Congressional Interest Item funding provided for Human Mach	ine Teaming			
Congressional Add: Impact Attenuation Materials for Limb Protection		-	1.500	
FY 2022 Plans: Congressional Interest Item funding provided for Impact Attenue Protection	uation Materials for Limb			
Congressional Add: Soldier Situational Awareness		-	8.000	
FY 2022 Plans: Congressional Interest Item funding provided for Soldier Situat	tional Awareness			
Congressional Add: Squad Operations Advanced Resupply		-	8.000	
FY 2022 Plans: Congressional Interest Item funding provided for Squad Opera	tions Advanced Resupply			
	Congressional Adds Subtotals	45.200	44.500	
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A				

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603118A / Soldier Lethality Advanced Technology	Project (Number/Name) BS8 / Soldier Lethality Advanced Technology
C. Other Program Funding Summary (\$ in Millions)		
<u>Remarks</u>		
D. Acquisition Strategy		
N/A		

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army Date: April 2022						2022						
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)					R-1 Program Element (Number/Name) PE 0603119A / Ground Advanced Technology							
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	196.055	280.490	32.546	-	32.546	33.403	39.922	40.631	46.023	0.000	669.070
BK8: Robotics for Engineer Operations Adv Tech	-	4.194	6.221	6.314	-	6.314	3.784	4.523	6.500	8.179	0.000	39.715
BK9: Ground System Fluids and Fuels Adv Tech	-	1.684	1.732	2.301	-	2.301	2.752	3.063	3.150	3.099	0.000	17.781
BL3: Explosives Forensics Advanced Technology	-	2.002	2.096	2.214	-	2.214	2.246	2.267	2.267	2.267	0.000	15.359
BL6: Expedient Passive Protection Advanced Technology	-	3.051	0.494	3.613	-	3.613	5.998	5.821	4.154	4.773	0.000	27.904
BL8: Power Projection in A2AD Environments Adv Tech	-	1.220	2.970	4.948	-	4.948	3.302	4.101	2.660	3.699	0.000	22.900
BM1: Protection from Advanced Weapon Effects Adv Tech	-	2.104	5.868	4.856	-	4.856	4.915	5.103	5.302	5.490	0.000	33.638
BO3: MILITARY ENGINEERING TECHNOLOGY DEMONSTRATION (CA)	-	181.800	257.100	-	-	-	-	-	-	-	0.000	438.900
CJ9: Ground Enabling University Adv Development	-	-	4.009	3.896	-	3.896	4.195	6.002	6.097	6.095	0.000	30.294
CV5: Engineer Enablers Maneuver, LOG, & Sustainment Adv	-	-	-	2.539	-	2.539	3.298	4.781	2.183	3.586	0.000	16.387
DA2: SAFR Alternatives for Readiness Advanced Tech	-	-	-	1.865	-	1.865	2.913	4.261	5.199	5.509	0.000	19.747
DB8: Center for Mobile Power and Energy Adv Research*	-	-	-	-	-	-	-	-	3.119	3.326	0.000	6.445

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2023

<u>Note</u>

Project CV5 (Engineer Enablers Maneuver, LOG, & Sustainment Adv) and Project DA2 (SAFR Alternatives for Readiness Advanced Tech) are New Starts in Fiscal Year 2023 (FY23).

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	
2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced	PE 0603119A I Ground Advanced Technology	
Technology Development (ATD)		

A. Mission Description and Budget Item Justification

This Program Element (PE) matures and demonstrates ground movement and maneuver technologies that support and enable the Army's modernization priority for the Next Generation of Combat Vehicles. This PE also matures, integrates and demonstrates advanced technologies that are necessary and foundational for legacy and future ground platforms and ground maneuver. These technology areas include: robotic and autonomous Army Combat Engineer equipment, liquid logistics (i.e., fuels, lubricants, and oils) and related monitoring and distribution, forensic analysis of explosives and other chemical materials, rapidly deployable passive protection technologies, entry and maneuver assessment technologies and structural hardening technologies to protect personnel and critical assets from advanced weapon effects.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas in support of the National Defense Strategy.

Research is performed by the United States (U.S.) Army Futures Command and the U.S. Army Engineer Research and Development Center.

Research in this PE complements PE 0602144A (Ground Technology), PE 0602145A (Next Generation Combat Vehicle Technology), and PE 0603462A (Next Generation Combat Vehicle Advanced Technology).

B. Program Change Summary (\$ in Millions)	<u>FY 2021</u>	<u>FY 2022</u>	FY 2023 Base	FY 2023 OCO	<u>FY 2023</u>	Total
Previous President's Budget	196.055	23.403	0.000	-		0.000
Current President's Budget	196.055	280.490	32.546	-	3	32.546
Total Adjustments	0.000	257.087	32.546	-	3	32.546
 Congressional General Reductions 	-	-				
 Congressional Directed Reductions 	-	-				
 Congressional Rescissions 	-	-				
 Congressional Adds 	-	257.100				
 Congressional Directed Transfers 	-	-				
 Reprogrammings 	-	-				
 SBIR/STTR Transfer 	-	-				
 Adjustments to Budget Years 	-	-	32.546	-	3	32.546
FFRDC Transfer	-	-0.013	-	-		-
Congressional Add Details (\$ in Millions, and Incl	udes General Redu	<u>ictions)</u>			FY 2021	FY 2022
Project: BO3: MILITARY ENGINEERING TECHNOL	OGY DEMONSTRA	TION (CA)				
Congressional Add: Electrical System Safety and	l Reliability				5.000	5.000
Congressional Add: Cold Regions Research				-	2.000	2.000
Congressional Add: High-Performance Concrete	Technology			-	6.000	6.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army		Date: April 2022	Date: April 2022			
Appropriation/Budget Activity2040: Research, Development, Test & Evaluation, Army I BA 3: AdvancedTechnology Development (ATD)	R-1 Program Element (Number/Name) PE 0603119A <i>I Ground Advanced Technology</i>					
Congressional Add Details (\$ in Millions, and Includes General	Reductions)	FY 2021	FY 2022			
Congressional Add: Secure Management of Energy Generation	and Storage	5.000	5.000			
Congressional Add: Composite Flywheel Technology		7.000	7.000			
Congressional Add: Robotic Construction Equipment		5.000	-			
Congressional Add: Environmental Sensors for Explosives		3.000	-			
Congressional Add: Robotic 4-D Printing of Geopolymer-Based	Composites	2.000	-			
Congressional Add: Materials and Manufacturing Technology for	r Cold Environments	4.000	4.000			
Congressional Add: Research Facility Modernization		6.000	-			
Congressional Add: Program Increase - Smart Installation and C	Community Program	5.000	-			
Congressional Add: Program Increase - Flow Battery Demonstra	20.000	-				
Congressional Add: Program Increase - Corrosion Protection an	10.000	-				
Congressional Add: Program Increase - Rapid Entry and Sustain	nment for the Arctic	8.000	8.000			
Congressional Add: Program Increase - Secure Management of	f Energy Generation and Storage	5.000	-			
Congressional Add: Program Increase - Water Quality and Resi	liency	5.000	5.000			
Congressional Add: Program Increase - Rare Earth Element Ex	traction	5.000	-			
Congressional Add: Program Increase - Organic Light Emitting I	Diode	5.000	5.000			
Congressional Add: Program Increase - Coatings Technology		5.000	-			
Congressional Add: Program increase - Heavy Load Simulator		4.200	-			
Congressional Add: Program Increase - Integrated Microgrids		4.000	-			
Congressional Add: Program Increase - Infrastructure Resilience	e and Flood Assessment	3.000	3.500			
Congressional Add: Program Increase - Single Connection Quic	ck Oil Change System	3.000	-			
Congressional Add: Program Increase - Clean Modular Hydro T	echnology	4.000	8.000			
Congressional Add: Program Increase - Accelerator Technology	for Ground Maneuver	5.000	5.000			
Congressional Add: Program increase - Autonomous Combat E	ngineering Solutions	5.500	4.000			
Congressional Add: Program Increase - Coastal Terrain Hazard	Research	8.000	6.000			
Congressional Add: Program Increase - Expeditionary Deploym	ent of Fully Sustainable Utility	10.000	-			
Congressional Add: Program Increase - Graphene Research		5.000	-			

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army		Date: April 2022	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)	R-1 Program Element (Number/Name) PE 0603119A <i>I Ground Advanced Technology</i>		
Congressional Add Details (\$ in Millions, and Includes General Re	eductions)	FY 2021	FY 2022
Congressional Add: Program Increase - Impacts of Soil Structures	s on Hydrology	4.000	5.000
Congressional Add: Program Increase - Operational Energy Rese	arch	1.300	-
Congressional Add: Program Increase - Temperature Insensitive I	High?Energy Density Lithium?Ion Batteries	2.500	-
Congressional Add: Program Increase - Vehicle Performance Reli	ability and Operations	3.000	-
Congressional Add: Program Increase - Cross-Laminated Timber	and Recycled Carbon Fiber Materials	1.300	5.500
Congressional Add: Program Increase - Advanced Explosion Res	istant Window Systems	5.000	-
Congressional Add: 3D Printing of Concrete		-	2.000
Congressional Add: 3D Printing of Infrastructure		-	5.000
Congressional Add: Additive Construction for Field Deployment		-	4.000
Congressional Add: Anticipating Threats to Natural Systems		-	5.000
Congressional Add: Army Visual and Tactical Arctic Reconnaissar	nce	-	2.000
Congressional Add: Assessments and Monitoring Systems for His	toric Structures	-	5.000
Congressional Add: Autonomous Construction and Manufacturing		-	5.000
Congressional Add: Biofuel		-	6.000
Congressional Add: Biomass Polymer Technology		-	2.000
Congressional Add: Cold Weather Energy Research		-	5.000
Congressional Add: Cold Weather Research		-	3.000
Congressional Add: Distributed Technologies for Steam Loop Rep	lacements	-	5.000
Congressional Add: Electrochemical Conversion of Water Stream	s	-	5.000
Congressional Add: Entry Control Points at Installations		-	5.000
Congressional Add: Expeditionary Additive Construction		-	15.000
Congressional Add: Explosive Materials Detection		-	3.000
Congressional Add: Frost Heave Effects Monitoring		-	4.500
Congressional Add: Graphene Applications for Military Engineerin	g	-	10.000
Congressional Add: Hardened Facility Standards		-	4.600
Congressional Add: High Power Fast Charging for Electric Vehicle	e Fleets	-	3.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army	C	ate: April 2022	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)	R-1 Program Element (Number/Name) PE 0603119A <i>I Ground Advanced Technology</i>		
Congressional Add Details (\$ in Millions, and Includes General Red	ductions)	FY 2021	FY 2022
Congressional Add: Infrastructure Smart Technology		-	5.000
Congressional Add: Low Carbon Hydrogen Technologies		-	10.000
Congressional Add: Microgrid Reliability and Resiliency		-	10.000
Congressional Add: Military Waste Stream Conversion		-	5.000
Congressional Add: Partnership and Technology Transfer		-	4.000
Congressional Add: Power Generation for Increased Facility Resilie	ence Pilot	-	10.000
Congressional Add: Power Projection		-	7.000
Congressional Add: Sustainable Smart Utilities		-	5.000
Congressional Add: Water Resiliency and Self Sufficiency		-	4.000
Congressional Add: Water Reuse Consortium		-	10.000
Congressional Add: Watercraft Simulator		-	4.000
	Congressional Add Subtotals for Project: Bo)3 181.800	257.100
	Congressional Add Totals for all Project	ts 181.800	257.100

Change Summary Explanation

Fiscal Year 2023 (FY23) funding increase reflects the fact that the FY22 President's Budget request did not include out-year funding.

Appropriation/Budget Activity R: Program Element (Number/Name) Project (Number/Name) Project (Number/Name) 2040 / 3 Piton Proor Proor <td< th=""><th>Exhibit R-2A, RDT&E Project J</th><th>ustification</th><th>: PB 2023 A</th><th>Army</th><th></th><th></th><th></th><th></th><th></th><th></th><th>Date: Apri</th><th>il 2022</th><th></th></td<>	Exhibit R-2A, RDT&E Project J	ustification	: PB 2023 A	Army							Date: Apri	il 2022	
COST (§ in Millions)Prior YearsFY 2021FY 2022FY 2022FY 2023FY 2023FY 2023FY 2024FY 2024FY 2025FY 2026FY 2027CompleteTotalBK8: Robatics for Engineer Operations Adv Tech-4.1946.2216.314-6.3143.7844.5236.5008.1790.00039.716Quantity of RDT&E Articles<	Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)ProjPE 0603119A / Ground Advanced TechnoloBK8gyTecl				Project (N BK8 / Robe Tech	oject (Number/Name) 8 I Robotics for Engineer Operations Adv ch		
BK8: Robotics for Engineer - 4.194 6.221 6.314 - 6.314 3.784 4.523 6.500 8.179 0.000 38.715 Operations Adv Tech -	COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Quantity of RDT&E Articles - <	BK8: Robotics for Engineer Operations Adv Tech	-	4.194	6.221	6.314	-	6.314	3.784	4.523	6.500	8.179	0.000) 39.715
A. Mission Description and Budget Item Justification This Project matures and demonstrates robotic engineer equipment capabilities that can remotely characterize the environment and operate in the battlespace for autonomous Combat Engineer actions. This Project provides technologies for Combat Engineer mission of mobility, counter mobility, and survivability through semi-autonomous or autonomous operations. The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy. Research in this Project supports the Army Science and Technology Ground Portfolio. Research is performed by the United States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command. Research in this Project is related to, and fully coordinated with Program Element (PE) 0602144A (Ground Technology) / Project BK7 (Robotics for Engineer Operations Technology). Research in this PE complements PE 0602114A (Ground Technology), PE 0602145A (Next Generation Combat Vehicle Technology), and PE 0603462A (Next Generation Combat Vehicle Advanced Technology). B. Accomplishments/Planned Programs (s in Millions) FY 2021 FY 2022 FY 2023 Title: Beyond-Visual-Line-of-Sight Tele-operated Engineer Operations Demonstration 4.194 5.994 6.314 Description: This effort matures and demonstrates remote control and semi-autonomous behaviors on small scale construction equipment to provide information and coordination. FY 2022 I FY 2022 FY 2023 6.314 </td <td>Quantity of RDT&E Articles</td> <td>-</td> <td></td> <td></td>	Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
B. Accomplishments/Planned Programs (\$ in Millions)FY 2021FY 2022FY 2023Title: Beyond-Visual-Line-of-Sight Tele-operated Engineer Operations Demonstration4.1945.9946.314Description: This effort matures and demonstrates remote control and semi-autonomous behaviors on small scale construction equipment to provide information that scales to larger legacy equipment as well as assess the applicability of small scale equipment working in collaboration and coordination.FY 2022 Plans: Demonstrate autonomous Engineer site characterization with a semantically labeled site model and change detection; demonstrate compact track loader and mini-hydraulic excavator performing Combat Engineer tasks at Beyond-Visual-Line-of-FY 2021FY 2022	This Project matures and demon autonomous Combat Engineer as maintaining, repairing, and co through semi-autonomous or au The cited research is consistent Research in this Project support Research is performed by the U Research in this Project is relate Technology). Research in this PE complement Generation Combat Vehicle Adv	nstrates robo actions. Thi onstructing e itonomous o with the Uno ts the Army S inited States ed to, and ful ots PE 06021 vanced Tech	otic enginee is Project pr expedient in perations. der Secreta Science and (U.S.) Army Ily coordinat	r equipmen ovides tech frastructure ry of Defens I Technolog / Engineer I red with Pro	t capabilitie nologies fo . These effo se for Rese ly Ground P Research a ogram Elem ogy), PE 06	es that can r r Combat E orts will enh arch and Er Portfolio. and Develop ent (PE) 06 02145A (Ne	emotely cha ngineer mis ance Comb ngineering p ment Cente 02144A (Gr ext Generati	aracterize th sion plannir at Engineer priority focus er and coord round Techr on Combat	e environm ng, creating missions o areas and inated with nology) / Pro Vehicle Teo	ent and ope or reducing f mobility, co the Army M U.S. Army I oject BK7 (F chnology), a	erate in the barriers ar ounter mob lodernization Futures Co Robotics for and PE 060	battlespace nd obstacle ility, and su on Strategy mmand. Engineer (3462A (Ne	e for s, as well irvivability Operations
Title: Beyond-Visual-Line-of-Sight Tele-operated Engineer Operations Demonstration 4.194 5.994 6.314 Description: This effort matures and demonstrates remote control and semi-autonomous behaviors on small scale construction equipment to provide information that scales to larger legacy equipment as well as assess the applicability of small scale equipment working in collaboration and coordination. 6.314 FY 2022 Plans: Demonstrate autonomous Engineer site characterization with a semantically labeled site model and change detection; demonstrate compact track loader and mini-hydraulic excavator performing Combat Engineer tasks at Beyond-Visual-Line-of- 4.194	B. Accomplishments/Planned	Programs (\$ in Million	s)						FY	2021	FY 2022	FY 2023
Description: This effort matures and demonstrates remote control and semi-autonomous behaviors on small scale construction equipment to provide information that scales to larger legacy equipment as well as assess the applicability of small scale equipment working in collaboration and coordination. FY 2022 Plans: Demonstrate autonomous Engineer site characterization with a semantically labeled site model and change detection; demonstrate compact track loader and mini-hydraulic excavator performing Combat Engineer tasks at Beyond-Visual-Line-of-	Title: Beyond-Visual-Line-of-Sig	ht Tele-oper	ated Engine	er Operatio	ons Demons	stration					4.194	5.994	6.314
FY 2022 Plans: Demonstrate autonomous Engineer site characterization with a semantically labeled site model and change detection; demonstrate compact track loader and mini-hydraulic excavator performing Combat Engineer tasks at Beyond-Visual-Line-of-	Description: This effort matures equipment to provide information equipment working in collaboration	s and demon n that scales on and coor	istrates rem to larger leg dination.	ote control gacy equipr	and semi-a ment as wel	utonomous Il as assess	behaviors o the applica	on small sca bility of sma	le construc Ill scale	tion			
	FY 2022 Plans: Demonstrate autonomous Engir demonstrate compact track load	eer site chai er and mini-l	racterizatior hydraulic ex	n with a sen cavator per	nantically la forming Co	beled site n mbat Engin	nodel and cl leer tasks at	nange deteo Beyond-Vis	ction; sual-Line-o	f-			

		Date: April 2022			
R-1 Program Element (Number/Name) PE 0603119A / Ground Advanced Technolo gy	Project (N BK8 / Rob Tech	lumber/l otics for	Name) Engineer Ope	erations Adv	
	F	2021	FY 2022	FY 2023	
trate a universal controller developed by Comba Engineer equipment.	ıt				
at Engineer task. Will validate capabilities for ple pieces of heavy Engineer equipment in a Jc	int				
		-	0.227	-	
Accomplishments/Planned Programs Sub	totals	4.194	6.221	6.314	
	R-1 Program Element (Number/Name) PE 0603119A / Ground Advanced Technolo gy rate a universal controller developed by Comba Engineer equipment. at Engineer task. Will validate capabilities for pieces of heavy Engineer equipment in a Jo Accomplishments/Planned Programs Subt	R-1 Program Element (Number/Name) Project (N PE 0603119A / Ground Advanced Technolo BK8 / Rob gy Trate a universal controller developed by Combat FY rate a universal controller developed by Combat FY at Engineer equipment. at Engineer task. Will validate capabilities for FY at Engineer task. Will validate capabilities for Die pieces of heavy Engineer equipment in a Joint Image: State of the sta	R-1 Program Element (Number/Name) Project (Number/I PE 0603119A / Ground Advanced Technolo BK8 / Robotics for gy Tech rate a universal controller developed by Combat FY 2021 rate a universal controller developed by Combat FY 2021 at Engineer task. Will validate capabilities for or ole pieces of heavy Engineer equipment in a Joint - Accomplishments/Planned Programs Subtotals 4.194	R-1 Program Element (Number/Name) Project (Number/Name) PE 0603119A / Ground Advanced Technolo BK8 / Robotics for Engineer Optige gy FY 2021 FY 2022 rate a universal controller developed by Combat FY 2021 FY 2022 rate a universal controller developed by Combat FY 2021 FY 2022 rate a universal controller developed by Combat a 0.227 at Engineer task. Will validate capabilities for ole pieces of heavy Engineer equipment in a Joint - 0.227 Accomplishments/Planned Programs Subtotals 4.194 6.221	

Exhibit R-2A, RDT&E Project Ju							Date: April	2022				
Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060311 <i>gy</i>	Program Element (Number/Name)Project (Number/Name)603119A I Ground Advanced TechnoloBK9 I Ground System Fluids and Fu Tech				Fuels Adv		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BK9: Ground System Fluids and Fuels Adv Tech	-	1.684	1.732	2.301	-	2.301	2.752	3.063	3.150	3.099	0.000	17.781
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates liquid logistics technologies such as enhanced jet fuels, lubricants, oils, powertrain fluids, coolants, bulk fluid treatment, monitoring, metering, storage, and distribution in support of established Army regulations and requirements. This Project improves products and technologies to optimize fuel efficiency, meet new hardware fluid requirements, modernize fluids, ensure bulk fluid meets quality requirements, and provide bulk fluid asset visibility, to optimize logistics and reduce logistics requirements. This Project executes the demonstration of enhanced jet fuels for ground systems, gear oils, anti-lock brake system - compatible brake fluid, smart bulk fuel metering and monitoring technologies. This Project improves liquid logistics products and technologies that are critical enablers for multi-domain operations requiring semi-independent operations to enable dispersed operations to extend operational reach, prolong endurance and allow freedom of action for the Joint Force.

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

Research in this Project supports the Army Science and Technology Ground Portfolio.

Research is performed by the United States (U.S.) Army Futures Command.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Ground System Fluids and Fuels	1.684	1.668	2.301
Description: This effort focuses on reducing the logistics footprint, improving fuel efficiency, and ensuring mobility by maturing and demonstrating technologies in areas such petroleum quality monitoring, filtration, storage and distribution, hydraulic fluids; enhanced jet fuels and fuel additives, lubricants, oil, powertrain fluids and coolants. Validates additional candidate synthetic fuel blends to determine their suitability for military ground systems.			
Validates candidate fuel efficient gear oils that maintain and improve vehicle axle durability and provide extended performance time over current gear oil for military use. Provide performance requirements for a new military brake fluid that is compatible with anti-lock braking system (ABS) and investigate candidate fluid technologies. Integrate smart fuel metering technology into self-correcting devices that automatically report fuel quantity and conduct fuel filter effectiveness testing to establish fuel particle contamination limits for new fuel monitoring technology.			

R-1 Program Element (Number/Name) PE 0603119A / Ground Advanced Technolo IV	Project (Num BK9 / Ground Tech	System Flu	ids and	l Fuels Adv		
y	Tech			r rueis Auv		
	FY 202					
		21 FY 2	022	FY 2023		
<i>FY 2022 Plans:</i> Will continue assessment of the lubrication capacity of fuel additive using improved methods and component test rigs for the initial fuel pump selected to optimize wear reduction of fuel delivery system components. Will conduct fuel injector testing based on the results of the fuel filter effectiveness testing to establish fuel particle contamination limits for new fuel monitoring technology. Will develop criteria and laboratory methodology to assess extended life and performance capabilities of coolants.						
<i>FY 2023 Plans:</i> Will correlate fuel lubricity additive concentration to fuel injection pump performance from the bench scale through test rig evaluation to full engine demonstrations for improved durability and operation using aviation fuels. Complete enhanced performance engine coolant candidate fluid testing and candidate down selection. Conduct testing to evaluate and establish smart meter performance baseline and initiate effort to transfer data via the server to a fuel dashboard.						
FY 2022 to FY 2023 Increase/Decrease Statement: Increase investment in fuel metering to provide fuel asset visibility and predictive logistics.						
		-	0.064	-		
Accomplishments/Planned Programs Sub	totals 1.	684	1.732	2.301		
	d methods and component test rigs for the is. Will conduct fuel injector testing based on a limits for new fuel monitoring technology. A ince capabilities of coolants. ce from the bench scale through test riging aviation fuels. Complete enhanced Conduct testing to evaluate and establish to a fuel dashboard. ogistics.	d methods and component test rigs for the initial Will conduct fuel injector testing based on the I limits for new fuel monitoring technology. Will Ince capabilities of coolants. ce from the bench scale through test rig Ig aviation fuels. Complete enhanced Conduct testing to evaluate and establish to a fuel dashboard. ogistics. ccomplishments/Planned Programs Subtotals 1.4	d methods and component test rigs for the initial . Will conduct fuel injector testing based on the 1 limits for new fuel monitoring technology. Will ince capabilities of coolants. ce from the bench scale through test rig 1 g aviation fuels. Complete enhanced Conduct testing to evaluate and establish • to a fuel dashboard. ogistics. - ccomplishments/Planned Programs Subtotals 1.684	d methods and component test rigs for the initial . Will conduct fuel injector testing based on the h limits for new fuel monitoring technology. Will nce capabilities of coolants. ce from the bench scale through test rig ig aviation fuels. Complete enhanced Conduct testing to evaluate and establish to a fuel dashboard. ogistics. - 0.064 ccomplishments/Planned Programs Subtotals 1.684 1.732		

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: Apr	1 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progr PE 060317 <i>gy</i>	am Elemen 19A <i>I Groun</i>	t (Number / d Advanced	Name) I Technolo	Project (N BL3 / Explo Technology	umber/Na osives Fore /	me) ensics Adva	nced
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BL3: Explosives Forensics Advanced Technology	-	2.002	2.096	2.214	-	2.214	2.246	2.267	2.267	2.267	0.000	15.359
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Bud This Project matures and demons precursor materials to enable the Chemical, Biological, Radiologica detection and attribution of an exp The cited research is consistent w Research in this Project supports Research is performed by the Un Research in this Project is related	Iget Item J strates instr warfighter il, and Nucl plosive haz with the Uno the Army S ited States d to, and ful	ustification rumentation to integrate ear point an ard or Home der Secretar Science and (U.S.) Army ly coordinat	and algoriti chemical a d stand-off e-made Exp ry of Defens Technolog r Engineer I ed with Pro	hms require nd explosiv sensors, al blosive man se for Resea y Ground P Research a gram Elemo	ed to provide e hazard de ternative ch ufacturing/a arch and Er Portfolio. nd Develop ent (PE) 060	e improved p etection equ lemical dete assembly loo ngineering p ment Cente 02144A (Gro	point, proxir ipment. This ction modal cation. riority focus r and coord ound Techn	nity, and sta s Project int lities and al areas and inated with lology).	and-off dete egrates exp gorithms that the Army M the U.S. Arn	ction of ex plosive dete at will impro odernization my Futures	plosives and ection into the pove the prob on Strategy.	d ne family of bability of
B. Accomplishments/Planned P	rograms (S	in Millions	<u>s)</u>						FY	2021	FY 2022	FY 2023
<i>Title:</i> Detection Mechanisms for O <i>Description:</i> This effort matures and their precursors, and other ch <i>FY 2022 Plans:</i> Will further mature novel portable continue maturation of photonic in footprint. <i>FY 2023 Plans:</i> Will demonstrate improved point a chemical explosives reconnaissan	Contaminar and demon nemicals an detection to ntegrated ci and standof nce focusing	nts strates impr id hazardou: echnology fo rcuit (PIC) fo for detection of g on integra	oved point s materials. or further m or chemical of military h tion to unm	and stando aturity and sensing to omemade e anned grou	ff detection testing of re decrease s explosives a ind platform	of military a ealistic threa ize, weight a and other ch s. Will eval	nd homema Its and scer and power of emical threa uate integra	ade explosiv narios. Will configuration ats to facilita ated system	n ate s for	2.002	2.020	2.214

1_

Appropriation/Budget Activity 2040 / 3 R-1 Program Element (Number/Name) PE 0603119A / Ground Advanced Technolo gy Project (Number/Name) BL3 / Explosives Forensics Advanced Technology B. Accomplishments/Planned Programs (\$ in Millions) semi-autonomous trace level detection of surface threats and vapor phase explosive and chemical threats. Will integrate maturing technologies in hyperspectral imaging, portable mass spectrometry, and advanced optical methodologies for sensor development. FY 2021 FY 2022 FY 2022 FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort. FY 2022 SBIR/STTR Transfer - 0.076 Description: Funding transferred in accordance with Title 15 USC ?638 - 0.076 -		chibit R-2A, RDT&E Project Justification: PB 2023 Army				
B. Accomplishments/Planned Programs (\$ in Millions) FY 2021 FY 2022 FY 2022 FY 2022 FY 2022 FY 2022 FY 2022 FY 2023 Intersection of surface threats and vapor phase explosive and chemical threats. Will integrate maturing technologies in hyperspectral imaging, portable mass spectrometry, and advanced optical methodologies for sensor development. FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort. FU 2022 SBIR/STTR Transfer 0.076 O.076 Description: Funding transferred in accordance with Title 15 USC ?638 FU 2022 ?638 FU 2021 FU 2021 FU 2021 FU 2022 FU 2023 FU	Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603119A / Ground Advanced Technolo gy	Project (Number/Name) BL3 / Explosives Forensics Advanced Technology			
semi-autonomous trace level detection of surface threats and vapor phase explosive and chemical threats. Will integrate maturing technologies in hyperspectral imaging, portable mass spectrometry, and advanced optical methodologies for sensor development.Image: Transfor and the form of the	B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023	
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort. Title: FY2022 SBIR/STTR Transfer Description: Funding transferred in accordance with Title 15 USC ?638	semi-autonomous trace level detection of surface threats and vapor phase e technologies in hyperspectral imaging, portable mass spectrometry, and ad	explosive and chemical threats. Will integrate main vanced optical methodologies for sensor develop	uring ment.			
Title: FY2022 SBIR/STTR Transfer - 0.076 Description: Funding transferred in accordance with Title 15 USC ?638 - 0.076	FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.					
Description: Funding transferred in accordance with Title 15 USC ?638	Title: FY2022 SBIR/STTR Transfer		-	0.076	-	
	Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638	FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638	FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
Accomplishments/Planned Programs Subtotals 2.002 2.096 2.2		Accomplishments/Planned Programs Sub	totals 2.002	2.096	2.214	
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>	<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>					
<u>D. Acquisition Strategy</u> N/A	<u>D. Acquisition Strategy</u> N/A					

Exhibit R-2A, RDT&E Project Ju							Date: Apri	1 2022				
Appropriation/Budget Activity 2040 / 3				R-1 Program Element (Number/Name) PE 0603119A / Ground Advanced Technolo gyProject (N BL6 / Expe 				l umber/Name) edient Passive Protection Technology				
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BL6: Expedient Passive Protection Advanced Technology	-	3.051	0.494	3.613	-	3.613	5.998	5.821	4.154	4.773	0.000	27.904
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates rapidly deployable protection solutions to protect small distributed units; decision support applications and software; and tactics, techniques, and procedures to increase the survivability of personnel, critical assets, and facilities from a range of threats. Force protection technologies will be matured and demonstrated for applications in complex and urban environments to protect against advanced energetic threats, large caliber rockets and missiles, and other emerging weapons.

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

Research in this Project supports the Army Science and Technology Ground portfolio.

Research in this Project conducted by the United States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

Research in this Project is related to and fully coordinated with Program Element (PE) 0602144A (Ground Technology) / Project BL5 (Expedient Passive Protection Technology).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Force Protection in the Urban Environment Demonstrations	3.051	-	-
Description: This effort matures and demonstrates force protection solutions for urban environments focusing on the use of existing structures; rapidly deployable protection systems; decision support applications and software; and tactics, techniques, and procedures to provide protection with consideration for a complex three-dimensional threat.			
Title: Protection Against High Trajectory Large Caliber Rocket and Missile Threats	-	0.476	-
Description: This effort matures and demonstrates expedient force protection solutions for emerging threats such as large caliber rocket and missile weapon effects. This effort also demonstrates decision support tools to aid the warfighter in selecting protection schemes for survivability from emerging threats supporting All-Domain/Multi-Domain Operations.			
FY 2022 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603119A / Ground Advanced Technolo gy	Project BL6 / E> Advance	(Number/N xpedient Pa ed Technolo	lame) ssive Protect ogy	ion
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023
Assess capabilities of legacy protective systems to protect critical assets and f effects such as large caliber rockets and missiles to establish baseline perform	acilities from emerging threat weapon system nance.				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding realigned based on completion of the baseline assessment phase and from Emerging Threats (ASSET) Demonstrations effort in this project reflecting newly developed expedient force protection solutions for emerging threats.	d shift to Assessments of Solutions for Surviva g a planned shift in focus to include both legac	bility / and			
Title: Assessments of Solutions for Survivability from Emerging Threats Demo	onstrations		-	-	3.613
Description: This effort matures and demonstrates both legacy and newly develop for emerging threats such as large caliber rocket and missle weapon effects are algorithms for decision support applications and software; and inform tactics, the survivability of personnel, critical assets, and facilities against emerging threats schemes for survivability from emerging threats supporting Multi-Domain Oper	veloped expedient force protection solutions nd UAV threats. This effort also demonstrates echniques, and procedures (TTP's) to increase reats to enable the Warfighter to select protection rations.	e on			
<i>FY 2023 Plans:</i> Will mature and demonstrate rapidly deployable protection systems (expedient expeditionary bunkers) to protect critical semi-fixed assets and facilities from emissiles to establish baseline performance so these systems can be optimized	t barriers, expedient personnel shelters, and merging threats such as large caliber rockets a I to provide tailored protection.	and			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding realigned to demonstrate passive protection capabilities developed in (Expedient Passive Protection Technology).	PE 0602144A (Ground Technology) / Project	BL5			
Title: FY 2022 SBIR/STTR Transfer			-	0.018	-
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	totals	3.051	0.494	3.613
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603119A / Ground Advanced Technolo gy	Project (Number/Name) BL6 <i>I Expedient Passive Protection</i> <i>Advanced Technology</i>
C. Other Program Funding Summary (\$ in Millions)		
<u>Remarks</u>		
N/A		
D. Acquisition Strategy		
N/A		

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: April	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)Project (NPE 0603119A / Ground Advanced TechnoloBL8 / PowgyEnvironme				lumber/Name) /er Projection in A2AD ents Adv Tech			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BL8: Power Projection in A2AD Environments Adv Tech	-	1.220	2.970	4.948	-	4.948	3.302	4.101	2.660	3.699	0.000	22.900
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates remote assessment technologies to determine entry and maneuver corridors, provides site selection tools and decision support technologies for all climates in all season conditions including aviation site- selection tools, enhanced automated route reconnaissance technologies, mobility models for extreme climates, and road capacity assessment technologies. These technologies reduce reliance on manned on-site reconnaissance for force projection assessments and provide all-season predictions to ensure air and ground battlespace entry and maneuver. This Project also matures and demonstrates material solutions to repair, rebuild, and construct infrastructure required for movement and maneuver in highly contested, complex operational environments such as Anti-Access/Area Denial.

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

Research in this Project supports the Army Science and Technology Ground portfolio.

Research in this Project conducted by the United States (U.S.) Army Engineer Research and Development Center and coordinated with the U.S. Army Futures Command.

Research in this Project is related to and fully coordinated with Program Element (PE) 0602144A (Ground Technology) / Project BL7 (Power Projection in A2AD Environments Technology).

FY 2021	FY 2022	FY 2023
1.220	1.522	3.312
	FY 2021 1.220	FY 2021 FY 2022 1.220 1.522

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: /	April 2022	
Appropriation/Budget Activity 2040 / 3	Name) ction in A2AD [.] Tech			
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
Will mature and demonstrate planning capabilities for predicting route deteriors methods for assessing ground mobility across snow-covered terrain and thawi procedures (TTP).	ation from military ground vehicles; will demons ng artic soils to inform Army tactics, techniques	trate , and		
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase provides for the final year of demonstration events for this ef	fort completing in Fiscal Year 2023.			
Title: Engineering for Battlespace Maneuver Demonstrations		-	1.340	1.636
Description: This effort demonstrates material solutions and techniques for exdamaged infrastructure along mobility corridors and restaging areas to maintait overmatch and tactical advantage in contested complex environments.	xpedient repair to rapidly repair and upgrade in and enhance freedom of maneuver achieving	9		
FY 2022 Plans: Will demonstrate techniques for rapid soil stabilization to support military groun techniques, and procedures as well as material solutions for rapid infrastructure	nd vehicle maneuver; and will demonstrate tact re capacity upgrades.	ics,		
FY 2023 Plans: Will demonstrate effectiveness of material additives for stabilizing reclaimed parequipment solutions for expedient road repair.	avement materials; will mature and demonstrate	e		
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.				
Title: FY 2022 SBIR/STTR Transfer		-	0.108	-
Description: Funding transferred in accordance with Title 15 USC ?638				
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638				
	Accomplishments/Planned Programs Sub	totals 1.220	2.970	4.948
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A				

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603119A / Ground Advanced Technolo gy	Project (Number/Name) BL8 <i>I Power Projection in A2AD</i> <i>Environments Adv Tech</i>
C. Other Program Funding Summary (\$ in Millions)		
<u>Remarks</u> N/A		
<u>D. Acquisition Strategy</u> N/A		

Exhibit R-2A, RDT&E Project Ju					Date: April	2022						
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603119A / Ground Advanced Technolo gyProject (N BM1 / Pro 				(Number/Name) Protection from Advanced Weapon Adv Tech			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BM1: Protection from Advanced Weapon Effects Adv Tech	-	2.104	5.868	4.856	-	4.856	4.915	5.103	5.302	5.490	0.000	33.638
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates structural hardening solutions and force protection technologies to increase survivability of facilities and provide critical updates to protective design specifications and guidance. Additionally, this project matures and demonstrates passive protection technologies and provides protective design criteria advancements to mitigate attack from emerging advanced threats.

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

Research in this Project supports the Army Science and Technology Ground portfolio.

Research in this Project is conducted by the United States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

This Project is related to and fully coordinated with Program Element (PE) 0602144A (Ground Technology) / Project BL9 (Protection from Advanced Weapon Effects Technology).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Defeat of Complex Attack Demonstrations	2.104	5.654	4.856
Description: This effort demonstrates force protection technologies that mitigate the effects of emerging peer and near peer adversaries advanced penetrating threats and high yield blast effects by optimizing high-performance, logistically feasible material solutions and processes.			
FY 2022 Plans: Demonstrate optimized subscale hardening solutions against emerging complex weapon attack scenarios; and optimize damage prediction and system performance for full-scale demonstration.			
FY 2023 Plans: Will demonstrate full scale structural hardening solution against emerging complex weapon attack scenario. Will demonstrate enhanced algorithm for structural hardening and damage prediction from peer and near peer adversaries' precision strike penetrating weapons.			
FY 2022 to FY 2023 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date:	Date: April 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603119A / Ground Advanced Technolo gy	Project (Number/Name) BM1 <i>I Protection from Advanced Weapo</i> <i>Effects Adv Tech</i>				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023		
Funding decrease reflects planned lifecycle of this effort completing in Fiscal Y	Year 2023.					
Title: FY 2022 SBIR/STTR Transfer		-	0.214	-		
Description: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638 FY 2022 to FY 2023 Increase/Decrease Statement:						
Funding transferred in accordance with Title 15 USC 2638	Accomplishments/Planned Programs Sub	totals 2 10/	5 868	1 856		
N/A <u>Remarks</u> N/A <u>D. Acquisition Strategy</u> N/A						

Exhibit R-2A, RDT&E Project Justification: PB 2023	Army							Date: Apri	2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603119A / Ground Advanced Technolo gy				Project (Number/Name) BO3 / MILITARY ENGINEERING TECHNOLOGY DEMONSTRATION (CA)					
COST (\$ in Millions) Prior Years FY 202	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BO3: <i>MILITARY</i> - 181.80 ENGINEERING TECHNOLOGY DEMONSTRATION (CA)	0 257.100	-	-	-	-	-	-	-	0.000	438.900
Quantity of RDT&E Articles -	-	-	-	-	-	-	-	-		
A. Mission Description and Budget Item Justification Congressional Interest Item funding provided for Militation The cited work is consistent with the Under Secretary	<u>on</u> ry Engineerir of Defense fo	ng Technolo or Research	ogy Demons	stration. eering priori	ty focus are	eas and the	Army Mode	rnization St	rategy.	
B. Accomplishments/Planned Programs (\$ in Millic	<u>ns)</u>					FY 2021	FY 2022			
Congressional Add: Electrical System Safety and Re	liability					5.000	5.000			
FY 2021 Accomplishments: Program Increase supported advanced research on Electrical System Safety and Reliability. Work executed by Army Futures Command.										
FY 2022 Plans: Congressional Interest Item funding p	rovided for E	lectrical Sys	stem Safety	and Reliab	ility					
Congressional Add: Cold Regions Research						2.000	2.000			
<i>FY 2021 Accomplishments:</i> Program Increase supported advanced research on Cold Regions Research. Work executed by Army Futures Command. <i>FY 2022 Plans:</i> Congressional Interest Item funding provided for Cold Weather Research Station										
Congressional Add: High-Performance Concrete Ted	hnology					6.000	6.000			
FY 2021 Accomplishments: Program Increase supported advanced research on High-Performance Concrete Technology.										
Work executed by Army Futures Command.										
FY 2022 Plans: Congressional Interest Item funding p	rovided for H	igh-Perform	nance Contr	ete						
Congressional Add: Secure Management of Energy	Generation a	nd Storage				5.000	5.000			
Exhibit R-2A, RDT&E Project Justification: PB 2023 Army				Date: April 2022						
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Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number PE 0603119A / Ground Advance gy	R-1 Program Element (Number/Name) PE 0603119A <i>I Ground Advanced Technolo</i> <i>gy</i>								
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022							
FY 2021 Accomplishments: Program Increase supported advanced Energy Generation and Storage.	research on Secure Management of									
Work executed by Army Futures Command.										
FY 2022 Plans: Congressional Interest Item funding provided for Secuand Storage	ure Management of Energy Generation									
Congressional Add: Composite Flywheel Technology		7.000	7.000							
FY 2021 Accomplishments: Program Increase supported advanced Technology.	research on Composite Flywheel									
Work executed by Army Futures Command.										
FY 2022 Plans: Congressional Interest Item funding provided for Com	posite Flywheel Technology									
Congressional Add: Robotic Construction Equipment		5.000	-							
FY 2021 Accomplishments: Program Increase supported advanced Equipment	research on Robotic Construction									
Work executed by Army Futures Command.										
Congressional Add: Environmental Sensors for Explosives		3.000	-							
FY 2021 Accomplishments: Program Increase supported advanced Explosives.	research on Environmental Sensors for									
Work executed by Army Futures Command.										
Congressional Add: Robotic 4-D Printing of Geopolymer-Based Composites			-							
FY 2021 Accomplishments: Program Increase supported advanced Geopolymer-Based Composites.	research on Robotic 4-D Printing of									
Work executed by Army Futures Command.										
Congressional Add: Materials and Manufacturing Technology for Col	ld Environments	4.000	4.000							

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/ PE 0603119A / Ground Advanced gy	Project (N BO3 / MILI TECHNOL	umber/Name) ITARY ENGINEERING .OGY DEMONSTRATION (CA)	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022]
FY 2021 Accomplishments: Conduct advanced research in Materials and Materials Environments.	nufacturing Technology for Cold			
Work executed by Army Futures Command.				
FY 2022 Plans: Congressional Interest Item funding provided for Materials and Cold Environments	Manufacturing Technology for			
Congressional Add: Research Facility Modernization		6.000	-	
FY 2021 Accomplishments: Program Increase supported advanced research Modernization.	on Research Facility			
Work executed under the direction of the Army Futures Command.				
Congressional Add: Program Increase - Smart Installation and Community Pr	ogram	5.000	-	
FY 2021 Accomplishments: Program Increase supported advanced research Community Program.	on Smart Installation and			
Work executed by Army Futures Command.				
Congressional Add: Program Increase - Flow Battery Demonstration		20.000	-	
FY 2021 Accomplishments: Program Increase supported advanced research	on Flow Battery Demonstration.			
Work executed by Army Futures Command.				
Congressional Add: Program Increase - Corrosion Protection and Prevention		10.000	-	
FY 2021 Accomplishments: Program Increase supported advanced research Prevention.				
Work executed by Army Futures Command.				
Congressional Add: Program Increase - Rapid Entry and Sustainment for the	Arctic	8.000	8.000	
FY 2021 Accomplishments: Program Increase supported advanced research for the Arctic.	on Rapid Entry and Sustainment			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/ PE 0603119A / Ground Advanced gy	Name) I Technolo	Project (N BO3 / MILI TECHNOL	umber/Name) TARY ENGINEERING OGY DEMONSTRATION (CA)
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	
Work executed by Army Futures Command.				
FY 2022 Plans: Congressional Interest Item funding provided for Rapid Entry a	ind Sustainment for the Arctic			
Congressional Add: Program Increase - Secure Management of Energy Gene	eration and Storage	5.000	-	
FY 2021 Accomplishments: Program Increase supported advanced research Energy Generation and Storage.	on Secure Management of			
Work executed by Army Futures Command.				
Congressional Add: Program Increase - Water Quality and Resiliency		5.000	5.000	
FY 2021 Accomplishments: Program Increase supported advanced research	on Water Quality and Resiliency.			
Work executed by Army Futures Command.				
FY 2022 Plans: Congressional Interest Item funding provided for Water Quality	and Resiliency Technologies			
Congressional Add: Program Increase - Rare Earth Element Extraction		5.000	-	
FY 2021 Accomplishments: Program Increase supported advanced research Extraction.	on Rare Earth Element			
Work executed by Army Futures Command.				
Congressional Add: Program Increase - Organic Light Emitting Diode		5.000	5.000	
FY 2021 Accomplishments: Program Increase supported advanced research	on Organic Light Emitting Diode.			
Work executed by Army Futures Command.				
FY 2022 Plans: Congressional Interest Item funding provided for Organic Light	Emitting Diode			
Congressional Add: Program Increase - Coatings Technology		5.000	-	
FY 2021 Accomplishments: Program Increase supported advanced research	on Coatings Technology.			
Work executed by Army Futures Command.				
Congressional Add: Program increase - Heavy Load Simulator		4.200	-	
FY 2021 Accomplishments: Program Increase supported advanced research	on Heavy Load Stimulator.			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army				Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number PE 0603119A / Ground Advance gy	r/ Name) d Technolo	Project (N BO3 / MIL TECHNOL	lumber/Name) ITARY ENGINEERING .OGY DEMONSTRATION (CA)
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022		
Work executed by Army Futures Command.				
Congressional Add: Program Increase - Integrated Microgrids		4.000	-	
FY 2021 Accomplishments: Program Increase supported advanced res	search on Integrated Microgrids.			
Work executed by Army Futures Command.				
Congressional Add: Program Increase - Infrastructure Resilience and F	Flood Assessment	3.000	3.500	
FY 2021 Accomplishments: Program Increase supported advanced res Flood Assessment.	search on Infrastructure Resilience and			
Work executed by Army Futures Command.				
FY 2022 Plans: Congressional Interest Item funding provided for Infrastr Assessment	ucture Resilience and Flood			
Congressional Add: Program Increase - Single Connection Quick Oil C	hange System	3.000	-	
FY 2021 Accomplishments: Program Increase supported advanced res Change System.	search on Single Connection Quick Oil			
Work executed by Army Futures Command.				
Congressional Add: Program Increase - Clean Modular Hydro Technolo	оду	4.000	8.000	
FY 2021 Accomplishments: Program Increase supported advanced res Technology.	search on Clean Modular Hydro			
Work executed by Army Futures Command.				
FY 2022 Plans: Congressional Interest Item funding provided for Clean I	Modular Hydro Technology.			
Congressional Add: Program Increase - Accelerator Technology for Green Green Green Congressional Add: Program Increase - Accelerator Technology for Green Gr	ound Maneuver	5.000	5.000	
FY 2021 Accomplishments: Program Increase supported advanced res Ground Maneuver.	search on Accelerator Technology for			

Appropriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name) 2040 / 3 PC 0603119A / Ground Advanced Technolo BO3 / MULTARY ENclineERING 2040 / 3 Y FY 2021 FY 2021 Box Accomplishments/Planned Programs (\$ in Millions) FY 2021 FY 2021 FY 2022 Work executed by Army Futures Command. FY 2021 forgram increase - Autonomous Combat Engineering Solutions 5.500 4.000 FY 2021 Accomplishments: Program Increase supported advanced research on Autonomous Combat Engineering Solutions. S.000 6.000 FY 2021 Plans: Congressional Interest Item funding provided for Autonomous Combat Engineering Solutions. 8.000 6.000 FY 2022 Plans: Congressional Interest tem funding provided for Autonomous Combat Engineering Solutions FY 2021 Accomplishments: Program Increase supported advanced research on Costal Terrain Hazard 8.000 6.000 FY 2022 Plans: Congressional Interest Item funding provided for Coastal Terrain Hazard Research 8.000 6.000 FY 2022 Plans: Congressional Interest Item funding provided for Coastal Terrain Hazard Research 72021 FY 2022 Plans: Congressional Interest Item funding provided for Coastal Terrain Hazard Research 8.000 6.000 FY 2022 Plans: Congressional Interest Item funding provided for Coastal Terrain Hazard Research 5.000 <td< th=""><th>Exhibit R-2A, RDT&E Project Justification: PB 2023 Army</th><th></th><th></th><th></th><th>Date: April 2022</th></td<>	Exhibit R-2A, RDT&E Project Justification: PB 2023 Army				Date: April 2022
B. Accomplishments/Planned Programs (\$ in Millions) FY 2021 FY 2022 Work executed by Army Futures Command. - FY 2022 Plans: Congressional Interest Item funding provided for Accelerator Technology for Ground Maneuver - Congressional Add: Program Increase - Autonomous Combat Engineering Solutions 5.500 4.000 FY 2021 Accomplishments: Program Increase supported advanced research on Autonomous Combat Engineering Solutions. - - Work executed by Army Futures Command. - - - FY 2021 Accomplishments: Program Increase - Coastal Terrain Hazard Research 8.000 6.000 FY 2021 Accomplishments: Program Increase supported advanced research on Costal Terrain Hazard 8.000 6.000 FY 2022 Plans: Congressional Interest Item funding provided for Coastal Terrain Hazard Research 8.000 6.000 FY 2022 Plans: Congressional Interest Item funding provided for Coastal Terrain Hazard Research - - FY 2022 Plans: Congressional Interest Item funding provided for Coastal Terrain Hazard Research - - FY 2021 Accomplishments: Program Increase supported advanced research on Expeditionary Deployment of Fully Sustainable Utility. 10.000 - FY 2021 Accomplishments: Program Increase supported advanced research on Graphene Research. - -	Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/ PE 0603119A / Ground Advanced gy	' Name) d Technolo	u mber/Name) TARY ENGINEERING OGY DEMONSTRATION (CA)	
Work executed by Army Futures Command. FY 2022 Plans: Congressional Interest Item funding provided for Accelerator Technology for Ground Maneuver Congressional Add: Program increase - Autonomous Combat Engineering Solutions 5.500 4.000 FY 2021 Accomplishments: Program Increase supported advanced research on Autonomous Combat Engineering Solutions. 5.500 4.000 FY 2022 Plans: Congressional Interest Item funding provided for Autonomous Combat Engineering Solutions 6.000 6.000 FY 2021 Accomplishments: Program Increase - Coastal Terrain Hazard Research 8.000 6.000 FY 2021 Accomplishments: Program Increase supported advanced research on Costal Terrain Hazard Research 8.000 6.000 FY 2022 Plans: Congressional Interest Item funding provided for Coastal Terrain Hazard Research 8.000 6.000 FY 2021 Accomplishments: Program Increase supported advanced research on Costal Terrain Hazard Research 7000 - FY 2021 Accomplishments: Program Increase - Expeditionary Deployment of Fully Sustainable Utility 10.000 - FY 2021 Accomplishments: Program Increase supported advanced research on Expeditionary Deployment of Fully Sustainable Utility. 10.000 - Work executed by Army Futures Command. - - - Congressional Add: Program Increase - Graphene Research 5.000 - -	B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022		
FY 2022 Plans: Congressional Interest Item funding provided for Accelerator Technology for Ground Maneuver Congressional Add: Program Increase - Autonomous Combat Engineering Solutions S.500 4.000 FY 2021 Accomplishments: Program Increase supported advanced research on Autonomous Combat Engineering Solutions Congressional Add: Program Increase - Coastal Terrain Hazard Research Rome Solutions Congressional Add: Program Increase - Coastal Terrain Hazard Research Rome Solutions FY 2021 Accomplishments: Program Increase supported advanced research on Costal Terrain Hazard Research. Work executed by Army Futures Command. FY 2022 Plans: Congressional Interest Item funding provided for Coastal Terrain Hazard Research Congressional Add: Program Increase - Expeditionary Deployment of Fully Sustainable Utility 10.000 FY 2021 Accomplishments: Program Increase supported advanced research on Expeditionary Deployment of Fully Sustainable Utility Vork executed by Army Futures Command. Congressional Add: Program Increase - Expeditionary Deployment of Fully Sustainable Utility 10.000 FY 2021 Accomplishments: Program Increase supported advanced research on Graphene Research S.000 FY 2021 Accomplishments: Program Increase - Graphene Research S.000 FY 2021 Accomplishments: Program Increase supported advanced research on Graphene Research. Work executed by Army Futures Command. Congressional Add: Program Increase - Graphene Research S.000<td>Work executed by Army Futures Command.</td><td></td><td></td><td></td><td></td>	Work executed by Army Futures Command.				
Congressional Add: Program increase - Autonomous Combat Engineering Solutions5.5004.000FY 2021 Accomplishments: Program Increase supported advanced research on Autonomous Combat Engineering Solutions.5.5004.000Work executed by Army Futures Command.FY 2022 Plans: Congressional Interest Item funding provided for Autonomous Combat Engineering Solutions8.0006.000FY 2022 Plans: Congressional Interest Item funding provided for Autonomous Combat Engineering Solutions8.0006.000FY 2021 Accomplishments: Program Increase - Coastal Terrain Hazard Research8.0006.000FY 2022 Plans: Congressional Interest Item funding provided for Coastal Terrain Hazard Research8.0006.000FY 2022 Plans: Congressional Interest Item funding provided for Coastal Terrain Hazard Research7.000-FY 2022 Plans: Congressional Interest Item funding provided for Coastal Terrain Hazard Research7.000-Congressional Add: Program Increase - Expeditionary Deployment of Fully Sustainable Utility10.000-FY 2021 Accomplishments: Program Increase supported advanced research on Expeditionary Deployment of Fully Sustainable Utility.5.000-Work executed by Army Futures Command.5.000FY 2021 Accomplishments: Program Increase - Graphene Research5.000-FY 2021 Accomplishments: Program Increase - Graphene Research on Graphene Research.5.000-Work executed by Army Futures CommandCongressional Add: Program Increase - Impacts of Soil Structures on Hydrology4.0005.000FY 2021 Accomplishments: Program Increa	FY 2022 Plans: Congressional Interest Item funding provided for Acce	elerator Technology for Ground Maneuver			
FY 2021 Accomplishments: Program Increase supported advanced research on Autonomous Combat Image: Compliant of the support of	Congressional Add: Program increase - Autonomous Combat Engin	eering Solutions	5.500	4.000	
Work executed by Army Futures Command. FY 2022 Plans: Congressional Interest Item funding provided for Autonomous Combat Engineering Solutions 6.000 Congressional Add: Program Increase - Coastal Terrain Hazard Research 8.000 6.000 FY 2021 Accomplishments: Program Increase supported advanced research on Costal Terrain Hazard Research. 8.000 6.000 Work executed by Army Futures Command. FY 2022 Plans: Congressional Interest Item funding provided for Coastal Terrain Hazard Research 6.000 Congressional Add: Program Increase - Expeditionary Deployment of Fully Sustainable Utility 10.000 - FY 2021 Accomplishments: Program Increase supported advanced research on Expeditionary Deployment of Fully Sustainable Utility. 10.000 - Work executed by Army Futures Command. Congressional Add: Program Increase - Graphene Research 5.000 - FY 2021 Accomplishments: Program Increase supported advanced research on Graphene Research. 5.000 - Work executed by Army Futures Command. Congressional Add: Program Increase supported advanced research on Graphene Research. 5.000 - FY 2021 Accomplishments: Program Increase supported advanced research on Graphene Research. 5.000 - Work executed by Army Futures Command. Congressional Add: Program Increase - Impacts of Soil Structures on Hydrology 4.000 5.000	FY 2021 Accomplishments: Program Increase supported advanced Engineering Solutions.				
FY 2022 Plans: Congressional Interest Item funding provided for Autonomous Combat Engineering Solutions Congressional Add: Program Increase - Coastal Terrain Hazard Research 8.000 6.000 FY 2021 Accomplishments: Program Increase supported advanced research on Costal Terrain Hazard Research. Work executed by Army Futures Command. FY 2022 Plans: Congressional Interest Item funding provided for Coastal Terrain Hazard Research Congressional Add: Program Increase - Expeditionary Deployment of Fully Sustainable Utility 10.000 FY 2021 Accomplishments: Program Increase supported advanced research on Expeditionary Deployment of Fully Sustainable Utility. Work executed by Army Futures Command. Congressional Add: Program Increase - Caphene Research Sound FY 2021 Accomplishments: Program Increase supported advanced research on Graphene Research. Work executed by Army Futures Command. Congressional Add: Program Increase - Graphene Research Sound FY 2021 Accomplishments: Program Increase supported advanced research on Graphene Research. Work executed by Army Futures Command. Congressional Add: Program Increase - Graphene Research Sound FY 2021 Accomplishments: Program Increase supported advanced research on Graphene Research. Work executed by Army Futures Command. Congressional Add: Program Increase - Impacts of Soil Structures on Hydrology 4.000 5.000 FY 2021 Accomplishments: Program Increase supported advanced research on Impacts of S	Work executed by Army Futures Command.				
Congressional Add: Program Increase - Coastal Terrain Hazard Research8.0006.000FY 2021 Accomplishments: Program Increase supported advanced research on Costal Terrain Hazard Research.8.0006.000Work executed by Army Futures Command.FY 2022 Plans: Congressional Interest Item funding provided for Coastal Terrain Hazard Research10.000FY 2021 Plans: Congressional Interest Item funding provided for Coastal Terrain Hazard Research10.000-FY 2021 Accomplishments: Program Increase - Expeditionary Deployment of Fully Sustainable Utility10.000-FY 2021 Accomplishments: Program Increase supported advanced research on Expeditionary Deployment of Fully Sustainable Utility.5.000-Work executed by Army Futures Command.Congressional Add: Program Increase - Graphene Research5.000-FY 2021 Accomplishments: Program Increase supported advanced research on Graphene Research.5.000-Work executed by Army Futures Command.Congressional Add: Program Increase - Graphene Research on Graphene ResearchWork executed by Army Futures CommandCongressional Add: Program Increase - Impacts of Soil Structures on Hydrology4.0005.000FY 2021 Accomplishments: Program Increase - Impacts of Soil Structures on Hydrology4.0005.000FY 2021 Accomplishments: Program Increase supported advanced research on Impacts of Soil Structures on Hydrology.5.000	FY 2022 Plans: Congressional Interest Item funding provided for Auto	onomous Combat Engineering Solutions			
FY 2021 Accomplishments: Program Increase supported advanced research on Costal Terrain Hazard Image: Congressional Provided for Coastal Terrain Hazard Research Work executed by Army Futures Command. FY 2022 Plans: Congressional Interest Item funding provided for Coastal Terrain Hazard Research 10.000 Congressional Add: Program Increase - Expeditionary Deployment of Fully Sustainable Utility 10.000 - FY 2021 Accomplishments: Program Increase supported advanced research on Expeditionary Deployment of Fully Sustainable Utility. 10.000 - Work executed by Army Futures Command. - - - Congressional Add: Program Increase - Graphene Research 5.000 - FY 2021 Accomplishments: Program Increase supported advanced research on Graphene Research. - - Work executed by Army Futures Command. - - - Congressional Add: Program Increase supported advanced research on Graphene Research. - - Work executed by Army Futures Command. - - - Congressional Add: Program Increase - Impacts of Soil Structures on Hydrology 4.000 5.000 - FY 2021 Accomplishments: Program Increase supported advanced research on Impacts of Soil Structures on Hydrology. - - -	Congressional Add: Program Increase - Coastal Terrain Hazard Res	search	8.000	6.000	
Work executed by Army Futures Command.Image: Congressional Interest Item funding provided for Coastal Terrain Hazard ResearchImage: Congressional Add: Program Increase - Expeditionary Deployment of Fully Sustainable Utility10.000FY 2021 Accomplishments: Program Increase supported advanced research on Expeditionary Deployment of Fully Sustainable Utility.10.000-Work executed by Army Futures Command.Image: Congressional Add: Program Increase - Graphene Research5.000-FY 2021 Accomplishments: Program Increase supported advanced research on Graphene Research.5.000-Work executed by Army Futures Command.Image: Congressional Add: Program Increase supported advanced research on Graphene Research.5.000-Work executed by Army Futures Command.Image: Congressional Add: Program Increase supported advanced research on Graphene Research.5.000-Work executed by Army Futures Command.Image: Congressional Add: Program Increase - Impacts of Soil Structures on Hydrology4.0005.000FY 2021 Accomplishments: Program Increase supported advanced research on Impacts of Soil Structures on Hydrology.5.000-	FY 2021 Accomplishments: Program Increase supported advanced Research.				
FY 2022 Plans: Congressional Interest Item funding provided for Coastal Terrain Hazard Research Image: Congressional Add: Program Increase - Expeditionary Deployment of Fully Sustainable Utility 10.000 - FY 2021 Accomplishments: Program Increase supported advanced research on Expeditionary Deployment of Fully Sustainable Utility. 10.000 - Work executed by Army Futures Command. Image: Congressional Add: Program Increase - Graphene Research 5.000 - FY 2021 Accomplishments: Program Increase supported advanced research on Graphene Research. Image: Source Comparisional Add: Program Increase supported advanced research on Graphene Research. 5.000 - Work executed by Army Futures Command. Image: Source Comparisional Add: Program Increase supported advanced research on Graphene Research. 5.000 - Work executed by Army Futures Command. Image: Source Comparisional Add: Program Increase Supported advanced research on Graphene Research. Image: Source Comparisional Add: Program Increase - Impacts of Soil Structures on Hydrology 4.000 5.000 FY 2021 Accomplishments: Program Increase supported advanced research on Impacts of Soil Structures on Hydrology. Image: Source Comparisional Add: Program Increase supported advanced research on Impacts of Soil Structures on Hydrology. Image: Source Comparisional Add: Program Increase Supported advanced research on Impacts of Soil Structures on Hydrology. Image: Source Comparisional Addi Program Increase Supported advanced research on Impacts of Soil	Work executed by Army Futures Command.				
Congressional Add:Program Increase - Expeditionary Deployment of Fully Sustainable Utility10.000-FY 2021 Accomplishments:Program Increase supported advanced research on Expeditionary Deployment of Fully Sustainable Utility.10.000-Work executed by Army Futures CommandCongressional Add:Program Increase - Graphene Research5.000-FY 2021 Accomplishments:Program Increase supported advanced research on Graphene ResearchWork executed by Army Futures CommandCongressional Add:Program Increase supported advanced research on Graphene ResearchWork executed by Army Futures CommandCongressional Add:Program Increase - Impacts of Soil Structures on Hydrology4.0005.000FY 2021 Accomplishments:Program Increase supported advanced research on Impacts of Soil Structures on Hydrology	FY 2022 Plans: Congressional Interest Item funding provided for Coa	stal Terrain Hazard Research			
FY 2021 Accomplishments: Program Increase supported advanced research on Expeditionary Deployment of Image: Complexity of the secure of th	Congressional Add: Program Increase - Expeditionary Deployment of	of Fully Sustainable Utility	10.000	-	
Work executed by Army Futures Command.Image: Congressional Add: Program Increase - Graphene Research5.000FY 2021 Accomplishments: Program Increase supported advanced research on Graphene ResearchWork executed by Army Futures CommandCongressional Add: Program Increase - Impacts of Soil Structures on Hydrology4.0005.000FY 2021 Accomplishments: Program Increase supported advanced research on Impacts of Soil Structures on Hydrology	FY 2021 Accomplishments: Program Increase supported advanced Fully Sustainable Utility.				
Congressional Add: Program Increase - Graphene Research5.000FY 2021 Accomplishments: Program Increase supported advanced research on Graphene ResearchWork executed by Army Futures CommandCongressional Add: Program Increase - Impacts of Soil Structures on Hydrology4.000FY 2021 Accomplishments: Program Increase supported advanced research on Impacts of Soil Structures on-Hydrology	Work executed by Army Futures Command.				
FY 2021 Accomplishments: Program Increase supported advanced research on Graphene Research. Image: Comparison of Comparison	Congressional Add: Program Increase - Graphene Research		5.000	-	
Work executed by Army Futures Command. Image: Congressional Add: Program Increase - Impacts of Soil Structures on Hydrology 4.000 5.000 FY 2021 Accomplishments: Program Increase supported advanced research on Impacts of Soil Structures on Hydrology. Image: Congressional Add: Program Increase Supported advanced research on Impacts of Soil Structures on Hydrology Image: Congressional Add: Program Increase Supported advanced research on Impacts of Soil Structures on Hydrology Image: Congressional Add: Program Increase Supported advanced research on Impacts of Soil Structures on Hydrology Image: Congressional Add: Program Increase Supported advanced research on Impacts of Soil Structures on Hydrology Image: Congressional Add: Program Increase Supported advanced research on Impacts of Soil Structures on Hydrology Image: Congressional Add: Program Increase Supported Advanced research on Impacts of Soil Structures on Hydrology Image: Congressional Add: Program Increase Supported Advanced research on Impacts of Soil Structures on Hydrology Image: Congressional Add: Program Increase Supported Advanced research on Impacts of Soil Structures on Hydrology Image: CongressionAdvanced Program Increase Supported Advanced Program Increase Program Increase Supported Advanced Program Increase Supported Advanced Program Increase Supported Advanced Program Increase Program Prog	FY 2021 Accomplishments: Program Increase supported advanced				
Congressional Add: Program Increase - Impacts of Soil Structures on Hydrology4.0005.000FY 2021 Accomplishments: Program Increase supported advanced research on Impacts of Soil Structures on Hydrology.4.0005.000	Work executed by Army Futures Command.				
FY 2021 Accomplishments: Program Increase supported advanced research on Impacts of Soil Structures on Hydrology.	Congressional Add: Program Increase - Impacts of Soil Structures o	n Hydrology	4.000	5.000	
	FY 2021 Accomplishments: Program Increase supported advanced Hydrology.	research on Impacts of Soil Structures on			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/I PE 0603119A / Ground Advanced gy	Name) I Technolo	Project (N BO3 / MILI TECHNOL	umber/Name) TARY ENGINEERING OGY DEMONSTRATION (CA)
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	
Work executed by Army Futures Command.				
FY 2022 Plans: Congressional Interest Item funding provided for Impacts of Sc	bil Structures on Hydrology			
Congressional Add: Program Increase - Operational Energy Research		1.300	-	
FY 2021 Accomplishments: Program Increase supported advanced research	on Operational Energy Research.			
Work executed by Army Futures Command.				
Congressional Add: Program Increase - Temperature Insensitive High?Energ	y Density Lithium?Ion Batteries	2.500	-	
FY 2021 Accomplishments: Program Increase supported advanced research Energy Density Lithium-Ion Batteries.	on Temperature Insensitive High-			
Work executed by Army Futures Command.				
Congressional Add: Program Increase - Vehicle Performance Reliability and (Operations	3.000	-	
FY 2021 Accomplishments: Program Increase supported advanced research Reliability and Operations.	on Vehicle Performance			
Work executed by Army Futures Command.				
Congressional Add: Program Increase - Cross-Laminated Timber and Recycl	ed Carbon Fiber Materials	1.300	5.500	
FY 2021 Accomplishments: Program Increase supported advanced research Recycled Carbon Fiber Materials.	on Cross-Laminated Timber and			
Work executed by Army Futures Command.				
FY 2022 Plans: Congressional Interest Item funding provided for Cross-Lamina Fiber Materials				
Congressional Add: Program Increase - Advanced Explosion Resistant Winde	5.000	-		
FY 2021 Accomplishments: Program Increase supported advanced research Resistant Window Systems.				
Work executed by Army Futures Command.				
Congressional Add: 3D Printing of Concrete		-	2.000	

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/ PE 0603119A / Ground Advanced gy	Name) d Technolo	Project (Nu BO3 / MILI TECHNOL	u mber/Name) TARY ENGINEERING OGY DEMONSTRATION (CA)
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	
FY 2022 Plans: Congressional Interest Item funding provided for 3D Printing of	f Concrete			
Congressional Add: 3D Printing of Infrastructure		-	5.000	
FY 2022 Plans: Congressional Interest Item funding provided for 3D Printing of	f Infrastructure			
Congressional Add: Additive Construction for Field Deployment		-	4.000	
FY 2022 Plans: Congressional Interest Item funding provided for Additive Con	struction for Field Deployment			
Congressional Add: Anticipating Threats to Natural Systems		-	5.000	
FY 2022 Plans: Congressional Interest Item funding provided for Anticipating	Threats to Natural Systems			
Congressional Add: Army Visual and Tactical Arctic Reconnaissance		-	2.000	
FY 2022 Plans: Congressional Interest Item funding provided for Army Visual Reconnaissance	and Tactical Arctic			
Congressional Add: Assessments and Monitoring Systems for Historic Struct	ures	-	5.000	
FY 2022 Plans: Congressional Interest Item funding provided for Assessments Historic Structures	s and Monitoring Systems for			
Congressional Add: Autonomous Construction and Manufacturing		-	5.000	
FY 2022 Plans: Congressional Interest Item funding provided for Autonomous	Construction and Manufacturing			
Congressional Add: Biofuel		-	6.000	
FY 2022 Plans: Congressional Interest Item funding provided for Biofuel				
Congressional Add: Biomass Polymer Technology		-	2.000	
FY 2022 Plans: Congressional Interest Item funding provided for Biomass Poly	ymer Technology			
Congressional Add: Cold Weather Energy Research			5.000	
FY 2022 Plans: Congressional Interest Item funding provided for Cold Weather Energy Research				
Congressional Add: Cold Weather Research			3.000	
FY 2022 Plans: Congressional Interest Item funding provided for Cold Weather	r Research			
Congressional Add: Distributed Technologies for Steam Loop Replacements		-	5.000	

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			C	Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number / PE 0603119A / Ground Advanced gy	R-1 Program Element (Number/Name) PE 0603119A <i>I Ground Advanced Technolo</i> <i>gy</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	
FY 2022 Plans: Congressional Interest Item funding provided for Dis Replacements	tributed Technologies for Steam Loop			
Congressional Add: Electrochemical Conversion of Water Streams		-	5.000	
FY 2022 Plans: Congressional Interest Item funding provided for Ele	ectrochemical Conversion of Water Streams			
Congressional Add: Entry Control Points at Installations		-	5.000	
FY 2022 Plans: Congressional Interest Item funding provided for Ent	try Control Points at Installtions			
Congressional Add: Expeditionary Additive Construction		-	15.000	
FY 2022 Plans: Congressional Interest Item funding provided for Exp	peditionary Additive Construction			
Congressional Add: Explosive Materials Detection		-	3.000	
FY 2022 Plans: Congressional Interest Item funding provided for Exp	plosive Materials Detection			
Congressional Add: Frost Heave Effects Monitoring		-	4.500	
FY 2022 Plans: Congressional Interest Item funding provided for Fro	ost Heave Effects Monitoring			
Congressional Add: Graphene Applications for Military Engineering	1	-	10.000	
FY 2022 Plans: Congressional Interest Item funding provided for Gra	aphene Applications for Military Engineering			
Congressional Add: Hardened Facility Standards		-	4.600	
FY 2022 Plans: Congressional Interest Item funding provided for Ha	rdened Facility Standards			
Congressional Add: High Power Fast Charging for Electric Vehicle	Fleets	-	3.000	
FY 2022 Plans: Congressional Interest Item funding provided for Hig Fleets	h Power Fast Charging for Electric Vehicle			
Congressional Add: Infrastructure Smart Technology		-	5.000	
FY 2022 Plans: Infrastructure Smart Technology				
Congressional Add: Low Carbon Hydrogen Technologies		-	10.000	
FY 2022 Plans: Congressional Interest Item funding provided for Low	w Carbon Hydrogen Technologies			
Congressional Add: Microgrid Reliability and Resiliency		-	10.000	

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/ PE 0603119A / Ground Advanced gy	Name) I Technolo	Project (Nu BO3 / MILIT TECHNOLO	I mber/Name) FARY ENGINEERING DGY DEMONSTRATION (CA)
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	
FY 2022 Plans: Congressional Interest Item funding provided for Microgrid Rel	iability and Resiliency			
Congressional Add: Military Waste Stream Conversion		-	5.000	
FY 2022 Plans: Congressional Interest Item funding provided for Military Waster	e Stream Converison			
Congressional Add: Partnership and Technology Transfer		-	4.000	
FY 2022 Plans: Congressional Interest Item funding provided for Partnership a	nd Technology Transfer			
Congressional Add: Power Generation for Increased Facility Resilience Pilot		-	10.000	
FY 2022 Plans: Congressional Interest Item funding provided for Power General Resilience Pilot	ation for Increased Facility			
Congressional Add: Power Projection		-	7.000	
FY 2022 Plans: Congressional Interest Item funding provided for Power Projec	tion			
Congressional Add: Sustainable Smart Utilities		-	5.000	
FY 2022 Plans: Congressional Interest Item funding provided for Sustainable S	Smart Utilities			
Congressional Add: Water Resiliency and Self Sufficiency		-	4.000	
FY 2022 Plans: Congressional Interest Item funding provided for Water Resilie	ncy and Self Sufficiency			
Congressional Add: Water Reuse Consortium		-	10.000	
FY 2022 Plans: Congressional Interest Item funding provided for Water Reuse	Consortium			
Congressional Add: Watercraft Simulator		-	4.000	
FY 2022 Plans: Congressional Interest Item funding provided for Watercraft Sir	mulator			
	Congressional Adds Subtotals	181.800	257.100	
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy				
N/A				

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army						Date: April	2022					
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)Project (Number/Name)PE 0603119A / Ground Advanced TechnoloCJ9 / Ground Enabling UniversitygyDevelopment				Adv			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CJ9: Ground Enabling University Adv Development	-	-	4.009	3.896	-	3.896	4.195	6.002	6.097	6.095	0.000	30.294
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Project matures and demonstrates advanced developments and technological innovations from academia, in the focus areas of ground autonomy, Artificial Intelligence / Machine Learning (Al/ML) and robotics, occupant/vehicle survivability and other ground platform technologies of importance to the Army, by maturing and demonstrating technologies with the goal of delivering technology to the warfighter more quickly. This Project matures and demonstrates advanced technologies with a focus on mid to far-term Army modernization priorities while also maintaining delivery of near-term technologies critical to the next generation combat vehicles. This Project focuses on maturation and demonstration of various advanced technologies originating from extramural applied research in academia pertaining to navigation/ routing, autonomous robotic vehicles with the use of artificial intelligence and machine learning as applied to ground mobility and maneuver, and other innovative ground enabling applied research technologies. This Project also matures and demonstrates advanced technologies leading to potential emerging capabilities in areas of strategic importance to the Army in autonomy, robotics and Al/ML, protection of both platform and occupant, and other ground platform technologies in propulsion, survivability, powertrain, etc., by bringing competitively selected Universities with research and development teams into Technical Alliances.

Research in this Project supports the Army Modernization Priority Next Generation Combat Vehicle.

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

Research in this Project is performed by the United States (US) Army Futures Command.

Research in this Project is done in coordination with Program Element (PE) 0620144A (Ground Technology), PE 0602145A (Next Generation Combat Vehicle Technology) and PE 0603462A (Next Generation Combat Vehicle Advanced Technology).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Robust autonomous capabilities for ground vehicles	-	2.136	1.959
Description: This effort demonstrates AI/ML and autonomous mobility integrated into ground vehicles to conduct off-road maneuvers to enable the transition from teleoperation to fully-autonomous or semi-autonomous scenarios. Research is conducted in collaboration with university partners to advance autonomous mobility and protection of both occupant and platform in optionally manned and autonomous ground vehicles.			
FY 2022 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: /	April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603119A / Ground Advanced Technolo gy	Project (Number/ CJ9 / Ground Ena Development	Name) bling Universit	ty Adv
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
Will further mature, integrate and demonstrate use of AI/ML method agent air and ground vehicle teams beyond existing behaviors such increase the speed of autonomous behavior acquisition through ef- identify terrain features in images and transfer of simulator-learned demonstrate methods of shared control (between human operator performance with human input.	ods to enable robust, autonomous, tactical behaviors for much as leader-follower (e.g., flanking, occupying); as well as ffective navigation and route planning using techniques to d behaviors to developmental ground platforms. Mature and s and AI/ML systems) that increase overall autonomous sy	ılti- J stem		
FY 2023 Plans: Will further mature, integrate and demonstrate use of AI/ML method agent air and ground vehicle teams beyond existing behaviors on Will continue to mature and demonstrate emerging autonomous te autonomy software platforms through academia.	ods that enable robust, autonomous, tactical behaviors for r common software platforms and Army experimental platfor echnologies to increase the overall system performance of t	nulti- ms. he		
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects realignments to PE 0603116A (Lethality A University Adv Development) and PE 0603042A (C3I Advanced T Development).	Advanced Technology) / Project CG2 (Lethality Enabling echnology) / Project CN3 (Network Enabling University Adv	/		
Title: Human-robot/AI interactions		-	1.727	1.937
Description: This effort matures, integrates, and demonstrates sy between humans and robots, with the use of reinforcement machin demonstrations, and safe human-aware controllers. Work is conduct autonomous mobility as well as other areas of ground platform tech perception.	vstems involving physical and cognitive levels of interaction ne learning which uses human feedback, learning from ucted in collaboration with university partners to advance chnologies in propulsion, survivability, powertrain, sensing,	and		
FY 2022 Plans: Will further mature, integrate and demonstrate use of AI/ML methor from human teleoperation commands, human interventions, and o Will mature and demonstrate tactics and algorithms on common se environments on the fly while working fully autonomously around h	ods to improve autonomous systems by capturing and learn other forms of human interaction (e.g., spoken language). oftware platforms which enable robots to deal with complex numans for extended periods of time.	ing		
FY 2023 Plans: Will further mature, integrate and demonstrate use of AI/ML methor from human teleoperation commands, human interventions, and o	ods to improve autonomous systems by capturing and learr ther forms of human interaction. Will mature and demonstr	ate		

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603119A / Ground Advanced Technolo gy	Project CJ9 / C Develo	t (Number/N Ground Enab pment	lame) ling University Adv		
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023	
tactics and algorithms on common software platforms and Army experimenta autonomously around humans for extended periods of time.	al platforms through academia while working fully	/				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.						
Title: SBIR/STTR Transfer			-	0.146	-	
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638						
	Accomplishments/Planned Programs Sub	totals	-	4.009	3.896	
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A						

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: April	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603119A / Ground Advanced Technolo gyProject (N CV5 / Eng 					l umber/Name) ineer Enablers Maneuver, LOG, & ent Adv		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CV5: Engineer Enablers Maneuver, LOG, & Sustainment Adv	-	-	-	2.539	-	2.539	3.298	4.781	2.183	3.586	0.000	16.387
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is a new start in FY 2023.

This is a New Start Project in Fiscal Year 2023 (FY23).

A. Mission Description and Budget Item Justification

This Project matures and demonstrates joint contested logistics operations technologies and provides capabilities to operate in disbursed battlefield operations and support sustainment operations through predicted dynamic scenario development that provides critical vulnerabilities assessment and methods/equipment to mitigate potential issues.

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

Research is performed at the United States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

This research complements Program Element (PE) 0602144A (Ground Technology).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Sustainment Planning Tool	-	-	2.539
Description: This effort will mature and demonstrate map-based sustainment running estimates with preposition of survivable material stockpiles based on synchronized ops/intel/log running estimates and informed by artificial intelligence (AI) based edge computing analyses.			
FY 2023 Plans: Will mature and optimize the existing Joint Planning Services (JPS)-developed Sustainment Quick Estimate model to connect to appropriate authoritative data sources and provide more robust capabilities for Sustainment Running Estimates (SRE).			
FY 2022 to FY 2023 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603119A / Ground Advanced Technolo gy	Project CV5 I Er Sustainr	(Number/I ngineer En nent Adv	Name) ablers Manei	ıver, LOG, &
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023
This is a New Start for FY23.					
	Accomplishments/Planned Programs Sub	totals	-	-	2.539
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>					
D. Acquisition Strategy					
N/A					

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: April	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)Project (Number/Name)PE 0603119A I Ground Advanced TechnoloDA2 I SAFR Alternatives for ReadinessgyAdvanced Technolo							liness
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
DA2: SAFR Alternatives for Readiness Advanced Tech	-	-	-	1.865	-	1.865	2.913	4.261	5.199	5.509	0.000	19.747
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

<u>Note</u>

This is a new start in FY 2023.

This is a New Start Project in Fiscal Year 2023 (FY23).

A. Mission Description and Budget Item Justification

This Project demonstrates cross-cutting, safer alternative advanced technologies that enable readiness. These technologies also support product availability, Soldier and worker safety, and a reduced environmental footprint in the manufacturing, maintenance, and use of ground vehicles and other Army weapon systems. The Project matures and optimizes safer alternatives in technology areas including surface finishes, coatings, solvents, refrigerants, and fire suppressants. This research addresses the growing impacts to health and readiness associated with carcinogens like hexavalent chromium, global warming chemicals like hydrofluorocarbons (HFCs) and persistent toxins like per- and polyfluoroalkyl substances (PFAS) (forever chemicals). This Project enables the Army to assess and resolve these types of emerging and continually evolving risks throughout the full life cycle of Army systems.

The cited research is consistent with the Army Modernization Strategy and provides enabling technologies in support of all Cross Functional Teams.

Research in this Project is performed by the United States (U.S.) Army Combat Capabilities Development Command (DEVCOM) Army Research Laboratory, Aberdeen Proving Ground, MD; the Armaments Center, Picatinny Arsenal, NJ; the Aviation and Missile Center, Huntsville, AL; the Soldier Center, Natick, MA; and the Ground Vehicle Systems Center, Warren, MI; and is coordinated with the United States (U.S.) Army Futures Command.

This Project complements and transitions technologies developed under Program Element (PE) 0602144A (Ground Technology).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Safer Alternatives for Readiness (SAFR) Advanced Technology	-	-	1.865
Description: Demonstrate safer alternative advanced technologies to replace hexavalent chromium, cadmium and other harmful chemicals during surface finishing; reduce the use of volatile organic compounds and other hazardous materials in coating and depainting processes; and ensure the availability of compatible next generation refrigerants and fire suppressants with low global warming potential.			
FY 2023 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603119A / Ground Advanced Technolo gy	Project (Nu DA2 / SAFF Advanced	u mber/N R Alterna Tech	lame) atives for Rea	adiness
B. Accomplishments/Planned Programs (\$ in Millions)		FY	2021	FY 2022	FY 2023
Will demonstrate advanced non-chromium surface finishing techniques for use depainting alternatives to n-methyl pyrrolidone; and will optimize the performar requirements for refrigerants and fire suppressants.	e on ground systems; will mature non-chemical nce of HFC alternatives against military-unique				
FY 2022 to FY 2023 Increase/Decrease Statement: This Project is a new start in FY23.					
	Accomplishments/Planned Programs Sub	totals	-	-	1.865
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A					

Exhibit R-2, RDT&E Budget Item	n Justifica	tion: PB 202	23 Army							Date: April	2022	
Appropriation/Budget Activity 2040: Research, Development, Te Technology Development (ATD)	I BA 3: Adv	anced	R-1 Progr PE 060313	am Elemen 34A / Counte	t (Number / er Improvise	Name) ed-Threat S	imulation					
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	24.087	24.747	21.486	-	21.486	21.571	21.551	21.817	21.811	0.000	157.070
CD3: Counter Improvised-Threat Simulation	-	24.087	24.747	21.486	-	21.486	21.571	21.551	21.817	21.811	0.000	157.070
This Program Element (PE) deve deployed forces to positively iden This PE is executed by the Army Defense Threat Reduction Agenc	tify IEDs w Futures Co y (DTRA).	ology for def rith minimal f	false alarms	ination with	the Under	ze or mitiga Secretary o	f Defense fo	ts of IEDs v	vith minimal	collateral c	Iamage.	the
B. Program Change Summary (S	in Millior	<u>15)</u>		<u>FY 2021</u>	<u>FY 202</u>	<u>22 F</u>	Y 2023 Ba	<u>se</u>	FY 2023 OC	<u>00</u>	FY 2023 To	tal
Previous President's Budg	et			24.087	24.74	17	0.0	00		-	0.0	00
Current President's Budge	t			24.087	24.74	17	21.4	86		-	21.4	86
I otal Adjustments		1		0.000	0.00)0	21.4	86		-	21.4	86
Congressional G Congressional D Congressional R	eneral Rec irected Re	ductions		-		-						
Congressional A	dds			_		_						
Congressional D	irected Tra	Insfers		-		-						
Reprogrammings	6			-		_						
SBIR/STTR Tran	Isfer			-		-						
Adjustments to E	ludget Yea	irs		-		-	21.4	86		-	21.4	86

Change Summary Explanation

Fiscal Year 2023 (FY23) funding increase reflects the fact that the FY22 President's Budget request did not include out-year funding.

Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060313 Simulation	am Elemen 34A / Counte	t (Number / er Improvise	' Name) ed-Threat	Project (N CD3 / Cou	ject (Number/Name) 3 / Counter Improvised-Threat Simulation				
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost		
CD3: Counter Improvised-Threat Simulation	-	24.087	24.747	21.486	-	21.486	21.571	21.551	21.817	21.811	0.000) 157.070		
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-				
This Project develops technology to positively identify IEDs with mir sites. Additionally the objective is This Project is executed by the Ar Defense Threat Reduction Agenc	for detection nimal false to positive my Future y (DTRA).	ng and defe alarms and ely neutralize s Command	ating improv increase the e or mitigate (AFC) in co	vised explor e rate of ad the effects pordination	sive devices lvance of de s of IEDs wit with the Un	s (IEDs). Th ployed forc th minimal c der Secreta	e goal of th es as well a collateral da rry of Defen	is research as to identify mage. se for Rese	is to increa vehicle an arch and E	se the abilit d personne ngineering	y of deploy I borne IED (USD/R&E)	ed forces at fixed and the		
B. Accomplishments/Planned P	rograms (in Millions	<u>s)</u>						FY	2021 I	TY 2022	FY 2023		
Title: Standoff Detection of IED TI	hreats in A	ll Environme	ents							9.470	9.804	10.090		
Description: This effort develops radar, light detection and ranging components that can be integrated also develops technologies and no will be evaluated on their ability to attached to vehicles or personnel. false alarms from naturally occurri	technology (LIDAR), a d on dismo etwork tech detect IED The goal f ing and ma	/ to detect If tomic magn unted Soldio niques to d bs and their or these tec n-made ent	ED threats a etometer an ers, ground, etect the ele components hnologies is ities.	t standoff o d other tec water-base ectronic signs within infr to achieve	distances. T hnologies a ed and aeria nature of ra astructure, o high proba	echnologies pplicable to al systems of dio-controlle on or under bilities of de	s include ele detecting I or at fixed si ed IEDs. Te ground and etection whi	ectro-optica EDs and the ites. This ef chnologies d water, and le minimizir	I, eir fort Ig					
FY 2022 Plans: Will further mature electro-optical/ components in simulated environm integrate sensor technologies on S Will demonstrate and assess deter personnel in various conditions.	infrared an nents. Will Soldier-bor ction of IEI	d radio freq validate det ne, ground, Ds or their c	uency senso ection of rac and aerial p omponents	or technolo dio-controll latforms or when burie	gies applica ed IEDs usi at fixed site ed, camoufla	ible to detec ng advance es to determ aged or atta	cting IEDs a d network t nine detection ched to veh	and their echniques. on performa iicles or	Will Ince.					
FY 2023 Plans: Will optimize electro-optical/infrare applicable to detecting IEDs and t	ed (EO/IR), heir compo	electromag	netic (EM), nulated field	neutron-ga environme	imma and ra ents. Will inte	adio frequer egrate sens	ncy sensor t or technolo	echnologie gies on Sol	s dier-					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army

Date: April 2022

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603134A / Counter Improvised-Threat Simulation	roject (Number/I D3 / Counter Imp	Name) rovised-Threa	at Simulation
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
borne, ground, and aerial platforms or at fixed sites to validate IED detection per of IEDs or their components when buried, camouflaged or attached to vehicles	erformance. Will demonstrate and assess detec or personnel in various operational conditions.	ion		
FY 2022 to FY 2023 Increase/Decrease Statement: Funding partially realigned to Program Element (PE) 0602134A (Counter Impro (Counter Improvised-Threat Advanced Studies) to enable longer-term applied r and defeating IEDs for transition to this project for future advanced technologie	ovised-Threat Advanced Studies) / Project CD2 research pipeline of novel methods for detecting s and demonstrators.			
Title: IED Neutralization, Prevention and Mitigation		5.319	4.833	3.108
Description: This effort develops technology critical to neutralizing and mitigat Technologies include directed energy sources, energetic or kinetic effectors, en base protection technologies. These technologies will be demonstrated to neu equipment from the effects of IEDs. This effort also explores advanced technic these technologies is to achieve high probabilities of avoiding the IED's effects	ing the effects of IEDs at standoff distances. neasement of the threat and Soldier, platform ar tralize IEDs in place and protect soldiers and ques to robotically manipulate IEDs. The goal for by friendly forces.	d r		
FY 2022 Plans: Will mature energetic, directed energy and kinetic effector technologies to neut protection approaches to mitigate the effects of IEDs to Soldiers, materiel and I capabilities in militarily relevant environments.	ralize IEDs or mitigate IED effects. Will optimize bases. Will demonstrate novel C-IED mitigation			
FY 2023 Plans: Will validate energetic and directed energy technologies to neutralize IEDs or novel C-IED mitigation capabilities in militarily relevant environments.	nitigate IED effects. Will continue to demonstra	e		
FY 2022 to FY 2023 Increase/Decrease Statement: Funding partially realigned to PE 0602134A (Counter Improvised-Threat Advar Threat Advanced Studies) to enable longer-term applied research pipeline of n transition to this project for future advanced technologies and demonstrators.	nced Studies) / Project CD2 (Counter Improvise ovel methods for detecting and defeating IEDs t	- Dr		
Title: Enabling C-IED Technologies		9.298	9.283	8.288
Description: This effort develops technologies that support the detection, prev Technologies include data sciences including sensor processing algorithms, in analytics, threat forecasting, and autonomous maneuver. Techniques will be d and to identify trends to forecast probabilities of encountering or attributing IED techniques. The goals for these technologies is to achieve high probabilities of	ention, neutralization and mitigation of IED thre tegration of sensor data, data processing and emonstrated to determine detection of IED thre s based on operational data and machine learn f detecting, predicting and attributing IEDs threa	its. ng s.		

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		D	ate: A	oril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603134A / Counter Improvised-Threat Simulation	Project (Nun CD3 / Counte	n ber/N er Impr	l ame) rovised-Threa	t Simulation
B. Accomplishments/Planned Programs (\$ in Millions)		FY 20	021	FY 2022	FY 2023
<i>FY 2022 Plans:</i> Will integrate advanced sensor processing techniques with appropriate sensor threats with reduced false alarms. Will analyze data from multiple sources to de to identify the means to exploit these signatures to detect IED threats. Will apple techniques and algorithms to autonomously detect threats with limited operator sensor data inputs and networked sensor feeds to improve performance capab	modalities and evaluate their ability to detect l etermine the signature attributes of threats and y machine learning and emerging data analys input. Will analyze techniques to employ mul ilities when compared to single sensor solutio	ED I is ti- ns.			
FY 2023 Plans: Will validate advanced sensor processing techniques and their ability to detect foreign partner sources and existing U.S. data repositories to optimize emergin develop new signature attributes that span multiple sensor modalities. Will vali techniques to autonomously detect threats with limited operator input.	IED threats with reduced false alarms. Will ex g IED threat data sets in varying environments date machine learning and emerging data ana	ploit s and Ilysis			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding partially realigned to PE 0602134A (Counter Improvised-Threat Advar Threat Advanced Studies) to enable longer-term applied research pipeline of ne transition to this project for future advanced technologies and demonstrators.	nced Studies) / Project CD2 (Counter Improvis ovel methods for detecting and defeating IEDs	ed- s for			
Title: FY2022 SBIR/STTR Transfer			-	0.827	-
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement:					
	Accomplishments/Planned Programs Sub	totals 24	1.087	24.747	21.486
C. Other Program Funding Summary (\$ in Millions) N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A	-				

Exhibit R-2, RDT&E Budget Iten							Date: April	2022				
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)				anced	R-1 Program Element (Number/Name) PE 0603386A <i>I Biotechnology for Materials - Advanced Research</i>							
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	3 FY 2023 FY 2023 Co OCO Total FY 2024 FY 2025 FY 2026 FY 2027 Co							Total Cost
Total Program Element	-	-	53.736	56.853	-	56.853	38.881	36.634	25.045	25.039	0.000	236.188
CP7: Biotechnology Demonstration and Evaluation	-	-	53.736	56.853	-	56.853	38.881	36.634	25.045	25.039	0.000	236.188

A. Mission Description and Budget Item Justification

This Program Element (PE) matures and demonstrates novel biotechnological methods, processes, and materials to enhance military supply chain resilience. The Army is responsible for centrally managing funding for Tri-Service Biotechnology for a Resilient Supply Chain (T-BRSC) efforts. T-BRSC leverages bio-industrial manufacturing to ensure critical domestic supply chain resilience for defense needs through domestic production of raw materials and critical products. The Army supports this Tri-Service effort under this PE with collaboration among sister Services and select allied partners to support a robust pipeline for biotechnology related manufacturing. Advanced research projects optimize and rapidly demonstrate future novel biotechnologies for disruptive breakthrough capabilities. This PE provides bio-engineered and biosynthetic materials to ensure domestic sourcing of critical products in the defense supply chain. Also under this PE, efforts mature and demonstrate rapid prototyping methods for rapid testing of bio-derived materials as well as optimize models for the design and bio-security of bio-engineered materials for defense applications.

This PE is coordinated with PE 0602386A (Biotechnology for Materials - Applied Research).

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

Research in this PE is performed by the United States (US) Army Futures Command (AFC).

B. Program Change Summary (\$ in Millions)	FY 2021	<u>FY 2022</u>	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	0.000	53.736	0.000	-	0.000
Current President's Budget	0.000	53.736	56.853	-	56.853
Total Adjustments	0.000	0.000	56.853	-	56.853
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
Congressional Adds	-	-			
 Congressional Directed Transfers 	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	56.853	-	56.853

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)	R-1 Program Element (Number/Name) PE 0603386A / <i>Biotechnology for Materials - Advanced F</i>	Research
Change Summary Explanation Fiscal Year 2023 (FY23) funding increase reflects the fact that the FY22	2 President's Budget request did not include out-year fund	ing.

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army											Date: April 2022			
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603386A <i>I Biotechnology for Materials</i> - Advanced Research				Project (Number/Name) CP7 <i>I Biotechnology Demonstration and</i> <i>Evaluation</i>					
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost		
CP7: Biotechnology Demonstration and Evaluation	-	-	53.736	56.853	-	56.853	38.881	36.634	25.045	25.039	0.000	236.188		
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-				
A. Mission Description and Bud	get Item J	ustification	l											

This Project collaborates with Joint Service partners to mature, optimize, and demonstrate novel biotechnologies and related methods to establish a domestic resilient supply chain for defense needs. Advanced research validates and provides bio-derived, bio-functionalized, and bio-manufactured materials. This Project matures and demonstrates high-throughput screening and small-scale prototyping, enhances material performance, and exploits biotechnologies to provide drop-in replacements and materials with enhanced properties for defense applications. Areas of focus may include high density, high performance fuels for high speed weapons, bio-based propellants, optical materials, and bio-derived systems that sense and respond to the presence of contaminants.

This Project is coordinated with Program Element (PE) 0602386A (Biotechnology for Materials - Applied Research) / CP6 (Foundational Biotechnology Design and Dev).

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Biosynthetic Material Demonstration	-	51.774	56.853
Description: This task matures and demonstrates novel and emerging biotechnologies related to bio-engineered or bio- manufactured materials to address vulnerabilities in the critical material supply chain for military needs.			
 FY 2022 Plans: Provide Tri-Service rapid prototyping capability for the rapid prototyping and evaluation of bio-products for defense applications to compress the timeline for bio-material development, prototyping, and qualification in support of accelerating transitions. These capabilities include high-throughput screening and small-scale prototyping, small scale material purification, and a Department of Defense (DoD) custom capacity for rapid screening and evaluation. Exploit biomanufacturing to provide mission-critical materials and reduce cost and burden of logistics for supply and resupply. Mature bio-manufactured drop-in replacement of high performance fuel by optimizing and validating high density, high performance fuel blends for high speed weapons in support of hypersonic flight. 			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603386A <i>I Biotechnology for Materials</i> - Advanced Research	Projec CP7 / Evalua	Project (Number/Name) CP7 I Biotechnology Demonstration and Evaluation				
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2021	FY 2022	FY 2023		
? Exploit the agility and flexibility in bio-manufacturing capabilities to address genhanced material and system performance for ensured operational dominance coating for high-temperature, fire-resistant composite materials in support of low	gaps in material performance and demonstrate e in contested environments. Mature fire-resis ng-range missile cases and hypersonic flight.	tant					
FY 2023 Plans: ? Optimize and expand the Tri-Service capability for rapid maturation, demons applications by exploiting the use of robotics for semi-autonomous capabilities. assessment of biotechnology solutions and biotechnologically derived materials	stration, and evaluation of bio-products for defe This Tri-Service capability will support the rap s with cutting-edge instrumentation.	ense id					
? Optimize bio-manufacturing methods and demonstrate the production of mat to commercial sources to provide an alternative means of sourcing critical mate bio-manufacture of a drop-in replacement high performance fuel blend to support	terials for defense needs at reduced cost comperials. Demonstrate the methods for the large sort high speed weapons in hypersonic flight.	bared scale					
? Optimize bio-manufacturing methods and capabilities for the production of a resistant composite materials supporting long-range missile cases and hyperso materials with improved performance that can be exploited as a viable resource	fire-resistant coating for high-temperature, fire onic flight. The result will be a bio-manufacture e for Warfighter dominance.	d					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase reflects planned lifecycle of this effort.							
Title: SBIR/STTR Transfer			-	1.962	-		
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638							
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638							
	Accomplishments/Planned Programs Sub	totals	-	53.736	56.853		
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>							
D. Acquisition Strategy N/A							

Exhibit R-2, RDT&E Budget Iten	Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army									Date: April 2022		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)					R-1 Program Element (Number/Name) PE 0603457A / C3/ Cyber Advanced Development							
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	43.357	61.426	41.354	-	41.354	28.720	19.097	34.073	34.361	0.000	262.388
6CY: Autonomous Cyber Advanced Technology	-	5.995	9.304	11.188	-	11.188	7.495	4.603	19.081	22.594	0.000	80.260
8CY: Information Trust Advanced Technology	-	10.900	15.876	20.028	-	20.028	11.138	4.157	-	-	0.000	62.099
9CY: Network Access and Effects Advanced Technology	-	4.464	4.347	8.170	-	8.170	10.087	10.337	14.992	11.767	0.000	64.164
CB4: Offensive Cyber Operations (OCO) Mirror Adv Tech	-	1.998	1.899	1.968	-	1.968	-	-	-	-	0.000	5.865
CB6: C3I Cyber Advanced Development (CA)	-	20.000	30.000	-	-	-	-	-	-	-	0.000	50.000

A. Mission Description and Budget Item Justification

This Program Element (PE) matures and demonstrates technologies for offensive and defensive cyber operations in tactical environments. Projects optimize devices, techniques, services, software and algorithms to enable cyber situational understanding and Cyber Electromagnetic Activities (CEMA). For offensive cyber, efforts demonstrate integrated electronic attack (EA) and CEMA hardware and software to execute force protection (FP), EA, electronic surveillance (ES), signals intelligence (SIGINT), electronic warfare (EW) and cyber missions in a dynamic, distributed and coordinated fashion. For defensive cyber, efforts demonstrate hardware and software to protect tactical wired and wireless networks against modern cyber attacks and focuses on configuration, operation, monitoring, data integrity, and defense in bandwidth constrained tactical environments while reducing the operator workload required to conduct these functions.

This PE directly supports the Network Army Modernization Priority.

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

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army Date:												
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)				R-1 Program Element (Number/Name) PE 0603457A / C3/ Cyber Advanced Development								
FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023	Total							
43.357	31.426	0.000	-		0.000							
43.357	61.426	41.354	-	4	1.354							
0.000	30.000	41.354	-	4	1.354							
-	-											
-	-											
-	-											
-	30.000											
-	-											
-	-											
-	-											
-	-	41.354	-	4	1.354							
ides General Red	ductions)			FY 2021	FY 2022							
l)												
dwidth Cryptomod	dule Enhancemen	ts and Certification		10.000	30.000							
P Software-Defin	ned MFEW			10.000	-							
	C	Congressional Add Subto	otals for Project: CB6	20.000	30.000							
		Congressional Add	Totals for all Projects	20.000	30.000							
	A 3: Advanced FY 2021 43.357 43.357 0.000 - - - - - - - - - - - - -	A 3: Advanced R-1 Program E PE 0603457A / PE 0603457A / 43.357 1.426 43.357 31.426 43.357 61.426 0.000 30.000 - - -<	A 3: Advanced R-1 Program Element (Number/Name) PE 0603457A / C3l Cyber Advanced De FY 2021 FY 2022 FY 2023 Base 43.357 31.426 0.000 43.357 61.426 41.354 0.000 30.000 41.354 - - - - - <t< td=""><td>R-1 Program Element (Number/Name) PE 0603457A / C3/ Cyber Advanced Development FY 2021 FY 2022 FY 2023 Base FY 2023 OCO 43.357 31.426 0.000 - 43.357 61.426 41.354 - 0.000 30.000 41.354 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 41.354 - A)</td></t<> <td>Program Element (Number/Name) Pet 0603457A / C3/ Cyber Advanced Development FY 2021 FY 2022 FY 2023 Base FY 2023 OCO FY 2023 43.357 31.426 0.000 - - - - - - 4 - - 4 0.000 30.000 41.354 - 4 - - 4 - - 4 - - 4 - - 4 - - 4 - - - 4 - - 4 - - 4 - - 4 - - 4 - - 4 - - 4 - - 4 - - - 4 - - - 4 - - - 4 - - - - - - 4 - - - - - - - - - - - - - -<!--</td--></td>	R-1 Program Element (Number/Name) PE 0603457A / C3/ Cyber Advanced Development FY 2021 FY 2022 FY 2023 Base FY 2023 OCO 43.357 31.426 0.000 - 43.357 61.426 41.354 - 0.000 30.000 41.354 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 41.354 - A)	Program Element (Number/Name) Pet 0603457A / C3/ Cyber Advanced Development FY 2021 FY 2022 FY 2023 Base FY 2023 OCO FY 2023 43.357 31.426 0.000 - - - - - - 4 - - 4 0.000 30.000 41.354 - 4 - - 4 - - 4 - - 4 - - 4 - - 4 - - - 4 - - 4 - - 4 - - 4 - - 4 - - 4 - - 4 - - 4 - - - 4 - - - 4 - - - 4 - - - - - - 4 - - - - - - - - - - - - - - </td							

Change Summary Explanation

Fiscal Year 2023 (FY23) funding increase reflects the fact that the FY22 President's Budget request did not include out-year funding.

Exhibit R-2A, RDT&E Project J	ustification	: PB 2023 A	Army							Date: Apri	l 2022		
Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060345 opment	am Elemen 57A / C3/ Cy	t (Number / /ber Advand	Name) ced Devel	Project (I 6CY / Aut Technolog	e ct (Number/Name) I Autonomous Cyber Advanced nology			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
6CY: Autonomous Cyber Advanced Technology	-	5.995	9.304	11.188	-	11.188	7.495	4.603	19.08 ⁻	22.594	0.000	80.260	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
A. Mission Description and Bu This Project will demonstrate de technologies driving the network Research in this Project complet The cited research is consistent	dget Item J fensive effect decisions. ⁻ ments Progr with the Uno	ustification ts to advers This Project am Element der Secretar United Stat	sarial use of also provide t (PE) 06022 ry of Defens	artificial in es cyber au 213A (C3I A e for Resea	telligence (A itonomy thre Applied Cyb arch and Er	AI) and mac ough scienc her) / Project ngineering p	hine learnin e & technol t CY6 (Auto riority focus	g (ML) to a ogy advanc nomous Cy areas and	void detect cements. ber Techn the Army I	ion and dec blogy). ⁄lodernizatio	eive our au on Strategy.	tomated	
B. Accomplishments/Planned	Programs (5 in Millions	s)		nanu.				F	(2021	TY 2022	FY 2023	
<i>Title:</i> Autonomous Cyber		.	-+							5.995	9.304	11.188	
Description: This effort will deve and develop a cyber response co response decisions.	elop proof-of ourse of acti	-concept se on decision	nsors that c aid for cybe	an adapt to r defenders	o and auton s to validate	omously rea suitability c	act to advers of actions ar	sary cyber-a nd to speed	attack				
FY 2022 Plans: Will validate the interoperable AI cyber emulation environment; w aid software while optimizing the and services to provide intuitive countering adversarial cybersect knowledge, validate correctness	/ML based c ill demonstra ingestion au recommenda urity events i of actions, a	yber defens ate significa nd correlatic ations to the n a high-fide and speed re	e decision a nt performan on of event fo S6 Cyber E elity cyber el esponse dec	aid architec nce improv eeds from e Electromagi mulation er sisions.	ture suppor ements in c existing sen netic Activit nvironment.	ting warfigh yber respon sors, cybers ies (CEMA) This techno	ter planning ise course o security app personnel f blogy will ea	g in a high-f of action de plications, for use in use the burc	idelity cision len of				
FY 2023 Plans: Will mature and demonstrate Al/ exercise; will mature and demon run exercise; will mature Genera algorithms along with defenses a	ML based cy strate senso tive network gainst such	/ber defense ors that can algorithms attacks to e	e decision ai adapt to anc and neural r ensure trustv	d architect l autonomo network so vorthiness	ure support busly react t ftware to sir of autonom	ing warfight o adversary nulate adve ous decisior	er planning cyber-attac rsarial attac n engines a	at a soldier k at a soldi ks on Al/M nd mitigate	run er -				

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	ect (Number/Name) I Autonomous Cyber Advanced nology				
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023
vulnerable decisions, as well as demonstrate these capabilities in lab and field learning architecture to ensure the machine learning software can interoperate be demonstrated in lab and field based demonstrations.	hine n will				
FY 2022 to FY 2023 Increase/Decrease Statement: Planned funding increase of this effort to improve and demonstrate cyber respo	onse course of action decision aid software.				
	Accomplishments/Planned Programs Sub	ototals	5.995	9.304	11.188
C. Other Program Funding Summary (\$ In Millions) N/A Remarks D. Acquisition Strategy N/A					

Exhibit R-2A, RDT&E Project J	ustification	: PB 2023 A	rmy							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progr PE 06034 opment	am Elemen 57A / C3/ Cy	t (Number / /ber Advand	Name) ced Devel	Project (N 8CY / Info Technolog	ct (Number/Name) Information Trust Advanced pology		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
8CY: Information Trust Advanced Technology	-	10.900	15.876	20.028	-	20.028	11.138	4.157	-	-	0.000	62.099
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Bu This Project demonstrates enha such as an attempt to manipulat Research in this Project comple Applied Cyber) / Project CY1 (Ir The cited research is consistent	nced awaren e data trave ments Progr formation As with the Uno	ness of the i rsing the ne am Element ssurance an der Secretar	nformation' twork. t (PE) 0602 d Network ry of Defens	s "provenar 2213A (C3) Resiliency ⁻ se for Rese	nce" from or I Applied Cy Tech). arch and Er	riginator to c vber) / Proje ngineering p	consumer (e ct 2CY (Info riority focus	e.g. sensor f prmation Tru areas and	to shooter) ust Technol the Army M	in the pres ogy) and P lodernizati	ence of cybe E 0602213A on Strategy.	er-attacks, \ (C3I
Research in this Project is perio	rmed by the		es (US) Am	ny Futures	Command	AFC).				2024	EV 2022	EV 2022
Title: Information Trust Advance	d Technoloc		<u>9</u>						F1	3.500	4.507	6.532
Description: This Project demo sensor to shooter) in the present	nstrates enh ce of cyber-a	anced awar ittacks, such	eness of the as an atte	e informatic mpt to man	on's "proven iipulate data	ance" from a traversing	originator to the network	o consumer	(e.g.			
FY 2022 Plans: Will mature and demonstrate the services that ensure the integrity demonstrate the authentication s architecture; will implement and can be leveraged to ensure a se malicious modification; will optim emulation environment.	e specificatio of a messa service proof mature tech cure distribu ize user and	n based fixe ges data, or -of-concept nology to cro ted ledger o I role-based	ed format m igin, and ch that helps o eate a suita f messages authentica	essage che pain of custo determine a ble de-cent s and assoc tion service	ecking and r ody as it tra- and track us tralized light ciated risk w es and demo	nachine lea verses the r er trust valu weight bloc vith automat onstrate with	rning based network; will es within a k chain algo ed analysis nin high fide	integrity mature and block chain orithm that of attempted lity cyber	d i ed			
FY 2023 Plans: Will continue to mature and demintegrity services that ensure the specification based and machine	onstrate the integrity of learning ba	specificatio messages d sed integrity	n based fixe ata, origin, ⁄ services a	ed format m and chain o nd will dem	nessage che of custody a nonstrate wi	ecking and r is it traverse thin high fide	machine lea the netwo elity cyber e	rning base ork; will opti emulation	d mize			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name)Project (Number/Name)PE 0603457A / C3/ Cyber Advanced Devel opment8CY / Information Trust Advanced Technology						
B. Accomplishments/Planned Programs (\$ in Millions)		FY	2021	FY 2022	FY 2023		
environment; will continue to implement and mature technology to create a sui algorithm that can be leveraged to ensure a secure distributed ledger of messa of attempted malicious modification; will optimize the lightweight blockchain tec environment; will implement and mature technology to create a trust score arcl analytics based level of trustworthiness upon the data received from the integr	table de-centralized lightweight blockchain ages and associated risk with automated analy chnology within a high fidelity cyber emulation nitecture that provides a real-time and quantita ty, authentication, and provenance tracker ser	sis tive vices.					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding in this effort was increased for demonstration of the authentication ser	vice.						
<i>Title:</i> Agile Virtual Enclave			7.400	11.369	13.496		
 Description: This effort matures and demonstrates a Multi-Level Security (ML required for US Government owned systems and develop a Mission Partner El (CDS) to enable data sharing with coalition partners. FY 2022 Plans: Will integrate a demonstrable baseline Cross Domain Solution (CDS) which wi Transfer Guard solution. Will conduct a validation and verification evaluations a deliverable in order to prove out the technology. Will mature all supporting doc Agile Virtual Enclave (AVE) program to include Preliminary Design Reviews (P all the deliverables. Will mature a generalized solution for use on MSL Access Armed Forces systems and will incorporate it into the final deliverable. 	S) Access Guard to reduce hardware infrastru nvironment (MPE) transfer cross domain soluti Il incorporate MSL Access Guard with the MPE and field tests, on the final Integrated CDS umentation generated throughout the length of DRs) and Capabilities Design Document (CDE Guard platform with potential for adaptation ac	ture on the Ds) for cross					
<i>FY 2023 Plans:</i> Will continue development of a software solution for Army Mission Command (adjustable data exchange between US Armed Forces tactical systems and MF Transfer Guard components; will conduct lab and field-based risk reduction ac readiness levels for the integrated solution in a relevant environment and addre Security Agency (NSA) concerns prior to transition.	MC) systems to achieve secure and operation E connected systems; will mature Access and tivities; will demonstrate and assess technolog ess Program Manager (PM) MC and National	ally y					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding in this effort was increased to mature and demonstrate technology to mission partner environment with a reduced hardware footprint.	develop a MLS Access Guard for data sharing	in a					
	Accomplishments/Planned Programs Sub	totals	10.900	15.876	20.028		

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603457A / C3/ Cyber Advanced Devel opment	Project (Number/Name) 8CY I Information Trust Advanced Technology
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A		
Remarks		
<u>D. Acquisition Strategy</u> N/A		

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	Army							Date: Apri	l 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)ProjePE 0603457A / C3/ Cyber Advanced Devel9CY /opmentAdvanced					ect (Number/Name) I Network Access and Effects anced Technology		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
9CY: Network Access and Effects Advanced Technology	-	4.464	4.347	8.170	-	8.170	10.087	10.337	14.992	11.767	0.000	64.164
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Research in this Project compler The cited research is consistent Research in this Project is perfor	nents Progr with the Uno med by the	am Elemen der Secretar United Stat	t (PE) 0602 ry of Defens es Army Fu	213A (C3L) se for Rese itures Comi	Applied Cyt arch and Er mand (AFC)	ber) / Projec ngineering p).	t 3CY (Network)	work Acces	s and Effec the Army M	ts Technolo	ogy). on Strategy.	EV 2022
Title: Offensive Cyber Enabling			<u>ə</u> t						F1	2021	1 347	R 170
Description: This effort matures selection and sequencing of effect FY 2022 Plans: Will mature and demonstrate OC technique development for expect Computers, and Intelligence (AC support of the Commander's des	and demon cts to suppo O/RF enabl dited vulnera 4I) targets o ired intent.	strates adva rt the agile o ed access a ability discov f interest; a	anced missi deployment and effects very agains nd mature o	ion manage and execu vectors aga t validated <i>i</i> decision aid	ement tools ition of OCC ainst validate Adversary C Is for optimi	and workflo) / RF Enabl ed targets of Command, C zation of RF	ws, to prom led capabilit f interest; op Control, Con ⁻ enabled te	ote efficien ies. otimize assi nmunicatior chniques ir	t sted n,			
FY 2023 Plans: Will demonstrate assisted technic demonstrate OCO/RF enabled et platforms against near-peer targe	que develop ffect technol ets of interes	oment to red logies again st with a sca	uce time to st priority ta lled process	vector disc arget of inte s while min	covery via so erest. Will op nimizing man	oftware trans otimize the u nual process	sition. Will use of OCO/ sing and op	mature and /RF firing erator burde	en.			
FY 2022 to FY 2023 Increase/D	ecrease Sta	atement:										

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603457A / C3/ Cyber Advanced Devel opment	Projec 9CY / <i>Advan</i>	ct (Number/N Network Acco ced Technolo	ts	
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2021	FY 2022	FY 2023
Funding increase to mature and demonstrate technologies for higher and deployment.	er ranked priorities for Offensive Cyber capability develop	oment			
	Accomplishments/Planned Programs Sub	ototals	4.464	4.347	8.170
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A					

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: Apr	il 2022			
Appropriation/Budget Activity 2040 / 3						R-1 Program Element (Number/Name)ProjePE 0603457A / C3/ Cyber Advanced DevelCB4 /opmentMirror					ect (Number/Name) I Offensive Cyber Operations (OCO) or Adv Tech			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost		
CB4: Offensive Cyber Operations (OCO) Mirror Adv Tech	-	1.998	1.899	1.968	-	1.968	-	-	-	-	0.000	5.865		
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-				
critical Offensive Cyber Operation units during operations. Research in this Project complem The cited research is consistent of Research in this Project is perform	ns (OCO) m nents Progra with the Unc med by the	iission funct am Element der Secretar United State	tions to inclu t (PE) 0602 ry of Defens es Army Fu	ude but not 213A (C3I A se for Resea tures Comr	limited to de Applied Cyb arch and En nand.	evelopment er) / Project ngineering p	, exercise, r 5CY (Offe	mission reh ensive Cybe areas and	earsal and r Operation the Army M	provide tec s (OCO) M lodernizatio	hnical reach lirror Technc on Strategy.	back to blogy).		
B. Accomplishments/Planned P	<u>rograms (</u> \$	in Millions	<u>s)</u>						FY	2021	FY 2022	FY 2023		
Title: Offensive Cyber Operations	s Mirror									1.998	1.899	1.968		
Description: This effort matures relevant cyberspace environment mission rehearsal and provide teo FY 2022 Plans: Will mature and demonstrate incr Security Operations (DevSecOps	and demons supporting chnical reac emental mo	strates meth critical OCC h back to un deling and s	nods, tools ; D mission fu nits during c simulation (2adio Frequ	and techniq inctions to i operations. M&S) softw ency (RE) f	ues to enab nclude but i vare and opt	ble rapid ins not limited to timize fidelit	tantiation o o developm y driven De	f an operati ent, exercis velopment	onally se,					
social influence mission functions within relevant environment; and optimizes the ?body of evidence? necessary to achieve an accredited rapid response enclave in support of DevSecOps utilization of tactical OCO/RF Enabled platforms at mission speed.														
FY 2023 Plans: Will demonstrate OCO Mirror Rev 3 product at annual Cyber Blitz test event. Will transition OCO Mirror product Rev 3 at technology readiness level (TRL) 6. All OCO Mirror products will receive authorization to operate (ATO) on Top Secret level information systems.														
FY 2022 to FY 2023 Increase/De	ecrease Sta	tement:												

	Date: April 2022				
R-1 Program Element (Number/Name) PE 0603457A / C3/ Cyber Advanced Devel opment	Proje CB4 / Mirror	ct (Number/N Offensive Cy Adv Tech	l ame) ber Operation	ns (OCO)	
	ſ	FY 2021	FY 2022	FY 2023	
Accomplishments/Planned Programs Sub	totals	1.998	1.899	1.968	
	PE 0603457A I C3I Cyber Advanced Devel opment Accomplishments/Planned Programs Sub	PE 0603457A / C3/ Cyber Advanced Devel opment CB4 / Mirror Accomplishments/Planned Programs Subtotals	R-1 Program Element (Number/Name) per decided of the second of the se	R-1 Program Element (Number/Name) Project (Number/Name) Determine CB4 I Offensive Cyber Operation Mirror Adv Tech FY 2021 Accomplishments/Planned Programs Subtotals 1.998 1.899 1.899	

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	Army							Date: Apri	l 2022	
Appropriation/Budget Activity 2040 / 3						am Elemen 57A / C3/ C <u>j</u>	it (Number / yber Advand	' Name) ced Devel	Project (Number/Name) CB6 / C3/ Cyber Advanced Development (CA)			
COST (\$ in Millions)	COST (\$ in Millions) Prior Years FY 2021 FY 2022 Base				FY 2023 OCO	FY 2023 FY 2023 OCO Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CB6: C3I Cyber Advanced Development (CA)	-	20.000	30.000	-	-	-	-	-	-	-	0.000	50.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Buc Congressional Interest Item fund The cited work is consistent with	Iget Item J ing provide the Under S	ustification d for C3I Cy Secretary of	i ber Advanc Defense fo	ed Develop r Research	oment. n and Engine	eering priori	ty focus are	eas and the	Army Mode	ernization S	trategy.	
Congressional Add: Program In	crease - Hi	oh Bandwid	s) th Cryptomo	odule Enha	ncements a	nd Certifica	tion	10.000	30.000			
FY 2021 Accomplishments: Con and Certification.	nducted adv	vanced rese	arch in Hig	h Bandwidt	h Cryptomo	dule Enhan	cements					
Work executed by Army Futures	Command.											
FY 2022 Plans: Congressional In and Certification	iterest Item	funding pro	vided for Hi	gh Bandwi	dth Cryptom	odule Enha	ancements					
Congressional Add: Program Increase - Low SWAP Software-Defined MFEW									-			
FY 2021 Accomplishments: Con	nducted adv	vanced rese	earch in Low	/ SWAP Sc	oftware-Defi	ned MFEW.						
Work executed by Army Futures	Command.											
					Congress	ional Adds	Subtotals	20.000	30.000			
C. Other Program Funding Sum	nmary (\$ in	Millions)								-		
N/A												
Remarks												
Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022										
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Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603457A / C3/ Cyber Advanced Devel opment	Project (Number/Name) CB6 / C3/ Cyber Advanced Development (CA)										
D. Acquisition Strategy												
N/A												
PE 0603457A: C3I Cyber Advanced Development												

Exhibit R-2, RDT&E Budget Item							Date: April	2022				
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)				anced	R-1 Progra PE 060346	am Elemen 61A / High P	t (Number/l Performance	Name) Computing	Moderniza	tion Progra	m	
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	221.161	229.123	251.964	-	251.964	254.647	258.284	259.412	260.402	0.000	1,734.993
DS7: High Performance Computing Modernization Program	-	181.161	189.123	251.964	-	251.964	254.647	258.284	259.412	260.402	0.000	1,654.993
DW5: HIGH PERF COMP MODERN (HPCM) (CA)	-	40.000	40.000	-	-	-	-	-	-	-	0.000	80.000

A. Mission Description and Budget Item Justification

The High Performance Computing Modernization Program (HPCMP) addresses the supercomputing requirements of Department of Defense (DoD) scientists and engineers by: (1) demonstrating and maturing the most advanced, leading-edge computational architectures while exploiting the resulting systems by employing complementary specialized expertise; (2) demonstrating and maturing the Defense Research and Engineering Network (DREN), which investigates, demonstrates, and matures leading-edge digital networking and security technologies to securely deliver computational capabilities to the distributed DoD Research, Development, Test, and Evaluation (RDTE) community; and (3) leveraging specialized expertise from DoD, other federal departments and agencies, industry, and academia to demonstrate and mature leading-edge software application codes. DoD Supercomputing Resource Centers (DSRCs) provide extensive computational capabilities to demonstrate and mature emerging technologies that address the supercomputing requirements of the DoD RDTE community in the areas of hardware, software, and programming environments. All HPCMP sites are interconnected to each other, the DoD High Performance Computing (HPC) RDTE community, and other major defense sites via the DREN, a research network which investigates, demonstrates, and matures (a) state-of-the-art digital networking technologies to ensure a robust distributed environment and (b) the most advanced digital security capabilities to protect the intellectual property of the DoD and its contract entities as they employ HPCMP capabilities. The HPCMP's software application effort (a) optimizes, enhances, demonstrates, and matures critical DoD physics-based and engineering software to allow scientists and engineers to execute calculations with precision and efficiency on leading-edge supercomputers, (b) demonstrates and matures immersive collaborative programming environments to improve science and engineering workflows, and (c) demonstrates and matures leading-edge computational tech

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

Program E 603461A / Y 2022 189.123 229 123	Element (Number/Name) High Performance Computir	ng Modernization	Program	
Y 2022 189.123 229.123	FY 2023 Base	FY 2023 OCO	EV 2023	-
189.123 29 123	0.000		1 1 2025	Total
29 123	0.000	-		0.000
	251.964	-	25	1.964
40.000	251.964	-	25	1.964
-				
-				
-				
40.000				
-				
-				
-				
-	251.964	-	25	1.964
<u>ns)</u>			FY 2021	FY 2022
			40.000	40.000
C	Congressional Add Subtotals	for Project: DW5	40.000	40.000
	Congressional Add Tota	Is for all Projects	40.000	40.000
r	40.000 - - 40.000 - - - - - - - 1s)	29.123 251.904 40.000 251.964 - 40.000 - 251.964 15) Congressional Add Subtotals Congressional Add Tota	29.123 251.964 - 40.000 251.964 - 40.000 - 251.964 - 15) Congressional Add Subtotals for Project: DW5 Congressional Add Totals for all Projects	29.123 251.964 - 25 40.000 251.964 - 25 - 40.000 - - - - - - - - - - - - - - - - -

Change Summary Explanation

Fiscal Year 2023 (FY23) funding increase reflects the fact that the FY22 President's Budget request did not include out-year funding.

Exhibit R-2A, RDT&E Project Ju	stification	PB 2023 A	rmy							Date: April	2022	
Appropriation/Budget Activity 2040 / 3	Budget Activity				R-1 Program Element (Number/Name)ProPE 0603461A I High Performance ComputiDSTng Modernization ProgramMod				Project (N DS7 <i>I High</i> <i>Modernizat</i>	roject (Number/Name) S7 I High Performance Computing Iodernization Program		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
DS7: High Performance Computing Modernization Program	-	181.161	189.123	251.964	-	251.964	254.647	258.284	259.412	260.402	0.000	1,654.993
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The High Performance Computing Modernization Program (HPCMP) addresses the supercomputing requirements of Department of Defense (DoD) scientists and engineers by (1) demonstrating and maturing the most advanced, leading-edge computational architectures and exploiting the resulting systems by employing complementary specialized expertise; (2) demonstrating and maturing the Defense Research and Engineering Network (DREN) which investigates, demonstrates, and matures leading-edge digital networking and security technologies to securely deliver computational capabilities to the distributed DoD Research, Development, Test, and Evaluation (RDTE) and acquisition engineering communities; and (3) leveraging specialized expertise from DoD, other federal departments/agencies, industry, and academia to demonstrate and mature leading-edge software application codes. DoD Supercomputing Resource Centers (DSRCs) provide extensive computational capabilities and demonstrate and mature emerging technologies that address the supercomputing requirements of the DoD RDTE and acquisition engineering communities in the areas of hardware, software, and programming environments. HPCMP sites are interconnected to each other, the DoD High Performance Computing (HPC) RDTE community, and other major defense sites via DREN, a research network which investigates, demonstrates, and matures (a) state-of-the-art digital networking technologies to ensure a robust distributed environment and (b) the most advanced digital security capabilities to effectively protect the intellectual property of the DoD and its contract entities as they employ HPCMP advanced capabilities. The HPCMP's software application effort (a) optimizes, enhances, demonstrates, and matures critical DoD physics-based and engineering software to allow scientists and engineers to execute calculations with precision and efficiency on leadingedge supercomputers, (b) demonstrates and matures immersive collaborative programming environments to improve science and engineering workflows, and (c) demonstrates and matures leading-edge computational technology from academia and industry. These synergistic activities collectively demonstrate and mature horizontal technologies that are exploited throughout the DoD RDTE and acquisition engineering communities, ensuring the DoD maintains the most advanced research ecosystem in the areas of computationally-intensive modeling and design.

The research cited 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 2021	FY 2022	FY 2023
Title: Department of Defense Supercomputing Resource Centers	95.975	96.537	144.207
Description: The effort investigates, demonstrates, and matures general and special-purpose supercomputing environments that incorporate the most advanced, leading-edge computational architectures, distributed mass storage technologies, and data analysis methodologies; employs complementary specialized expertise to mature and exploit these environments; enables the DoD RDTE and acquisition engineering communities to effectively and efficiently investigate, demonstrate, and mature a broad range of technologies through advanced computational methods.			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	oril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603461A <i>I High Performance Computi</i> <i>ng Modernization Program</i>	Project DS7 / Moder	t (Number/N High Perform nization Prog	l ame) ance Compu ram	ting
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021 FY 2022				
<i>FY 2022 Plans:</i> Complete integration of commercial cloud computing, making it broadly availab data-centric center methodologies into our supercomputing centers. Continue to suite of supercomputers and high-end computing services to address DoD prior stakeholders including security, workload, and architecture requirements. Cont multiple architectures (scientific, analytics, machine learning, etc.) that incorpor memory, data input/output (I/O), interconnect, and operating system (OS) capa to access and reduce barriers to supercomputers. Continue to leverage data-ir use cases in machine learning, artificial intelligence, and data sciences. Impler classified supercomputing, transportable data-intensive computing at the tactical	le to the entire HPCMP user community. Inte to accelerate technology capabilities with a rities that satisfy the diverse needs of DoD tinue to demonstrate the potential benefits of rate leading-edge processors, accelerators, bilities. Continue to demonstrate new mechan ntensive supercomputing architectures for DoI ment new capabilities for secure shared highly al edge, and persistent data services.	grate nisms) /-			
FY 2023 Plans: Will accelerate the integration of commercial cloud computing, with the goal of a user community. Will continue to integrate data-centric center methodologies in ability to rapidly extract information from complex computations. Will continue to of supercomputers and high-end computing services to address DoD priorities including security, workload, and architecture requirements. Will continue to de High End Computing technologies including multiple architectures (scientific, ar leading-edge processors, accelerators, memory, data I/0, interconnect, and OS mechanisms to access and reduce barriers to supercomputers for non-tradition hybrid cloud connectivity for HEC workflows. Will continue to leverage data-integrate cases in machine learning, artificial intelligence, and data sciences. Will im highly-classified supercomputing, transportable data-intensive computing at the add additional capacity and capability in HPC through strategic retention of HPC commercial cloud computing.	making it broadly available to the entire HPCM nto our supercomputing centers to improve the to accelerate technology capabilities with a su that satisfy the diverse needs of DoD stakeho emonstrate the potential benefits of emerging nalytics, machine learning, etc.) that incorpora capabilities. Will continue to demonstrate ne al users and establish mechanisms for establi- ensive supercomputing architectures for DoD nplement new capabilities for secure shared e tactical edge, and persistent data services. V C assets and conduct pilot projects for burst to	IP e ite Iders te w ishing Vill			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase ensures continued operations at DSRCs to include improved development.	HPC simulation to close gaps in hypersonic				
Title: Defense Research and Engineering Network			31.770	31.955	54.675
Description: The DREN effort investigates, demonstrates, and matures state-or a robust distributed environment among HPCMP sites, the DoD HPC RDTE an other major defense sites; investigates, demonstrates, and matures the most additional effective states are strained at the state of the strained at the state of the strained at the state of the state of the strained at the st	of-the-art digital networking technologies to en d acquisition engineering communities, and dvanced digital security capabilities to effectiv	sure ely			

PE 0603461A: *High Performance Computing Modernization...* Army

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603461A <i>I High Performance Computi</i> <i>ng Modernization Program</i>	Project (Number/I DS7 / High Perforn Modernization Prog	lame) nance Compu gram	iting
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
protect the intellectual property of the DoD and its contract entities as they encomplementary specialized expertise to mature and exploit this environment.	nploy HPCMP advanced capabilities; employs			
FY 2022 Plans: Continue to refine and exploit DREN (an advanced digital DoD wide area rest Network backbone) which provides robust, high-bandwidth, low-latency, low- the HPCMP and DoD RDTE/AE communities with specific efforts targeted at (T&E) and AE communities. Complete source selection activities for DREN 4 contract award for commercial wide area network services. DREN 4 is the fo generation technical capabilities and significantly increased bandwidths to su Continue to enhance and refine the protection of all external DREN boundari cybersecurity service provider capability to effectively protect the intellectual utilize HPCMP advanced capabilities. Establish and enhance network transp DoD RDTE/AE communities moving computation, data storage, and other re- mature the advanced network technologies and complex cybersecurity mech- networked COIs (communities of interest) at multiple classification levels.	earch network and part of the DoD Information jitter, and full-service network connectivity among the unique requirements of the test and evaluati , initiated in Fiscal Year 2021 (FY21), leading to low-on contract to DREN III, and will provide nex poport the HPCMP and DoD RDTE/AE communit es to enhance the HPCMP's DISA-accredited Tie property of the DoD and its contract entities as th ort to the commercial cloud for those HPCMP an quirements to the cloud environment. Continue to anisms required to implement logically-separated	g on a t- es. r 2 ey d o i		
FY 2023 Plans: Will continue to refine and exploit DREN (an advanced digital DoD wide area which provides robust, high-bandwidth, low-latency, low-jitter, and full-service RDTE/Acquisition Engineering (AE) communities with specific efforts targeter communities. Will complete transisiton activities for DREN 4. DREN 4 is the figeneration technical capabilities and significantly increased bandwidths to su Will continue to enhance and refine the protection of all external DREN boun Tier 2 cybersecurity service provider capabilities. Will continue to establish and e for those HPCMP advanced capabilities. Will continue to establish and e for those HPCMP and DoD RDTE/AE communities moving computation, date environment. Will continue to mature the advanced network technologies and implement logically-separated networked COIs at multiple classification level.	research network and part of the DoDIN backbo e network connectivity among the HPCMP and D d at the unique requirements of the T&E and AE follow-on contract to DREN III, and will provide ne poport the HPCMP and DoD RDTE/AE communit daries to enhance the HPCMP's DISA-accredited ectual property of the DoD and its contract entities enhance network transport to the commercial clo a storage, and other requirements to the cloud d complex cybersecurity mechanisms required to s. Removal of DREN under-provisioning.	ne) pD ext- es. s ud		
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase reflects adjustments to align with projected allocations sup network to include evolving cybersecurity requirements.	porting the DREN to support enhancements with	n the		
Title: Software Applications		53.416	53.728	53.082

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Da	nte: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603461A <i>I High Performance Computi</i> <i>ng Modernization Program</i>	Project (Num DS7 / High Pe Modernization	ber/N erform Prog	Name) nance Compu gram	uting
B. Accomplishments/Planned Programs (\$ in Millions)		FY 20	21	FY 2022	FY 2023
 B. Accomplishments/Planned Programs (\$ in Millions) Description: This effort optimizes, enhances, demonstrates, and matures soft of widely used applications and algorithms to address RDTE and acquisition er Computational Research Engineering Acquisition Tools and Environments (CF advanced application codes to allow scientists and engineers to use supercom DoD ships, fixed-wing aircraft, rotorcraft, ground vehicles, and radio frequency and mature advanced supercomputing application codes to address critical hig for platforms and personnel, high-power microwaves and lasers, munition sense High Performance Computing Applications Software Initiative (HASI) projects a DoD software that can take advantage of new and emerging hardware advance the DoD's highest-priority, highest-impact, most demanding computational workstandpoint; the Productivity, Enhancement, Technology Transfer, and Training critical DoD physics based and engineering software to allow scientists and en precision and efficiency on leading-edge supercomputers, (2) demonstrates are environments to improve science and engineering workflows, and (3) demonst technology from academia and industry. FY 2022 Plans: Continue to mature and enhance multi-disciplinary software technology in supple establishing a foundation for powerful decision support applications synthesize disciplinary technology for aeronautical systems of all types (i.e., fixed and rotathis endeavor matures model-centric conceptual design software technology to processes, enabling application of physics-based analysis of alternatives, tech implications. Continue to mature software improvements necessary to deploy processes, enabling application of physics-based analysis of alternatives, tech implications. Continue to mature software improvements necessary to deploy processes, enabling application of physics-based analysis of alternatives, tech implications. Continue to mature software improvements necessary to deploy processes of the perfor	ware applications to provide for the adaptation ngineering communities requirements. The REATE) initiative demonstrates and matures puters to design and analyze virtual prototypes (RF) antennas; HPCMP Institutes demonstrate h-impact DoD challenges (e.g. blast protection sitivities, and mobile network designs/prototype address the need to mature and refine critical es; the Frontier initiative represents and suppor k, both from a technical and mission-relevance (PETTT) initiative (1) optimizes and enhances gineers to execute scientific calculations with ad matures immersive collaborative programminates over of current and future defense programs, d using machine learning methodologies. Multi ary-wing aircraft, munitions, missiles, rockets, e o support Pre-Milestone-A Defense acquisition nology trade-space exploration, and analysis of production quality physics-based design analys c-Glide, and Manned/Unmanned Conventional eneration of high order accuracy solvers; b) con-	FY 20 s of s); rts ng i- tc.), f cost is ntinue	21	FY 2022	FY 2023
implementing hypersonic terminal maneuvers; and c) continue incorporating hypersonic terminal maneuvers; and c) continue incorporating hypersonicraft, continue aeromechanics analysis associated with maneuvers, airfrance carriage and release, as well as infrared suppression analysis, chaff trajectory prediction capability necessary for structural airworthiness assessments. RF are computational electromagnetics capabilities to assist in design and evaluation and ground-based platforms; continue demonstrating capability for assessment optimizing computational methods for electronic warfare assessments and evaluation and ground-based platforms in aircraft radar signature prediction capability for assessment and evaluation.	personic long-duration/heat soak algorithms. I me propulsion system integration, and weapon prediction, debris ingestion analysis, and loads ntenna design and analysis continue to mature of next generation radar for aircraft, ships, t of electromagnetic hazards on ordnance and luation of multiple antenna systems on a single illities that effectively include propulsion system	For s s			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date:	April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603461A <i>I High Performance Computi</i> <i>ng Modernization Program</i>	Project (Number DS7 I High Perfor Modernization Pro	(Name) mance Compl ogram	uting
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
inlet and exhaust. Continue efforts to incorporate high-resolution (XB fighter-scale aircraft. For Naval Ships (surface and submarine), conti seakeeping capabilities; and c) virtual ship powering algorithms. Con maneuvering. Continue development of ship shock virtual test and ar expand autonomy capabilities associated with ground mobility test re understand how physics-informed machine learning can impact DoD weapon system development, deployment, and operation life-cycle.	and frequencies) virtual test and analysis capabilities fo nue incorporation of; a) hullform optimization; b) multi-hi tinue to incorporate 6-degree of freedom (6-DOF) subm nalysis capabilities. For Ground Vehicles continue to equirements. Execute fact finding investigations to more priorities and effectively support decision makers throug	r ull aarine fully ghout		
FY 2023 Plans: Will continue to mature and advance multi-disciplinary software techn building a foundation for powerful decision support applications synth Multi-disciplinary technology for aeronautical systems of all types (i.e etc.), this endeavor will continue to mature model-centric conceptual simulations of weapons and weapon support systems across the pro alternatives, technology trade-space exploration, and analysis of cos software improvements necessary to deploy production quality physi systems (High Speed Strike, Tactical Boost-Glide, and Manned/Unm aircraft, a) will continue incorporating new generation of high order are terminal maneuvers; and c) will continue incorporating hypersonic lou aeromechanics analysis associated with maneuvers, airframe propul as well as infrared suppression analysis, chaff trajectory prediction, or necessary for structural airworthiness assessments. RF antenna des electromagnetics capabilities to assist in design and evaluation of ne platforms; will continue demonstrating capability for assessment of el computational methods for electronic warfare assessments and evalu- specific area of focus will be the application of antenna evaluation so aircraft radar signature prediction capabilities that effectively include evaluation of 6th generation fighter/attack aircraft. Will continue effor- test and analysis capabilities for fighter-scale aircraft. For Naval Ship hullform optimization; b) multi-hull seakeeping capabilities; and c) vir 6-D0F submarine maneuvering. Will continue development of ship sh the results of recent CVN-78 shock trials in preparation for establishi For Ground Vehicles will continue to expand autonomy capabilities a execute fact finding investigations to understand how physics-inform	hology in support of current and future defense program hesized using advanced machine learning methodologie ., fixed and rotary-wing aircraft, munitions, missiles, rocl design software technology to support high-fidelity digits duct lifecycle. This application of physics-based analys t implications will improve application. Will continue mat cs-based design analysis tools for future hypersonic we anned Conventional Prompt Global Strike). For fixed-wi ccuracy solvers; b) will continue implementing hyperson ng-duration/heat soak algorithms. For rotorcraft, will con sion system integration, and weapons carriage and rele lebris ingestion analysis, and loads prediction capability ign and analysis will continue to mature computational xt generation radar for aircraft, ships, and ground-based lectromagnetic hazards on ordnance and optimizing uation of multiple antenna systems on a single platform ftware on naval platforms. Will continue to include effort propulsion system inlet and exhaust critical to design ar ts to incorporate high-resolution (XBand frequencies) vir s (surface and submarine), will continue to incorporation o tual ship powering algorithms. Will continue to incorporating ng alternatives for future ship classes including FFG-62. ssociated with ground mobility test requirements. Will ed machine learning more fully can impact DoD prioritie	s, is. kets, al is of ure apon ng ic tinue ase, d a s in nd tual f; a) ite		

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603461A <i>I High Performance Computi</i> <i>ng Modernization Program</i>	Project DS7 / H Modern	t (Number/N digh Perform nization Prog	lame) pance Compu pram	ting
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023
effectively support decision makers throughout weapon system development, of in-situ HEC subject matter experts to improve S&T efforts directly supporting prototype efforts.	deployment, and operation life-cycle. Reintrodu g technology transfer into programs of record a	uction and			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding decrease reflects adjustments to align with projected allocations supplications have been reduced to facilitate the availability of fu	orting software applications. The level of effort unding to support enhanced DREN requiremer	its.			
Title: FY 2022 SBIR/STTR Transfer			-	6.903	-
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	totals	181.161	189.123	251.964
C. Other Program Funding Summary (\$ in Millions) N/A Remarks N/A D. Acquisition Strategy N/A					

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: April	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)ProjePE 0603461A I High Performance ComputiDW5ng Modernization Program(HPC)			Project (N DW5 / HIG (HPCM) (C	ect (Number/Name) I HIGH PERF COMP MODERN CM) (CA)			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
DW5: HIGH PERF COMP MODERN (HPCM) (CA)	-	40.000	40.000	-	-	-	-	-	-	-	0.000	80.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project enables the Defense Research, Development, Test and Evaluation (RDT&E) community to resolve critical scientific and engineering problems more quickly, and with more precision, using advanced, physics-based computer simulation supported by high performance computing (HPC) technology. The computational expertise and resources enable Department of Defense (DoD) personnel to analyze phenomena that are often impossible, not cost effective, too time-consuming, or too dangerous to study any other way. The High Performance Computing Modernization Program (HPCMP) supports the requirements of the DoD's scientists and engineers in three major areas of effort: supercomputing resource centers, the Defense Research and Engineering Network (DREN), and software applications. DoD Supercomputing Resource Centers (DSRCs) provide extensive capabilities and demonstrate new technologies that address user requirements for hardware, software, and programming environments. Efforts of the DSRCs are augmented by dedicated HPC project investments (DHPIs) that address near real-time and real-time HPC requirements. All sites in the HPC Modernization Program are interconnected to one another, the user community, and major defense sites via the DREN, a research network which matures and demonstrates state-of-the-art computer network technologies. The Software Application effort optimizes and improves the performance of critical common DoD applications programs to run efficiently on advanced HPC systems, matures and demonstrates leading-edge computational technology from academic and commercial partners, and provides collaborative programming environments.

The work cited 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 2021	FY 2022
Congressional Add: Program increase	40.000	40.000
FY 2021 Accomplishments: Program Increase supports advanced research on High Performance Computing.		
FY 2022 Plans: Congressional Interest Item funding provided		
Congressional Adds Subtotals	40.000	40.000

C. Other Program Funding Summary (\$ in Millions)

N/A

<u>Remarks</u>

D. Acquisition Strategy

PE 0603461A: *High Performance Computing Modernization...* Army

Exhibit R-2, RDT&E Budget Iten	n Justificat	tion: PB 202	23 Army							Date: April	2022			
Appropriation/Budget Activity 2040: Research, Development, Te Technology Development (ATD)	est & Evalua	ation, Army	/ BA 3: <i>Adv</i>	anced	R-1 Program Element (Number/Name) PE 0603462A / Next Generation Combat Vehicle Advanced Technology						logy			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost		
Total Program Element	-	309.860	299.712	193.242	-	193.242	212.497	201.523	205.254	206.775	0.000	1,628.863		
BF2: Autonomous Ground Resupply (AGR) Adv Tech	-	18.374	-	-	-	-	-	-	-	-	0.000	18.374		
BF4: Combat Vehicle Robotics Adv Tech	-	10.104	26.765	29.463	-	29.463	34.550	36.226	45.407	45.104	0.000	227.619		
BF7: Crew Augmentation and Optimization Adv Tech	-	4.211	3.768	4.326	-	4.326	3.795	4.334	4.386	4.385	0.000	29.205		
BG1: Sensors for Auto Oper and Survivability Adv Tech	-	14.054	10.666	12.464	-	12.464	12.670	12.664	12.652	12.648	0.000	87.818		
BG3: Modeling and Simulation for MUMT Advanced Tech	-	3.241	5.188	5.975	-	5.975	6.248	7.175	7.529	7.363	0.000	42.719		
BG4: Adv Mobility Experimental Prototype Adv Tech Demo	-	3.760	2.819	-	-	-	-	-	-	-	0.000	6.579		
BG5: Extended Line of Sight (ELOS) Advanced Technology	-	1.396	-	-	-	-	-	-	-	-	0.000	1.396		
BG7: Ground Systems Active Defense (GSAD) Advanced Tech	-	36.496	52.172	60.371	-	60.371	57.781	49.425	52.255	55.800	0.000	364.300		
BG9: Obscuration Advanced Technology	-	10.533	2.511	2.765	-	2.765	2.813	2.810	2.811	2.810	0.000	27.053		
BH1: Survivability Systems Controls Advanced Technology	-	11.880	-	-	-	-	-	-	-	-	0.000	11.880		
BH4: Ground Vehicle Holistic Defense Adv Tech	-	-	0.034	-	-	-	-	-	1.427	1.798	0.000	3.259		
BH6: <i>Platform Electrification and Mobility Adv Tech</i>	-	20.698	24.891	46.679	-	46.679	63.174	45.417	45.419	40.181	0.000	286.459		
BH8: Enhanced VETRONICS Advanced Technology	-	11.809	14.989	10.776	-	10.776	10.223	10.559	9.317	12.641	0.000	80.314		
BI3: Sensor Protection Advanced Technology	-	1.752	1.645	1.708	-	1.708	1.738	1.738	1.734	1.734	0.000	12.049		

PE 0603462A: *Next Generation Combat Vehicle Advanced ...* Army

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Exhibit R-2, RDT&E Budget Iten	n Justificat	ion: PB 202	23 Army							Date: April	2022		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)					R-1 Program Element (Number/Name) PE 0603462A / Next Generation Combat Vehicle Advanced Technology								
BI5: Materials Application and Integration Adv Tech	-	5.286	4.825	5.279	-	5.279	5.478	4.580	4.736	4.734	0.000	34.918	
BJ1: Vehicle System Security Advanced Technology	-	1.444	2.455	-	-	-	-	-	-	-	0.000	3.899	
BK1: Autonomous Mobility Adv Tech	-	11.370	6.087	6.323	-	6.323	5.282	5.286	-	-	0.000	34.348	
BK4: Next Gen Intelligent Fire Control(NG-IFC) Adv Tech	-	23.205	1.727	2.198	-	2.198	2.309	2.985	-	-	0.000	32.424	
BK6: Adv Direct InDirect Armament Sys (ADIDAS) Adv Tech	-	0.224	-	1.534	-	1.534	2.053	9.850	12.613	12.622	0.000	38.896	
BP6: Ground Vehicle Advanced Technology(CA)	-	116.200	135.250	-	-	-	-	-	-	-	0.000	251.450	
BZ9: Smart Targeting Environment for Lower Level Assets	-	3.823	3.920	3.381	-	3.381	4.383	4.393	-	-	0.000	19.900	
CU4: Platform Agnostic Armaments Advanced Technology*	-	-	-	-	-	-	-	4.081	4.968	4.955	0.000	14.004	

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2023

A. Mission Description and Budget Item Justification

This Program Element (PE) executes development, maturation, and demonstration for the Army's modernization priority for the Next Generation of Combat Vehicle (NCCV). This PE matures, integrates and demonstrates combat vehicle technologies that enable the Army to have a smarter, faster, more lethal, more precise, more protected, and more adaptable force. Technology development builds upon the foundational vehicle architectures to support the NGCV, to include autonomy architecture, power architecture, vehicle electronic architecture, physical architecture, lethality architecture and vehicle protection architecture. Technologies developed, matured, and demonstrated will enable leap ahead capabilities for manned, optionally manned and unmanned vehicles that deliver decisive lethality.

Research in this PE complements PE 0602141A (Lethality Technology), PE 0602144A (Ground Technology), PE 0602145A (Next Generation Combat Vehicle Technology), PE 0602146A (Network C3I Technology), PE 0603116A (Lethality Advanced Technology), PE 0603119A (Ground Advanced Technology), PE 0603463A (Network C3I Advanced Technology), PE 0604115A (Technology Maturation Initiatives), and PE 0708045A (End Item Industrial Preparedness Activities). Research in this PE also transitions to PE 0603645A (Armored Systems Modernization Adv Dev) and PE 0604017A (Robotics Development).

Exhibit R-2, RDT&E Budget Item Justification: PB 2023	Army			Date	e: April 2022	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I B Technology Development (ATD)	A 3: Advanced	R-1 Program El PE 0603462A / /	ement (Number/Name) Next Generation Comba) It Vehicle Advanced 7	- echnology	
The cited research is consistent with the Under Secretary	of Defense for Rese	earch and Enginee	ring priority focus areas	and the Army Moder	nization Strateg	у.
This PE is directly aligned to the NGCV Army Modernization	n Priority.					
Research is performed by the United States (U.S.) Army F	utures Command a	and the U.S. Army I	Engineer Research and	Development Center		
B. Program Change Summary (\$ in Millions)	<u>FY 2021</u>	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023	Total
Previous President's Budget	302.209	164.951	0.000	-		0.000
Current President's Budget	309.860	299.712	193.242	-	19	3.242
Total Adjustments	7.651	134.761	193.242	-	19	3.242
 Congressional General Reductions 	-	-				
Congressional Directed Reductions	-	-				
Congressional Rescissions	-	-				
Congressional Adds Congressional Directed Transfere	-	135.250				
Congressional Directed Transfers Reprogrammings	- 7 651	-				
SBIR/STTR Transfer	-	-				
Adjustments to Budget Years	-	-	193.242	-	19	3.242
FFRDC Transfer	-	-0.489	-	-	-	-
Congressional Add Details (\$ in Millions, and Inc	ludes General Re	ductions)			FY 2021	FY 2022
Project: BP6: Ground Vehicle Advanced Technolog	y(CA)					
Congressional Add: Additive Manufacturing for	lointless Hull				10.000	15.000
Congressional Add: Carbon Fiber and Graphite	Foam Technology				10.000	5.000
Congressional Add: Hydrogen Fuel Cells					10.000	-
Congressional Add: ATE5.2 Engine Development	nt				10.000	5.000
Congressional Add: Additive Manufacturing of C	ritical Components	;			5.000	-
Congressional Add: Combat Vehicle Weight Red	luction Initiative				10.000	5.000
Congressional Add: Virtual and Physical Prototy	ping				10.000	8.000
Congressional Add: HMMWV Autonomy					3.000	-
Congressional Add: HMMWV Automotive Enhar	cements				5.000	3.000
Congressional Add: Program Increase - Comba	Vehicle Blast Test	ing			6.000	-

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army		Date: April 2022	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)	R-1 Program Element (Number/Name) PE 0603462A / Next Generation Combat Vehicle Advanc	ed Technology	
Congressional Add Details (\$ in Millions, and Includes General Re	eductions)	FY 2021	FY 2022
Congressional Add: Program Increase - Advanced Adhesives		5.000	5.000
Congressional Add: Program Increase - Combat Vehicle Lithium 6	6T Battery Development	5.000	5.000
Congressional Add: Program Increase - Vehicle Technology Read	liness Levels	2.000	-
Congressional Add: Program Increase - 10X Technology Demons	tration	8.000	-
Congressional Add: Program Increase - HMMWV Augmented Rea	ality HUD	5.000	-
Congressional Add: Program Increase - Operator?In?The?Loop V	/irtual and Physical Prototyping	4.000	-
Congressional Add: Program Increase - Next Generation Electrific	ed Transmission	8.200	-
Congressional Add: Advanced Materials Applications		-	12.000
Congressional Add: Augmented Reality for Denied Environments		-	7.000
Congressional Add: Autonomous Minefield Clearance		-	7.000
Congressional Add: Autonomous Vehicle Mobility		-	10.000
Congressional Add: Carbon Fiber Tires		-	5.000
Congressional Add: Force Protection Vehicle Kit		-	5.000
Congressional Add: Fuel Cell Technology		-	5.000
Congressional Add: Machine Learning for Advanced Lightweight (Combat Vehicle Structures	-	6.000
Congressional Add: Maneuverable Lightweight Electric Weight Re	educer	-	5.000
Congressional Add: Off-Road Maneuver		-	5.000
Congressional Add: Predictive Maintenance System		-	2.000
Congressional Add: RCV-L		-	5.000
Congressional Add: Short Fiber Thermoplastic Applications		-	4.000
Congressional Add: Unmanned Navigational Technology		-	2.500
Congressional Add: Virtual Autonomy Environment		-	3.750
	Congressional Add Subtotals for Project: E	3P6 116.200	135.250
	Congressional Add Totals for all Proje	ects 116.200	135.250
Change Summary Explanation			

Fiscal Year 2023 (FY23) funding increase reflects the fact that the FY22 President's Budget request did not include out-year funding.

PE 0603462A: Next Generation Combat Vehicle Advanced ... Army

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Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	vrmy							Date: April	2022		
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) Project (Number PE 0603462A / Next Generation Combat V BF2 / Autonomou ehicle Advanced Technology Adv Tech					umber/Nar nomous Gr	Name) Ground Resupply (AGR)		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
BF2: Autonomous Ground Resupply (AGR) Adv Tech	-	18.374	-	-	-	-	-	-	-	-	0.000	18.374	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

A. Mission Description and Budget Item Justification

This Project will mature and demonstrate an improved ground supply distribution system across multiple levels of strategic and tactical sustainment operations. The Project will equip existing military ground vehicles with scalable robotic technology through the integration of modular kits, common interfaces, and a common architecture to improve inter-node supply movement. Further, the system will modernize and optimize the operations within the supply nodes to improve accountability and throughput. The objective of this Project is to integrate new and emerging technologies into the Army's sustainment system to improve throughput, accountability, and safety and provide the Warfighter with the flexibility needed to meet future needs.

The research under this Project will transition to the Leader Follower Program of Record (PoR). The architecture and safety work under this Project also lays the groundwork for the Next Generation Combat Vehicle (NGCV) Army Modernization Priority.

This Project matures and demonstrates simulation tools that predict autonomous vehicle performance. This Project also matures and demonstrates a real-time simulator that provides the ability to design and assess ground vehicle autonomous behaviors in adverse environmental conditions, reducing the need for field testing. These simulation technologies can be integrated across Army vehicle platforms as required.

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

Research in this Project supports the Army Modernization Priority Next Generation Combat Vehicle.

Research in this Project is performed by the United States (US) Army Futures Command and the US Army Engineer Research and Development Center.

Research in this Project is also coordinated with PE 0602145A (Next Generation Combat Vehicle Technology), and transitions to PE 0604017A (Robotics Development).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Architecture and Standards	7.035	-	-
Description: This effort matures and validates the government-owned autonomous architecture for an inclusive military library of behaviors that are non-proprietary and modular format to allow for design and development of payloads across the enterprise. This architecture allows the development and implementation of the same government owned software across multiple			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat V</i> <i>ehicle Advanced Technology</i>	 Project (Number/Name) / BF2 I Autonomous Ground Resupply (AGI Adv Tech 			
B. Accomplishments/Planned Programs (\$ in Millions)		FY 202 ²	FY 2022	FY 2023	
robotic systems. This will enable interoperability and modularity within systems sustainable lifecycle management model.	and will lay the foundation for an affordable a	nd			
<i>Title:</i> Hardware and Hardware-in-the-loop/Software-in-the-loop (HIL/SIL)		4.5	- 19	-	
Description: The HIL/SIL is a test system that uses real-time, physics-based n systems (optics/signal processing and positioning), platform mobility (vehicle-te provide a "virtual proving ground" for the Autonomous Ground Resupply (AGR)	nodels of the vehicle (multi-body dynamics), s errain interaction) and weather/environment to) system.	ensor			
<i>Title:</i> Soldier Experimentation		6.3	- 38	-	
Description: In conjunction with the Army Training and Doctrine Command (TI (ATEC), this effort will employ unmanned systems in an operational evaluation environments. After the lab testing is complete and a safety test performed by a determine if AGR is useful and rugged enough to enable the soldiers to increase	RADOC) and Army Test and Evaluation Comr to test the system in real word applications ar ATC, then the soldier will provide the final test se through put on actual missions.	nand d to			
Title: Simulation Tools for Autonomous Ground Resupply		0.4	32 -	-	
Description: This effort matures and demonstrates a real-time and high-fidelity environment for evaluation of autonomous systems, and algorithm design and analysis methods for modeling and simulation to provide enhanced demonstrate adverse environmental conditions.	y, hardware and software-in-the-loop simulation development for the same; demonstrates nove tions of autonomous ground vehicles to includ	n 91 9			
	Accomplishments/Planned Programs Sub	totals 18.3	- 74	-	
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A					

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: April	2022		
Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060346 ehicle Adva	a m Elemen 2A / Next G anced Tech	t (Number /l Generation C nology	Name) Combat V	Project (N BF4 / Com	Project (Number/Name) 3F4 / Combat Vehicle Robotics Adv Teo			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
BF4: Combat Vehicle Robotics Adv Tech	-	10.104	26.765	29.463	-	29.463	34.550	36.226	45.407	45.104	0.000	227.619	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

A. Mission Description and Budget Item Justification

This Project matures and demonstrates innovative enabling technologies that enable scalable integration of multi-domain robotic and autonomous system capabilities teamed within Army formations supporting all combat warfighting functions (close combat, reconnaissance, targeting and acquisition, etc.). Project focus areas include Platform Electronic Control and Autonomy Safety Engineering.

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

Research in this Project supports the Next Generation Combat Vehicle (NGCV) Army Modernization Priority.

Research is performed by the United States (U.S.) Army Futures Command (AFC).

Research is also coordinated with Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology), and transitions to PE 0604017A (Robotics Development).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Platform Electronic Control	5.845	11.411	8.822
Description: This effort optimizes the electronic, closed loop control of by-wire vehicle systems to provide stable, reliable, and predictable control in the presence of potential malicious or unintended commands for both wheeled and tracked unmanned vehicles.			
FY 2022 Plans: Will develop an optimized solution to an expanded closed loop control of drive by-wire (DBW) systems for robotic ground vehicles to improve safe platform control. Will develop a stable interface, to control autonomous ground vehicle systems, for autonomy kits and/or user interfaces (UI) while maintaining safety critical aspects of the platform. Will demonstrate these enhancements through Engineering Evaluation Testing (EET) to ensure the autonomous technology has been fully evaluated for system safety, thereby demonstrating technical maturity. Will mature and demonstrate Robotic and Autonomy Systems (RAS) safety standards for unmanned ground vehicle systems. Will validate Ground Vehicle Robotics Safety Board published guidelines to show they meet best practices for development of safety critical software for unmanned ground vehicle systems. Validation of Ground Vehicle			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat V</i> <i>ehicle Advanced Technology</i>	Project (Number BF4 / Combat Vel	Name) hicle Robotics /	Adv Tech	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023	
Robotics Safety Board processes will result in a useable safety confirmation to testing of autonomous ground combat systems.	enable testing and reduced developmental tim	e for			
FY 2023 Plans: Will mature and continue optimization of an expanded closed loop DBW system optimization of a platform side vehicle control architecture which will be aligned safety pedigree of ground robotic systems this will enable more stable interface. Will demonstrate these enhancements through EET to show technical maturity. safety standards for unmanned ground vehicle systems based on EET activities. Board published guidelines to show they meet best practices for development of vehicle systems while incorporating lessons learned. Validation of Ground Vehicle in improved safety pedigree which will enable higher confidence in receipt safet developmental time for testing of autonomous ground combat systems.	n for robotic ground systems. Focus will be on to a known safety standard to mature the curr controls enabling ease of autonomy integration. Will continue to mature and validate RAS s. Will update Ground Vehicle Robotics Safety of safety critical software for unmanned ground icle Robotics Safety Board processes will result ty confirmation to enable testing and reduced	ent n.			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding decreased in Fiscal Year 2023 (FY23) reallocated to PE 0603462A / P Adv Tech).	Project BH6 (Platform Electrification and Mobilit	/			
Title: Unmanned Maneuver		2.931	9.099	14.171	
Description: This effort matures and demonstrates the advanced mobility performed autonomy.	ormance of autonomous systems within complete teaming configurations at various levels of	ex,			
<i>FY 2022 Plans:</i> Will improve and demonstrate autonomous vehicle maneuvering in rough terrai avoid negative obstacles, such as large holes, bodies of water, and cliffs. Will n characteristics of the terrain the vehicle is driving over, and optimize the comba demonstrate these enhancements through EET to ensure the autonomous tech thereby demonstrating technical maturity.	in. Will demonstrate the ability to detect and nature and demonstrate the ability to detect the it vehicle?s driving behaviors in response. Will nnology has been fully evaluated for system sa	ety,			
<i>FY 2023 Plans:</i> Will optimize and demonstrate autonomous vehicle maneuvering in hostile environments of tware, Robotic Technology Kernel (RTK). Will mature and demonstrate the a maneuvers including human team members. Will improve cybersecurity posture advanced collaborative surveillance behaviors for unmanned ground vehicles. It o ensure the autonomous technology has been fully evaluated for system safe	ironments using government owned autonomy ability to conduct Manned-Unmanned Teaming e in development of autonomy. Will demonstra Will demonstrate all enhancements though EE ty, thereby demonstrating technical maturity. V	e r /ill			

PE 0603462A: Next Generation Combat Vehicle Advanced ... Army

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat V</i> <i>ehicle Advanced Technology</i>	Project (Number BF4 / Combat Ve	/ Name) hicle Robotics	Adv Tech
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
mature the Autonomous Ground Vehicle Reference Architecture (AGVRA) frame physical data models while connecting them to exiting instantiated architecture associated libraries to support these evolving model viewpoints. Will develop a (ROS-M) to support the registration and distribution of Robotic and Autonomous	mework by developing conceptual, logical and es and further develop safety and cyber models and mature the Robot Operating System ? Milita us System models.	and ary		
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increased in FY23 to optimize autonomous forward surveillance and s deployable sensors including support of on-going soldier evaluations of unmar	small unmanned ground vehicles (UGVs) as nned systems.			
Title: Soldier-Robotic Interface Integration		1.32	3 5.278	4.138
Description: This effort is a focused approach to optimize control of the unmain corporating Manned-Unmanned Teaming enabled formations and is measure for improved operational effectiveness and overall system performance.	nned systems with improved performance ed against multiple phases of the combat scena	ario		
FY 2022 Plans: Will develop an expanded operator span of control for robotic vehicles in define Teaming to increase operator standoff and enable control of multiple platforms EET to ensure the autonomous technology has been fully evaluated for system	ed mission to improve Manned /Unmanned 3. Will demonstrate these enhancements throug n safety, demonstrating technical maturity.	gh		
FY 2023 Plans: Will mature and demonstrate an enhanced human robot interaction technology tool for the human to complete the mission utilizing built in government owned Will exploit Manned /Unmanned Teaming technologies that will allow the opera enabling efficient control of robotic platforms. Will optimize novel control method to improve robotic control across multiple control methods (mounted interface a demonstrate these technology enhancements through EET to validate the automaturity.	y to improve the effectiveness of the robot as a Warfighter Machine Interface (WMI) software. ator to be at a longer standoff distance while ods leveraging a wide range of hardware interfa / dismounted-tablets/heads-up displays). Will onomous technology system safety and technic	ices al		
FY 2022 to FY 2023 Increase/Decrease Statement: Funding realigned to Small UGV as Deployable Sensor effort within this Project intelligence of multi-domain robotic and autonomous system capabilities.	ct to better align with the research of artificial			
<i>Title:</i> : Small UGV as Deployable Sensor		-	-	2.332
Description: This effort improves the long range autonomy, mobility and sens reconnaissance in terrains and environments large systems cannot reach (i.e.	ing capabilities of small UGVs to expand culverts, underground, dense urban) and to se	rve		

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date:	April 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A / Next Generation Combat V ehicle Advanced Technology	Project (Number BF4 / Combat Ve	ect (Number/Name) I Combat Vehicle Robotics Adv Tech			
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023		
as unmanned listening & observation posts. The small UGVs will deploy out c and reduce the risk to the systems.	of NGCV systems to enhance battlespace aware	eness				
FY 2023 Plans: Will develop and optimize small robot autonomy built within the government of size, weight and power (SWaP) limitations of small platforms. Will develop an distribution (swarming) to overcome mobility and functional limitations of small and demonstrate MMPs interoperable across multiple platforms that provide of the mission needs. Will demonstrate these enhancements through Engineering integrated MMPs have been fully evaluated for system safety, performance and series are series and series and series and series and series and series are series and series and series are series and series and series are series are series and series are series and series are series are series and series are series are series and series are series and series are series are series are series are series and series are series are series are series are series and series are series are series are series are series are series and series are s	wned RTK autonomy software to overcome d implement enhanced functionality and task- ll robots for effective reconnaissance. Will matur commanders with options to configure systems ng EET to ensure the autonomous technology a nd technical maturity.	re co nd				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding realigned from the Soldier-Robotic Interface integration effort in this I autonomy technologies that will enhance functionality and overcome mobility reduced operator direct control.	Project to mature and demonstrate small robot limitations for more effective reconnaissance with the second states and the second st	th				
Title: FY2022 SBIR/STTR Transfer		-	0.977	-		
Description: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638						
	Accomplishments/Planned Programs Sub	totals 10.10	4 26.765	29.463		
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A						

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: April	2022	
Appropriation/Budget Activity 2040 / 3	Project (Number/Name) Project (Number/Name) PE 0603462A / Next Generation Combat V BF7 / Crew Augmentat ehicle Advanced Technology Adv Tech							ne) Ition and Opt	timization			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BF7: Crew Augmentation and Optimization Adv Tech	-	4.211	3.768	4.326	-	4.326	3.795	4.334	4.386	4.385	0.000	29.205
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates advanced technologies to enable crew augmentation and optimization for closed hatch operations of ground vehicle platforms in a complex multi-domain operations environment. This includes integration of intelligent technologies to improve dynamic tasking and full crew interactions, machine learning to improve decision aids, early warnings, reduce response times and shorten task durations, and machine learning to optimize tasking and function. Mature technologies are incorporated onto existing or prototype Army-owned technology demonstrators so that performance of the enabling technologies can be evaluated.

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

Research in this Project supports the Next Generation Combat Vehicle Army Modernization Priority.

Research in this Project is conducted by the United States (US) Army Futures Command.

Work in this Project is also coordinated with work in Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology) and PE 0602143 (Soldier Lethality Technology).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Crew Augmentation and Optimization Advanced Technology	4.211	3.630	4.326
Description: This effort focuses on optimizing crew station technologies while reducing crew sizes that will provide the same overall performance by exploiting human-machine interaction technologies, automation, machine intelligence and customization to permit soldiers to achieve performance beyond today's constrained ground vehicle environment			
<i>FY 2022 Plans:</i> Will mature and demonstrate vehicle and crew task management at the section level to enable sharing of critical tasks between crew and robotic operators during times of high workload. Will integrate and demonstrate interface advancements in novel display technologies (i.e. helmet mounted displays) to improve situational awareness. Will demonstrate section-level teaming of crew and robotic operator configuration to permit reconfiguration of mission roles. Will validate effectiveness in an operationally-relevant, field experiment.			
FY 2023 Plans:			

PE 0603462A: Next Generation Combat Vehicle Advanced ... Army

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A / Next Generation Combat V ehicle Advanced Technology	Project (Number/Name) BF7 / Crew Augmentation and Optimiz Adv Tech					
B. Accomplishments/Planned Programs (\$ in Millions)		[FY 2021	FY 2022	FY 2023		
Will integrate and demonstrate a threshold capability to adapt autonomous tec battlefield context inferred from Soldier behaviors. Will integrate and demonstr decision support tools for automated play calling and task allocation. Will integrate technology that enables Soldier-driven adaption of autonomy behavior from mi operationally-relevant and motion-based Modeling & Simulation (M&S) virtual	hnologies by providing information regarding rate technology aids with basic integrated grate and demonstrate after-action review (AAI ission to mission. Will validate effectiveness in validation.	र) ı an					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort to focus on platoon-leve	el validation over a section-level formation.						
Title: FY2022 SBIR/STTR Transfer			-	0.138	-		
Description: Funding transferred in accordance with Title 15 USC ?638							
<i>FY 2022 Plans:</i> Funding transferred in accordance with Title 15 USC ?638 <i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> Funding transferred in accordance with Title 15 USC ?638							
	Accomplishments/Planned Programs Sub	totals	4.211	3.768	4.326		
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A							

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3		R-1 Program Element (Number/Name)ProjePE 0603462A / Next Generation Combat VBG1 /ehicle Advanced TechnologySurvi					ect (Number/Name) I Sensors for Auto Oper and vability Adv Tech					
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BG1: Sensors for Auto Oper and Survivability Adv Tech	-	14.054	10.666	12.464	-	12.464	12.670	12.664	12.652	2 12.648	3 0.000	87.818
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
This Project matures, optimizes, a complex environments, for next g increased situational awareness (The cited research is consistent v Research in this Project supports Research in this Project is perform	and demon eneration r (e.g. pre-sh vith the Und the Army S med by the	strates auto nanned, opt lot and host der Secreta Science and United Stat	mated, adva tionally man ile fire detec ry of Defens I Technology es (US) Arm	anced mult ned, and ro tion, threat e for Rese y Next Gen ny Futures	i-function se obotic platfo t classification arch and Er peration Cor Command.	ensors and i rm applicati on) in all en ngineering p nbat Vehicle	integrates the ons. This Povironments oriority focus of the soldier Le	nreat cueing roject will d for mannec areas and ethality, and	g capabilitie eliver sens I and unma the Army I I Future Ve	es for opera or payloads nned groun Aodernization rtical Lift mo	tions in full which prov d vehicle sy on Strategy odernizatior	spectrum, ide greatly vstems. n priorities.
B. Accomplishments/Planned P	rograms (S	\$ in Million	<u>s)</u>						F	í 2021	FY 2022	FY 2023
Title: Advanced Sensors with Em	bedded Pro	ocessing								8.680	5.539	8.787
Description: Matures and demon with improved performance in all e conditions. Matures and demonst longwave infrared) and real-time h imaging components and embedd environments via manned, optiona	environmer trates rapid nostile fire o led process ally manne	vanced, mul nts and agai detection o detection (H sing. Enable d, and robot	ti-spectral a nst all threa if concealed FD) for anti- es enhance tic platform a	nd multi-fun ts to includ enemy op armor thre d situations applications	nction sense e low-contra tical threat s ats while or al awarenes s.	ors, and ima ast targets in systems (vis n the move, s and target	age process n camouflag sible, midwa exploiting n ting capabili	ing capabil ge or in deg ve infrared nulti-functio ties in com	ities raded nal plex			
FY 2022 Plans: Will mature low-power processing and detect threats. Will validate p range, sensitivity, and higher data (DROIC) technologies for 3rd Ger for greatly enhanced range perfor advanced pulsed mid-wave infrare FY 2023 Plans:	approache performanc rates for p n Forward L mance and ed laser teo	es for high d ce of novel u assive HFD Looking Infra l increased a chnology to a	lefinition (HI incooled infr of anti-arm ared to impro ability to det enable matu	D) sensor d ared sense or threats. ove multi-s ect targets uration of o	lata to explo ors to asses Will exploit pectral, mul and threats n-the-move	bit imagery i s the impac infrared digi tifunction ta s in degrade threat optic	n degraded t of increase ital read out irgeting and d environme s detection	environme ed dynamic integrated threat dete ents. Will m capabilities	nts circuit ection nature 5.			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat V</i> <i>ehicle Advanced Technology</i>	Project (Number/ 8G1 / Sensors for Survivability Adv T	Name) Auto Oper and ech	d
it R-2A, RDT&E Project Justification: PB 2023 Army priation/Budget Activity 3 PE 60603462A I Next Generation Combat V ehicle Advanced Technology complishments/Planned Programs (\$ in Millions) timize novel uncooled infrared sensors, incorporating low power processing to minimize system size, weight, and pow timize targeting and threat detection sensors with embedded multifunction processing against threats at increased ra ex environments. Will mature and provide advanced targeting and navigation laser technologies, novel image process aches and infrared sensors for on-the-move target detection, ranging and tracking. Will validate image process aches to enable optimized transmission from sensor to shooter systems. 22 to FV 2023 Increase/Decrease Statement: ng increase reflects investments required to develop advanced sensing capabilities with integrated targeting approach complex environments. Wulti-Mission Payload iption: Matures and demonstrates sensor payloads for ground vehicle based unmanned aerial systems to detect line and beyond line of sight threats and complex obstacles such as personnel and vehicles in all environments. 22 Plans: uprove performance of rotary and fixed wing unmanned aerial system (UAS) payloads to enable advanced detection of a advanced sensing capabilities inherent in the multi-modal sensor technologies to increase detection etchniques to a advanced sensing capabilities inherent in the multi-modal sensor technologies to increase detection of near-pear thr uppress clutter. Will demonstrate advanced sensor payloads in realistic open terrain environments to establish a base ility to augment maneuver and protection of small unit level formations. 23 Plans: mo		FY 2021	FY 2022	FY 2023
Will optimize novel uncooled infrared sensors, incorporating low power process Will optimize targeting and threat detection sensors with embedded multifunction complex environments. Will mature and provide advanced targeting and navig approaches and infrared sensors for on-the-move target detection, ranging and approaches to enable optimized transmission from sensor to shooter systems.	sing to minimize system size, weight, and powe on processing against threats at increased rang ation laser technologies, novel image processir d tracking. Will validate image processing	e in g		
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase reflects investments required to develop advanced sensing c use in complex environments.	apabilities with integrated targeting approaches	for		
Title: Multi-Mission Payload		5.374	4.736	3.677
Description: Matures and demonstrates sensor payloads for ground vehicle basight, and beyond line of sight threats and complex obstacles such as personnel.	ased unmanned aerial systems to detect line of el and vehicles in all environments.			
<i>FY 2022 Plans:</i> Will improve performance of rotary and fixed wing unmanned aerial system (UA threats and targets in complex environments, day or night. Will exploit feature enable advanced sensing capabilities inherent in the multi-modal sensor technic and suppress clutter. Will demonstrate advanced sensor payloads in realistic of capability to augment maneuver and protection of small unit level formations.	AS) payloads to enable advanced detection of extraction and target detection techniques to ologies to increase detection of near-pear threa open terrain environments to establish a baselir	is e		
FY 2023 Plans: Will demonstrate rotary wing unmanned aerial system optionally tethered with a for detection of threats in complex environments, day or night. Will demonstrate capabilities to increase detection of near-pear threats and suppress clutter. Wil advanced lasers to enhance detection of a wider range of threats and improve	a manned or unmanned ground vehicle (UGV) e real time feature extraction and target detection I exploit fusion of polarization sensors and target location accuracy.	n		
FY 2022 to FY 2023 Increase/Decrease Statement: Decrease represents completion of preliminary sensor improvement development rotary wing unmanned aerial system optionally tethered with a manned or unm	ent efforts necessary to enable demonstrations anned ground vehicles.	of a		
Title: FY2022 SBIR/STTR Transfer	-	0.391	-	
Description: Funding transferred in accordance with Title 15 USC ?638				
FY 2022 Plans:				

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A / Next Generation Combat V ehicle Advanced Technology	Proje BG1 / Surviv	oject (Number/Name) 1 I Sensors for Auto Oper and rvivability Adv Tech				
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023		
Funding transferred in accordance with Title 15 USC ?638							
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638							
	Accomplishments/Planned Programs Sub	ototals	14.054	10.666	12.464		
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A							

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	vrmy							Date: April	2022	
Appropriation/Budget Activity R-1 Program 2040 / 3 PE 0603 ehicle Activity PE 0603							-1 Program Element (Number/Name)Project (Number/Name)E 0603462A / Next Generation Combat VBG3 / Modeling andhicle Advanced TechnologyAdvanced Tech					r MUMT
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BG3: Modeling and Simulation for MUMT Advanced Tech	-	3.241	5.188	5.975	-	5.975	6.248	7.175	7.529	7.363	0.000	42.719
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates modeling and simulation (M&S) tools/technologies to assess and improve freedom of movement for ground forces and supports vehicle developers by addressing challenges for robotic and ground vehicles. This Project matures and demonstrates obstacle detection capabilities for autonomous systems operating in complex environments. This Project also matures and demonstrates real-time mobility decision support tools, vehicle-terrain interaction models for autonomous convoy operations, simulation tools for vehicle mobility in highly altered terrain, and M&S tools for predicting the performance of autonomous vehicles. These M&S technologies can be integrated across Army vehicle platforms as required.

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

Research in this Project supports the Next Generation Combat Vehicle Army Modernization Priority .

Research in this Project is conducted by the United States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

Research in this Project is coordinated with Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology) / Project BG2 (Modeling and Simulation for MUMT Technology).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Simulation Tools for Combat Vehicle Robotics (CoVeR) Demonstrations	3.241	4.999	5.975
Description: This effort matures and demonstrates M&S tools to support the development of autonomous ground vehicle platforms and components for successful maneuver in unstructured and mission relevant environments. This effort demonstrates M&S capabilities to evaluate hardware and software technologies enabling battlefield autonomy in complex and challenging environments.			
FY 2022 Plans: Mature and demonstrate analytical tools and adaptive learning models for predicting autonomous maneuver performance and determining alternative routes in unstructured environments; and mature advanced algorithms to detect obstacles that affect maneuver corridors in unstructured environments.			
FY 2023 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat V</i> <i>ehicle Advanced Technology</i>	Projec BG3 / Advan	t (Number/N Modeling and ced Tech	lame) d Simulation f	or MUMT
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2021	FY 2022	FY 2023
Will mature and demonstrate advanced algorithms to detect obstacles to mane environments. Will mature and demonstrate computational environment test be platforms and components; will release of M&S tools with high-fidelity software	uver in unstructured and operationally relevar ed to support development of autonomous veh -in-the-loop capability.	nt iicle			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.					
Title: FY 2022 SBIR/STTR Transfer			-	0.189	-
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	totals	3.241	5.188	5.975
C. Other Program Funding Summary (\$ in Millions) N/A Remarks N/A D. Acquisition Strategy N/A					

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	Army							Date: Apr	ril 2022		
Activity 040 / 3 COST (\$ in Millions) Prior Years FY 2021 FY 2022 G4: Adv Mobility Experimental rototype Adv Tech Demo uantity of RDT&E Articles - 3.760 2.819 Mission Description and Budget Item Justification his Project matures and demonstrates advanced powertrain, powe o- go terrain for ground vehicles, increase the maneuver speeds ad nd provide onboard power generation to enable the integration of effective research in this Project is conducted by the United States (US) Arm Research in this Project is coordinated with Program Element (PE) (Accomplishments/Planned Programs (\$ in Millions) itle: Advanced Mobility Experimental Prototype (AMEP) Advanced pechnologies for integration into a ground combat vehicle that will pro- tranned capabilities in order to validate performance and capability of combat vehicle design. Y 2022 Plans:					R-1 Program Element (Number/Name)ProjectionPE 0603462A / Next Generation Combat VBG4ehicle Advanced TechnologyAdv					ject (Number/Name) 4 I Adv Mobility Experimental Prototype ⁄ Tech Demo			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
BG4: Adv Mobility Experimental Prototype Adv Tech Demo	-	3.760	2.819	-	-	-	-	-	-	-	0.000	0 6.579	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
A. Mission Description and Buc This Project matures and demon- no- go terrain for ground vehicles and provide onboard power gene The cited research is consistent w Research in this Project supports Research in this Project is condu Research in this Project is coordi	dget Item J strates adv s, increase eration to er with the Un s the Next C icted by the inated with	ustification anced powe the maneuve nable the internation der Secretan Generation C United Stat Program Ele	ertrain, powe er speeds a egration of ry of Defens Combat Veh res (US) Arr ement (PE)	er generatio across all tra energy-bas se for Rese nicle Army M my Futures 0604115A	on and runni aversable te ed capabilit earch and Er Modernizatio Command. (Technolog	ing gear tec errain, reduc ies such as ngineering p on Priority. y Maturation	chnologies in ce fuel dema directed en priority focus n Initiatives)	nto a comba ands thus e lergy weap s areas and	at vehicle th xtending op ons and elec the Army M	at will redu eration tim ctromagne lodernizati	uce the perc le between r tic armor. on Strategy	entage of resupply,	
B. Accomplishments/Planned P	Programs (\$ in Millions	<u>s)</u>						FY	2021	FY 2022	FY 2023	
<i>Title:</i> Advanced Mobility Experim	ental Proto	type (AMEP) Advanced	l Technolog	ду					3.760	2.716	-	
 Description: This effort develops technologies for integration into a manned capabilities in order to va combat vehicle design. FY 2022 Plans: Will improve running gear perform FY 2022 to FY 2023 Increase/Description 	s and demo a ground co alidate perfo nance for g e crease St a	nstrates the mbat vehicle ormance and round comb atement:	advanced e that will pr d capability at vehicles	powertrain, ovide incre enhancem with gross	track and reased mobili ents at incre vehicle weig	unning gear ty, maneuve eased vehic ghts up to 50	r, and unma er speeds, a le weights t 0 tons.	nned roboti and optiona o inform gro	ic Ily bund				
Project completes in Fiscal Year	2022 (FY22	2).											
Title: FY2022 SBIR/STTR Transf	fer									-	0.103	-	
Description: Funding transferred	l in accorda	ince with Tit	le 15 USC '	?638									

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A / Next Generation Combat V ehicle Advanced Technology	Proje BG4 / Adv 7	ct (Number/N Adv Mobility Tech Demo	lame) Experimental	Prototype
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	ototals	3.760	2.819	-
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A					

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	Army							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3		R-1 Progr PE 060340 ehicle Adv	am Elemer 62A / Next (anced Tech	i t (Number Generation nology	Project (N BG5 / Exte Advanced	e ct (Number/Name) I Extended Line of Sight (ELOS) anced Technology						
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BG5: Extended Line of Sight (ELOS) Advanced Technology	-	1.396	-	-	-	-	-	-	-	-	0.000	1.396
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
The cited research is consistent Research in this Project supports Research in this Project is perfor	with the Un s the Next G med by the	der Secreta Generation C United Stat	ry of Defens Combat Veh es (US) Arr	se for Rese hicle Army N my Futures	earch and Er Modernizatio Command.	ngineering p on Priority.	priority focus	s areas and	the Army N	<i>l</i> odernizati	on Strategy.	
B. Accomplishments/Planned F	Programs (\$ in Million	<u>s)</u>						F۱	(2021	FY 2022	FY 2023
Title: Extended Line Of Sight (EL	.OS) Advan	ced Techno	logy							1.396	-	-
Description: This effort demonst line of sight ranges beyond current	rates a 120 nt capability	-mm Tank-f ⁄.	ired ELOS	Munition the	at counters	the growing	ATGM thre	eat at exten	ded			
					Accomplis	shments/Pl	anned Pro	grams Sub	ototals	1.396	-	-
<u>C. Other Program Funding Sum</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A	<u>ımary (\$ in</u>	<u>Millions)</u>										

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: April	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060346 ehicle Adva	a m Elemen 2A / Next G anced Tech	t (Number / Generation (nology	Name) Combat V	Project (Number/Name) BG7 I Ground Systems Active Defense (GSAD) Advanced Tech			ense
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BG7: Ground Systems Active Defense (GSAD) Advanced Tech	-	36.496	52.172	60.371	-	60.371	57.781	49.425	52.255	55.800	0.000	364.300
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates protection and survivability technologies to increase the survivability of ground vehicles and the protection of the Soldiers who depend on them. The tasks will focus on component maturation and demonstration and transfer products for demonstration as holistic (vehicle level) solutions. The Project will mature and demonstrate technologies to defeat threats throughout the timeline of a threat engagement; from obscuring a target, to actively defeat a threat and through mitigating its effects after engagement. These technologies include the active employment of smoke, physical and electronic active protection, advanced and adaptive armors, advanced and active blast mitigation systems and adaptive interior protection.

Research in this Project supports the Next Generation Combat Vehicle Army Modernization Priority.

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

Research in this Project is performed by the United States (US) Army Futures Command.

Research in this Project will be coordinated with Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology) and transitions to PE 0604852A (Suite of Vehicle Protection Systems - EMD).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Obscuration Technologies for Active Protection Systems	2.298	-	-
Description: Research, develop, test, evaluate, and demonstrate obscurant soft-kill vehicle protection technologies to defeat the observer/gunner, anti-tank guided missiles (ATGMs), and other guided threats. Design and evaluate systems that are Modular Active Protection System (MAPS) and Survivability Subsystem Controls (SSC) compliant.			
Title: Active Protection Technologies	6.898	-	-
Description: This effort demonstrates protection for light armored combat vehicles from anti-armor threat weapons such as rocket-propelled grenades (RPG), ATGM, and recoilless rifle projectiles (RR).			
Title: Advanced Radar and Soft-Kill (A-RASK) Suite	6.058	0.938	6.682

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A / Next Generation Combat V ehicle Advanced Technology	Project (Number/Name) BG7 I Ground Systems Active Defen (GSAD) Advanced Tech		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
Description: This effort matures and demonstrates next generation soft-kill countermeasure techniques to support a layered modular accombat platforms in all-weather day or night conditions with 360 dep	n vehicle radar technologies and holistic electronic warnin ctive protection suite and ensure the survivability of grour gree situational awareness and threat defeat.	g and d		
FY 2022 Plans: Will continue to develop soft-kill countermeasure techniques and ef of system capabilities with integrated techniques to assess system profiles and distances.	fects for additional ATGM threats. Will conduct demonstr performance against multiple ATGM threat classes, launc	ations h		
FY 2023 Plans: Will begin development of universal threat detection sensor hardwarevaluate sensor system level requirements based upon the latest live Will conduct sensor sub-system derived requirements analysis with	re and algorithms to detect priority ATGM threats. Will ve fire demonstration results from Fiscal Year 2022 (FY22 modeling and simulation.	2).		
FY 2022 to FY 2023 Increase/Decrease Statement: The funding increase reflects development of universal threat detect	tion sensors in accordance with the project plan.			
Title: Long Range Hard Kill Countermeasure (LRHK-CM)		1.396	-	-
Description: This effort matures and demonstrates a MAPS-complethreats such as RPG, ATGM and future threat munitions such as kill effort will optimize a complete hard-kill active protection system includemonstrate capabilities through modeling and simulation and live-	iant hard-kill countermeasure system able to defeat curre netic energy and artillery delivered sub-munitions. This uding munitions, launcher, sensors, and fire-control, and fire demonstrations.	nt		
Title: Soft-Kill System Development		9.140	9.827	15.310
Description: This effort focuses on maturing and demonstrating so from current and emerging ATGM threats at stand-off distances with capability will also enhance situational awareness to vehicle occupa Technologies will be optimized and integrated on combat vehicles a demonstrated in a relevant environment.	ft-kill system technologies to protect combat vehicles h an unlimited magazine and low collateral hazard. This ants by detecting and alerting when threats have been fire using the MAPS Framework and Controller. They will be	ed.		
FY 2022 Plans: Will develop and mature soft-kill subsystems such as those develop Project by delivering soft-kill capabilities, environmentally hardening	bed in the Advanced Radar and Soft-Kill Suite effort in this g, upgrading to the latest revision of the MAPS Framework	5 K		

PE 0603462A: *Next Generation Combat Vehicle Advanced ...* Army

Appropriation/Pudget Activity		Dute. /	pm 2022	
2040 / 3	R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat V</i> <i>ehicle Advanced Technology</i>	Project (Number/Name) BG7 I Ground Systems Active Defens (GSAD) Advanced Tech		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
(MAF), and optimizing space, weight, and power (SWAP) of the subsystem subsystem performance and robustness in preparation for system integra	ms. Will begin virtual / lab demonstrations to assess tion.			
FY 2023 Plans: Will develop components and other hardware needed for FY23 demonstrative soft-kill subsystems matured in FY22 utilizing the MAPS Framework a performance and continue lab and field demonstrations to assess system	ation and vehicle integration in FY24. Will integrate and Controller. Will optimize ground vehicle system performance of integrated subsystems.			
FY 2022 to FY 2023 Increase/Decrease Statement: The funding increase reflects maturation of subsystems and focus on syst with the project plan.	tem-level integration for demonstration in accordanc	e		
Title: Advanced Threat Protection		4.014	-	-
Description: This effort matures and provides armor and occupant protect and bottom attacks threats increasing vehicle survivability and Soldier pro	ction technology to protect against emerging both to tection.)		
Title: Survivability Capability Characterization and Demonstration		2.944	2.412	2.395
Description: This effort evaluates and demonstrates emerging protection performance and maturity and potential for transition to Product Manager	technologies to characterize and assess their (PdM) Vehicle Protection System (VPS).			
FY 2022 Plans: Canvas industry, academia, and government for unverified high potential applicability to current ground vehicle platform requirements. Down-select academia, or government partners to begin planning for the demonstration technology and any other necessary resources for future demonstration.	/ high impact survivability technologies that have promising technologies and work with industry, n and assessment of the technologies. Identify the			
<i>FY 2023 Plans:</i> Will demonstrate and validate the selected survivability subsystem. Will trastakeholders and help determine the feasibility of further maturing the subcapability and applicability to current ground vehicle platforms, targeting the subcapacity of the subcapacity	ansition relevant information to our acquisition system. Will analyze available survivability subsysten nreats.	ms		
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.				
Title: Sensors for Adaptive Armor		2.714	1.629	1.502

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat V</i> <i>ehicle Advanced Technology</i>	Project (Number/Name) BG7 I Ground Systems Active Defense (GSAD) Advanced Tech		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
Description: This effort matures and demonstrates sensor technology to enable Framework and Controller on a combat vehicle platform. This effort matures reactive threat trajectory prediction algorithm and integrates sensors with an adaptive Framework and Controller to ensure the activation of adaptive armor to protect	le an adaptive armor system using the MAPS al-time processing software, continuously refir /e countermeasure for threat defeat to the MA against incoming threats.	es >S		
FY 2022 Plans: Will optimize real-time processing software and improve trajectory prediction al adaptive armor systems. Will mature sensor subsystem and will perform enviro	gorithm of the sensor technology to enable onmental and hardening testing.			
FY 2023 Plans: Will improve trajectory prediction algorithm of the sensor technology to enable a subsystem integration and demonstrate capabilities against pacing applicable to	adaptive armor system. Will mature sensor threats in a relevant environment.			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.				
Title: Active Blast Mitigation Environmental and Durability Validation		1.034	-	-
Description: This effort demonstrates mature sensor technology for an Active Framework on a combat vehicle platform with improved countermeasure desig support a reduction of injuries caused from underbody blast events by providing vehicle hull.	Blast Mitigation System (ABMS) into the MAP n for protection from blast events. ABMS will g a counterforce to the blast acceleration of the	5		
Title: APS Residuals Protection Maturation and Complex Threat Attack Protect	tion (CTAP)	-	9.714	7.441
Description: This effort contributes to the Army?s ground vehicle survivability advanced technologies which physically defeat incoming threats. These technot that work seamlessly with active protection systems in order to increase the own mature and demonstrate armor components that defeat residual blast and frage engagements with kinetic threats in order to protect vehicle occupants and critic demonstrates armor and occupant protection components that provide threat d complex defeat mechanisms.	by maturing, integrating, and demonstrating ologies involve passive and reactive mechanis erall efficiency of the system. This effort will mentation from hard-kill active protection syste cal subsystems. This effort also matures and lefeat for advanced and emerging threats with	ms Ims		
FY 2022 Plans: Will mature and demonstrate component technologies developed under PE 060 Technology) / Project BG6 (Advanced Concepts for Active Defense Technolog shields for sensors, advanced mechanisms for moving armor to protect optics,	02145A (Next Generation Combat Vehicle gy) for protection against degraded threats, ba and multi-functional modular seats to protect	listic		

PE 0603462A: Next Generation Combat Vehicle Advanced ... Army

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: A	pril 2022					
Appropriation/Budget Activity 2040 / 3	priation/Budget ActivityR-1 Program Element (Number/Name)Pr3PE 0603462A / Next Generation Combat VBCehicle Advanced Technology(G			Y roject (Number/Name) GG7 I Ground Systems Active Defense GSAD) Advanced Tech			
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023			
occupants from injury. Will mature and package these component desit threat defeat performance through exposure to environmental conditio parameters, such as size and weight, are able to meet vehicle system	igns for durability. Will demonstrate hardened compone ns. Will validate that packaged component physical -level design constraints.	nt					
<i>FY 2023 Plans:</i> Will build upon prior year work to integrate and demonstrate packaged system-level. Will mature and optimize components through integrated testing, followed by ballistic testing, to validate performance against sy vehicle system architecture. Will provide capstone demonstrations of c environment.	l component for protection against threat residuals at th d system-level environmental and automotive durability rstem-level requirements. Will validate compliance with capabilities to protect from pacing threats in a relevant	e					
FY 2022 to FY 2023 Increase/Decrease Statement: The funding decreased as components for demonstrations have been	developed in FY22 in accordance with the project plan						
Title: Controls and Architecture		-	5.253	5.617			
Description: This effort provides the basis for holistic (vehicle level) as subsystems and systems. This effort matures and demonstrates the effor active defense systems. The focus will be to enable the integration and secure configurations. This effort will optimize size, weight, and per components.	ctive defense by ensuring compatibility of active defens ffectiveness and efficiency of the controls and architect of multiple emerging survivability technologies into safe ower - cooling (SWaP-C) performance for the system	e ure e					
<i>FY 2022 Plans:</i> Will build upon previous controls and architecture for APS efforts by ac cross domain management solution, active survivability safety measur survivability technologies. Will ensure that enhancements do not interf	dvancing the intelligent decision management subsyste es, and vehicle user-interface subsystem for emerging ere with current compliant technology performance.	m,					
<i>FY 2023 Plans:</i> Will optimize active survivability architecture for single platform protect products, to include enhancements, and will perform component level for coordinated efforts. Will validate software performance against new backward compatibility. Will perform studies for collaborative active de	ion. Will conduct build of base kit hardware and softwar validation and verification. Will verify available compon- v enhancements through regression testing to ensure fense across multiple platforms.	re ents					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.							
Title: Hard Kill Active Protection System (HK APS) Development, Integ	gration, and Demonstration	-	20.494	21.424			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022					
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat V</i> <i>ehicle Advanced Technology</i>	Project (Number/Name) BG7 I Ground Systems Active Defense (GSAD) Advanced Tech			
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023
Description: This effort matures, integrates, and demonstrates a HK APS capa Missiles, and Recoilless Rifles ensuring the platform?s ability to shoot, move ar will be compliant to the Modular APS Framework (MAF). This effort will optimize systems; counter-measure, launcher, and sensors (active/passive). Will demon demonstration in a relevant operational environment.	able of defeating RPGs, Anti-Tank Guided nd communicate after an engagement. The sy e an HK APS that includes the following sub- istrate HK APS capabilities in a virtual and live	stem fire			
Counter-measure (CM): Matures and demonstrates CM designs that includes the following aspects: blast size, time of flight, velocity, engagement distance, accuracy, and SWaP-C. Analysis will be conducted for each counter-measure component as well as at the sub-system level. Demonstrations will be performed in the following environments: virtual, hardware in the loop, and live fire.					
Launcher: Matures and demonstrates launcher designs that considers the following aspects: SWaP-C, engagement speed and accuracy, number of launchers, material composition and reliability. The most mature and suitable launcher for the project will be demonstrated in the following environments: virtual, hardware in the loop, and live fire.					
Sensors: Matures and demonstrates overall sensor suite design (active/passive frequency, power, weight, volume, algorithms, accuracy, search range, tracking integration and optimization. The most mature and suitable sensor suite (active following environments: virtual, hardware in the loop, and live fire.	e) that considers the following aspects; radar g and identification time, and passive cueing e/passive) for the project will be demonstrated	in the			
Integration: Demonstrate the matured HK APS sub-systems on a platform in the loop, and live fire. This will also analyze subsystem and system performance cl (IPT) stakeholder requirements. Develop a performance baseline for future hard	e following environments: virtual, hardware in haracteristics against Integrated Product Tean d kill system evaluations.	the າ			
FY 2022 Plans: Will conduct individual Initial Design Reviews for the CM, Launcher and Sensor with industry and government experts. Will integrate CM, Launcher and sensor Reviews including long lead components for future sub-system demonstration a sub-system models to demonstrate the sub-systems in a virtual environment. A CM, Launcher, and Sensor sub-systems into a unified HK APS onto the demon Initial Design Review including the CM, Launder and Sensor sub-system baseli	r sub-systems, using previous efforts as a bas suite sub-systems based on the Initial Design and validation. Will begin planning and develo Will conduct planning for the integration of the nstration platform. Will execute a system level ines established in the sub-system Initial Desig	eline, o gn			
Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
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Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat V</i> <i>ehicle Advanced Technology</i>	Project BG7 / G (GSAD)	t (Number/N Ground Syste) Advanced	lame) ems Active D Tech	efense
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023
Reviews. Will begin planning and integrate an HK APS simulation to represent previous efforts to demonstrate the HK APS in a virtual environment.	the system in a relevant environment using				
<i>FY 2023 Plans:</i> Will improve and optimize the sub-system requirements and design through an countermeasure (CM) warhead, guidance, and other sub-system components. industry partners, to tailor the performance to meet the requirements of the CM within the established APS framework to ensure components are designed for planning virtual tests and demonstrations of the sub-systems. Will continue plasystem-level design.	alysis. Will conduct a down-selection of the Will mature design of the sensor sub-system, I sub-system. Will optimize the system archite system compliance and compatibility. Will beg anning integration of the sub-systems to develo	with cture in p the			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.					
Title: FY2022 SBIR/STTR Transfer			-	1.905	-
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	otals	36.496	52.172	60.371
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A					

Exhibit R-2A, RDT&E Project J	ustification	: PB 2023 A	Army							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progr PE 060340 ehicle Adv	am Elemen 62A I Next (anced Tech	t (Number / Generation (nology	Name) Combat V	Project (N BG9 / Obs	umber/Na curation A	me) dvanced Teo	chnology
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BG9: Obscuration Advanced Technology	-	10.533	2.511	2.765	-	2.765	2.813	2.810	2.811	2.810	0.000	27.053
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and But The Project matures and demon sensors and defeating the enem are developed with the goal of p Department of Defense (DoD) w The cited research is consistent Research in this Project support Research is performed by the Ut Research in this Project is related	dget Item J strates obso y's target ac roviding effic ith the ability with the Un- s the Next G nited States ed to and full	ustification curant techn cquisition de cient and sa y to manufa der Secretar Generation C (U.S.) Army y coordinate	ologies with vices, miss fe screenin cture produ ry of Defens Combat Veh / Futures Co ed with Prog	n potential t ile guidance g of deploy cts such as se for Rese icle Army M ommand. gram Eleme	o enhance e, and direc ed forces. S explosive a arch and Er Aodernizatio	personnel a ted energy v Synthetic Bic alternatives ngineering p on Priority.	nd platform weapons. D ology Manuf and defense priority focus	survivability isseminatio acturing tec e-only critica areas and on Combat \	y by degrad n systems f chnologies i al chemicals the Army M Vehicle Tec	ing threat f for new and n this proje s & materia lodernization hnology).	orce surveil d improved ect will provi als. on Strategy.	lance obscurants de
B. Accomplishments/Planned I	Programs (\$ in Million	s <u>)</u>						FY	2021	FY 2022	FY 2023
Title: Advanced Obscuration										2.533	2.416	2.765
Description: This effort matures	and demon	strates the	disseminatio	on of new a	ind advance	ed obscuran	ts.					
FY 2022 Plans: Will examine packing and dissen efficiently disseminated, and mat	nination met terial packin	hods of adv g methods g	anced obso geared towa	uration ma	terials. Will obscuration	ensure that programs.	t materials c	an be safel	y and			
FY 2023 Plans: Will conduct field demonstration select material coating and cond	of a bi-spec uct flammab	tral screenir ility testing.	ıg obscurati	on module	and transiti	on to Progra	am Manage	r. Will down	I-			
FY 2022 to FY 2023 Increase/D Funding change reflects planned	ecrease Sta I lifecycle of	a <i>tement:</i> this effort.										
Title: Synthetic Biology Bioproce	essing Facili	ty								8.000	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat V</i> <i>ehicle Advanced Technology</i>	Proje BG9 /	ct (Number/N Obscuration	lame) Advanced Te	chnology
B. Accomplishments/Planned Programs (\$ in Millions)		[FY 2021	FY 2022	FY 2023
Description: This effort supports the modernization of the Army's Synthetic Bipilot scale products such as explosives, obscurants and defense-only critical c transitioning products from the new Synthetic Biology Manufacturing Innovation support the Department of Defense.	ology Bioprocessing Technology to manufactu hemicals & materials. This effort will expedite n Institute into technology development efforts	to			
Title: FY2022 SBIR/STTR Transfer			-	0.095	-
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	totals	10.533	2.511	2.765
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A					

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: Apri	2022		
Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060346 ehicle Adva	a m Elemen 32A / Next G anced Tech	t (Number/ Generation (nology	Name) Combat V	Project (N BH1 / Surv Advanced	roject (Number/Name) H1 / Survivability Systems Controls dvanced Technology			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
BH1: Survivability Systems Controls Advanced Technology	-	11.880	-	-	-	-	-	-	-	-	0.000	11.880	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

A. Mission Description and Budget Item Justification

This Project advances the design and capability of the Modular Active Protection System (MAPS) framework and controller to enable integrating emerging survivability technologies into safe and secure configurations and demonstrating them in a representative operational environment. The Project will verify compliance of component sensors and effectors with the modular active protection architecture. This Project ultimately feeds demonstrations of active defense subsystems for demonstration as holistic (vehicle level) solutions. This Project is also a key enabler for insertion of current and future active survivability technologies onto ground platforms in order to combat current and emerging threats.

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

Research in this Project supports the Next Generation Combat Vehicle Army Modernization Priority.

This research is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Survivability System Control	11.880	-	-
Description: This effort focuses on maturing and demonstrating a common and open survivability architecture and core implementation to ensure its operational effectiveness. Specifically, this effort includes extending the MAPS architecture across a broader set of active survivability capabilities and increasing the portfolio of MAPS Framework (MAF) compliant technologies. In addition, this project will enhance the government-developed controller subsystem for performance and integration effectiveness with high speed digital signal processing and embedded systems/firmware/software which will be required due to the expanded active defense suite of sensors (e.g., electro-optic, infrared, radio frequency, magnetic, acoustic), sensor fusion, and explore synthesizing sensor data beyond situational awareness to situational understanding with context that can greatly enhance operational effectiveness and vehicle survivability. The activities under this effort provide incremental growth for broader threat spectrum defeat relevant to vehicle protection systems and will be aligned to capability gaps for transition to the acquisition community.			
Accomplishments/Planned Programs Subtotals	11.880	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat V</i> <i>ehicle Advanced Technology</i>	Project (Number/Name) BH1 <i>I Survivability Systems Controls</i> <i>Advanced Technology</i>
C. Other Program Funding Summary (\$ in Millions) N/A Remarks		
D. Acquisition Strategy N/A		

Appropriation/Budget Activity 2040 / 3Propriation/Budget Activity PE 0603462A / Next Generation Combat V ehicle Advanced TechnologyProject (Number/Name) BH4 / Ground Vehicle Holistic Defense A TechCOST (\$ in Millions)Prior YearsFY 2021FY 2022FY 2023FY 2023FY 2023FY 2023FY 2023FY 2024FY 2025FY 2025FY 2026FY 2027Cost To CompleteTotal CostBH4: Ground Vehicle Holistic0.0341.4271.7980.0003	Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	Army							Date: April	2022	
COST (\$ in Millions)Prior YearsFY 2021FY 2022FY 2023FY 2023FY 2023FY 2023FY 2023FY 2024FY 2025FY 2025FY 2026FY 2027Cost To CompleteTotalBH4: Ground Vehicle Holistic Defenses Adv. Tash0.0341.4271.7980.0003	Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)PPE 0603462A / Next Generation Combat VBehicle Advanced TechnologyTr					Number/Name) bund Vehicle Holistic Defense A		
BH4: Ground Vehicle Holistic 0.034 1.427 1.798 0.000 3	COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
	BH4: Ground Vehicle Holistic Defense Adv Tech	-	-	0.034	-	-	-	-	-	1.427	1.798	0.000	3.259
Quantity of RDT&E Articles - </td <td>Quantity of RDT&E Articles</td> <td>-</td> <td></td> <td></td>	Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project will be the basis for a holistic survivability design framework utilizing virtual design models in a Modeling and Simulation (M&S) environment as well as conducting hardware in the loop and live fire demonstration. This Project will inform multiple system level demonstrations to validate that layered survivability technologies are optimized to defeat emerging near-peer threats. Data collected will be used to further validate and verify M&S tools. This Project also provides a design approach available to analyze and adjust the family of protection technologies for combat vehicles in relevant operational theaters.

Research in this Project supports the Next Generation Combat Vehicle Army Modernization Priority.

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

Research in this Project is performed by the United States (US) Army Futures Command.

Research in this Project is coordinated with Program Element (PE) 0603462A (Next Generation Combat Vehicle Advanced Technology) / Project BG7 (Ground Systems Active Defense (GSAD) Advanced Tech) and transitions to PE 0604852A (Suite of Vehicle Protection Systems - EMD).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Layered Survivability Demonstration	-	0.033	-
Description: This effort will utilize virtual models in a M&S environment to analyze layered survivability technologies for integration to a demonstration platform. Selected technologies will be demonstrated in a relevant environment to include, virtual, hardware/software in the loop, and live fire environments. This effort will validate that layered Survivability technologies are optimized to defeat threats consistent with the threat defeat capabilities of the selected technologies.			
FY 2022 Plans: Will conduct very limited holistic vehicle defense analysis in support of larger vehicle systems security activities.			
FY 2022 to FY 2023 Increase/Decrease Statement: Change reflects planned lifecycle of this effort.			
Title: FY2022 SBIR/STTR Transfer	-	0.001	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A / Next Generation Combat V ehicle Advanced Technology	Proje BH4 / Tech	oject (Number/Name) 14 I Ground Vehicle Holistic Defense ch			
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023	
Description: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638						
	Accomplishments/Planned Programs Sub	ototals	-	0.034	-	
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A						

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: April	2022		
Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060346 ehicle Adva	am Element 62A / Next G anced Techi	t (Number/ Seneration (nology	Name) Combat V	Project (N BH6 <i>I Platf</i> Adv Tech	Number/Name) atform Electrification and Mobility			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
BH6: Platform Electrification and Mobility Adv Tech	-	20.698	24.891	46.679	-	46.679	63.174	45.417	45.419	40.181	0.000	286.459	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

A. Mission Description and Budget Item Justification

This Project matures, integrates and demonstrates technologies to electrify both manned and unmanned Next Generation Combat Vehicle platforms. Electrification of these platforms will enable advanced onboard electrified payloads such as directed energy weapons, reduce battlefield fuel consumption, and provide new capabilities such as burst acceleration, extended silent mobility and silent watch. This Project will also mature, integrate and demonstrate technologies to increase electric power such as a high voltage/temperature generator and high power/ temperature power electronics as well as technologies to reduce power demands including composite rubber band track and adaptive hydro-strut suspension.

This Project also continues the Advanced Vehicle Power Technology Alliance (AVPTA) between the Department of Energy and the Department of the Army with a focus on electrification technology that enables military ground vehicles to become significantly more energy efficient. The Alliance is chartered to accelerate the conceptualization and transition into deployment of inventive and creative energy-saving concepts that the Nation needs to achieve energy security.

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

Research in this Project supports the Next Generation Combat Vehicle Army Modernization Priority.

Research is performed by the United States (U.S.) Army Futures Command.

This work complements Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Platform Electrification Technologies	11.069	10.613	11.871
Description: This effort matures and integrates components and sub-systems in order to demonstrate a modular electrification architecture that scales across light to heavy weight classes of combat vehicles.			
FY 2022 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat V</i> <i>ehicle Advanced Technology</i>	Projec BH6 / Adv Te	t (Number/N Platform Elec ech	ame) trification and	l Mobility
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2021	FY 2022	FY 2023
Will mature the electric sprocket drive system and develop integration software modular high voltage energy storage system. Will mature the diesel-electric por develop integration software. Will develop high power electrical components to	 Will mature thermal management system for wer system and thermal management system o enable the tactical battlefield recharging capa 	a and bility.			
<i>FY 2023 Plans:</i> Will validate subsystems for the electric sprocket drive, diesel-electric power sy demonstrate all sub-systems in a system integration validation laboratory. Will controls and integrated system operation. Will perform subsystem integration a energy storage system. Will mature and improve performance of tactical battle improve electric sprocket drive and electric cooling to support Heavy Combat V	vstem and thermal management system, and validate supervisory controls for the subsystem nd laboratory evaluation of a modular high vol field recharging technologies. Will continue to vehicle electrification requirements.	n age			
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> Funding increased to support application of electric sprocket drive and electric	cooling for heavy combat vehicle electrification	ı.			
Title: Advanced Mobility Technologies			3.744	5.606	6.061
Description: This effort matures and demonstrates a reduced weight composite applications which increases operational effectiveness and reduces fuel consumptions which increases operational effectiveness and reduces fuel consumptions are applied as a second s	te running gear system for medium combat ve mption.	nicle			
<i>FY 2022 Plans:</i> Will exploit composite materials and component designs to significantly reduce integration and supportability concerns with external suspension systems.	running gear system weights. Will reduce				
<i>FY 2023 Plans:</i> Will improve performance of composite track system technology with longer las capacities. Will optimize external suspension system design to increase mobilit	sting compounds at higher weight carrying y performance.				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.					
Title: Advanced Vehicle Power Technology Alliance - Electrification Technology	JY		2.841	1.992	2.207
Description: This effort matures and develops advanced energy storage techn and safety for vehicles. Higher energy stored with less space and weight incre electrified ground vehicles have enough power for mobility, silent watch, and en lethality and network capabilities. This effort is a partnership with the Departmet	nologies to improve power and energy perform ases vehicle efficiency and range. Ensures nables capabilities such as advanced protectic ent of Energy.	ance n,			
FY 2022 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A / Next Generation Combat V ehicle Advanced Technology	Project (BH6 / Pla Adv Tech	oject (Number/Name) 16 I Platform Electrification and Mobility v Tech				
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2021	FY 2022	FY 2023		
Will mature and optimize commercial based energy storage systems	s to meet military environmental conditions at a module le	evel.					
<i>FY 2023 Plans:</i> Will improve energy storage module performance and validates per	formance at the energy pack level.						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase reflects planned lifecycle of this effort.							
Title: System/Vehicle Integration and Test		3.044	2.502	3.983			
Description: This effort integrates advanced mobility, platform electrechnologies into surrogate platforms and demonstrates the perform will provide the capabilities of silent mobility, improved mobility performs provides power to enable integration of advanced protection, lethality	which , and						
FY 2022 Plans: Will demonstrate sub-system packaging into the surrogate hulls for maximizing system integration for ease of assembly, maintenance,							
FY 2023 Plans: Will demonstrate the electrified system control, performance, and or and laboratory testing. Will integrate the modular/ scalable electrified	perational energy efficiency through system-level integrat d system into surrogate platforms for future demonstration	ion n.					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase reflects development of systems integration lab for	r early integration of component technologies.						
Title: Scalable Electrification & Control Architecture Technology			-	1.860	3.536		
Description: This effort validates component-level performance and implement a common, scalable, electrified vehicle power architectur voltage batteries, fast vehicle charging from the grid, and silent mob	d integrates the power distribution and control component to enable analyze layered survivability technologies, high ility on combat platforms from 15 to 50 tons.	ts to gh					
FY 2022 Plans: Will demonstrate component-level performance of the high voltage integrate those components into the power subsystem to validate su							
FY 2023 Plans:							

PE 0603462A: *Next Generation Combat Vehicle Advanced ...* Army

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Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat V</i> <i>ehicle Advanced Technology</i>	Project (Number/Name) BH6 <i>I Platform Electrification and Mobility</i> <i>Adv Tech</i>			
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023	
Will demonstrate component-level performance of high voltage power distributi and integrate that component into the power subsystem to validate subsystem- software that will take advantage of the new capabilities and use-cases they er	ion component that enables electrified powertra -level performance. Will provide power subsys nable.	ins, em			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase reflects planned lifecycle of this effort, moving from compone a laboratory environment.	ent-level demonstration to subsystem integratio	n in			
Title: Robotic Combat Vehicle Silent Watch and Mobility Range Extension Adv	vanced Technology	-	1.409	2.021	
Description: This effort matures and demonstrates JP8 reformer components watch and mobility as part of a modular electrification architecture supporting revehicles are expected to have increased silent watch and silent mobility require	nbat s.				
FY 2022 Plans: Will optimize the lightweight anode supported solid oxide fuel cell integration w stand alone operation on a light robotic combat vehicle to increase silent watch	ith JP8 reformer and mature from test stand to n and mobility.				
<i>FY 2023 Plans:</i> Will demonstrate initial JP8 reformer and anode supported solid oxide fuel cell increased silent watch and mobility.	system for a light robotic combat vehicle for				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding Increase reflects planned lifecycle of this effort.					
Title: Parallel Hybrid Electric Combat System		-	-	1.800	
Description: This effort is focused on developing and demonstrating a parallel that will enable silent mobility and improved fuel efficiency.	l hybrid electric capability for tracked combat ve	icles			
FY 2023 Plans: Will develop architecture and controls to enable a clutch with position sensor ne systems.	ecessary for a parallel hybrid tracked combat				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase reflects the development of parallel hybrid electric capabilities efficiency and reduce impacts on the climate.	s for tracked combat vehicles that will improve	fuel			
Title: Tactical and Wheeled Vehicles Hybrid Electric System		-	-	6.400	

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date:	Date: April 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat V</i> <i>ehicle Advanced Technology</i>	Program Element (Number/Name)Project (Number/Name)0603462A / Next Generation Combat VBH6 / Platform Electrification and Mobilitycle Advanced TechnologyAdv Tech				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023		
Description: This effort is part of the climate change initiative to reduce vehic of hybrid electric, anti-idle and multi-vehicle power networking capabilities for	cle platform carbon emissions through developn tactical and wheeled platforms.	lent				
<i>FY 2023 Plans:</i> Will mature hybrid electric technologies and multi-vehicle power networking n high voltage energy storage, and hybrid functions of regenerative braking, ele develop the supervisory control system that integrates the subsystems into a generating. Will develop and integrate a multi-vehicle microgrid dashboard.	ode. Will develop integration software for anti-ic ectric launch assist, and mobility optimization. W cohesive propulsion system including motoring	le, ill and				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase reflects the development of hybrid electric capabilities for ta efficiency and reduce impacts on the climate.	ctical wheeled vehicles that will improve fuel					
Title: Battery Technologies for Supply Chain Security		-	-	8.800		
Description: This effort researches technologies that mitigate battery supply form factors that are critical to military ground vehicle electrification and other a coordinated effort to conduct assessments of technologies across the Defer DoD battery technology projects in PEs 0603342D8Z, 0605798D8Z, 0603680 0901212N.	chain security issues as it relates to common m Army battery applications. This effort is part of nse Advanced Battery Supply Chain along with D8Z, 0607210D8Z, 0605805Z, 0603724N, and	ilitary				
<i>FY 2023 Plans:</i> Will provide an assessment of industrial base risk in battery component techn common form factors needed to support future capability, and the current risk supply influence. This assessment will inform follow on research into batteries be domestically sourced. Will begin to mature, integrate, and demonstrate sm Tactical Universal Battery (STUBS)) in vehicle and other communications-ele adoption of these standard form factor batteries. Will exploit mature 6T comm to demonstrate alternative uses to accelerate the electrification of other Army evaluate commercial energy storage technologies in military vehicle and other	ologies, quantifying the battery designs and of exposure of those battery components to for and battery chemistries and materials that can hall battery types (such as BB2590 and Small ctronics applications to develop a pathway for th on form factor Li-ion (Lithium ion) battery techn and DOD platforms. Will validate capabilities to r conditions.	eign ie blogy				
FY 2022 to FY 2023 Increase/Decrease Statement: This increase is to address defense-wide critical battery supply chain security electrified vehicle systems.	issues that would prevent the Army from fieldir	g				
Title: FY2022 SBIR/STTR Transfer		-	0.909	-		

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Exhibit R-2A, RDT&E Project Justification: PB 2023 Army						
Appropriation/Budget Activity 2040 / 3	Proje BH6 / Adv T	roject (Number/Name) H6 I Platform Electrification and Mobility dv Tech					
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023		
Description: Funding transferred in accordance with Title 15 USC ?638							
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638							
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638							
	Accomplishments/Planned Programs Sub	ototals	20.698	24.891	46.679		
Remarks D. Acquisition Strategy N/A							

chibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: April	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)IPE 0603462A / Next Generation Combat VIehicle Advanced TechnologyI				Project (N BH8 / Enha Technology	Project (Number/Name) BH8 / Enhanced VETRONICS Advanced Fechnology		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BH8: Enhanced VETRONICS Advanced Technology	-	11.809	14.989	10.776	-	10.776	10.223	10.559	9.317	12.641	0.000	80.314
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures, integrates, and demonstrates vehicle electronics hardware such as computers, sensors, communications systems, displays, and vehicle command/control/driving mechanisms as well as vehicle software to enhance crew performance, increase vehicle fuel efficiency, reduce Size, Weight, and Power (SWaP) burdens and reduce vehicle maintenance costs. This Project also exploits open system architectures (power and data) for military ground vehicles to enable common interfaces, standards and hardware implementations. The overall vehicle system architecture approach provides an open architecture such as the Vehicle Integration for Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance / Electronic Warfare (C4ISR/EW) Interoperability (VICTORY), to allow platforms to accept future technologies without the need for significant re-design as new technologies are developed and integrated. Additionally, this project improves infrastructure that enables the ease of integration of autonomous subsystem technologies into future and existing tactical and combat vehicle architectures. Technical challenges include software and algorithm development for increased levels of automation for both manned and unmanned systems, secure vehicle data networks, interoperability of intra-vehicle and inter-vehicle systems, and implementation of advanced user interfaces. Overcoming these technical challenges enables improved and increased span of collaborative vehicle operations, efficient workload management, commander's decision aids, embedded simulation for battlefield visualization and fully integrated virtual test/evaluation.

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

Research in this Project supports the Next Generation Combat Vehicle Army Modernization Priority.

Research in this Project is performed by the United States (US) Army Futures Command.

Research in this Project is coordinated with Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Enhanced - Vehicle Electronics (E-Vetronics)	11.809	14.442	10.776
Description: This effort addresses technical and integration challenges in the areas of vehicle architecture and systems integration. Specifically, this effort focuses on maturing and demonstrating a common ground vehicle open architecture with distributed display processing architecture, computing hardware capable of being re-configured to adapt to changes in Input / Output (I/O) needs, advanced network video distribution, advancements in slip ring technology, tactical situational awareness (SA), cooperative engagement and mission package integration through open architecture components and software. These			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat</i> <i>ehicle Advanced Technology</i>	V BH8 / Techn	ct (Number/N Enhanced Vi ology	Name) ETRONICS A	dvanced
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023
efforts will enable future vehicle capabilities, reduce dependencies or competition through open architecture components and software. This ground combat vehicles to enable software and hardware commonal	n proprietary solutions, and support increased marke is effort will create the electronics architecture for fut ity and reduce system integration timing and cost.	et ure			
FY 2022 Plans: Will continue development of architecture, tactical situational awarent advanced slip sing. Will conduct final demonstration of advanced slip second bench level demonstration of all available components in an on hybrid electric system architecture for tactical vehicles as well as intermanagement systems to improve fuel efficiency for military vehicles.	ess, digital containerization, flexible computing I/O a o ring and flexible computing I/O technologies, as we open system architecture. Will develop scalable, mo rfaces to high voltage energy storage modules, pow	nd ell as a dular er			
<i>FY 2023 Plans:</i> Will improve the ground vehicle common architecture, tactical situation Will integrate mission packages for key network functions within the or architecture to include objective hardware available to conduct bench	onal awareness, and digital containerization lines of common network architecture. Will demonstrate ope n level demonstration.	efforts. n system			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding realigned to Parallel Hybrid Electric Combat System in projetactical vehicle hybrid electrification architecture.	ct BH6 Platform Electrification and Mobility Adv Tec	h for			
Title: FY2022 SBIR/STTR Transfer			-	0.547	-
Description: Funding transferred in accordance with Title 15 USC ?6	538				
<i>FY 2022 Plans:</i> Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs	Subtotals	11.809	14.989	10.776
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy					
N/A					
PE 0603462A: Next Generation Combat Vehicle Advanced Army	UNCLASSIFIED Page 41 of 62 R-1 Lin	e #44		Volu	ime 1c - 277

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: Date											2022	
Appropriation/Budget Activity 2040 / 3			R-1 Program Element (Number/Name)Project (Number/Name)PE 0603462A / Next Generation Combat VBI3 / Sensor Protection Advancedehicle Advanced TechnologyTechnology									
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BI3: Sensor Protection Advanced Technology	-	1.752	1.645	1.708	-	1.708	1.738	1.738	1.734	1.734	0.000	12.049
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Bud	get Item J	ustification										

This Project matures and demonstrates novel sensor protection capabilities which dramatically reduce the susceptibility of our thermal electro-optic/infrared (EO/IR) sensors to ever increasing threats on the battlefield. This Project enables continuation of the mission despite potential threat laser engagements. Low cost modular solutions will be demonstrated that can be applied across current and planned EO/IR targeting, surveillance, and situational awareness sensor systems against existing and emerging threats in support of combined arms maneuver.

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

Research in this Project supports the Next Generation Combat Vehicle, Soldier Lethality, and Future Vertical Lift Army Modernization Priorities.

Research in this Project is performed by the United States (US) Army Futures Command.

Research in this Project is coordinated with Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology), 0602143A (Soldier Lethality Technology), 0603465A (Future Vertical Lift Advanced Technology) and 0603118A (Soldier Lethality Advanced Technology).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Sensor Protection Advanced Technology	1.752	1.585	1.708
Description: This effort will mature and demonstrate sensor protection and signature reduction capabilities which better ensure sensors are difficult to detect, dazzle, and damage by current and future laser threats.			
FY 2022 Plans: Will mature super window optical coating or material solution with environmental hardening. Will validate protected uncooled microbolometer camera in a relevant environment.			
FY 2023 Plans: Will optimize longwave infrared (LWIR) filter coatings for newly available high sensitivity uncooled bolometer cameras. Will demonstrate effectiveness of visible filter materials against relevant commercially available visible laser threats.			
FY 2022 to FY 2023 Increase/Decrease Statement:			

PE 0603462A: Next Generation Combat Vehicle Advanced ... Army

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022								
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat V</i> <i>ehicle Advanced Technology</i>	Projec BI3 / S Techno	oject (Number/Name) 3 I Sensor Protection Advanced echnology					
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2021	FY 2022	FY 2023			
Funding change reflects planned lifecycle of this effort								
Title: FY2022 SBIR/STTR Transfer			-	0.060	-			
Description: Funding transferred in accordance with Title 15 USC ?638								
FY 2022 Plans:								
Funding transferred in accordance with Title 15 USC ?638								
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638								
	Accomplishments/Planned Programs Sub	ototals	1.752	1.645	1.708			
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A								

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: Apri	1 2022	
Appropriation/Budget Activity 2040 / 3				R-1 Program Element (Number/Name)Project (NPE 0603462A / Next Generation Combat VBI5 / Mateehicle Advanced TechnologyAdv Tech				umber/Name) rials Application and Integration				
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BI5: Materials Application and Integration Adv Tech	-	5.286	4.825	5.279	-	5.279	5.478	4.580	4.736	4.734	0.000	34.918
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Buc This Project matures, integrates, technologies enable the Army to This Project also continues the A on developing advanced materia	Iget Item J and demon address cri dvanced Ve Is technolog	ustification Istrates light tical areas c shicle Powe gies that ena	tweight nove of survivabili r Technolog able military	el materials ty, mobility gy Alliance ground vel	, and new n , and transp (AVPTA) be hicles to bed	nanufacturir ortability wi tween the I come signifi	ng processe thin the Nex Department cantly more	s and meth t Generatic of Energy a energy effi	odologies. ⁻ on Combat \ and the Dep cient. The <i>I</i>	These mate /ehicle (NG artment of f	erials and iCV). the Army wit hartered to a	h a focus accelerate

the conceptualization and transition to deployment of inventive and creative energy-saving concepts that the Nation needs to achieve energy security. This Project matures and integrates lightweight materials and joining technologies in support of lighter military vehicles which are more fuel-efficient and capable in expeditionary scenarios, yet, with superior mobility and protection of both vehicles and occupants.

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

Research in this Project supports the Next Generation Combat Vehicle Army Modernization Priority.

Research is performed by the United States (US) Army Futures Command.

Research in this Project is coordinated with Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: System Design Optimization for Lightweighting	4.588	3.992	4.544
Description: This effort improves technologies, tools, and advanced manufacturing techniques in support of the Army?s mission to increase mobility, protection, and transportability while reducing weight. This effort focuses on maturing and demonstrating technologies to decrease ground vehicle weight while optimizing performances and enabling the Army trade space for enhanced capabilities. The technologies being demonstrated are in the fields of material maturation, design optimization, operational metrics, joining technologies, and additive manufacturing. FY 2022 Plans:			
		·	

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat V</i> <i>ehicle Advanced Technology</i>	Project (I BI5 / Mate Adv Tech	lumber/N erials App	lame) lication and lr	ntegration
B. Accomplishments/Planned Programs (\$ in Millions)		F	í 2021	FY 2022	FY 2023
Will mature and demonstrate advanced/lightweight materials technologies inclumaterials for high temperature and high wear surfaces. Will apply integrated comproved Modeling & Simulation for virtual prototyping. Will mature and demonas additive manufacturing for design optimization to improve component and su and reduce weight. Will validate and demonstrate integration of solid-state matarmor materials.	uding materials for armor applications, and nov omputational materials engineering (ICME) too nstrate advanced manufacturing technologies ub-system performance, reduce part complexi erials joining to include joint designs for advan	rel bls for such ty, ced			
FY 2023 Plans: Will continue to improve the Fiscal Year 2022 (FY22) plan for advanced lightwe surface materials utilizing improvements made to virtual prototyping, additive m Will mature and demonstrate lightweight, topology optimized ballistic casting for and demonstrate advanced additive manufacturing feedstocks and processes is sub-system performance metrics, simplify complexity for reduced material was integration processes for materials joining to include designs for advanced arm	n ues. lature and arget				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.					
Title: Advanced Vehicle Power Technology Alliance ? Materials			0.698	0.653	0.735
Description: This effort matures and demonstrates lightweight materials and journal vehicles which are more fuel-efficient and expeditionary with superior mobility a Lighter materials/constructions and advances in joining technologies such as more to lightweight military vehicle structures.	pining technologies in support of lighter military and protection of both vehicles and occupants nulti-material and dissimilar material joining wil	/ I lead			
FY 2022 Plans: Will mature and demonstrate advanced/lightweight materials for weight optimiz as FeMnAI (Iron, Manganese and Aluminum alloy) for high hard armor applicat and conductive materials for energy transfer; validate manufacturing, machinin weldability and corrosion performance for these materials. Will mature and der design optimization of large ground system components.	ation, energy storage/transfer, and protection ions, high strength alloy for structural applicati g, blast/ballistic, dissimilar materials joining/ monstrate wire arc additive manufacturing for	such ons,			
FY 2023 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat V</i> <i>ehicle Advanced Technology</i>	Proje BI5 / I Adv T	Project (Number/Name) BI5 <i>I Materials Application and Integration</i> <i>Adv Tech</i>			
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023	
Will mature and demonstrate advanced/lightweight materials for weight optimiz such as Copper,Tantalum (CuTa) for conductive materials for energy transfer a components. Will also validate manufacturing, machining, and corrosion perfo	zation, energy storage/transfer, and protection and high temperature alloys for critical engine rmance for these materials.					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.						
Title: FY2022 SBIR/STTR Transfer			-	0.180	-	
Description: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638						
	Accomplishments/Planned Programs Sub	totals	5.286	4.825	5.279	
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A						

Exhibit R-2A, RDT&E Project J	ustification	: PB 2023 A	Army							Date: Ap	ril 2022	
Appropriation/Budget Activity 2040 / 3	ropriation/Budget Activity R-1 Program Element (Number/Name)) / 3 PE 0603462A / Next Generation Combat V ehicle Advanced Technology						Project (N BJ1 / Vehi Technolog	lumber/Na cle Syster y	ame) n Security Ad	dvanced		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BJ1: Vehicle System Security Advanced Technology	-	1.444	2.455	-	-	-	-	-	-	-	- 0.000	3.899
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	
 A. Mission Description and Bu This Project matures and demor continued operation in near-pee and maintain assured vehicle fu The cited research is consistent Research in this Project support Research is performed by the U Research in this Project is coord 	dget Item J nstrates grou r cyber content nctionality a with the Un- s the Next G nited States linated with	ustification und vehicle of ested enviro nd freedom der Secretar Generation C (US) Army Program Ele	u cyber proter onments. Th of maneuve ry of Defens Combat Veh Futures Co ement (PE)	ction and re lis Project v er in the cyb se for Rese licle Army N mmand. 0602145A	esilience tec will mature o ber warfight earch and Er Modernization	chnologies to cybersecurit ing domain. ngineering p on Priority. eration Com	o increase t y technolog priority focus bat Vehicle	he cyberse ies at the p s areas and Technolog	curity of gro latform leve the Army M	und vehic I to defeat Iodernizat	les and ensu cybersecuri ion Strategy	re their ty threats
B. Accomplishments/Planned	Programs (\$ in Million	s)						FY	2021	FY 2022	FY 2023
<i>Title:</i> Vehicle System Security A	dvanced Te	chnology								1.444	2.365	-
Description: This effort matures during offensive digital attacks to in peer and near-peer cyber-con future and emerging cyber vulne FY 2022 Plans: Mature and demonstrate vehicle	and demon military gro tested enviro rabilities by	nstrates tech ound vehicle onments. Th designing hi ity technolog	nologies re systems. A ne effort will ighly assure	quired to m dditionally, also matur ed systems	naintain ope the effort w re and demo with cybers alidate the f	rating tempo vill maintain ponstrate tecl security desi	o and overn critical vehi hnologies to igned from t of the hard	natch capal cle function o mitigate ria the beginnin ware, softw	bility ality sk of ng. vare			
or firmware operation of vehicula hardware, software or firmware a functionality.	ar microelect and the corre	tronics by ide esponding th	entification, nreat mitiga	logging an tion strateg	id notificatio jies without	n of any ins degrading t	tances of contracts the vehicle's	ompromise designed	d			
This project completes in Fiscal	y ecrease St a Year 2022 (I	atement: FY22).										
Title: FY2022 SBIR/STTR Trans	sfer									-	0.090	-

PE 0603462A: Next Generation Combat Vehicle Advanced ... Army

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022								
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat V</i> <i>ehicle Advanced Technology</i>	Proje BJ1 / Techn	dvanced					
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023			
Description: Funding transferred in accordance with Title 15 USC ?638								
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638								
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638								
	Accomplishments/Planned Programs Sub	ototals	1.444	2.455	-			
N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A								

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army								Date: April	2022			
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)FPE 0603462A / Next Generation Combat VEehicle Advanced TechnologyE				Project (Number/Name) BK1 / Autonomous Mobility Adv Tech			əch
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BK1: Autonomous Mobility Adv Tech	-	11.370	6.087	6.323	-	6.323	5.282	5.286	-	-	0.000	34.348
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates Artificial Intelligence and Machine Learning (AI/ML) technologies to increase autonomy and mobility to perform teamed operations with manned and unmanned air and ground vehicles in a military relevant environment through data collection on relevant platforms. Data collection will involve both simulation and live collection. Simulation will provide a baseline to correctly collect, clean, and analyze data that meets the need for improving algorithms for both formation control and unmanned aerial vehicle map input for unmanned ground vehicle mobility. Live data will start with Surrogate platforms in local areas. This will allow proper collection techniques, tools, and data to maximize embedded autonomy using Machine Learning and other Artificial Intelligent methods before utilizing live data collection. The Project will use AI/ML techniques to mature and demonstrate intelligent formation control to be used on maintained roads and in complex terrain without the need for a global positioning system (GPS). Data will be collected from mounted platforms. Also, the Project will use AI/ML techniques to optimize intelligent autonomous ground platform planning through the use of Unmanned Aerial Systems (UAS) mapped areas. Data collected from air vehicle will be converted to maneuverable information for unmanned ground platform with the identification of enemy positions, go/no-go areas, terrain classification, and optimal suggested paths.

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

Research in this Project supports the Next Generation Combat Vehicle Army Modernization Priority.

Research in this Project is performed by the United States (US) Army Futures Command.

Research in this Project is coordinated with Program Element (PE) 0602145A (Next Generation Combat Vehicle Technology).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Machine Learning Data Collection	5.195	3.261	1.760
Description: This effort matures and demonstrates techniques and technologies for mass unmanned ground vehicle data collection to be used towards Army research in autonomy and mobility with machine learning efforts.			
FY 2022 Plans: Will optimize the data infrastructure for storage of large amounts of robotic ground vehicle data (petabytes) and access by many concurrent users. Will demonstrate the ground robotic data collection process with sensor kits installed on Army ground vehicles.			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat V</i> <i>ehicle Advanced Technology</i>	Project (Number/ BK1 / Autonomous	Name) Mobility Adv	Tech
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
Will mature and expand the AI/ML data for robotic ground data vehicle ground vehicle data	es to include new environments and new types of roboti	c		
FY 2023 Plans: Will collect data from sensor and robotic ground vehicles at multiple si scenarios. Will process the data and ingest it into the project data environment sharing and ML development.	tes to provide a database of diverse environments and ironment to make it available for visualization, searching	g,		
FY 2022 to FY 2023 Increase/Decrease Statement: Funding decrease in Fiscal Year 2023 (FY23) reflects planned lifecycl formation control data-driven techniques in the Formation Control task	e progression of effort to focus on development of the in this project.			
<i>Title:</i> UAS Mapping		3.275	2.598	1.615
Description: This effort matures and demonstrates the use of combin to develop intelligent unmanned ground system path planning. Data conformation for unmanned ground platform to help with the identification and optimal suggested paths.	ed UAS and ground system (UGV) data with ML techni ollected from UAS will be converted to maneuverable on of enemy positions, go/no-go areas, terrain classifica	ques tion,		
FY 2022 Plans: Will mature the ability to map the terrain, identify obstacles, and chara an UGV to better inform its planned maneuver(s). Will demonstrate the site.	cterize the soil from a UAS and share that information vesse capabilities with Army platforms at a relevant Army	vith test		
FY 2023 Plans: Will mature and demonstrate teaming of unmanned air and ground ve canopies and in complex terrains with limited line-of-sight to validate the mobility in varying scenarios.	hicles in challenging environments such as mapping ur he robustness and utility of teamed UAS/UGS to improv	ider /e		
FY 2022 to FY 2023 Increase/Decrease Statement: FY23 funding decrease reflects planned lifecycle progression and mat	turation of effort as demonstrated in live testing events.			
Title: Formation Control		-	-	2.948
Description: This effort uses ML techniques to develop intelligent forr to be used on maintained roads and in contested environments under will be collected from mounted platforms utilizing special internal and e exact positioning, undistributed formation control, and increased speed	mation control for manned and unmanned ground vehic electronic warfare (EW) and GPS-denied conditions. D external sensors to develop and demonstrate algorithm d.	les ata s for		

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022									
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat V</i> <i>ehicle Advanced Technology</i>	Proje BK1 /	oject (Number/Name) <1 / Autonomous Mobility Adv Tech						
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023				
FY 2023 Plans: Will perform simulation and data collection and analysis of ML models and algorithms for formation correction of ML models and algorithms for formation corrections.	prithms; will collect experimental data while htrol tactical maneuvers of robotic ground vehi	cles.							
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase in FY23 reflects planned completion of effort in PE 06021454 Project BJ9 (Autonomous Mobility Tech) and the planned focus on data-driven ground vehicle data is collected and ingested in the Project?s data environment learning models and algorithms for robotic ground vehicle formation control.	A (Next Generation Combat Vehicle Technolog development of formation control techniques at to enable more reliable and robust machine	gy) / as							
Title: Aided Target Recognition - Multiple Cooperative Auto Sensors			2.900	-	-				
Description: This effort will mature and demonstrate an AI-enabled scalable to will cooperatively conduct a zone recon to identify, geolocate, and track threats electro optical-infrared (EO-IR) sensors.	at) and								
Title: FY2022 SBIR/STTR Transfer			-	0.228	-				
Description: Funding transferred in accordance with Title 15 USC ?638									
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638									
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638									
	Accomplishments/Planned Programs Sub	totals	11.370	6.087	6.323				
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A									

Exhibit R-2A, RDT&E Project J	ustification	: PB 2023 A	Army							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3	priation/Budget Activity 3				R-1 Progr PE 06034 ehicle Adv	am Elemen 62A I Next (anced Tech	it (Number) Generation (nology	' Name) Combat V	Project (N BK4 / Nex IFC) Adv 7	umber/Na t Gen Intell Fech	me) ligent Fire Co	ontrol(NG-
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BK4: Next Gen Intelligent Fire Control(NG-IFC) Adv Tech	-	23.205	1.727	2.198	-	2.198	2.309	2.985	-	-	0.000	32.424
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
The cited research is consistent Research in this Project supports Research in this Project is perfor Research in this Project is relate	with the Un s the Next C rmed by the ed to and full	der Secreta Generation C United Stat	ry of Defens Combat Veh es (US) Arr I with the ef	se for Rese nicle Army N ny Futures forts fundeo	arch and Er Modernizatio Command. d in Prograr	ngineering p on Priority . n Element (I	priority focus	areas and	the Army M	lodernizati	on Strategy. nicle Techno	loav).
B. Accomplishments/Planned I	Programs (s in Million	s)		0	,	,	,	FY	2021	FY 2022	FY 2023
Title: Next Generation Intelligent	Fire Contro	bl	-+							8.903	1.664	2.198
Description: This effort will delive Combat Vehicle with the necessar FY 2022 Plans: Will demonstrate reduction of end	ver armamer ary fire contr gagement ti	nt specific har rol on future meline by le	ardware, ala manned ar	gorithms an nd unmanne dvances of	nd architectu ed platforms fire control t	ures to supp s. technologies	ort the Nex	t Generation	n			
engagements through an improv framework.	ed user inte	rface. Will r	mature hard	lware to de	monstrate a	a tailored mo	odular archit	ecture				
FY 2023 Plans: Will optimize fire control and mod direct fire platforms. Will mature a and scenarios.	deling chara and demons	cteristics to strate the mo	improve pe odel charac	rformance teristics by	of target pri assessing p	oritization m performance	nodels for cu e against sp	urrent and f ecified targ	uture ets			
FY 2022 to FY 2023 Increase/D	ecrease Sta	atement:										

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Da	ate: April	2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A / Next Generation Combat V ehicle Advanced Technology	Project (Nun BK4 / Next G IFC) Adv Tec	n ber/Nam en Intellig h	n e) gent Fire C	Control(NG-
B. Accomplishments/Planned Programs (\$ in Millions)		FY 20	021 F	Y 2022	FY 2023
Funding increase reflects project plan.					
Title: FIRESTORM Advanced Research		14	4.302	-	-
Description: Designs and demonstrates networked lethality role-based archite target handoff capability for combined arms operations. Designs and demonstrate real-time, prioritized data for decision agents to support scalable operations with the support scalable operations with the support scalable operations.	ecture to support automated decision aids and rates a hybrid distributed architecture that will i th reduced processing time.	ingest			
Title: FY2022 SBIR/STTR Transfer			-	0.063	-
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans:					
Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	ototals 23	3.205	1.727	2.198
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A					

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	Army							Date: Apri	2022	
Appropriation/Budget Activity 2040 / 3	ation/Budget Activity					am Elemen 62A I Next G anced Tech	t (Number / Generation (nology	Name) Combat V	Project (N BK6 / Adv (ADIDAS)	roject (Number/Name) K6 I Adv Direct InDirect Armament Sy ADIDAS) Adv Tech		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BK6: Adv Direct InDirect Armament Sys (ADIDAS) Adv Tech	-	0.224	-	1.534	_	1.534	2.053	9.850	12.613	12.622	0.000	38.896
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
(mm) direct fire cannons and be demonstrates technologies for ra to reduce impulse and allow integ supervised autonomy and remote The cited research is consistent of Research in this Project supports Research in this Project is perfor Research in this Project is related PE 0604115A (Technology Matu	optimized fo pid fire on-t gration onto e operation with the Uno the Next G med by the d to and full uration Initia	or future ope the-move at lighter platf and integra der Secretar Generation C United Stat y integrated tives).	erational en all elevatio forms, auto tes intellige ry of Defens Combat Veh es (US) Arr	vironment v ns (direct & mated amm nt fire contr se for Rese icle Army N ny Futures forts fundec	with cross-d indirect), con nunition han ol to addres arch and Er Modernizatio Command. d in Progran	omain enga ompact amr dling and re ss multi-dom ngineering p on Priority. n Element (f	gement cap nunition des loading. Th nain targets priority focus PE) 060214	ability. Spe sign with ad is Project a from mann areas and 5A (Next G	ecifically, this lvanced igni lso supports ed and unm the Army M eneration C	s Project int tion, advan s open arch anned platf lodernizatio	egrates and ced recoil n itecture to e orms. n Strategy.	d nitigation enable logy) and
B. Accomplishments/Planned F	rograms (\$ in Million	<u>s)</u>						FY	2021 F	Y 2022	FY 2023
Title: Large Caliber Armament Sy	ystem (LCA	S)								0.224	-	1.534
<i>Description:</i> This effort matures for Next Generation Combat Vehi <i>FY 2023 Plans:</i> Will demonstrate integrated techr algorithms, and enhanced targeti	and demon icle, providin nologies for ng and enga	strates a ne ng tank-like improving le agement teo	ext generation lethality for ethal perfor chniques fo	on, automat light mediu mance of di r direct fire	ted, lightwei ım-weight o irect fire pro projectiles.	ight 120-mm ptionally ma jectiles. Wil	n armament anned platfo I mature arr	system des rms. nament trac	sign cking			
FY 2022 to FY 2023 Increase/De	ecrease Sta	atement:										

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603462A / Next Generation Combat V ehicle Advanced Technology	Projec BK6 / / (ADID/	t (Number/N Adv Direct Ini AS) Adv Tech	lame) Direct Arman า	nent Sys
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2021	FY 2022	FY 2023
Funding resumes in Fiscal Year 2023 (FY23) to demonstrate emergin (Next Generation Combat Vehicle Technology) / Project BK5 (Adv Dir	g large caliber direct fire technology from PE 0602145/ ect In-Direct Armament Sys (ADIDAS) Tech).	A			
	Accomplishments/Planned Programs Sub	ototals	0.224	-	1.534
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A					

Appropriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name) Project (Number/Name) 2040 / 3 PE 603462/A / Mext Generation Combat / V BF6 (Ground Vehicle Advanced Technology/CA) BF6 (Ground Vehicle Advanced Technology/CA) BF6 (Ground Vehicle Advanced Technology/CA) Total FY 2023 FY 2023 FY 2023 FY 2023 FY 2024 FY 2026 FY 2026 Conjunt Vehicle Advanced Technology/CA) 0.000 251.45 Defic Ground Vehicle Advanced - 116.200 135.250 - - - - 0.000 251.45 Quantity of RDT&E Articles - - - - - - 0.000 251.45 Nate Congressional Interest Item funding provided for Ground Vehicle Advanced Technology. -	Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	Army							Date: Apri	1 2022		
COST (\$ in Millions)Prior YearsFY 2021FY 2021FY 2023FY 2023FY 2023FY 2024FY 2025FY 2026FY 2027Cost ToTotalBP6: Ground Vehicle Advanced-116.200135.2500.000251.45Quantity of RDT&E Articles0.000251.45Congressional Interest Item funding provided for Ground Vehicle Advanced Technology.A0.000251.45Abision Description and Budget Item Justification Congressional Interest Item funding provided for Ground Vehicle Advanced Technology	Appropriation/Budget Activity 2040 / 3						R-1 Program Element (Number/Name) PE 0603462A <i>I Next Generation Combat V</i> <i>ehicle Advanced Technology</i>				Project (Number/Name) BP6 / Ground Vehicle Advanced Technology(CA)			
BPB: Ground Vehicle Advanced Technology(CA) - - - - - 0.000 251.45 Quantity of RDT&E Articles - - - - - - 0.000 251.45 Note Congressional Interest Item funding provided for Ground Vehicle Advanced Technology. - <th>COST (\$ in Millions)</th> <th>Prior Years</th> <th>FY 2021</th> <th>FY 2022</th> <th>FY 2023 Base</th> <th>FY 2023 OCO</th> <th>FY 2023 Total</th> <th>FY 2024</th> <th>FY 2025</th> <th>FY 2026</th> <th>FY 2027</th> <th>Cost To Complete</th> <th>Total Cost</th>	COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
Quantity of RDT&E Articles -	BP6: Ground Vehicle Advanced Technology(CA)	-	116.200	135.250	-	-	-	-	-	-	-	0.000	251.450	
Note Congressional Interest Item funding provided for Ground Vehicle Advanced Technology. A. Mission Description and Budget Item Justification Congressional Interest Item funding provided for Ground Vehicle 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 2021 FY 2021 Congressional Add: Additive Manufacturing for Jointless Hull 10.000 15.000 FY 2021 Accomplishments: Conduct advanced research in Additive Manufacturing for Jointless Hull. 10.000 5.000 FY 2021 Plans: Congressional Interest Item funding provided for Additive Manufacturing for Jointless Hull 10.000 5.000 FY 2021 Accomplishments: Conduct advanced research in Carbon Fiber and Graphite Foam Technology. 10.000 5.000 FY 2022 Plans: Congressional Interest Item funding provided for Carbon Fiber and Graphite Foam 10.000 5.000 FY 2022 Plans: Congressional Interest Item funding provided for Carbon Fiber and Graphite Foam - - FY 2022 Plans: Congressional Interest Item funding provided for Carbon Fiber and Graphite Foam - - FY 2022 Plans: Congressional Interest Item funding provided for Carbon Fiber and Graphite Foam - - FY	Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
B. Accomplishments/Planned Programs (\$ in Millions)FY 2021FY 2021Congressional Add: Additive Manufacturing for Jointless Hull10.00015.000FY 2021 Accomplishments: Conduct advanced research in Additive Manufacturing for Jointless Hull.10.00015.000Work executed by Army Futures Command.FY 2022 Plans: Congressional Interest Item funding provided for Additive Manufacturing for Jointless Hull00Congressional Add: Carbon Fiber and Graphite Foam Technology10.0005.0000FY 2021 Accomplishments: Conduct advanced research in Carbon Fiber and Graphite Foam Technology.00Work executed by Army Futures Command.FY 2022 Plans: Congressional Interest Item funding provided for Carbon Fiber and Graphite Foam0FY 2022 Plans: Congressional Interest Item funding provided for Carbon Fiber and Graphite Foam00Congressional Add: Hydrogen Fuel Cells10.000-FY 2021 Accomplishments: Conduct advanced research in Hydrogen Fuel Cells.10.000-Work executed by Army Futures CommandFY 2021 Accomplishments: Conduct advanced research in Hydrogen Fuel Cells.10.000-Work executed by Army Futures CommandFY 2021 Accomplishments: Conduct advanced research in Hydrogen Fuel CellsWork executed by Army Futures CommandFY 2021 Accomplishments: Conduct advanced research in ATE5.2 Engine Development	A. Mission Description and Bud Congressional Interest Item fundi The cited work is consistent with	Iget Item J ing provided the Under S	ustification d for Ground Secretary of	u Vehicle Ad d Vehicle Ad	dvanced Te	echnology. and Engine	eering priori	ity focus are	eas and the	Army Mode	ernization S	trategy.		
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FY 2021 Accomplishments: Conduct advanced research in Additive Manufacturing for Jointless Hull.	Congressional Add: Additive Ma	anufacturing	g for Jointles	ss Hull					10.000	15.000				
Work executed by Army Futures Command.Image: Congressional Interest Item funding provided for Additive Manufacturing for Jointless HullImage: Congressional Add: Carbon Fiber and Graphite Foam Technology10.0005.000FY 2021 Accomplishments: Conduct advanced research in Carbon Fiber and Graphite Foam Technology.Image: Congressional Interest Item funding provided for Carbon Fiber and Graphite FoamImage: Congressional Interest Item funding provided for Carbon Fiber and Graphite FoamImage: Congressional Interest Item funding provided for Carbon Fiber and Graphite FoamImage: Congressional Interest Item funding provided for Carbon Fiber and Graphite FoamImage: Congressional Add: Hydrogen Fuel CellsImage: Congressional Interest Item funding provided for Carbon Fiber and Graphite FoamImage: Congressional Interest Item funding provided for Carbon Fiber and Graphite FoamImage: Congressional Interest Item funding provided for Carbon Fiber and Graphite FoamImage: Congressional Interest Item funding provided for Carbon Fiber and Graphite FoamImage: Congressional Interest Item funding provided for Carbon Fiber and Graphite FoamImage: Congressional Add: Hydrogen Fuel CellsImage: Congressional Add: Hydrogen Fuel CellsImage: Congressional Interest Item funding provided for Carbon Fiber and Carbon Fiber and Graphite FoamImage: Congressional Add: ATE5.2 Engine DevelopmentImage: Congressional Add: ATE5.2 Engine Developme	FY 2021 Accomplishments: Con	nduct advar	nced resear	ch in Additiv	ve Manufac	turing for Jo	ointless Hull	l.						
FY 2022 Plans: Congressional Interest Item funding provided for Additive Manufacturing for Jointless HullImage: Congressional Add: Carbon Fiber and Graphite Foam TechnologyCongressional Add: Carbon Fiber and Graphite Foam Technology10.0005.000FY 2021 Accomplishments: Conduct advanced research in Carbon Fiber and Graphite Foam Technology.10.0005.000Work executed by Army Futures Command.FY 2022 Plans: Congressional Interest Item funding provided for Carbon Fiber and Graphite Foam10.000-FY 2022 Plans: Congressional Add: Hydrogen Fuel Cells10.000Work executed by Army Futures Command.10.000FY 2021 Accomplishments: Conduct advanced research in Hydrogen Fuel Cells.10.000-Work executed by Army Futures CommandFY 2021 Accomplishments: Conduct advanced research in Hydrogen Fuel Cells.10.000-Work executed by Army Futures CommandCongressional Add: ATE5.2 Engine Development10.0005.000FY 2021 Accomplishments: Conduct advanced research in ATE5.2 Engine Development	Work executed by Army Futures	Command.												
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FY 2021 Accomplishments: Conduct advanced research in Carbon Fiber and Graphite Foam Technology. Image: Conduct advanced research in Carbon Fiber and Graphite Foam Work executed by Army Futures Command. FY 2022 Plans: Congressional Interest Item funding provided for Carbon Fiber and Graphite Foam Image: Congressional Add: Hydrogen Fuel Cells Congressional Add: Hydrogen Fuel Cells 10.000 - FY 2021 Accomplishments: Conduct advanced research in Hydrogen Fuel Cells. Image: Congressional Add: ATE5.2 Engine Development Work executed by Army Futures Command. 10.000 5.000 FY 2021 Accomplishments: Conduct advanced research in ATE5.2 Engine Development. Image: Congressional Add: ATE5.2 Engine Development	Congressional Add: Carbon Fib	er and Gra	phite Foam	Technology	,				10.000	5.000				
Work executed by Army Futures Command.Image: Congressional Interest Item funding provided for Carbon Fiber and Graphite FoamImage: Congressional Add: Hydrogen Fuel CellsCongressional Add: Hydrogen Fuel Cells10.000-FY 2021 Accomplishments: Conduct advanced research in Hydrogen Fuel Cells.Image: Congressional Add: ATE5.2 Engine Development10.000Work executed by Army Futures Command.Image: Congressional Add: ATE5.2 Engine Development10.0005.000FY 2021 Accomplishments: Conduct advanced research in ATE5.2 Engine Development.Image: Congressional Add: ATE5.2 Engine Development10.000	FY 2021 Accomplishments: Con	nduct advar	nced resear	ch in Carbo	n Fiber and	d Graphite F	oam Techn	ology.						
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Congressional Add:ATE5.2 Engine Development10.0005.000FY 2021 Accomplishments:Conduct advanced research in ATE5.2 Engine Development.10.0005.000	Work executed by Army Futures	Command.												
FY 2021 Accomplishments: Conduct advanced research in ATE5.2 Engine Development.	Congressional Add: ATE5.2 Eng	gine Develo	opment						10.000	5.000				
	FY 2021 Accomplishments: Con	nduct advar	nced resear	ch in ATE5.	2 Engine D	evelopmen)	t.							

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022								
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number PE 0603462A <i>I Next Generation ehicle Advanced Technology</i>	' Name) Combat V	Project (N BP6 / Grou Technology	umber/Name) ınd Vehicle Advanced _V (CA)				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022					
Work executed by Army Futures Command.								
FY 2022 Plans: Congressional Interest Item funding provided for ATE5.2 Engi	ne Development							
Congressional Add: Additive Manufacturing of Critical Components		5.000	-					
FY 2021 Accomplishments: Conduct advanced research in Additive Manufac	cturing of Critical Components.							
Work executed by Army Futures Command.								
Congressional Add: Combat Vehicle Weight Reduction Initiative		10.000	5.000					
FY 2021 Accomplishments: Conduct advanced research in Combat Vehicle	Weight Reduction Initiative.							
Work executed by Army Futures Command.								
FY 2022 Plans: Congressional Interest Item funding provided for Combat Veh	icle Weight Reduction Initiative							
Congressional Add: Virtual and Physical Prototyping		10.000	8.000					
FY 2021 Accomplishments: Conduct advanced research in Virtual and Physic	ical Prototyping.							
Work executed by Army Futures Command.								
FY 2022 Plans: Congressional Interest Item funding provided for Virtual and P	Physical Prototyping							
Congressional Add: HMMWV Autonomy		3.000	-					
FY 2021 Accomplishments: Conduct advanced research in HMMWV Autono	my.							
Work executed by Army Futures Command.								
Congressional Add: HMMWV Automotive Enhancements		5.000	3.000					
FY 2021 Accomplishments: Conduct advanced research in HMMWV Automo	otive Enhancements.							
Work executed by Army Futures Command.								
FY 2022 Plans: Congressional Interest Item funding provided for HMMWV Aut	tomotive Enhancements							
Congressional Add: Program Increase - Combat Vehicle Blast Testing		6.000	-					
FY 2021 Accomplishments: Conduct advanced research in Combat Vehicle	Blast Testing.							

PE 0603462A: *Next Generation Combat Vehicle Advanced ...* Army

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022								
Appropriation/Budget Activity 2040 / 3	' Name) Combat V	Project (Nu BP6 / Grou Technology	u mber/Name) nd Vehicle Advanced ⁄(CA)					
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022					
Work executed by Army Futures Command.								
Congressional Add: Program Increase - Advanced Adhesives		5.000	5.000					
FY 2021 Accomplishments: Conduct advanced research in Advanced Adhes	ives.							
Work executed by Army Futures Command.								
FY 2022 Plans: Congressional Interest Item funding provided for Advanced Ac	Ihesives							
Congressional Add: Program Increase - Combat Vehicle Lithium 6T Battery I	Development	5.000	5.000					
FY 2021 Accomplishments: Conduct advanced research in Combat Vehicle I	Lithium 6T Battery Development.							
Work executed by Army Futures Command.								
FY 2022 Plans: Congressional Interest Item funding provided for Combat Vehi Development	cle Lithium 6T Battery							
Congressional Add: Program Increase - Vehicle Technology Readiness Leve	ls	2.000	-					
FY 2021 Accomplishments: Conduct advanced research in Vehicle Technolo	gy Readiness Levels.							
Work executed by Army Futures Command.								
Congressional Add: Program Increase - 10X Technology Demonstration		8.000	-					
FY 2021 Accomplishments: Conduct advanced research in 10x Technology I	Demonstration.							
Work executed by Army Futures Command.								
Congressional Add: Program Increase - HMMWV Augmented Reality HUD		5.000	-					
FY 2021 Accomplishments: Conduct advanced research in HMMWV Augment	nted Reality HUD.							
Work executed by Army Futures Command.								
Congressional Add: Program Increase - Operator?In?The?Loop Virtual and F	Physical Prototyping	4.000	-					
FY 2021 Accomplishments: Conduct advanced research in Operator-in-the-L Prototyping.	oop Virtual and Physical							

PE 0603462A: Next Generation Combat Vehicle Advanced ... Army

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022					
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name)Project (NPE 0603462A / Next Generation Combat VBP6 / Grouehicle Advanced TechnologyTechnology					
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022			
Work executed by Army Futures Command.						
Congressional Add: Program Increase - Next Generation Electrified Transmis	ssion	8.200	-			
FY 2021 Accomplishments: Conduct advanced research in Next Generation	Electrified Transmission.					
Work executed by Army Futures Command.						
Congressional Add: Advanced Materials Applications		-	12.000			
FY 2022 Plans: Congressional Interest Item funding provided for Advanced Ma	aterials Applications					
Congressional Add: Augmented Reality for Denied Environments	· ·	-	7.000	-		
FY 2022 Plans: Congressional Interest Item funding provided for Augmented F	Reality for Denied Environments					
Congressional Add: Autonomous Minefield Clearance		-	7.000	-		
FY 2022 Plans: Congressional Interest Item funding provided for Autonomous	Minefield Clearance					
Congressional Add: Autonomous Vehicle Mobility		-	10.000	-		
FY 2022 Plans: Congressional Interest Item funding provided for Autonomous	Vehicle Mobility					
Congressional Add: Carbon Fiber Tires		-	5.000	-		
FY 2022 Plans: Congressional Interest Item funding provided for Carbon Fiber	Tires					
Congressional Add: Force Protection Vehicle Kit		-	5.000			
FY 2022 Plans: Congressional Interest Item funding provided for Force Protec	tion Vehicle Kit					
Congressional Add: Fuel Cell Technology		-	5.000			
FY 2022 Plans: Congressional Interest Item funding provided for Fuel Cell Tec	chnology					
Congressional Add: Machine Learning for Advanced Lightweight Combat Vel	hicle Structures	-	6.000			
FY 2022 Plans: Congressional Interest Item funding provided for Machine Lea Combat Vehicle Structures	rning for Advanced Lightweight					
Congressional Add: Maneuverable Lightweight Electric Weight Reducer		-	5.000	1		

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date:	April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/ PE 0603462A / Next Generation C ehicle Advanced Technology	Name) Combat V	Project (Number BP6 / Ground Ve Technology(CA)	r/ Name) hicle Advanced
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	
FY 2022 Plans: Congressional Interest Item funding provided for Maneuverable Reducer	le Lightweight Electric Weight			
Congressional Add: Off-Road Maneuver		-	5.000	
FY 2022 Plans: Congressional Interest Item funding provided for Off-Road Ma	neuver			
Congressional Add: Predictive Maintenance System		-	2.000	
FY 2022 Plans: Congressional Interest Item funding provided for Predictive Ma	aintenance System			
Congressional Add: RCV-L		-	5.000	
FY 2022 Plans: Congressional Interest Item funding provided for RCV-L				
Congressional Add: Short Fiber Thermoplastic Applications		-	4.000	
FY 2022 Plans: Congressional Interest Item funding provided for Short Fiber T	hermoplastic Applications			
Congressional Add: Unmanned Navigational Technology		-	2.500	
FY 2022 Plans: Congressional Interest Item funding provided for Unmanned N	lavigational Technology			
Congressional Add: Virtual Autonomy Environment		-	3.750	
FY 2022 Plans: Congressional Interest Item funding provided for Virtual Auton	omy Environment			
	Congressional Adds Subtotals	116.200	135.250	

N/A

<u>Remarks</u>

D. Acquisition Strategy

N/A

ustification	: PB 2023 A	Army							Date: Ap	ril 2022				
Appropriation/Budget Activity 2040 / 3						R-1 Program Element (Number/Name)ProjePE 0603462A / Next Generation Combat VBZ9 /ehicle Advanced TechnologyLowe					ject (Number/Name) I Smart Targeting Environment for ver Level Assets			
Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost			
-	3.823	3.920	3.381	-	3.381	4.383	4.393	-	-	0.000	0 19.900			
-	-	-	-	-	-	-	-	-	-					
ency (DARP and share ta with the Und s the Next G rmed by the	A) System-c argeting dat der Secreta Generation C United Stat	of-System E a and acce ry of Defens Combat Veh es (US) Arr	inhanced S ss strike as se for Rese icle Army N ny Futures	mall Unit (S sets in mult arch and Er Aodernizatio Command.	ESU), curre i-domain op ngineering p on Priority.	ent force, ar verations. priority focus	ad Science a	and Techno the Army M	logy (S&T lodernizati) in order to ion Strategy	enable			
Programs (S	s in Million	<u>s)</u>						FY	2021	FY 2022	FY 2023			
ent for Lowe	r Level Asse	ets (STELL/	۹)						3.823	3.775	3.381			
and demon ocess. This g time and in ayload data is, and strea	strates integ improved puterface with to increase mline interfa	grated targe rocess will u systems for accuracy for aces for sm	et search ar utilize auton or detecting or target en all units to a	nd electronio nated target concealed gagement, o access joint	c warfare da t search alg targets and optimize dat strike asse	ata dissemir orithms bas setting targ ta dissemina ts.	ation algori ed on missi et priority. ation algorit	thms on It will hms						
improved ali mplement ta Will continue ment both pi t is meeting	gnment of r ictical proce maturing si rior to and d threshold m	oon-kinetic s dure softwa mall unit co uring missio etrics.	strike assets are into Mou mmon oper ons. Will co	s and plan f unted Comp rating picture onduct Sold	or integratic outing Enviro e procedura ier touch po	on into the c onment/Mou I software fr ints and lab	ommon inted Missic or strike /field basec	on I						
	Prior Years 	Prior FY 2021 - 3.823 - 3.823 - - dget Item Justification nstrates mission targeting ency (DARPA) System-or and share targeting dat with the Under Secretar :s the Next Generation Or rmed by the United State Programs (\$ in Millions ent for Lower Level Assets :s and demonstrates integoress. This improved pig :g time and interface with :ayload data to increase :s, and streamline interface improved alignment of r mplement tactical proce Will continue maturing signent both prior to and d t is meeting threshold m	Prior FY 2021 FY 2022 - 3.823 3.920 - - 3.823 - - - dget Item Justification - - nstrates mission targeting support sency (DARPA) System-of-System E and share targeting data and acces - with the Under Secretary of Defenses - - st the Next Generation Combat Veh - - rmed by the United States (US) Arre - - Programs (\$ in Millions) - - ent for Lower Level Assets (STELLA) - - s and demonstrates integrated target optical data to increase accuracy for allog data to increase accuracy for allog data to increase accuracy for allog time and interface with systems for allog data to increase accuracy for allog time and interface with systems for allog time and streamline interfaces for sm improved alignment of non-kinetic se - will continue maturing small unit con ment both prior to a	Prior FY 2021 FY 2022 Base - 3.823 3.920 3.381 - - - - dget Item Justification - - - strates mission targeting support software and ency (DARPA) System-of-System Enhanced S and share targeting data and access strike as with the Under Secretary of Defense for Rese st the Next Generation Combat Vehicle Army M rmed by the United States (US) Army Futures Programs (\$ in Millions) ent for Lower Level Assets (STELLA) and demonstrates integrated target search ar pocess. This improved process will utilize autor g time and interface with systems for detecting rayload data to increase accuracy for target en is, and streamline interfaces for small units to a simplement tactical procedure software into Mod Will continue maturing small unit common oper ment both prior to and during missions. Will continue to a streamline interface software into Mod Will continue maturing small unit common oper ment both prior to and during missions. Will continue maturing small unit common oper ment both prior to and during missions. Will continue maturing small unit common oper ment both prior to and during missions. Will continue maturing small unit common oper ment both prior to and during missions. Will continue maturing small unit common oper ment both prior to and during missions. Will continue maturing small unit common oper ment both prior to and during missions. Will continue maturing small unit common oper ment both prior to and during missions. Will cont to a streamline interface.	ustification: PB 2023 Army R-1 Progr PE 06034/ ehicle Adv Years FY 2021 FY 2022 Base OCO - 3.823 3.920 3.381 - - - - - - dget Item Justification - - - - strates mission targeting support software and algorithms ency (DARPA) System-of-System Enhanced Small Unit (S and share targeting data and access strike assets in mult with the Under Secretary of Defense for Research and En sthe Next Generation Combat Vehicle Army Modernization rmed by the United States (US) Army Futures Command. Programs (\$ in Millions) - ent for Lower Level Assets (STELLA) - and demonstrates integrated target search and electronic occess. This improved process will utilize automated target g time and interface with systems for detecting concealed rayload data to increase accuracy for target engagement, is, and streamline interfaces for small units to access joint improved alignment of non-kinetic strike assets and plan f mplement tactical procedure software into Mounted Comp Will continue maturing small unit common operating pictur ment both prior to and during missions. Will conduct Sold t is meeting threshold metrics.	R-1 Program Element PE 0603462A / Next (ehicle Advanced Tech Prior FY 2021 FY 2022 Base OCO Total - 3.823 3.920 3.381 - 3.381 - - - - - - dget Item Justification - - - - strates mission targeting support software and algorithms, to include ency (DARPA) System-of-System Enhanced Small Unit (SESU), curre and share targeting data and access strike assets in multi-domain op with the Under Secretary of Defense for Research and Engineering p s the Next Generation Combat Vehicle Army Modernization Priority. rmed by the United States (US) Army Futures Command. Programs (\$ in Millions) ent for Lower Level Assets (STELLA) a and demonstrates integrated target search and electronic warfare data ceess. This improved process will utilize automated target search algo g time and interface with systems for detecting concealed targets and ayload data to increase accuracy for target engagement, optimize data as, and streamline interfaces for small units to access joint strike asset improved alignment of non-kinetic strike assets and plan for integratic mplement tactical procedure software into Mounted Computing Enviro Will continue maturing small unit common operating picture procedura ment both prior to and during missions. Will conduct Soldier touch pot t is meeting threshold metrics. </td <td>R-1 Program Element (Number/ PE 0603462A / Next Generation of ehicle Advanced Technology Prior Years FY 2021 FY 2022 Base OCO Total FY 2024 - 3.823 3.920 3.381 - 3.381 4.383 - - - - - - - - dget Item Justification - - - - - - - - dget Item Justification - <td< td=""><td>ustification: PB 2023 Army R-1 Program Element (Number/Name) PE 0603462A / Next Generation Combat V ehicle Advanced Technology Prior Years FY 2021 FY 2022 Base OCO Total FY 2024 FY 2025 - 3.823 3.920 3.381 - 3.381 4.383 4.393 - - - - - - - - dget Item Justification strates mission targeting support software and algorithms, to include Electronic Warfare cap ancy (DARPA) System-of-System Enhanced Small Unit (SESU), current force, and Science a and share targeting data and access strike assets in multi-domain operations. with the Under Secretary of Defense for Research and Engineering priority focus areas and is the Next Generation Combat Vehicle Army Modernization Priority. rmed by the United States (US) Army Futures Command. Programs (\$ in Millions) end demonstrates integrated target search and electronic warfare data dissemination algoritizes. and demonstrates integrated target search and electronic warfare data dissemination algoritizes. and demonstrates integrated target search and electronic warfare data dissemination algoritits, and streamline interfaces for small units to access joint strike assets. improved alignment of non-kinetic strike assets and plan for integratio</td><td>ustification: PB 2023 Army R-1 Program Element (Number/Name) PE 0603462A / Next Generation Combat V BZ9 / Sma Lower Lev Prior Years FY 2021 FY 2022 FY 2023 Base FY 2023 OCO FY 2023 Total FY 2024 FY 2025 FY 2026 - 3.823 3.920 3.381 - 3.381 4.383 4.393 - - - - - - - - - - dget Item Justification strates mission targeting support software and algorithms, to include Electronic Warfare capabilities, let ancy (DARPA) System-of-System Enhanced Small Unit (SESU), current force, and Science and Techno and share targeting data and access strike assets in multi-domain operations. with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army M is the Next Generation Combat Vehicle Army Modernization Priority. FY rmed by the United States (US) Army Futures Command. Fry FY Programs (\$ in Millions) FY at for Lower Level Assets (STELLA) and demonstrates integrated target search and electronic warfare data dissemination algorithms based on mission g time and interface with systems for detecting concealed targets and setting target priority. It will ayload data to increase accuracy for target engagement, optimize data dissemination algorithms is, an differenting roccurat software into Mounted Computing Environment/</td><td>Uate: Ap Date: Ap PE 0603462 / Next Generation Combat V PE 0603462 / Next Generation Combat V ehicle Advanced Technology Project (Number/Name) Project (Number/Name) biole Advanced Technology Years FY 2021 FY 2022 FY 2023 FY 2023 FY 2023 FY 2024 FY 2025 FY 2026 FY 2027 - 3.823 3.920 3.381 - 3.381 4.393 - <</td><td>Date: April 2022 Prior Colspan="2" Prior Colspan="2" Prior Prior</td></td<></td>	R-1 Program Element (Number/ PE 0603462A / Next Generation of ehicle Advanced Technology Prior Years FY 2021 FY 2022 Base OCO Total FY 2024 - 3.823 3.920 3.381 - 3.381 4.383 - - - - - - - - dget Item Justification - - - - - - - - dget Item Justification - <td< td=""><td>ustification: PB 2023 Army R-1 Program Element (Number/Name) PE 0603462A / Next Generation Combat V ehicle Advanced Technology Prior Years FY 2021 FY 2022 Base OCO Total FY 2024 FY 2025 - 3.823 3.920 3.381 - 3.381 4.383 4.393 - - - - - - - - dget Item Justification strates mission targeting support software and algorithms, to include Electronic Warfare cap ancy (DARPA) System-of-System Enhanced Small Unit (SESU), current force, and Science a and share targeting data and access strike assets in multi-domain operations. with the Under Secretary of Defense for Research and Engineering priority focus areas and is the Next Generation Combat Vehicle Army Modernization Priority. rmed by the United States (US) Army Futures Command. Programs (\$ in Millions) end demonstrates integrated target search and electronic warfare data dissemination algoritizes. and demonstrates integrated target search and electronic warfare data dissemination algoritizes. and demonstrates integrated target search and electronic warfare data dissemination algoritits, and streamline interfaces for small units to access joint strike assets. improved alignment of non-kinetic strike assets and plan for integratio</td><td>ustification: PB 2023 Army R-1 Program Element (Number/Name) PE 0603462A / Next Generation Combat V BZ9 / Sma Lower Lev Prior Years FY 2021 FY 2022 FY 2023 Base FY 2023 OCO FY 2023 Total FY 2024 FY 2025 FY 2026 - 3.823 3.920 3.381 - 3.381 4.383 4.393 - - - - - - - - - - dget Item Justification strates mission targeting support software and algorithms, to include Electronic Warfare capabilities, let ancy (DARPA) System-of-System Enhanced Small Unit (SESU), current force, and Science and Techno and share targeting data and access strike assets in multi-domain operations. with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army M is the Next Generation Combat Vehicle Army Modernization Priority. FY rmed by the United States (US) Army Futures Command. Fry FY Programs (\$ in Millions) FY at for Lower Level Assets (STELLA) and demonstrates integrated target search and electronic warfare data dissemination algorithms based on mission g time and interface with systems for detecting concealed targets and setting target priority. It will ayload data to increase accuracy for target engagement, optimize data dissemination algorithms is, an differenting roccurat software into Mounted Computing Environment/</td><td>Uate: Ap Date: Ap PE 0603462 / Next Generation Combat V PE 0603462 / Next Generation Combat V ehicle Advanced Technology Project (Number/Name) Project (Number/Name) biole Advanced Technology Years FY 2021 FY 2022 FY 2023 FY 2023 FY 2023 FY 2024 FY 2025 FY 2026 FY 2027 - 3.823 3.920 3.381 - 3.381 4.393 - <</td><td>Date: April 2022 Prior Colspan="2" Prior Colspan="2" Prior Prior</td></td<>	ustification: PB 2023 Army R-1 Program Element (Number/Name) PE 0603462A / Next Generation Combat V ehicle Advanced Technology Prior Years FY 2021 FY 2022 Base OCO Total FY 2024 FY 2025 - 3.823 3.920 3.381 - 3.381 4.383 4.393 - - - - - - - - dget Item Justification strates mission targeting support software and algorithms, to include Electronic Warfare cap ancy (DARPA) System-of-System Enhanced Small Unit (SESU), current force, and Science a and share targeting data and access strike assets in multi-domain operations. with the Under Secretary of Defense for Research and Engineering priority focus areas and is the Next Generation Combat Vehicle Army Modernization Priority. rmed by the United States (US) Army Futures Command. 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FY rmed by the United States (US) Army Futures Command. Fry FY Programs (\$ in Millions) FY at for Lower Level Assets (STELLA) and demonstrates integrated target search and electronic warfare data dissemination algorithms based on mission g time and interface with systems for detecting concealed targets and setting target priority. It will ayload data to increase accuracy for target engagement, optimize data dissemination algorithms is, an differenting roccurat software into Mounted Computing Environment/	Uate: Ap Date: Ap PE 0603462 / Next Generation Combat V PE 0603462 / Next Generation Combat V ehicle Advanced Technology Project (Number/Name) Project (Number/Name) biole Advanced Technology Years FY 2021 FY 2022 FY 2023 FY 2023 FY 2023 FY 2024 FY 2025 FY 2026 FY 2027 - 3.823 3.920 3.381 - 3.381 4.393 - <	Date: April 2022 Prior Colspan="2" Prior Colspan="2" Prior Prior			

Appropriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name) 2040 / 3 PE 0603462A / Next Generation Combat V BZ9 / Smart Targeting Environment for 2040 / 3 ehicle Advanced Technology BZ9 / Smart Targeting Environment for B. Accomplishments/Planned Programs (\$ in Millions) FY 2021 FY 2022 FY 2023 Will implement pairing of electronic warfare target effects in coordination with kinetic effects. Will evaluate additional electronic FY 2021 FY 2022 FY 2023 Will implement pairing of electronic warfare target effects in coordination. Will conduct Soldier evaluations and laboratory and field-based demonstrations to ensure project meets threshold metrics. FY 2022 Increase/Decrease Statement: FY 2022 Increase/Decrease Statement: FY 2022 to FY 2023 BlR/STTR Transfer - 0.145 - Description: Funding transferred in accordance with Title 15 USC ?638 FY 2022 to FY 2023 Increase/Decrease Statement: - 0.145 FY 2022 to FY 2023 Increase/Decrease Statement: - 0.145 - Description: Funding transferred in accordance with Title 15 USC ?638 - - 0.145 FY 2022 to FY 2023 Increase/Decrease Statement: - - 0.145 - FY 2022 to FY 2023 Increase/Decrease Statement:	Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date	April 2022									
B. Accomplishments/Planned Programs (\$ in Millions) FY 2021 FY 2022 FY 2023 Will implement pairing of electronic warfare target effects in coordination with kinetic effects. Will evaluate additional electronic warfare system use cases and develop end-to-end system demonstrations. Will conduct Soldier evaluations and laboratory and field-based demonstrations to ensure project meets threshold metrics. FY 2022 to FY 2023 Increase/Decrease Statement: Funding decrease reflects planned lifecycle of this effort. - 0.145 Title: FY2022 SBIR/STTR Transfer - 0.145 Description: Funding transferred in accordance with Title 15 USC ?638 FY 2022 to FY 2023 Increase/Decrease Statement: - Funding transferred in accordance with Title 15 USC ?638 FY 2022 to FY 2023 Increase/Decrease Statement: - Funding transferred in accordance with Title 15 USC ?638 - - - FY 2022 to FY 2023 Increase/Decrease Statement: - - - FY 2022 to FY 2023 Increase/Decrease Statement: - - - FY 2022 to FY 2023 Increase/Decrease Statement: - - - FY 2022 to FY 2023 Increase/Decrease Statement: - - - FY 2022 to FY 2023 Increase/Decrease Statement: - - -	Appropriation/Budget Activity 2040 / 3	t ActivityR-1 Program Element (Number/Name)Program Element (Number/Name)PE 0603462A / Next Generation Combat VBZehicle Advanced TechnologyLot											
FY 2022 to FY 2023 Increase/Decrease Statement: Funding decrease reflects planned lifecycle of this effort. Title: FY2022 SBIR/STTR Transfer Description: Funding transferred in accordance with Title 15 USC ?638 FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638 FY 2022 to FY 2023 Increase/Decrease Statement: For 2022 to FY 2023 Increase/Decrease Statement:	B. Accomplishments/Planned Programs (\$ in Millions) Will implement pairing of electronic warfare target effects in coordination with I warfare system use cases and develop end-to-end system demonstrations. W field-based demonstrations to ensure project meets threshold metrics.	kinetic effects. Will evaluate additional electror /ill conduct Soldier evaluations and laboratory a	FY 2021 and	FY 2022	FY 2023								
Title: FY2022 SBIR/STTR Transfer - 0.145 Description: Funding transferred in accordance with Title 15 USC ?638 - 0.145 FY 2022 Plans: - - - Funding transferred in accordance with Title 15 USC ?638 - - - FY 2022 to FY 2023 Increase/Decrease Statement: - - - -	FY 2022 to FY 2023 Increase/Decrease Statement: Funding decrease reflects planned lifecycle of this effort.												
Funding transferred in accordance with Title 15 USC ?638 FY 2022 to FY 2023 Increase/Decrease Statement:	<i>Title:</i> FY2022 SBIR/STTR Transfer <i>Description:</i> Funding transferred in accordance with Title 15 USC ?638 <i>FY 2022 Plans:</i>			0.145	-								
Funding transferred in accordance with Title 15 USC ?638	Funding transferred in accordance with Title 15 USC ?638 FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638												
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A	C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A		101013	3 3.320	5.501								
Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army										Date: April 2022			
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Appropriation/Budget Activity 2040: Research, Development, Te Technology Development (ATD)	est & Evalu	ation, Army	/ BA 3: Adv	anced	R-1 Progr PE 060346	am Elemen 63A / Netwo	t (Number / rk C3I Adva	nology					
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
Total Program Element	-	215.337	211.068	125.565	-	125.565	107.766	112.285	139.273	151.952	0.000	1,063.246	
AM7: Modular RF Communications Advanced Technology	-	12.057	9.270	10.440	-	10.440	-	1.978	13.207	12.683	0.000	59.635	
AM9: Protected SATCOM Advanced Technology	-	16.032	25.494	31.660	-	31.660	14.138	-	14.079	15.485	0.000	116.888	
AN2: Narrowband SATCOM Advanced Technology	-	4.813	11.590	-	-	-	-	-	-	-	0.000	16.403	
AN4: Non Traditional Waveforms Advanced Technology	-	7.508	9.300	5.905	-	5.905	5.192	20.173	11.540	9.104	0.000	68.722	
AN6: Prot SATCOM-WB Global SATCOM Inter Canc Adv Tech	-	1.725	-	-	-	-	-	-	-	-	0.000	1.725	
AN8: COE - Every Receiver is a Sensor Advanced Tech	-	2.934	2.887	1.371	-	1.371	6.510	6.433	6.435	6.434	0.000	33.004	
AO1: UNT - Every Receiver is a Sensor Advanced Tech	-	2.888	2.944	-	-	-	3.156	3.153	3.154	3.153	0.000	18.448	
AO3: Stand-In Advanced RF Effects (STARE) Adv Tech	-	2.888	-	-	-	-	-	-	-	-	0.000	2.888	
AO6: Tag Track and Locate Small Satellites Adv Tech	-	16.051	-	-	-	-	-	-	-	-	0.000	16.051	
AO7: EW for Maneuver Operations (EMO) Adv Tech	-	2.810	5.769	6.142	-	6.142	3.138	1.084	3.136	3.135	0.000	25.214	
AP6: C4ISR Integrated Demonstrations Advanced Tech	-	3.603	-	-	-	-	-	-	-	-	0.000	3.603	
AP8: Comms/Horiz Int for Army Mod Priorities Adv Tech	-	6.798	-	-	-	-	-	-	-	-	0.000	6.798	
AP9: Next Generation HF Advanced Technology	-	6.739	7.730	-	-	-	-	-	-	-	0.000	14.469	

n Justificati	on: PB 202	23 Army						Date: April 2022			
est & Evalua	tion, Army I	' BA 3: Advar	nced	R-1 Progra PE 060346		000 0711					
-	3.744	-	-	-	-	-	-	-	-	0.000	3.744
-	1.971	1.645	0.625	-	0.625	1.946	1.966	1.963	1.962	0.000	12.078
-	2.911	3.099	6.636	-	6.636	3.586	3.762	3.899	3.898	0.000	27.791
-	3.138	4.075	-	-	-	-	-	-	3.643	0.000	10.856
-	2.706	2.524	2.767	-	2.767	2.730	1.682	-	-	0.000	12.409
-	0.948	1.611	-	-	-	-	-	-	-	0.000	2.559
-	4.600	2.448	-	-	-	-	-	-	-	0.000	7.048
-	3.360	2.217	-	-	-	-	-	-	-	0.000	5.577
-	2.888	3.059	4.603	-	4.603	4.739	4.178	5.416	8.013	0.000	32.896
-	3.603	4.207	5.996	-	5.996	2.103	2.702	2.797	5.717	0.000	27.125
-	2.022	2.171	-	-	-	-	-	-	-	0.000	4.193
-	7.905	7.956	12.197	-	12.197	10.905	10.731	5.090	5.089	0.000	59.873
-	3.771	3.867	-	-	-	-	-	-	-	0.000	7.638
-	1.949	-	-	-	-	-	-	-	-	0.000	1.949
-	2.068	7.751	0.896	-	0.896	0.043	2.268	12.409	16.282	0.000	41.717
	n Justificati est & Evalua - - - - - - - - - - - - - - - - - - -	Justification: PB 202 est & Evaluation, Army I - 3.744 - 1.971 - 2.911 - 2.911 - 2.911 - 2.911 - 2.911 - 2.911 - 2.911 - 2.911 - 2.911 - 3.138 - 2.706 - 2.706 - 2.706 - 2.888 - 2.888 - 2.888 - 2.022 - 7.905 - 3.771 - 3.771 - 1.949 - 2.068	Justification: PB 2023 Army est & Evaluation, Army / BA 3: Advant - 3.744 - - 3.744 - - 1.971 1.645 - 2.911 3.099 - 2.911 3.099 - 2.911 3.099 - 2.911 3.099 - 2.911 3.099 - 2.911 3.099 - 2.911 3.099 - 2.911 3.099 - 2.911 3.099 - 2.911 3.099 - 2.706 2.524 - 0.948 1.611 - 0.948 1.611 - 3.360 2.217 - 2.888 3.059 - 3.603 4.207 - 2.022 2.171 - 7.905 7.956 - 3.771 3.867 - 2.068 7.751	Justification: PB 2023 Army est & Evaluation, Army I BA 3: Advanced - 3.744 - - 3.744 - - - 1.971 1.645 0.625 - 2.911 3.099 6.636 - 2.911 3.099 6.636 - 2.911 3.099 6.636 - 2.911 3.099 6.636 - 2.911 3.099 6.636 - 2.911 3.099 6.636 - 2.911 3.099 6.636 - 2.911 3.099 6.636 - 2.911 3.099 6.636 - 2.706 2.524 2.767 - 0.948 1.611 - - 3.360 2.2171 - - 2.888 3.059 4.603 - 2.022 2.171 - - 2.022 2.171 - - 3.701 3.867 - - 1.949 -	Justification: PB 2023 Army R-1 Progra est & Evaluation, Army / BA 3: Advanced R-1 Progra 1 3.744	Pustification: PB 2023 Army R1 Program Element PE 0603463A / Network R1 Program Element PE 0603463A / Network Colspan="4">1.971 1.645 0.625 1 1.971 1.645 0.625 0.625 1 2.911 3.099 6.636 6.636 1 3.138 4.075 2 2.706 2.524 2.767 1 0.948 1.611 1 0.948 1.611 1 0.948 1.611 1 0.948 1.611 1 3.360 2.217 1 3.603 4.207 5.996 1 3.603 4.207 5.996 1 3.603 4.207 5.996 1 2	Justification: PB 2023 Army R-1 Program Element (Number/I PE 0603463A / Network C3/ Advanced PE 0603464A / Network C3/ Advanced PE 0603464A / Network C3/ Advanced PE 0603464A / Network C3/ Advanced PE 060346A / Network C3/ Advanced PE 060346A / Network C3/ Advanced PE 06043A / Network C3/ Advanced PE 060346A / Netw	Justification: PB 2023 Army R-1 Program Element (Number/Name) PE 0603463A / Network C3/ Advance dTechnic PE	Partification: PB 2023 Army R-1 Program Element (Number/Name) PE 0603403 / Network C31 Advanced Technology Sat & Evaluation, Army / BA 3: Advanced Technology R-1 Program Element (Number/Name) PE 0603403 / Network C31 Advanced Technology Sat & Evaluation, Army / BA 3: Advanced Technology Sat & Evaluation, Army / BA 3: Advanced Technology Sat & Evaluation, Army / BA 3: Advanced Technology Sat & Evaluation, Army / BA 3: Advanced Technology Sat & Evaluation, Army / BA 3: Advanced Technology Sat & Evaluation, Army / BA 3: Advanced Technology Sat & Evaluation, Army / BA 3: Advanced Technology Sat & S	Justification: PB 2023 Army PE 06034-34 Network C31 Adverse Prevent S14 Adverse Pr	Justification::: PB 2023 Hmy Date: April 2022 PL Programme (Number/N

Exhibit R-2, RDT&E Budget Iten	n Justification: PB 202	23 Army							Date: April	2022			
Appropriation/Budget Activity 2040: Research, Development, Te Technology Development (ATD)	est & Evaluation, Army	/ BA 3: <i>Adv</i>	anced	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Technology									
AV8: Navigation Warfare (NAVWAR) Advanced Technology	- 2.535	1.927	1.949	-	1.949	6.002	3.958	5.985	-	0.000	22.356		
AW4: DoD PNT M&S Collaborative Initiative (CI) Adv Tech	- 2.888	-	-	-	-	-	-	-	-	0.000	2.888		
AW6: Modular GPS Independent Sensors Advanced Tech	- 10.684	6.791	10.131	-	10.131	12.289	16.702	14.629	20.609	0.000	91.835		
BP4: ELECTRONIC WARFARE ADVANCED TECHNOLOGIES (CA)	- 64.800	55.500	-	-	-	-	-	-	-	0.000	120.300		
CF9: Automated IPB Adv Tech		0.989	-	-	-	-	-	-	-	0.000	0.989		
Cl7: Mobile & Survivable Command Post (MASCP) Adv Tech		7.809	13.119	-	13.119	18.609	16.332	19.729	19.724	0.000	95.322		
CJ8: Assured PNT Communications Advanced Tech		16.438	11.128	-	11.128	11.640	13.208	13.830	13.903	0.000	80.147		
DB6: Pathfinder 3D Advanced Technology*		-	-	-	-	1.040	1.975	1.975	3.118	0.000	8.108		

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2023

A. Mission Description and Budget Item Justification

This Program Element (PE) matures and demonstrates technologies to provide an Army tactical network and enabling infrastructure that support operations in any environment, to include where the electromagnetic spectrum is denied or degraded. This is accomplished through the exploitation and optimization of components and systems for robust, low signature communications and data networks; assured positioning, navigation, and timing in contested environments; converged and coordinated cyber and electronic warfare activities; resilient mission command on the move; and the collection, processing, and dissemination of information for intelligence, surveillance, and reconnaissance in a common operating picture.

Work in this PE complements PE 0602146A (Network C3I Technology), PE 0602143A (Soldier Lethality Technology), PE 0602145A (Next Generation Combat Vehicle Technology), PE 0602147A (Long Range Precision Fires Technology), PE 0602148A (Future Vertical Lift Technology), PE 0602150A (Air and Missile Defense Technology), PE 0602213A (C3I Applied Cyber), PE 0603118A (Soldier Lethality Advanced Technology), PE 0603462A (Next Generation Combat Vehicle Advanced Technology), PE 0603464A (Long Range Precision Fires Advanced Technology), PE 0603465A (Future Vertical Lift Advanced Technology), and PE 0603466A (Air and Missile Defense Advanced Technology).

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Technology	

This PE is directly aligned with the Network and Assured Positioning, Navigation, and Timing (APNT) Army Modernization priorities.

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

Research is performed by the United States (U.S.) Army Futures Command (AFC), the U.S. Army Space and Missile Defense Command (SMDC) and U.S. Army Engineer Research and Development Center (ERDC).

B. Program Change Summary (\$ in Millions)	<u>FY 2021</u>	<u>FY 2022</u>	FY 2023 Base	FY 2023 OCO	<u>FY 2023</u>	Total
Previous President's Budget	216.520	155.867	0.000	-		0.000
Current President's Budget	215.337	211.068	125.565	-	12	5.565
Total Adjustments	-1.183	55.201	125.565	-	12	5.565
 Congressional General Reductions 	-	-				
 Congressional Directed Reductions 	-	-				
 Congressional Rescissions 	-	-				
 Congressional Adds 	-	55.500				
 Congressional Directed Transfers 	-	-				
 Reprogrammings 	-1.183	-				
 SBIR/STTR Transfer 	-	-				
 Adjustments to Budget Years 	-	-	125.565	-	12	5.565
FFRDC Transfer	-	-0.299	-	-		-
Congressional Add Details (\$ in Millions, and Inclu	des General Redu	<u>ictions)</u>			FY 2021	FY 2022
Project: BP4: ELECTRONIC WARFARE ADVANCED	TECHNOLOGIES	(CA)				
Congressional Add: Assured Position, Navigation,	and Timing Techno	ology			6.300	4.000
Congressional Add: Army Visual and Tactical Arcti	c Reconnaissance				2.000	-
Congressional Add: Program increase - anticipatin	g threats to natura	l systems			6.000	-
Congressional Add: Program Increase - S?UAS cy	/ber threat manage	ement			7.500	-
Congressional Add: Program Increase - Sub?Surfa	ace Infrastructure ii	n Arctic Environn	nents		1.000	-
Congressional Add: Program Increase - Mesh Net	work-Enabled Sma	ll Satellites			10.000	-
Congressional Add: Program Increase - Geospatia	al Artificial Intelliger	nce Analytic Tool	s		4.000	-
Congressional Add: Program Increase - Advanced	Materials and Tec	hnologies for Co	mmand Post Modernizat	ion	10.000	-
Congressional Add: Program Increase - Advanced	Materials for Resi	lient Sensors			8.000	5.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army	C	ate: April 2022	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Technology		
Congressional Add Details (\$ in Millions, and Includes General Rec	luctions)	FY 2021	FY 2022
Congressional Add: Program Increase - Tactical Geospatial Informa	tion Capabilities	10.000	5.000
Congressional Add: Alternative Navigation for GPS-Denied Landing	Environments	-	4.500
Congressional Add: Edge-High Performance Computing for Multi-De	omain Operations	-	5.000
Congressional Add: HALITE		-	7.000
Congressional Add: Next Generation Command Posts		-	10.000
Congressional Add: Receiver-Sensor Technology for Tactical Netwo	orks	-	15.000
	Congressional Add Subtotals for Project: B	P4 64.800	55.500
	Congressional Add Totals for all Proje	cts 64.800	55.500

Change Summary Explanation

Fiscal Year 2023 (FY23) funding increase reflects the fact that the FY22 President's Budget request did not include out-year funding.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: Apri	2022	
Appropriation/Budget Activity 2040 / 3	hibit R-2A, RDT&E Project Justification: PB 2023 Army propriation/Budget Activity 10 / 3 COST (\$ in Millions) Prior Years FY 2021 FY 2022 I 7: Modular RF - 12.057 9.270 I mmunications Advanced chnology - 12.057 9.270 I munications Advanced chnology - - - - Mission Description and Budget Item Justification is Project optimizes autonomous networking protocols to automate apt, and continue operations under changing environments and thr esearch in this Project complements Program Element (PE) 060214 02213A (C3I Applied Cyber) / Project CY1 (Information Assurance e cited research is consistent with the Under Secretary of Defense esearch in this Project is performed by the United States (U.S.) Arm Accomplishments/Planned Programs (\$ in Millions) Ide: Modular Radio Frequency (RF) Communications Advanced Tect scription: This effort optimizes autonomous networking protocols to apt, and continue operations under changing environments and three is apt, and continue operations under changing environments and three is apt, and continue operations across the Army Brigade network; optimize the network protocols design for disparate transport network fied network operations across the Army Brigade network; optimize the vertice from external systems; integrate the automated PACE (A-PA unted Miss			R-1 Program Element (Number/Name)Project (NPE 0603463A / Network C3I Advanced TecAM7 / ModhnologyAdvanced					lumber/Name) dular RF Communications Technology			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AM7: Modular RF Communications Advanced Technology	-	12.057	9.270	10.440	-	10.440	-	1.978	13.207	12.683	0.000	59.635
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Research in this Project complem 0602213A (C3I Applied Cyber) / The cited research is consistent v Research in this Project is perform	nents Progr Project CY ⁻ with the Un-	am Element 1 (Informatic der Secretar United Stat	t (PE) 0602 on Assuranc ry of Defens es (U.S.) Ar	146A (Netw e and Netw e for Resea my Futures	vork C3I Teo vork Resilien arch and Er command	chnology) / I ncy Tech). ngineering p (AFC).	Project AM	6 (Modular I s areas and	RF Commur	nications Te	echnology) a n Strategy.	and PE
B. Accomplishments/Planned P	rograms (\$ in Millions	<u>s)</u>						FY	2021 F	Y 2022	FY 2023
Title: Modular Radio Frequency (RF) Comm	unications A	Advanced To	echnology						12.057	8.931	10.440
Description: This effort optimizes adapt, and continue operations up	s autonomo nder chang	ous networki ing environn	ng protocol nents and th	s to automa nreats.	ate the PAC	E communio	cation plan	to initialize,				
FY 2022 Plans: Will optimize the network protoco unified network operations across received from external systems; in Mounted Mission Command Soft Technology (S&T) products; will u Technology Demonstration (JCTE	ls design fo the Army l ntegrate the ware and A ise opportu D), and Dyn	or disparate f Brigade netw e automated dvanced Fie nities such a pamic Front f	transport ne vork; optimi I PACE (A-F eld Artillery ⁻ as, Network to optimize	tworks acro ze the algo PACE) solut factical Dat Moderniza the design.	oss multiple rithms of the tion with Pro ta System (<i>i</i> tion Experir	security cla e decision e ogram of Re AFAATDS) ment (NetMo	assifications ongine to pro- ecord produ and other S od X), Joint	enabling a ocess data cts (e.g. Science and Capabilities	5			
FY 2023 Plans: Will demonstrate automated PAC PACE capabilities with various no Tactical (WIN-T) (dismounted and	E capabiliti des; dismo l command	es in simula ounted, mou post node v	ted laborato nted, comm variants con	ory and field and post ar opleted in F	d test enviro nd interface Fiscal Year 2	nments. Wi to Warfight 2020 (FY20)	ll demonstr er Informat), mounted	ate integrate ion Network node varian	ed - it to			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022					
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Project (Number/Name) Tec AM7 I Modular RF Communications Advanced Technology						
B. Accomplishments/Planned Programs (\$ in Millions)		FY	2021	FY 2022	FY 2023			
be completed in FY21/FY22, WIN-T interface to be completed in FY23). Will ma and demonstrated integration with other protected terrestrial and space-based in input to the decision engine.	ature automated PACE decision engine featur radios/waveforms and external systems to pro	es vide						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase reflects planned lifecycle level of effort for increased maturity	and demonstration of PACE communication.							
Title: FY2022 SBIR/STTR Transfer			-	0.339	-			
Description: Funding transferred in accordance with Title 15 USC ?638								
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638								
FY 2022 to FY 2023 Increase/Decrease Statement:								
	Accomplishments/Planned Programs Sub	totals	12.057	9.270	10.440			
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A			12.007	9.270	10.440			

ustification	: PB 2023 A	rmy							Date: Apri	il 2022		
hibit R-2A, RDT&E Project Justification: PB 2023 Army propriation/Budget Activity 40 / 3 COST (\$ in Millions) Prior Years FY 2021 FY 2022 M9: Protected SATCOM - 16.032 25.494 Vanced Technology - 16.032 25.494 Vanced Technology - - - Mission Description and Budget Item Justification nis Project matures and demonstrates technologies and components nis Project improves responses to a component of radio frequency (RF) spectrum signature in order to esearch in this Project complements Program Element (PE) 0602 ne cited research is consistent with the Under Secretary of Defenses esearch in this Project is performed by the United States (U.S.) A Accomplishments/Planned Programs (\$ in Millions) Me: Protected SATCOM Advanced Technology and Resilient Tac escription: This effort matures and demonstrates technologies are contested and congested electromagnetic environments. This effort surveillance capabilities. Y 2022 Plans: Ill mature and demonstrate components that support the control complexity of surveillance capabilities. Y 2022 Plans: Ill mature and demonstrate components that support the control complexity operation over multiple satellite constellations with low					am Elemen 53A / Netwo	t (Number / ork C3I Adva	Project (N AM9 / Prot Technolog	ct (Number/Name) / Protected SATCOM Advanced nology				
Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
-	16.032	25.494	31.660	-	31.660	14.138	-	14.079	15.485	0.000) 116.888	
-	-	-	-	-	-	-	-	-	-			
strates tech onments. T RF) spectrur nents Progr with the Uno	nologies an his Project in n signature am Element der Secretar	d compone mproves res in order to d (PE) 0602 ry of Defens	nts to incre siliency thro counter ene 146A (Netw se for Rese	ase resilien ough scienc emy electror vork C3I Teo arch and Er	cy of Wideb e & technolo nic surveillar chnology) / I ngineering p	and Satellit ogy investig nce capabili Projects AM riority focus	e Commun lation. Will d ities. 18 (Protecte a areas and	ications (SA compliment ed SATCOM the Army M	TCOM) in technologie 1 Technolog 1odernizatio	contested a es that prov gy). on Strategy	ind ide	
Programs (20 (0.0.) / "		o communa				EV	2021	EV 2022	EV 2023	
ced Techno	logy and Re	silient Tact	tial Network	ing and Co	mms				12.223	24.368	31.660	
and demon romagnetic chnologies tl s.	strates tech environmer hat provide	nologies an its. This effo obfuscation	nd compone ort improve of RF spec	ents to incre s resiliency ctrum signat	ase resilien through scie ture in order	cy of Wideb ence & tech ⁻ to counter	oand SATC nology enemy	ОМ				
nponents th nunications vill automati nd enterpris iple satellite iple satellite tions Center	at support th resiliency te cally adapt f e environme constellation for tactical v e constellation rs (TOC).	ne control o echnologies to changing ents; mature ons with low ehicles; and ons simultar	f the Army s s; mature ar contested e On-the-Me v available s d mature At neously, lea	satellite net nd optimize environmer ove (OTM) s size, weight t-the-Halt (A ading to Arm	works in a c select SAT(nts, leading satellite grou , and power , and power , TH) satellite ny communi	contested er COM techno to protection und termina (SWAP), le ground ter cations resi	nvironment, ologies for n which Il technolog ading to Ar minal techn liency throu	ly my nology ıgh				
	Prior Years - dget Item J strates tech onments. The strates tech onments. The spectrum ments Programs (S ced Technologies the ced Technologies the ced Technologies the nonologies the s. 	Prior FY 2021 - 16.032 - 16.032 - - dget Item Justification strates technologies an onments. This Project in RF) spectrum signature ments Program Element with the Under Secretar med by the United State Programs (\$ in Millions ced Technology and Re and demonstrates tech romagnetic environment chnologies that provide of s. hponents that support the munications resiliency tervill automatically adapt for iple satellite constellation iple satellite constellation	Prior FY 2021 FY 2022 - 16.032 25.494 - - - dget Item Justification strates technologies and compone onments. This Project improves reactions in order to or onments. This Project improves reactions - spectrum signature in order to or onments Program Element (PE) 0602 - with the Under Secretary of Defense - med by the United States (U.S.) An organas (\$ in Millions) - ced Technology and Resilient Tacta and demonstrates technologies arromagnetic environments. This effect on onunications resiliency technologies arromagnetic environments. This effect on the optimization of the optimization	Prior Years FY 2021 FY 2022 Base - 16.032 25.494 31.660 - - - - dget Item Justification strates technologies and components to increation onments. This Project improves resiliency throater the counter end onments. This Project improves resiliency throater the counter end on the United States (U.S.) Army Futures Programs (\$ in Millions) - ced Technology and Resilient Tactial Network and demonstrates technologies and components romagnetic environments. This effort improve the control of the Army munications resiliency technologies; mature arrow will automatically adapt to changing contested and enterprise environments; mature On-the-M iple satellite constellations with low available sign diversity for tactical vehicles; and mature At iple satellite constellations simultaneously, lead tions Centers (TOC).	R-1 Progr PE 060340 hnology Prior Years FY 2021 FY 2022 Base OCO - 16.032 25.494 31.660 - - - - - - dget Item Justification strates technologies and components to increase resilien onments. This Project improves resiliency through science RF) spectrum signature in order to counter enemy electron nents Program Element (PE) 0602146A (Network C3I Ter with the Under Secretary of Defense for Research and Er med by the United States (U.S.) Army Futures Command Programs (\$ in Millions) ced Technology and Resilient Tactial Networking and Co and demonstrates technologies and components to increate romagnetic environments. This effort improves resiliency thnologies that provide obfuscation of RF spectrum signation s. mponents that support the control of the Army satellite net munications resiliency technologies; mature and optimize will automatically adapt to changing contested environmer nucleations resiliency technologies; mature and optimize will automatically adapt to changing contested environmer d enterprise environments; mature On-the-Move (OTM) iple satellite constellations with low available size, weight th diversity for tactical vehicles; and mature At-the-Halt (A iple satellite constellations simultaneously, leading to Arm tions Centers (TOC).	Istification: PB 2023 Army R-1 Program Elemen PE 0603463A / Network hnology Prior Years FY 2021 FY 2022 Base OCO FY 2023 FY 2023 Total - 16.032 25.494 31.660 - 31.660 - - - - - - - dget Item Justification strates technologies and components to increase resiliency of Wideb onments. This Project improves resiliency through science & technologF) spectrum signature in order to counter enemy electronic surveillar nents Program Element (PE) 0602146A (Network C3I Technology) / with the Under Secretary of Defense for Research and Engineering p med by the United States (U.S.) Army Futures Command. Programs (\$ in Millions) ced Technology and Resilient Tactial Networking and Comms and demonstrates technologies and components to increase resilien romagnetic environments. This effort improves resiliency through scithonologies that provide obfuscation of RF spectrum signature in order s. nponents that support the control of the Army satellite networks in a c nunications resiliency technologies; mature and optimize select SATG will automatically adapt to changing contested environments, leading nd enterprise environments; mature On-the-Move (OTM) satellite gro iple satellite constellations with low available size, weight, and power the diversity for tactical vehicles; and ma	Istification: PB 2023 Army R-1 Program Element (Number/ PE 0603463A / Network C3I Adva hnology Prior Years FY 2021 FY 2022 Base OCO FY 2023 FY 2024 - 16.032 25.494 31.660 - 31.660 14.138 - - - - - - - dget Item Justification - - - - - - strates technologies and components to increase resiliency of Wideband Satellit comments. This Project improves resiliency through science & technology investig RF) spectrum signature in order to counter enemy electronic surveillance capabil nents Program Element (PE) 0602146A (Network C3I Technology) / Projects AW with the Under Secretary of Defense for Research and Engineering priority focus med by the United States (U.S.) Army Futures Command. Programs (\$ in Millions) - - - ced Technology and Resilient Tactial Networking and Comms and demonstrates technologies and components to increase resiliency of Wideb chonologies that provide obfuscation of RF spectrum signature in order to counter s. nponents that support the control of the Army satellite networks in a contested er munications resiliency technologies; mature and optimize select SATCOM techno- uil automatically adapt to changing contested environments, leading to protection denterprise environments; mature	Istification: PB 2023 Army Prior Years FY 2021 FY 2022 FY 2023 FY 2024 FY 2024 FY 2025 - 16.032 25.494 31.660 - 31.660 14.138 - - - - - - - - - States technologies and components to increase resiliency of Wideband Satellite Commun onments. This Project improves resiliency through science & technology investigation. Will other sectors and components up electronic surveillance capabilities. Nents Program Element (PE) 0602146A (Network C3I Technology) / Projects AM8 (Protecter with the Under Secretary of Defense for Research and Engineering priority focus areas and med by the United States (U.S.) Army Futures Command. Programs (\$ in Millions) - ced Technology and Resilient Tactial Networking and Comms - - - and demonstrates technologies and components to increase resiliency of Wideband SATC - - - <t< td=""><td>Istification: PB 2023 Army R-1 Program Element (Number/Name) PE 6003463A / Network C3I Advanced Tec hnology Ang / Proi Technolog Years FY 2021 FY 2022 FY 2023 Base FY 2023 OCO FY 2023 FY 2024 FY 2025 FY 2026 - 16.032 25.494 31.660 - 31.660 14.138 - 14.079 - - - - - - - - - dget Item Justification - - - - - - - strates technologies and components to increase resiliency of Wideband Satellite Communications (SA onments. This Project improves resiliency through science & technology investigation. Will compliment RF) spectrum signature in order to counter enemy electronic surveillance capabilities. - nents Program Element (PE) 0602146A (Network C3I Technology) / Projects AM8 (Protected SATCOM with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army M med by the United States (U.S.) Army Futures Command. FY Programs (\$ in Millions) FY FY - - ced technology and Resilient Tactial Networking and Comms - - FY <td< td=""><td>Jate: April project (Number/Name) Prior <th colspan<="" td=""><td>Jattification: PB 2023 Army Date: April 2022 R-1 Program Element (Number/Name) PE 0603463A / Network C3/ Advance Tec hnology Project (Number/Name) PE 0603463A / Network C3/ Advance Tec hnology Prior FY 2021 FY 2022 FY 2023 FY 2023 FY 2024 FY 2024 FY 2025 FY 2025 FY 2026 FY 2027 Cost To Complete Complete -</td></th></td></td<></td></t<>	Istification: PB 2023 Army R-1 Program Element (Number/Name) PE 6003463A / Network C3I Advanced Tec hnology Ang / Proi Technolog Years FY 2021 FY 2022 FY 2023 Base FY 2023 OCO FY 2023 FY 2024 FY 2025 FY 2026 - 16.032 25.494 31.660 - 31.660 14.138 - 14.079 - - - - - - - - - dget Item Justification - - - - - - - strates technologies and components to increase resiliency of Wideband Satellite Communications (SA onments. This Project improves resiliency through science & technology investigation. Will compliment RF) spectrum signature in order to counter enemy electronic surveillance capabilities. - nents Program Element (PE) 0602146A (Network C3I Technology) / Projects AM8 (Protected SATCOM with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army M med by the United States (U.S.) Army Futures Command. FY Programs (\$ in Millions) FY FY - - ced technology and Resilient Tactial Networking and Comms - - FY <td< td=""><td>Jate: April project (Number/Name) Prior <th colspan<="" td=""><td>Jattification: PB 2023 Army Date: April 2022 R-1 Program Element (Number/Name) PE 0603463A / Network C3/ Advance Tec hnology Project (Number/Name) PE 0603463A / Network C3/ Advance Tec hnology Prior FY 2021 FY 2022 FY 2023 FY 2023 FY 2024 FY 2024 FY 2025 FY 2025 FY 2026 FY 2027 Cost To Complete Complete -</td></th></td></td<>	Jate: April project (Number/Name) Prior Prior <th colspan<="" td=""><td>Jattification: PB 2023 Army Date: April 2022 R-1 Program Element (Number/Name) PE 0603463A / Network C3/ Advance Tec hnology Project (Number/Name) PE 0603463A / Network C3/ Advance Tec hnology Prior FY 2021 FY 2022 FY 2023 FY 2023 FY 2024 FY 2024 FY 2025 FY 2025 FY 2026 FY 2027 Cost To Complete Complete -</td></th>	<td>Jattification: PB 2023 Army Date: April 2022 R-1 Program Element (Number/Name) PE 0603463A / Network C3/ Advance Tec hnology Project (Number/Name) PE 0603463A / Network C3/ Advance Tec hnology Prior FY 2021 FY 2022 FY 2023 FY 2023 FY 2024 FY 2024 FY 2025 FY 2025 FY 2026 FY 2027 Cost To Complete Complete -</td>	Jattification: PB 2023 Army Date: April 2022 R-1 Program Element (Number/Name) PE 0603463A / Network C3/ Advance Tec hnology Project (Number/Name) PE 0603463A / Network C3/ Advance Tec hnology Prior FY 2021 FY 2022 FY 2023 FY 2023 FY 2024 FY 2024 FY 2025 FY 2025 FY 2026 FY 2027 Cost To Complete Complete -

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: /	April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Project (Number / AM9 <i>I Protected</i> S Technology	Name) ATCOM Adva	nced
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
Will mature and optimize select SATCOM technologies that contribute to SAT terminal technology that supports operation over multiple satellite constellatio communications resiliency through diversity for tactical vehicles; and will mature supports operation over multiple satellite constellations simultaneously, leading diversity for Army TOCs.	COM resiliency; will mature OTM satellite groun ons with low available SWAP, leading to Army ure ATH satellite ground terminal technology tha ong to Army communications resiliency through	d t		
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase reflects increased support to technology maturation and op terminal technology in support of multiple satellite constellations leading to re vehicles.	timization efforts of OTM and ATH satellite groun siliency through diversity for Army TOCs and	nd		
Title: High Altitude: Wideband Global Satellite Communications (WGS) Ka Ba	and Surrogate Payload / Aerial Tier Networking	3.809	0.193	-
Description: Demonstrate a WGS surrogate payload for usage on a High Alt existing ground terminals by modifying existing solutions to support Capability Resiliency.	itude Platform (HAP) with seamless transition to y Sets (CS), beginning with CS 23: Capacity &			
FY 2022 Plans: Will validate the potential use of the WGS Surrogate?s receive signals to ider threats.	ntify and geo-locate adversary electronic warfare			
FY 2022 to FY 2023 Increase/Decrease Statement: Effort completes in Fiscal Year 2022 (FY22).				
Title: FY2022 SBIR/STTR Transfer		-	0.933	-
Description: Funding transferred in accordance with Title 15 USC ?638				
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638				
	Accomplishments/Planned Programs Subt	otals 16.032	25.494	31.660
C. Other Program Funding Summary (\$ in Millions) N/A				

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Project (Number/Name) AM9 I Protected SATCOM Advanced Technology
C. Other Program Funding Summary (\$ in Millions)		
Remarks		
D. Acquisition Strategy		
N/A		

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: April	2022	
Appropriation/Budget Activity 2040 / 3		R-1 Program Element (Number/Name)Project (NPE 0603463A / Network C3/ Advanced TecAN2 / NamehnologyTechnolog					Iumber/Name) rowband SATCOM Advanced ly					
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AN2: Narrowband SATCOM Advanced Technology	-	4.813	11.590	-	-	-	-	-	-	-	0.000	16.403
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

<u>Note</u>

In Fiscal Year 2023 (FY23) this Project is Terminated.

A. Mission Description and Budget Item Justification

This Project validates and demonstrates technologies to enable gateway communications across disparate Narrowband Satellite Communications (SATCOM) networks, enabling resiliency in contested environments. The Narrowband SATCOM network is the largest tactical network operated by the Army to provide situational understanding across all echelons. This Project also optimizes technologies and protocols to enable risk mitigation solution sets and awareness through adaptive learning capabilities.

Research in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project BZ6 (Narrowband SATCOM Technology).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Narrowband SATCOM Advanced Technology	4.813	11.166	-
Description: This effort validates and demonstrates technologies to enable gateway communications across disparate Narrowband SATCOM networks, enabling resiliency in contested environments.			
<i>FY 2022 Plans:</i> Will optimize the Narrowband SATCOM gateway network transport management system to incorporate capabilities such as artificial intelligence, machine learning and cognitive computing; validate system design performance and resiliency in maintaining an acceptable level of communication services; perform integrated demonstrations using multiple use-case scenarios of the Networks, Long Range Precision Fires, Air & Missile Defense and Next Generation Combat Vehicle; and mature system to Technology Readiness Level of 5.			
FY 2022 to FY 2023 Increase/Decrease Statement: This Project is Terminated in FY23.			
Title: FY2022 SBIR/STTR Transfer	-	0.424	-
Description: Funding transferred in accordance with Title 15 USC ?638			
FY 2022 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	(Number/Name) Project (Number/Name) C C3I Advanced Tec AN2 I Narrowband SATCOM Adva Technology					
B. Accomplishments/Planned Programs (\$ in Millions)		F	í 2021	FY 2022	FY 2023		
Funding transferred in accordance with Title 15 USC ?638							
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638							
	Accomplishments/Planned Programs Sub	totals	4.813	11.590	-		
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A							

Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060346 hnology	am Elemen 33A / Netwo	t (Number / rk C3I Adva	Name) Inced Tec	Project (N AN4 / Non Technology	u mber/Na r Traditional ′	ne) Waveforms	Advanced
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AN4: Non Traditional Waveforms Advanced Technology	-	7.508	9.300	5.905	-	5.905	5.192	20.173	11.540	9.104	0.000	68.722
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
of intercept, and low probability of environment, such as millimeter w communications in and under com Research in this Project complem AO4 (Energy Efficient Devices Te The cited research is consistent w Research in this Project is perform	detection vave comm tested and ents Progra chnology). vith the Uno ned by the	for the dismo ounications a congested am Element der Secretar Unites State	ounted and and direction electromag (PE) 0602 y of Defens es (U.S.) Ar	vehicular u nal network netic spectr 146A (Netw se for Resea	user. This P ing with col rum environ vork C3I Teo arch and Er command	roject also o nerent comb iments. chnology) / F ngineering p (AFC).	pptimizes tec pining of rad Project AN3 riority focus	chnologies io frequenc (Non Tradi areas and	not typically y signals, to tional Wave the Army M	applied to maintain r forms Tech odernizatio	the tactical networked nnology) an n Strategy.	d Project
B. Accomplishments/Planned Planned Pla	rograms (S	in Millions	<u>5)</u>						FY	2021 F	Y 2022	FY 2023
Title: Non Traditional Waveforms	Advanced	Technology								7.508	8.960	5.905
Description: This effort demonstr environments providing anti-jam, luser. This effort optimizes technolo and directional networking with co under contested and congested el	ates non-tr ow probabi ogies not ty herent com ectromagn	aditional wa lity of interce /pically appl nbining of rac etic spectru	veforms an ept, and lov ied to the ta dio frequen m environm	d technolog v probability actical envir cy signals, nents.	gies for resi y of detectic ronment, su to maintain	lient commu on for the dis ch as millim networked o	inications in smounted an leter wave c communica	contested nd vehicula communicat tions in and	r ions			
FY 2022 Plans: Will mature anti-jam and low proba communications to be better suite communications to support addition at operational distances); exploit a mmW communications systems; a communications) and enable uppr	ability of int d for opera onal users i and mature apply techn ade of a le	ercept, low p tionally relev n complex s government iques develo gacy wavefo	probability o vant, contes cenarios (e t owned mil oped in prev orm(s) via s	of detection sted enviror e.g. on-the-r llimeter way vious years oftware/firm	n communic nments; ena nove high s /e antenna , (cooperati nware upda	ations capal able direction peed direction aperture to n ve beamforr te only; and	bilities for pr nal millimete ional ad-hoo reduce the u ming for voi- enhance w	rotected er wave c network unit cost of ce and data aveform				

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army

Date: April 2022

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022						
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Project (AN4 / No Technolog	ject (Number/Name) 4 I Non Traditional Waveforms Advanc hnology					
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2021	FY 2022	FY 2023			
protection in contested environments using methods, such as combining coope probability of intercept, low probability of detection techniques.	erative beamforming with additional anti-jam lo	w						
<i>FY 2023 Plans:</i> Will mature tactical millimeter wave communications to technology readiness less solution for increased reliability in on-the-move scenarios including support for and integrate improved hybrid beamforming (or active electronically scanned a further reduce low probability of intercept/low probability of detection capability.	evel (TRL) 6. Will mature the robustness of the vehicular (ground based) relay nodes. Will de rray) antennas to increase line-of-sight range a.	e velop and						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding decrease in Fiscal Year 2023 (FY23) reflects planned lifecycle efforts technology and maturation to TRL 6.	ations							
Title: FY2022 SBIR/STTR Transfer			-	0.340	-			
Description: Funding transferred in accordance with Title 15 USC ?638								
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638								
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638								
	Accomplishments/Planned Programs Sub	totals	7.508	9.300	5.905			
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A								

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: Apr	il 2022		
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)ProjetPE 0603463A / Network C3/ Advanced TecAN6 /hnologyInter					e ct (Number/Name) I Prot SATCOM-WB Global SATCOM Canc Adv Tech			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
AN6: Prot SATCOM-WB Global SATCOM Inter Canc Adv Tech	-	1.725	-	-	-	-	-	-	-	-	0.000	1.725	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
through the use of technologies i Beyond Line of Sight (BLOS) cor Research in this Project complen The cited research is consistent v Research in this Project is perfor B. Accomplishments/Planned P Title: Prot SATCOM-WB Global S	ncluding ad nmunicatior nents Progr with the Und med by the Programs (S	aptive interf ns used by t am Elemen der Secretai Unites State in Millions ter Canc Ac	rerence miti he tactical <i>i</i> t (PE) 0602 ry of Defens es (U.S.) Ar s) ty Tech	gation and Army and th 146A (Netv se for Rese rmy Futures	diversity thr nis Project c vork C3I Ter arch and Er s Command	rough multip lemonstrate chnology). ngineering p I (AFC).	oriority focus	a of this values areas and	the Army I	he primary nunication I Modernizati Y 2021	nigh-bandwi ink. on Strategy. FY 2022	FY 2023	
Description: This effort matures congested electromagnetics throu multiple paths. Wideband SATCC project demonstrates protection of	technologie ugh the use OM is the pr of this valua	es providing of technolo imary high-t ble commur	increased r gies includi pandwidth E nication link	resiliency fo ng adaptive 3LOS Comr	or Widebanc e interferenc munications	I SATCOM ce mitigation used by the	from contes and divers a tactical Ar	ted and ity through my and this	3				
					Accomplis	shments/Pl	anned Prog	grams Sub	ototals	1.725	-	-	
C. Other Program Funding Sum N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A	ımary (\$ in	<u>Millions)</u>											

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	Army							Date: Apr	1 2022		
Appropriation/Budget Activity 2040 / 3	bit R-2A, RDT&E Project Justification: PB 2023 Army opriation/Budget Activity / 3 COST (\$ in Millions) Prior Years FY 2021 FY 2022 FY COE - Every Receiver is a or Advanced Tech - 2.934 2.887 htty of RDT&E Articles - - - ission Description and Budget Item Justification Project optimizes automated exploitation and fusion analysis tools and emerging data sources to improve understanding of the threat earch in this Project complements Program Element (PE) 0603463 anced Tech) and PE 0602146A (Network C3I Technology) / Project cited research is consistent with the Under Secretary of Defense for earch in this Project is performed by the Unites States (U.S.) Army complishments/Planned Programs (\$ in Millions) Complishments/Planned Programs (\$ in Millions) Cate and higher quality decision-making support for the commander and igence, surveillance and reconnaissance (ISR) planning and executas efforts that provide the capability to identify, fuse, and trace/trac 022 Plans: add and demonstrate enhanced attribute and cell level security cap porm to show functionality across different classification boundaries; postrate machine learning capabilities within the converged platforr				R-1 Program Element (Number/Name)ProgramPE 0603463A / Network C3I Advanced TecAN8hnologyAdvanced Tec					Yroject (Number/Name) N8 / COE - Every Receiver is a Sensor Advanced Tech			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
AN8: COE - Every Receiver is a Sensor Advanced Tech	-	2.934	2.887	1.371	-	1.371	6.510	6.433	6.435	6.434	0.000	33.004	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
A. Mission Description and Buc This Project optimizes automated new and emerging data sources Research in this Project complem Advanced Tech) and PE 060214 The cited research is consistent w Research in this Project is perfor	dget Item J d exploitatic to improve nents Progr 6A (Networ with the Un-	ustification on and fusion understandi am Elemen k C3I Techr der Secretan Unites State	n analysis to ng of the th t (PE) 0603 hology) / Pro ry of Defens es (U.S.) Ai	ools, applica ireat picture 463A (Netw bject AN7 (f se for Rese rmy Futures	ations, and a and more of vork C3I Ad COE - Every arch and Er s Command	software se efficiently su vanced Tec y Receiver is ngineering p (AFC).	rvices that h ipport near- hnology) / F s a Sensor ⁻ riority focus	narvest, cor real time Si Project AO1 Tech). areas and	relate and fi ituational Ur (UNT - Eve the Army M	use tactica nderstandir ery Receive lodernizatio	l receiver so ng of the bat or is a Senso on Strategy.	ources with tlefield. or	
B. Accomplishments/Planned P	Programs (\$ in Millions	s)			(*****)			FY	2021	FY 2022	FY 2023	
Title: Advanced Data Analytics for	or Situationa	al Awarenes	s							2.934	2.782		
Description: This effort improves faster and higher quality decision intelligence, surveillance and reco well as efforts that provide the ca	s software to -making su onnaissanc pability to io	echnologies pport for the e (ISR) plan dentify, fuse	for intellige commande ning and ex , and trace/	ence/missio er and his k kecution at t track specif	n command ey staff. Sp the Task Fo fic targets in	l (MC) missi ecific efforts prce/Battalio an asymme	on collabora focus on in n through tr etric enviror	ation to pro tegrating oop-level, a ment.	vide as				
FY 2022 Plans: Will add and demonstrate enhance platform to show functionality acre demonstrate machine learning ca Exploitation, and. Dissemination of demonstrating Tactical Edge data	ced attribute oss differen pabilities w (PED) work a synchroniz	e and cell lev It classificati ithin the cor flows and et zation to sup	vel security on boundar overged pla fficient data oport the Di	capabilities ries; Will int tform; Will o synchroniz sconnected	within the egrate mack demonstrate cation at low I, Intermitter	converged in hine learning tactical dis ver echelons nt, and Limit	ntelligence a g framework tributed Pro by develop red (DIL) en	and operati ks to cessing, ing and vironment.	ons				
FY 2022 to FY 2023 Increase/De Funding change reflects planned	conclusion	atement: of this task.											
Title: Intelligence, Surveillance a	nd Reconna	aissance Op	timization f	or Multi-Do	main Opera	tions Suppo	ort Advanced	d Tech		-	-	1.371	

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	R-2A, RDT&E Project Justification: PB 2023 Army								
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Project (Number/Name) AN8 / COE - Every Receiver is a Sens Advanced Tech							
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023				
Description: This effort will use automated threat process to focus se synchronized across echelons optimizing scheduling and placement of	ensor collection requirements. Collection plans are to be of sensor assets from both national and joint capabilitie	e s.							
FY 2023 Plans: Will evaluate sensor optimization algorithms. Will evaluate external int platforms.	terfaces of Program of Record (PoR) collection manag	ement							
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned initiation of this task.									
Title: FY2022 SBIR/STTR Transfer			-	0.105	-				
Description: Funding transferred in accordance with Title 15 USC ?6	38								
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638									
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638									
	Accomplishments/Planned Programs Sub	ototals	2.934	2.887	1.371				
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A									

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: April	2022	
Appropriation/Budget Activity 2040 / 3	priation/Budget Activity 3				R-1 Program Element (Number/Name)FPE 0603463A / Network C3I Advanced TecFhnologyF				Project (Number/Name) AO1 <i>I UNT - Every Receiver is a Sensor</i> <i>Advanced Tech</i>			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AO1: UNT - Every Receiver is a Sensor Advanced Tech	-	2.888	2.944	-	-	-	3.156	3.153	3.154	3.153	0.000	18.448
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this project has a funding skip year.

A. Mission Description and Budget Item Justification

This Project demonstrates high fidelity Cyber-Electromagnetic Activity (CEMA) situational understanding by exploiting tactical receivers with sufficient capabilities as sensors. This Project also optimizes real-time radio frequency mapping of the tactical environment in support of network operation and decision making.

Research in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Projects AN9 (UNT - Every Receiver is a Sensor Technology) and Project AN7 (COE - Every Receiver is a Sensor Technology); and PE 0603463A (Network C3I Advanced Technology) / Project AN8 (COE Every Receiver is a Sensor Advanced Tech).

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

Research in this Project is performed by the Unites States (U.S.) Army Futures Command (AFC).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Multi Intelligence Modernization supporting Multifunction Operations	2.888	2.837	-
Description: This effort will optimize Intelligence Community investments in software frameworks and exploits against threat signals of interest (SOI) to mature a library of open, modular, and scalable software solutions that address identified capability gaps and to provide the commander with electronic situational awareness while at the same time protecting his assets from enemy deception and jamming.			
<i>FY 2022 Plans:</i> Demonstrate Electronic Warfare payloads designed to operate from high altitude, long endurance platforms; mature and demonstrate small, form factor hardware standards to facilitate the use of modular hardware on small Size, Weight and Power (SWAP) platforms such as high altitude, long endurance platforms and small, unmanned aerial vehicles. <i>FY 2022 to FY 2023 Increase/Decrease Statement:</i>			
FY 2022 to FY 2023 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Proje AO1 / Advar	Sensor		
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023
In Fiscal Year 2023 (FY23) this Project has a funding Skip Year.					
Title: FY2022 SBIR/STTR Transfer			-	0.107	-
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	totals	2.888	2.944	-
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A					

Exhibit R-2A, RDT&E Project J	ustification	: PB 2023 A	Army							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3		R-1 Progr PE 060346 hnology	R-1 Program Element (Number/Name)ProjePE 0603463A / Network C3I Advanced TecAO3 / (STAL)					e ct (Number/Name) I Stand-In Advanced RF Effects RE) Adv Tech				
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AO3: Stand-In Advanced RF Effects (STARE) Adv Tech	-	2.888	-	-	-	-	-	-	-	-	0.000	2.888
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Research in this Project complet The cited research is consistent Research in this Project is perfo	ments Progr with the Uno rmed by the	am Elemen der Secreta United Stat	t (PE) 0602 ry of Defens tes (U.S.) A	146A (Netv se for Rese rmy Futures	vork C3I Ter arch and Er s Command	chnology) / ngineering p I (AFC).	Project AO2	2 (Stand-In s areas and	Advanced the Army	RF Effects Modernizati	(STARE)). on Strategy.	
B. Accomplishments/Planned	Programs (S	\$ in Million	<u>s)</u>						F	Y 2021	FY 2022	FY 2023
<i>Title:</i> Stand-In Advanced Radio <i>Description:</i> This effort harvests research, to mature hardware for	Frequency (s investment r demonstrat	RF) Effects ts from Appl tion of capa	Advanced ied Researd bilities for d	Technology ch compone istributed E	/ ent level ma Electronic W	ituration and arfare.	d hardware	synchroniz	ation	2.888	-	-
					Accomplis	shments/Pl	anned Pro	grams Sub	ototals	2.888	-	-
C. Other Program Funding Sur N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A	<u>nmary (\$ in</u>	<u>Millions)</u>										

Exhibit R-2A, RDT&E Project Ju	stification:	: PB 2023 A	rmy							Date: April	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)Project (NPE 0603463A / Network C3I Advanced TecAO6 / TaghnologyAdv Tech				lumber/Name) Track and Locate Small Satellites			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AO6: Tag Track and Locate Small Satellites Adv Tech	-	16.051	-	-	-	-	-	-	-	-	0.000	16.051
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates payloads, sensors, and data down link systems for tactically responsive Space and High Altitude platforms supporting Army ground forces. This Project matures, demonstrates, and integrates lightweight materials, hardware components with reduced power consumption, and advanced data collection, processing, and dissemination capabilities. This Project also improves algorithms that process space and near space sensor data in real and near real time for integration into battlefield operating systems including a technical demonstration of a sensor designed to provide space-based situational awareness to the tactical Warfighter; Development and demonstration of small satellite capabilities, which include classified payloads, to provide Assured Positioning, Navigation, and Timing services to the tactical ground component Warfighters; Constellation of space-based sensors that provide Reconnaissance, Surveillance, and Target Acquisition (RSTA) and Situational Awareness (SA) to the ground force commander to support Multi-Domain Operations (MDO); Applied research in quantum sciences based communications, sensing, and data teleportation to mature current technologies for small spacecraft applications.

These efforts support the Army's ability to control and exploit space assets that contribute to current and future military operations as defined in the national, Department of Defense (DOD), and Army future space strategies.

The Research completed under this Project supports the Army Modernization Priorities.

Research in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AO5 (Tag Track and Locate Small Satellites Technology).

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

Research in this Project is performed by the United States Army Space and Missile Defense Command (USASMDC) Technical Center (TC).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Tag, Track, and Locate Small Satellites	16.051	-	-
Description: This effort matures and demonstrates technologies required for smaller, warfighter-responsive sensor and communication Low Earth Orbit (LEO) small satellite constellations. Work will augment, improve, exploit and optimize existing commercial and DoD technologies and networks. This effort also validates software, hardware, and algorithms used to enable space-based capabilities in support of the Army's Modernization Priorities. This effort will exploit commercial advances and opportunities in small satellite constellation and payload management toward future Army concepts.			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Projec AO6 / Adv Te	ct (Number/N Tag Track an ech	lame) d Locate Sm	all Satellites
B. Accomplishments/Planned Programs (\$ in Millions)		[FY 2021	FY 2022	FY 2023
	Accomplishments/Planned Programs Sub	totals	16.051	-	-
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>					
<u>D. Acquisition Strategy</u> N/A					

Exhibit R-2A, RDT&E Project Justifica	ation: PB 2023 A	Army							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3		R-1 Program Element (Number/Name) Proje PE 0603463A / Network C3I Advanced Tec AO7 / hnology Adv 7					ect (Number/Name) <i>I EW for Maneuver Operations (EMC</i> <i>Tech</i>				
COST (\$ in Millions) Prio	or Irs FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AO7: EW for Maneuver Operations (EMO) Adv Tech	- 2.810	5.769	6.142	-	6.142	3.138	1.084	3.136	3.135	5 0.000	25.214
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-		
A. Mission Description and Budget Ite This Project matures and demonstrates opportunity in Anti-Access/ Area Denial Research in this Project complements F The cited research is consistent with the Research in this Project is performed by	em Justification technologies tha (A2/AD) environ Program Elemen e Under Secretar	at understar ments, resto t (PE) 0602 ⁻ ry of Defens es (U.S.) Ar	nd conteste ore network 146A (Netw se for Resea my Futures	d spectrum k capabilitie vork C3I Teo arch and Er s Command	features, se s, and enab chnology) / / ngineering p (AFC).	ense, locate le maneuve AP5 (Electro riority focus	, and cue fi er and fires. onic Warfar areas and	res missior e Technolo the Army N	is to create gy). Iodernizatio	windows of on Strategy.	
B. Accomplishments/Planned Program	ms (\$ in Million	<u>s)</u>						F۱	2021	FY 2022	FY 2023
<i>Title:</i> Electronic Warfare (EW) for Mane <i>Description:</i> This effort matures and de reconnaissance (ISR) in support of Army <i>FY 2022 Plans:</i> Will mature (i.e., technology readiness le environments, threats, and hardware; ar	uver Ops monstrates harc y tactical operati evel 6) and demo nd flight-demons	lware and so ons. onstrate EW trate distribu	oftware to o capabilitie uted and co	conduct EW es for use ag pordinated c	for intellige gainst senso apabilities fo	nce, surveil or systems in or novel geo	lance, and n represent blocation.	ative	1.601	1.672	_
FY 2022 to FY 2023 Increase/Decrease Funding change reflects planned conclu	e Statement: sion of this effor	t.									
Title: Simultaneous Countermeasure for	r Active Reconna	aissance an	d Surveilla	nce (SCARS	S)				1.209	-	-
Description: This effort matures and de (M&S) of threat ISR systems to validate	emonstrates EW coordinated and	capabilities collaborativ	leveraging ve non-kine	hardware-in etic effects.	n-the-loop a	nd modelin	g and simul	ation			
Title: Stand-in Advanced RF Effects Adv	vanced Technolo	ogy							-	2.698	3.078
Description: This effort matures and de systems against certain threat systems.	emonstrates high	ly advanced	l hardware	and softwa	re to improv	e power-on	-target for E	EW			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Project (Number/Name) AO7 I EW for Maneuver Operations (E Adv Tech						
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2021	FY 2022	FY 2023			
FY 2022 Plans: Will mature and optimized synchronization hardware, advanced signal process Field demonstrate hardware system improvements to validate the effectiveness systems.	sing, and EW system designs for distributed EV ss of distributed EW against certain classes of t	N. hreat						
FY 2023 Plans: Will demonstrate Array Control Payload synchronization capabilities for distributive waveforms capability at a technology readiness level (TRL) 6. Will deliver an electronic warfare.	uted EW techniques. Will demonstrate compleating design unit for cooperative network	x æd						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.								
Title: Tactical Force Signature Effects (TForSE) Advanced Technology ? Court	nter ISR Techniques		-	1.187	3.064			
Description: This effort matures and demonstrates Electronic Warfare capabi Intelligence, Surveillance, and Reconnaissance (ISR) systems leveraging high simulation (M&S), and representative systems.	lities against adversary counter-fire sensors ar i fidelity hardware-in-the-loop, modeling and	nd						
FY 2022 Plans: Will mature initial EW capabilities against adversary systems that provide battl and validate EW effectiveness in laboratory or representative environments to	efield situational understanding and localizatio mask and deceive blue locations.	n;						
FY 2023 Plans: Will integrate advanced apertures and decoy techniques into complex modelin contested operating environment. Will demonstrate advanced aperture and de determined	ng and simulation scenarios to prove efficacy in acoy techniques via a field validation exercise to	a b be						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase supports maturation of advanced aperture and decoy technic	ques.							
<i>Title:</i> FY2022 SBIR/STTR Transfer			-	0.212	-			
Description: Funding transferred in accordance with Title 15 USC ?638								
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638								
FY 2022 to FY 2023 Increase/Decrease Statement:								

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	oril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Projec AO7 / I Adv Te	t (Number/N EW for Mane ch	l ame) uver Operatio	ons (EMO)
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023
Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	totals	2.810	5.769	6.142
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>					
<u>D. Acquisition Strategy</u> N/A					

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3		R-1 Program Element (Number/Name)Project (NuPE 0603463A / Network C3I Advanced TecAP6 / C4IShnologyAdvanced Tec						me) ed Demonstr	rations			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AP6: C4ISR Integrated Demonstrations Advanced Tech	-	3.603	-	-	-	-	-	-	-	-	0.000	3.603
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
The cited research is consistent were consistent were consistent were consistent were consistent with the constant of the cons	with the Une	der Secreta United Stat	ry of Defensies (U.S.) A	se for Rese rmy Future	earch and Er s Commanc	ngineering p I (AFC).	priority focus	s areas and	the Army M	lodernizatio	on Strategy.	
B. Accomplishments/Planned P	rograms (5 in Million	<u>s)</u>						FY	2021	FY 2022	FY 2023
Description: This effort provides reduction processes, quantifiable field-based performance data to s resiliency, and situational underst	appropriate technology upplement anding thro	e SoS engin performand Technology ough S&T ad	ieering rigo ce in a SoS / Readiness dvancemen	r for multiple context, da s Level Ass ts.	e S&T proje ata- driven p essments. ∃	ects by provi programmati This effort p	ding field-ba ic decision s rovides netv	ased risk support, and work autom	d ation,	3.003	-	-
					Accomplis	shments/Pl	anned Pro	grams Sub	ototals	3.603	-	-
C. Other Program Funding Sum N/A <u>Remarks</u> D. Acquisition Strategy N/A	mary (\$ in	<u>Millions)</u>										

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	Army							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progr PE 060346 hnology	am Elemen 63A / Netwo	t (Number ork C3I Adva	(Name) anced Tec	Project (I AP8 / Cor Priorities	lumber/Na nms/Horiz I Adv Tech	me) Int for Army I	Mod
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AP8: Comms/Horiz Int for Army Mod Priorities Adv Tech	-	6.798	-	-	-	-	-	-	-	-	0.000	6.798
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Science & Technology (S&T) and complexity. Research in this Project complex The cited research is consistent Research in this Project is perfor	d commerci nents Progr with the Un med by the	al technolog am Elemen der Secreta Unites Stat	y adapted t t (PE) 0602 ry of Defens es (U.S.) A	to mitigate 146A (Netv se for Rese rmy Futures	performance vork C3I Tea arch and Er s Command	e gaps in the chnology) / ngineering p (AFC).	e presence Project AP7 priority focus	of electroni 7 (Comms/ŀ s areas and	c warfare (loriz Int for the Army I	EW) systen Army Mod ⁄lodernizati	ns and reduc Priorities Te on Strategy.	ce network
B. Accomplishments/Planned F	Programs (\$ in Million	<u>s)</u>						F	r 2021	FY 2022	FY 2023
Title: Communications Support to	o Army Moo	lernization F	Priorities/Hc	orizontal Inte	egration Fie	lds Advance	e Technolog	ду		6.798	-	-
Description: This effort provides end-to-end network demonstratio presence of EW systems and red	unified con ons which le luce networ	nmunication verage S&T k complexit	s for the Ar and comm y.	my's moder ercial techr	rnization prie nology adap	orities throu ted to mitig	gh operatio ate perform	nally-releva ance gaps	ant, in the			
					Accomplis	shments/Pl	anned Pro	grams Sub	ototals	6.798	-	-
C. Other Program Funding Sum N/A Remarks D. Acquisition Strategy N/A	<u>ımary (\$ in</u>	<u>Millions)</u>										

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: April	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060346 hnology	am Elemen 33A / Netwo	t (Number / rk C3I Adva	Name) anced Tec	Project (Number/Name) c AP9 / Next Generation HF Advanced Technology			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AP9: Next Generation HF Advanced Technology	-	6.739	7.730	-	-	-	-	-	-	-	0.000	14.469
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

<u>Note</u>

In Fiscal Year 2023 (FY23) this Project has completed.

A. Mission Description and Budget Item Justification

This Project improves performance of technologies to provide assured and resilient reach-back communications in satellite denied or degraded environments. This Project optimizes performance of new high frequency (HF) technology to provide low probability of detection and anti-jam capabilities to overcome emerging electronic warfare threats.

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Next Generation HF Advanced Technology	6.739	7.444	-
Description: This effort improves performance of technologies to provide assured and resilient reach-back communications in satellite denied or degraded environments. This effort optimizes performance of HF technology to provide low probability of detection and anti-jam capabilities to overcome emerging electronic warfare threats.			
<i>FY 2022 Plans:</i> Will enhance the HF Communications Hub and mature the edge terminal HF radio hardware and software to provide an assured, resilient, alternate beyond line-of-sight communications link for tactical and strategic Army assets; conduct technology readiness level 6 demonstration in a beyond line-of-sight operationally relevant environment of the HF Communications Hub proof-of-concept operating with legacy HF radios, other edge radio terminals, and the Regional Hub Node integrated into the larger tactical network executing mission threads; provide final assessment of performance from technology demonstration and provide recommendations to transition organizations; assess the performance against pacing threats in satellite denied and area denied environments to determine the increased resiliency to enemy detection and interception.			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Proje AP9 / Techn	ct (Number/N Next Genera hology	lame) tion HF Advai	nced
B. Accomplishments/Planned Programs (\$ in Millions)		[FY 2021	FY 2022	FY 2023
In FY23 this effort has completed.					
Title: FY2022 SBIR/STTR Transfer			-	0.286	-
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	totals	6.739	7.730	-
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A					

Exhibit R-2A, RDT&E Project Ju	stification	PB 2023 A	rmy							Date: Apri	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060346 hnology	am Elemen 33A / Netwo	t (Number / rk C3I Adva	Name) anced Tec) Project (Number/Name) Tec AQ1 / Spectrum Obfuscation Advance Technology			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AQ1: Spectrum Obfuscation Advanced Technology	-	3.744	-	-	-	-	-	-	-	-	0.000	3.744
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project validates and demonstrates technologies that provide obfuscation of radio frequency (RF) spectrum signature in order to counter enemy electronic surveillance capabilities. This Project optimizes, matures and demonstrates novel materials, technologies, techniques and applications that increase camouflage and concealment capabilities against known and emerging sensor threats, provide effective deception capabilities, increase survivability, mature analytical processes for modeling performance of signature management technologies during multi-domain operations as well as developing combinations of physical and electronic signature decoy components. These technologies will produce proof of concept system demonstrators that decrease the probability of detection and targeting by peer and near-peer adversaries, enabling freedom of movement of semi-independent and dispersed formations

Research in this Project complements Program Element (PE) 0603463A (Network C3I Advanced Technology) / Project CI7 (Mobile & Survivable Command Post (MASCP) Adv Tech) and 0603118A (Soldier Lethality Advanced Technology) / Project AZ6 (Soldier Signature Management Advanced Technology).

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

Research in this Project is performed by the Unites States (U.S.) Army Futures Command (AFC).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Camouflage, Concealment and Deception	3.744	-	-
Description: This effort demonstrates innovative camouflage, concealment and deception technologies for expeditionary assets (i.e. mission command platforms, battle management centers and supporting equipment) to defeat advanced current and emerging adversary Intelligence, Surveillance and Reconnaissance (ISR) threats, and to reduce the probability of detection in multi-domain operations. Matures physics-based models for material and system performance that support probability of detection metrics in the multi-domain operational environment, assisting in closing the capability gap between current camouflage, concealment and deception technologies and defeating enemy sensorial capabilities in future operating environments.			
Accomplishments/Planned Programs Subtotals	3.744	-	-
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022						
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Project (Number/Name) AQ1 / Spectrum Obfuscation Advanced Technology				
C. Other Program Funding Summary (\$ in Millions)						
Remarks						
D. Acquisition Strategy						
N/A						

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: Apri	1 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060346 hnology	am Elemen 33A / Netwo	t (Number / rk C3I Adva	Project (N AQ5 / Sen Architectur	ject (Number/Name) 5 I Sensor CE-Integrated Sensor hitecture Adv Tech			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AQ5: Sensor CE-Integrated Sensor Architecture Adv Tech	-	1.971	1.645	0.625	-	0.625	1.946	1.966	1.963	1.962	0.000	12.078
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
This Project matures and demons Research in this Project supports Precision Fires and Future Vertica The cited research is consistent v Research in this Project is perform	strates a se the Army S al Lift mode vith the Und med by the	nsor interop Science and ernization pr der Secretar Unites State	perability and Technolog iorities. ry of Defens es (U.S.) Ar	chitecture c y Network, se for Resea my Futures	onsisting of Next Gener arch and Er Command	standards, ration Comb ngineering p (AFC).	interfaces, a at Vehicle, riority focus	and service Soldier Leth areas and	s. nality, Air ar the Army N	nd Missile D Iodernizatic	efense, Loi on Strategy.	ng Range
B. Accomplishments/Planned P	rograms (S	in Millions	s <u>)</u>						FY	2021 F	Y 2022	FY 2023
Title: Sensor CE - Integrated Sen	sor Archite	cture								1.971	1.585	0.625
Description: This effort matures and demonstrates an agile and adaptive interoperability sensor architecture that allows a system to dynamically discover and leverage other systems on a network without any specific or prior knowledge across limited, heterogeneous resources and against a peer adversary. The goal of this effort is to develop standards, models, and protocols that provide a common language for sensor systems to connect, publish their capabilities and needs, and interact with other systems, even on disadvantaged networks. The benefits of this effort are increased sensor collaboration, reduced decision timelines, reduced soldier load, and reduced integration costs.							ed, s that ems,					
FY 2022 Plans: Will optimize network awareness technologies to improve bandwidth utilization for sensor interoperability; will demonstrate dynamic allocation of resources to show the correct sensor data assisting in providing targeting information to effectors.												
FY 2023 Plans: Will demonstrate intelligent subsc discovered on a network. Will opti multiple target indicators.	ription serv mize appro	ices and eff aches for se	ect on data ensor to sho	distribution poter data c	to show re- confidence t	duced time f o enable val	for a sensoi lidation and	r to be de-conflict	ion of			
FY 2022 to FY 2023 Increase/De	crease Sta	ntement:										

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date	April 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Project (Number AQ5 / Sensor Cl Architecture Adv	ct (Number/Name) I Sensor CE-Integrated Sensor tecture Adv Tech				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023			
Funding decrease reflects reduction in automatic redundancy efforts.							
Title: FY2022 SBIR/STTR Transfer			0.060	-			
Description: Funding transferred in accordance with Title 15 USC ?638							
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638							
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638							
	Accomplishments/Planned Programs Sub	totals 1.97	1 1.645	0.625			
N/A Remarks <u>D. Acquisition Strategy</u> N/A							

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army											Date: April 2022		
Appropriation/Budget Activity 2040 / 3				R-1 Program Element (Number/Name)Project (NPE 0603463A / Network C3I Advanced TecAQ8 / HighhnologyTools Adv					lumber/Name) h Tempo Data Driven Decision Tech				
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
AQ8: High Tempo Data Driven Decision Tools Adv Tech	-	2.911	3.099	6.636	-	6.636	3.586	3.762	3.899	3.898	0.000	27.791	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
A. Mission Description and Budget Item Justification This Project matures and demonstrates data driven decision tools that help develop cyber situational understanding (SU) for Commanders. It enhances decision-making													

This Project matures and demonstrates data driven decision tools that help develop cyber situational understanding (SU) for Commanders. It enhances decision-making and accurately assesses and integrates cyber impacts with all of the domains in Multi-Domain Operations (MDO) and thereby enhances mission effectiveness by improving decision cycles.

Research in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AQ7 (High Tempo Data Driven Decision Tools Technology).

The cited research 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 2021	FY 2022	FY 2023
Title: High Tempo Data Driven Decision Tools Advanced Technology	2.911	2.985	3.319
Description: This effort matures and demonstrates data driven decision tools tailored to reflect specific mission / information needs of the commander and individual staff members comprised of the following: software that facilitates the exchange of cyber data and mission information between the cyber electromagnetic activities (CEMA) cell, the S-6 and other staff officers (e.g., S-3, S-2, Fire Support Officer (FSO)), helping to assess higher-level impacts of lower-level events, and capturing the information as part of models for possible re-use; and software that dynamically populates the Common Operating Picture (COP) with visualizations designed for exploration and understanding of the impact of the cyber domain on the current mission.			
FY 2022 Plans: Update COP Visualizations based on soldier/stakeholder feedback; develop cyber visualization guides to inform COP Visualization development; incorporate additional commander's cyber needs into COP Visualizations; demonstrate improved cyber SU in S-6 / S-3 / Commander perspectives and collaboration in field environment and dynamically connect to canned data; demonstrate that the Collaborative Cyber Understanding software dynamically updates the COP Visualizations and cyber decision models; conduct a soldier evaluation of cyber decision model (cyber workflow/decision making process).			
FY 2023 Plans: Will develop software that connects to available and live data sources in a field environment for a soldier Collaborative Cyber Understanding demonstration. Will further mature existing and new cyber data sources, cyber avenues of approach and the cyber data visualization tool based on experimentation feedback. Wil demonstrate that the Collaborative Cyber Understanding software			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name)FPE 0603463A / Network C3I Advanced TecAhnology7	Project (Number/Name) AQ8 I High Tempo Data Driven Decision Tools Adv Tech					
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023			
dynamically updates the COP Visualizations and cyber decision momodel (cyber workflow/decision making process).	dels; Will conduct a soldier demonstration of cyber decision						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.							
Title: RoadRunner Advanced Technology		-	-	3.317			
Description: This effort matures and demonstrates stakeholder prid drive decisions to enable dominance in complex Multi-Domain Oper	pritized capabilities that fuse intel and ops perspectives that ations.						
<i>FY 2023 Plans:</i> Engagements with peer/near-peer and highly technical adversaries concurrent Development, Security and Operations (DEVSECOPS) e in friendly versus enemy engagements using digitized plans and rea insights, vulnerabilities, and opportunities during planning and execu	will reveal new vulnerabilities and opportunities. Using a environment, will develop and demonstrate optimal strategi al-time decision support providing exposure to non-obvious ution phases.	?S					
FY 2022 to FY 2023 Increase/Decrease Statement: In FY23 this effort will build upon the High Tempo Data Driven Decis operations information that enable faster decision making process	sion Tools effort to include the fusion of intelligence and						
Title: FY2022 SBIR/STTR Transfer		-	0.114	-			
Description: Funding transferred in accordance with Title 15 USC 3	?638						
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638							
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638							
	Accomplishments/Planned Programs Subto	tals 2.911	3.099	6.636			
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A							
PE 0603463A: Network C3I Advanced Technology							

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: April 2022		
ppropriation/Budget Activity R-1 Program Element (I 040 / 3 PE 0603463A / Network hnology P				It (Number/Name)Project (Number/Name)Drk C3I Advanced TecAR4 I Intelligent Env Battlefield Awaren Adv Tech				vareness				
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AR4: Intelligent Env Battlefield Awareness Adv Tech	-	3.138	4.075	-	-	-	-	-	-	3.643	0.000	10.856
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project is realigned to Program Element (PE) 0603042A (C3I Advanced Technology) / Project CX7 (Intelligent Env Battlefield Awareness Adv Tech).

A. Mission Description and Budget Item Justification

This Project demonstrates and optimizes technologies to allow Soldiers to maneuver faster around or through existing environmental (urban/industrial) conditions and physical landscape constraints. This Project also matures and demonstrates web modules/software tools delivering crucial geo-chemical resources and advanced knowledge of geo-environmental infrastructure to mission planners.

Research in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AR3 (Intelligent Environmental Battlefield Awareness).

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

Research in this Project is performed by the Unites states (U.S.) Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023		
Title: Geo-Forensics for Reconnaissance Exploitation	1.503	1.142	-		
Description: This effort provides unique terrestrial patterns to describe and predict the geological, biological, and overall ecological information associated with anti-access/area denial (A2/AD) sites from the continental U.S. (CONUS) analogs.					
FY 2022 Plans: Mature search algorithms to match global analogs, ?smart? interpolation function, and expand search criteria by desired geochemical characteristics.					
FY 2022 to FY 2023 Increase/Decrease Statement: In FY23 this Project is realigned to PE 0603042A (C3I Advanced Technology) / Project CX7 (Intelligent Env Battlefield Awareness Adv Tech).					
Title: Arctic Threat Demonstrations	1.635	1.237	-		
Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022			
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Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Project (AR4 I Inte Adv Tech	Number/I elligent Er	Name) av Battlefield A	Awareness
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2021	FY 2022	FY 2023
Description: This effort matures and demonstrates visualization tools which e physical threats, hazards and dependencies posed by terrain and weather extr	nable geospatial decisions based on anticipate remes in cold regions.	d			
<i>FY 2022 Plans:</i> Demonstrate environmental prediction algorithms to accurately assess ice strue operational movement.	cture, permafrost and freeze thaw events for				
FY 2022 to FY 2023 Increase/Decrease Statement: In FY23 this Project is realigned to PE 0603042A (C3I Advanced Technology) Adv Tech).	/ Project CX7 (Intelligent Env Battlefield Aware	ness			
Title: Predictive Geographic Information System (GIS) Mapping (physical) Der	nonstration		-	1.548	-
Description: This effort reduces the impact of unknown and changing terrain of datasets and overlays of terrain obstacles producing a high-fidelity map that in and permafrost/ice data.	oarate y,				
FY 2022 Plans: Demonstrate a comprehensive database of input and output variables used ac identify compatible integration points.	ross terrain (soil, hydrologic, and arctic) model	s and			
FY 2022 to FY 2023 Increase/Decrease Statement: In FY23 this Project is realigned to PE 0603042A (C3I Advanced Technology) Adv Tech).	/ Project CX7 (Intelligent Env Battlefield Aware	ness			
Title: FY 2022 SBIR/STTR Transfer			-	0.148	-
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	totals	3.138	4.075	-
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Project (Number/Name) AR4 I Intelligent Env Battlefield Awareness Adv Tech
C. Other Program Funding Summary (\$ in Millions)	· · · · · · · · · · · · · · · · · · ·	
<u>Remarks</u>		
N/A		
D. Acquisition Strategy		
N/A		

Exhibit R-2A, RDT&E Project J	ustification	: PB 2023 A	vrmy							Date: Apr	il 2022			
Appropriation/Budget Activity 2040 / 3	Appropriation/Budget Activity 2040 / 3						R-1 Program Element (Number/Name)ProjePE 0603463A / Network C3I Advanced TecAR6 / ThreadhnologyThread				ect (Number/Name) I Understanding the Environment as a eat Adv Tech			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost		
AR6: Understanding the Environment as a Threat Adv Tech	-	2.706	2.524	2.767	-	2.767	2.730	1.682	-	-	0.000	12.409		
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-				
Project matures and demonstrate planning tools. Research in this Project compler The cited research is consistent Research in this Project is perfor	ments Progr with the Uno	am Elemen e software a am Elemen der Secretar Engineer R	constraints ccurately in t (PE) 0602 ry of Defens esearch an	tegrating th 146A (Netw se for Rese d Developn	a risk versu ne risks of p vork C3I Te arch and Er nent Center	is reward ca hysical, che chnology) P ngineering p	roject AR5	operating in biological th (Understands) areas and	different ar nreats in an ding the En the Army N	eas of the urban envi vironment a lodernizati	aroan theate ronment inte as a Threat on Strategy.	Technolo).		
B. Accomplishments/Planned F	Programs (s in Million	5)						F	(2021	FY 2022	FY 2023		
Title: Environmental Threat Tech	nology Den	nonstrations	for route p	lanning						1.357	1.288	1.030		
Description: This effort matures environmental threats with mane environmental matrices in comple FY 2022 Plans: Mature and validate a risk-course and materials (TIC/Ms) in air, wa	and demon uver constra ex urban en e forecasting ter, and soil	strates a so aints along p vironments g algorithms in denied u	ftware tool ootential rou and include that accour rban terrain	that informs ites. The sc s the capat nt for dynar	s and baland oftware integ pility for rout mics and pe	ces the risk grates the ris ting in off-ro rsistence of	of exposure sks associa ad scenaric	e to ted with diff os. trial chemic	ferent					
FY 2023 Plans: Will demonstrate the next-phase degradation products in air, wate	capability o r and soil.	f minimally-	viable weigł	nted risk co	urse foreca	sting algorit	hms based	on sorption	/					
FY 2022 to FY 2023 Increase/D	ecrease Sta	atement:												

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	oril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Projec AR6 / Threat	t (Number/N Understandir Adv Tech	l ame) Ig the Enviror	nment as a
htt R-2A, RDT&E Project Justification: PB 2023 Army opriation/Budget Activity R-1 Program Element (Number/Name) / 3 PE 0603463A / Network C3I Advanced Tec hnology complishments/Planned Programs (\$ in Millions) PE 0603463A / Network C3I Advanced Tec hnology complishments/Planned Programs (\$ in Millions) In decrease reflects the planned lifecycle of this effort as resources are focused on subsurface forensics demonstrations this Project. Hazard Prediction Demonstration ription: This effort matures and demonstrates a mission planning platform that provides Soldiers with a predictive lization technology to identify, track and plan for industrial or commercial chemical/environmental threats in operational noments. P22 Plans: re and demonstrate developed algorithms that integrate contaminant mobility based on hydrology and soils and the sorpt dation products. P33 Plans: emonstrate next-phase capability based on review and critiques of minimally-viable hazard prediction models of TIC/Ms ater, and soil in denied urban terrain. P22 Pt 2023 Increase/Decrease Statement: In decrease reflects the planned lifecycle of this effort as resources are focused on subsurface forensics demonstration ription: This effort matures and demonstrates sensing technologies for TIC/Ms to detect illicit activities with authentic water treatment influent. P22 Plans: e data transmission capabilities from sensor through sewer systems and determine interoperability with commercial off to robotic platforms. P23 Plans: e data transmissio		Γ	FY 2021	FY 2022	FY 2023
Funding decrease reflects the planned lifecycle of this effort as resources within this Project.	are focused on subsurface forensics demonstratio	ns			
Title: Hazard Prediction Demonstration			1.349	1.044	1.022
Description: This effort matures and demonstrates a mission planning pl visualization technology to identify, track and plan for industrial or comme environments.	atform that provides Soldiers with a predictive prcial chemical/environmental threats in operational				
FY 2022 Plans: Mature and demonstrate developed algorithms that integrate contaminant degradation products.	t mobility based on hydrology and soils and the sor	ption/			
FY 2023 Plans: Will demonstrate next-phase capability based on review and critiques of r air, water, and soil in denied urban terrain.	ninimally-viable hazard prediction models of TIC/M	s in			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding decrease reflects the planned lifecycle of this effort as resources within this Project.	are focused on subsurface forensics demonstratio	ns			
Title: Subsurface Forensics Demonstration			-	0.100	0.715
Description: This effort matures and demonstrates sensing technologies wastewater treatment influent.	for TIC/Ms to detect illicit activities with authentic				
FY 2022 Plans: Mature data transmission capabilities from sensor through sewer systems shelf robotic platforms.	s and determine interoperability with commercial of	the			
FY 2023 Plans: Will demonstrate sensor communication systems through sewer structure platform for sensor suite.	es to determine minimal autonomous viable robotic				
FY 2022 to FY 2023 Increase/Decrease Statement: Planned funding increase reflects adjustments to develop and mature ser requirements found in complex urban landscapes.	nsor communication systems that meet operational				
Title: FY 2022 SBIR/STTR Transfer			-	0.092	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Project (Number/Name) AR6 I Understanding the Environment a Threat Adv Tech					
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023		
Description: Funding transferred in accordance with Title 15 USC ?638							
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638							
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638							
	Accomplishments/Planned Programs Subt	otals	2.706	2.524	2.767		
N/A Remarks N/A D. Acquisition Strategy N/A N/A							

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: Apri	2022	
Appropriation/Budget Activity 2040 / 3	propriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/N 40 / 3 PE 0603463A / Network C3/ Advanced Tech AR8 / Sensing in Constraints					umber/Nar sing in Con	ne) tested Enviro	onments				
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AR8: Sensing in Contested Environments Adv Tech	-	0.948	1.611	-	-	-	-	-	-	-	0.000	2.559
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project is realigned to Program Element (PE) 0603042A (C3I Advanced Technology) Project CX9 (Sensing in Contested Environments Adv Technologies).

A. Mission Description and Budget Item Justification

This Project matures and demonstrates advanced sensor technologies that characterize hazards posed to warfighters by non-weaponized biological hazards in subterranean environments. The Project will demonstrate adaptive commercial off the shelf sensor technologies on existing unmanned ground vehicles (UGV) platforms to gather end-user feedback.

Research in this Project complements (PE) 0602146A (Network C3I Technology) / Project AR7 (Sensing in Contested Environments Technology).

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

Research in this Project is performed by the United States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Non-Traditional Threat Detection Advance Technology	0.948	1.552	-
Description: This effort matures and demonstrates combined commercial off the shelf capabilities from multiple sources as an integrated robotic-operable expeditionary kit for accurate detection of biological hazards for early warning in subterranean environments from point of ingress/egress prior to exposure.			
FY 2022 Plans: Demonstrate an integrated optical sensor platform capable of identification of relevant environmental threats.			
FY 2022 to FY 2023 Increase/Decrease Statement: In Fiscal Year 2023 (FY23) this Project is realigned to Program Element (PE) 0603042A (C3I Advanced Technology) Project CX9 (Sensing in Contested Environments Adv Technologies).			
Title: FY 2022 SBIR/STTR Transfer	-	0.059	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3/ Advanced Tec hnology	Proje AR8 / Adv T	ct (Number/N Sensing in C ech	lame) ontested Env	ironments
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023
Description: Funding transferred in accordance with Title 15 USC ?638					
<i>FY 2022 Plans:</i> Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	totals	0.948	1.611	-
C. Other Program Funding Summary (\$ in Millions) N/A Remarks N/A D. Acquisition Strategy N/A					

Exhibit R-2A, RDT&E Project Ju							Date: April	2022					
Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060346 hnology	am Elemen 33A / Netwo	t (Number / ork C3I Adva	Name) anced Tec	Project (N AS9 I Pers Infrasound	oject (Number/Name) 69 / Persistent Geophysical Sensing- frasound Adv Tech			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
AS9: Persistent Geophysical Sensing-Infrasound Adv Tech	-	4.600	2.448	-	-	-	-	-	-	-	0.000	7.048	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

Note

In Fiscal Year 2023 (FY23) this Project is realigned to Program Element (PE) 0603042A (C3I Advanced Technology) Project CX8 (Persistent Geophysical Sensing-Infrasound Adv Tech).

A. Mission Description and Budget Item Justification

This Project matures and demonstrates kitted hardware and software solutions that persistently monitor (through non-line-of-sight sensing including infrasound) critical infrastructure conditions and threat activities in dynamic battlefields. These technologies provide near real time data collection, processing, and alerts of infrastructure go/no-go condition required for maneuver planning. This Project also matures and demonstrates methodologies to assign maneuver relevant engineering attributes to geospatial feature data such as bridge load classification, road condition, and bathymetry.

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

Research in this Project conducted at Unites States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

Research in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AR9 (Persistent Geophysical Sensing-Infrasound Tech).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Remote Assessment of Infrastructure for Ensured Maneuver (RAFTER) Demonstrations	4.600	-	-
Description: This effort matures and demonstrates a light-weight, low-power, persistent monitoring system that is capable of integration with mission command platforms with associated software for processing geophysical data in near-real-time to provide actionable intelligence concerning critical transportation assets.			
Title: Battlefield Intelligence by Geophysical Sensing (BIGS) Demonstration	-	2.359	-
Description: This effort matures and demonstrates geophysical and geo-sensing technologies to persistently assess battlefield elements to include infrastructure (algorithm refinements) and additional sources of interest, such as explosive and fires events and various threats. Optimization of the array sensors and geometry to improve array performance for new sources of interest while reducing logistics will also be matured and demonstrated. New detection and classification signal processing algorithms will be validated throughout the life of the task in a phased demonstration schedule.			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Project (AS9 / Pe Infrasour	Number/I rsistent G nd Adv Teo	Name) eophysical Se ch	ensing-
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2021	FY 2022	FY 2023
<i>FY 2022 Plans:</i> Mature and validate non-high performance computing meteorological and terra through internal demonstrations before integrating with existing software and v Sensor Architecture (ISA) messaging within the existing software to be compared (CPCE).	ain/topography overlays for detection threshold vill provide configuration updates to Integrated tible with Command Post Computing Environm	s ient			
FY 2022 to FY 2023 Increase/Decrease Statement: In FY23 this effort is realigned to PE 0603042A (C3I Advanced Technology) P Infrasound Adv Tech).	roject CX8 (Persistent Geophysical Sensing-				
Title: FY 2022 SBIR/STTR Transfer			-	0.089	-
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	totals	4.600	2.448	-
C. Other Program Funding Summary (\$ in Millions) N/A Remarks N/A D. Acquisition Strategy N/A					

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: Apri	2022	
Appropriation/Budget Activity 2040 / 3	udget Activity R-1 Program Element (Number/Name) Project (Number/Name) PE 0603463A / Network C3I Advanced Tec AT3 / Subterranean Detect hnology Monitoring Adv Tech					ne) etection and	I					
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AT3: Subterranean Detection and Monitoring Adv Tech	-	3.360	2.217	-	-	-	-	-	-	-	0.000	5.577
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project is realigned to Program Element (PE) 0603042A (C3I Advanced Technology) Project CZ5 (Subterranean Detection and Monitoring Advanced Tech).

A. Mission Description and Budget Item Justification

This Project validates and demonstrates advanced subterranean monitoring and vulnerability assessment technologies providing mobile and man-portable solutions to enhance survivability and threat awareness during urban operations and negate enemy subterranean operation advantage. This Project also optimizes and demonstrates enhanced technologies to detect tunnels and tunneling activity in complex and varied environments.

This Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AT2 (Subterranean Detection and Monitoring Technology).

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

Research in this Project conducted at the United States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Subterranean Threat Assessment by Real-time Sensing Demonstrations	3.360	2.136	-
Description: This effort validates and demonstrates integrated suite of tunnel detection and persistent surveillance technologies, mobile and man-portable solutions to detect underground municipal infrastructure, voids, and other subterranean vulnerabilities in urban and complex domains.			
FY 2022 Plans: Demonstrate an integrated suite of tunnel detection and persistent surveillance technologies to detect subterranean avenues of approach in an operationally relevant urban environment.			
FY 2022 to FY 2023 Increase/Decrease Statement: The effort ends in Fiscal Year 2022 with scheduled demonstration at Maneuver Support, Sustainment and Protection Integration Experiments (MSSPIX).			
Title: FY 2022 SBIR/STTR Transfer	-	0.081	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022							
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	ne) Project (Number/Name) AT3 / Subterranean Detection and Monitoring Adv Tech					
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023		
Description: Funding transferred in accordance with Title 15 USC ?638							
<i>FY 2022 Plans:</i> Funding transferred in accordance with Title 15 USC ?638							
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638							
	Accomplishments/Planned Programs Sub	ototals	3.360	2.217	-		
N/A Remarks N/A D. Acquisition Strategy N/A N/A							

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army								Date: April	2022			
Appropriation/Budget Activity 2040 / 3				R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnologyProject (AT8 / Ne 				Project (N AT8 / Netw Services A	Number/Name) work-Enabled GeoSpatial-GEOINT AdvTech			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AT8: Network-Enabled GeoSpatial-GEOINT Services AdvTech	-	2.888	3.059	4.603	-	4.603	4.739	4.178	5.416	8.013	0.000	32.896
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Bud	aet Item J	ustification										

This Project accelerates and exploits the tactical value of emerging field generated, mission relevant 3-dimensional (3D) geospatial data supporting mission planning, mission rehearsal and tactical situational awareness. Integrates and demonstrates the geo-registration, feature extraction, change detection, data visualization and transmission capabilities developed in the applied research portion of this Project. Tools developed for the exploitation of 3D datasets will be integrated into a streamlined workflow requiring low levels of expertise, putting advanced processing capabilities in the hands of the Soldier. This Project also includes demonstrations of tactical enhancements and the integrated ability to rapidly share mission critical 3D information in support of planning and execution.

Research in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AT7 (Network-Enabled GeoSpatial and GEOINT Services Tech).

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

Research in this Project is performed by the Unites States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

FY 2021	FY 2022	EV 2023
		112020
2.888	2.947	2.764
	2.888	2.888 2.947

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	lumber/N vork-Ena \dvTech	lame) bled GeoSpa	tial-GEOINT	
B. Accomplishments/Planned Programs (\$ in Millions)		F۱	⁄ 2021	FY 2022	FY 2023
Will demonstrate advanced change detection algorithms achieving on aver sources to achieve standard and shareable geospatial foundation data. W software in a relevant implementation environment for real-time processin archived 3D geospatial data.	erage less than 10% of errors in matching varied data /ill demonstrate 2.5D and 3D data co-registration g, analytics, dissemination of tactical field collections	a s to			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects the final year of Technical Readiness Level (TRL Manager Intelligence Systems and Analytics.) 6 demonstration supporting insertion to Program				
Title: Optimization of Geospatial Data for Tactical Visualization-Demonstr	ation		-	-	1.839
Description: This effort matures and demonstrates new open source soft based geospatial foundation layer to enable end-users systems to visualiz required level-of-detail (LOD) and enable position-navigation self-localizat accuracies optimized for the device, application, and mission.	ware, data models and processes to generate a visi re real-time mission critical geospatial content at the ion capability applicable to end-user devices at requ	on ired			
FY 2023 Plans: Will mature and demonstrate delivery of optimized 3D geospatial data for Position Navigation (PN) solutions extracted from field generated sources generation of Level-of-Detail (LOD) 3D data.	visualization on end-user-devices. Will demonstrate and delivered on to handheld devices through auto-				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding for this effort is realigned from PE 0603463A (Network C3I Advar Geospatial Data for Visualization).	nced Technology) / Project AU2 (Optimization of				
Title: FY 2022 SBIR/STTR Transfer			-	0.112	-
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Subt	otals	2.888	3.059	4.603
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Project (Number/Name) AT8 / Network-Enabled GeoSpatial-GEOINT Services AdvTech
C. Other Program Funding Summary (\$ in Millions)	I	
<u>Remarks</u> N/A		
<u>D. Acquisition Strategy</u> N/A		

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022												
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)ProjePE 0603463A / Network C3I Advanced TecAU1hnologyCapa				Project (N AU1 / Tacti Capabilitie	Project (Number/Name) AU1 / Tactical GeoSpatial Information Capabilities ATech		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AU1: Tactical GeoSpatial Information Capabilities ATech	-	3.603	4.207	5.996	-	5.996	2.103	2.702	2.797	5.717	0.000	27.125
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
timelines will greatly increase So Work in this Project complement The cited research is consistent Research in this Project is perfor B. Accomplishments/Planned F	Idier situations SPE 06021 with the Uno med by the Programs (S	onal awaren 46A Networ der Secretar Unites State in Millions	ess and sup rk C3I Techn ry of Defens es (U.S.) Ar <u>s)</u>	oport faster nology Proj se for Resea my Engine	decision m ect AT9 (Ta arch and Er er Research	aking in con ctical GeoS ngineering p n and Develo	nplex terrain patial Inforr riority focus opment Cer	n. nation Capa areas and nter and coo	abilities Tec the Army M ordinated wi	hn). Iodernizatio ith U.S. Arr 2021 I	on Strategy. ny Futures (FY 2022	Command. FY 2023
<i>Title:</i> 3D Terrain Analysis <i>Description:</i> This effort integrate workstations for improved capabi decision making at the tactical ed <i>FY 2022 Plans:</i> Demonstrate advanced terrain da Common Ground System (DCGS sources. Demonstrate enhanced situational awareness, actionable of combined dense terrain and ex <i>FY 2023 Plans:</i>	es and demo lities to gen lge. ata processi S-A). Test au terrain proc e maneuver dernal imag	onstrates so erate, proce ng capabiliti utomated fea essing tools and force pr e sources.	ftware mode ess and exp ies, followed ature extrac s providing f rotection in	els and wor loit terrain p d by toolkit tion and fas nighly accur complex te	kflows prov products ena testing and ster process rate, tactica rrain throug	isioned on t abling situat delivery, tar sing times fo l scale decis h an enhand	he geospat ional aware geted for th or higher-res sion aids su ced geospa	ial and GEC eness and ra be Distribute solution dat pporting tial feature	DINT apid a layer	3.064	2.148	3.902

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: A	pril 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	me) Project (Number/Name) ed Tec AU1 / Tactical GeoSpatial Information Capabilities ATech			
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023	
Will demonstrate mature enhanced terrain processing and feature layer general Systems and Analytics (IS&A) (formerly DCGS-A), providing high resolution, his situational awareness, actionable maneuver and force protection in highly dyna	tion tools for Program Manager (PM) Intelligene ghly accurate feature information to support mic operational environments.	e			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase supports final year of Technical Readiness Level (TRL) 6 der	nonstration supporting insertion to PM IS&A.				
Title: Previously Advanced Airborne Light Detection and Ranging (LIDAR)		0.539	1.905	2.094	
Description: This effort integrates and demonstrates enhanced Geiger-mode I protocols, equipment, and products for enhanced high-altitude/wide area terrain	iDAR hardware/software, for advanced testing n data collection, to support tactical operations.	of			
FY 2022 Plans: Mature new airborne LIDAR sensors signal processing algorithms to increase of collection accuracy providing evolutionary improvements to airborne collection coverage and decreased workflow timelines.	collection speed and enhance terrain feature of enhanced 3D urban data with expanded area				
FY 2023 Plans: Will demonstrate integrated system of hardware components with system-spec inform system requirements enabling long-standoff airborne 3D remote sensing	ific calibration and optimized signal processing	to			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase supports final year of TRL6 demonstration.					
Title: FY 2022 SBIR/STTR Transfer		-	0.154	-	
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Subto	tals 3.603	4.207	5.996	
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Project (Number/Name) AU1 / Tactical GeoSpatial Information Capabilities ATech
C. Other Program Funding Summary (\$ in Millions)		
<u>Remarks</u> N/A		
D. Acquisition Strategy N/A		

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army									Date: Apri	l 2022		
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603463A <i>I Network C3I Advanced Tec</i> <i>hnology</i>				Project (Number/Name) AU2 I Optimization of Geospatial Data for Visualization			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AU2: Optimization of Geospatial Data for Visualization	-	2.022	2.171	-	-	-	-	-	-	-	0.000	4.193
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project is realigned to Program Element (PE) 0603463A (Network C3I Advanced Technology) Project AT8 (Network-Enabled GeoSpatial-GEOINT Services AdvTech).

A. Mission Description and Budget Item Justification

This Project develops and demonstrates new open source software defined data models, and establishes an architecture to provide correct (mission context) geospatial content to the end-user consistent with device, tactical assessment/need, available bandwidth, and user movement. Advanced software and processes will reduce file size and network requirements, enabling near real-time updates to Soldiers. Resulting three-dimension 3D foundation data and associated accuracy information will enable position and navigation determination, through analysis with a variety of Soldier and vehicle borne sensors.

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

Research in this Project is performed by the Unites States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Optimization of Geospatial Data for Tactical Visualization-Demonstration	2.022	2.092	-
Description: This effort matures and demonstrates new open source software, data models and processes to generate a vision- based geospatial foundation layer to enable end-users systems to visualize real-time mission critical geospatial content at the required level-of-detail (LOD) and enable position-navigation self-localization capability applicable to end-user devices at required accuracies optimized for the device, application, and mission.			
FY 2022 Plans: Demonstrate push of tactically relevant geospatial intelligence (GEOINT) to mobile devices, with consideration paid to factors determining level of detail and new 3D data representation selected to minimize bandwidth.			
FY 2022 to FY 2023 Increase/Decrease Statement: In Fiscal Year 2023 this Project is realigned to PE 0603463A (Network C3I Advanced Technology) Project AT8 (Network-Enabled GeoSpatial-GEOINT Services Adv Tech).			
Title: FY 2022 SBIR/STTR Transfer	-	0.079	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022							
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Project (Number/Name) AU2 I Optimization of Geospatial Data for Visualization					
B. Accomplishments/Planned Programs (\$ in Millions)		[FY 2021	FY 2022	FY 2023		
Description: Funding transferred in accordance with Title 15 USC ?638							
<i>FY 2022 Plans:</i> Funding transferred in accordance with Title 15 USC ?638							
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638							
	Accomplishments/Planned Programs Sub	totals	2.022	2.171	-		
C. Other Program Funding Summary (\$ in Millions) N/A Remarks N/A D. Acquisition Strategy N/A							

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army									Date: April	2022		
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) Project (Number/Name) PE 0603463A / Network C3I Advanced Tec AU4 / Geospatially Enabled Ope hnology Design Adv Tech				n e) abled Opera	ational		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AU4: Geospatially Enabled Operational Design Adv Tech	-	7.905	7.956	12.197	-	12.197	10.905	10.731	5.090	5.089	0.000	59.873
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project demonstrates, integrates and transitions to the Army Command Post Computing Environment, a geospatially enabled collaborative planning environment, accessible across echelons, with capabilities that support Army Design Methodology (ADM) by providing the ability to perform conceptual planning and problem framing, supporting a greater understanding and visualization of the dynamic operational environment, a shared understanding of the operations purpose across echelons, and enhanced products to drive detailed budget planning and operational assessment processes, enhancing the collaborative interaction between commanders, staffs, and unified action partners.

Research in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AU3 (Geospatially Enabled Operational Design Technology).

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

Research in this Project is performed by the Unites States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Geospatially Operational Design (GEOD) - Demonstration	7.905	7.665	5.081
Description: This effort integrates and demonstrates automation technologies to digitally visualize, create and assess critical elements of the Operational Environment required to inform the Operational Design functions, including collaborative conceptual framing of the problem.			
FY 2022 Plans: Demonstrate tools to support Army Design Methodology (ADM) to frame the problem and visualize the desired end state in a geospatial context. Evaluate a suite of data visualization capabilities that allow commanders and staffs to bridge conceptual planning to deliberate planning at echelons down to battalion.			
FY 2023 Plans: Will demonstrate and transition a set of advanced strategic and operational planning tools to support ADM, and digitally create, visualize, assess, and brief the design framework, critical elements, and their interrelationships inside the Operational			

xhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022								
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A <i>I Network C3I Advanced Tec</i> <i>hnology</i>	Project (Number/Name) AU4 / Geospatially Enabled Operational Design Adv Tech						
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023				
Environment in geospatial and geopolitical context. Will be transitioned to the Program of Record.	Command Post Computing Environment (CPC	E)						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding decrease as a result of the final year of Technical Readiness Level (T Manager Mission Command.	RL) 6 demonstration and transition to Program							
Title: Integration of intel and logistics Multi Echelon Planning		-	-	4.038				
Description: This effort demonstrates a suite of analytical and visualization to of action through modeling and simulation (M&S) and wargames to support de and approval of the operational plan.	ols designed to facilitate analysis of multiple co velopment of alternate Courses of Action (COA	urses s)						
FY 2023 Plans: Will integrate and demonstrate an advanced suite of automated tools to facilitat assessments of their viability and set up of wargames and M&S that support fully and set up of war	ate development of COAs, to include initial urther analysis.							
FY 2022 to FY 2023 Increase/Decrease Statement: Funding for this effort is realigned from PE 0603463A (Network C3I Advanced Integration-Planning Adv Tech).	Technology) / Project AV1 (GEOInt/Ops Logis	ics						
Title: Automated intelligence Preparation of the Battlefield (IPB) Demonstration	ns	-	-	3.078				
Description: This effort develops and demonstrates a collaborative, adaptive resources leveraging geospatial, terrain, environmental effects, and authoritation order to collaborate in the development and assessment of courses of action, we develop and disseminate plans and orders.	planning capability that allows planners to emp ve data from distributed information databases visualize potential outcomes, make decisions a	loy in nd						
FY 2023 Plans: Will develop and demonstrate advanced capabilities for multi-domain visualizathose products into the military planning process.	tion of IPB products, and automates integration	ı of						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding for this effort is realigned from PE 0603463A (Network C3I Advanced Demonstrations).	Technology) / Project CF9 (Automated IPB							
Title: FY 2022 SBIR/STTR Transfer		-	0.291	-				
Description: Funding transferred in accordance with Title 15 USC ?638								

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Projec AU4 / (Design	lame) Enabled Ope	erational		
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023	
<i>FY 2022 Plans:</i> Funding transferred in accordance with Title 15 USC ?638						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638						
	Accomplishments/Planned Programs Sub	totals	7.905	7.956	12.197	
C. Other Program Funding Summary (\$ in Millions) N/A <u>Remarks</u> N/A <u>D. Acquisition Strategy</u> N/A						

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army									Date: Apri	1 2022		
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) Project (Number/Name) PE 0603463A / Network C3I Advanced Tec AV1 / GEOInt/Ops Logistics I hnology Planning Adv Tech				ne) gistics Integi	ration-		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AV1: GEOInt/Ops Logistics Integration-Planning Adv Tech	-	3.771	3.867	-	-	-	-	-	-	-	0.000	7.638
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project is realigned to Program Element (PE) 0603463A (Network C3I Advanced Technology) Project AU4 (Geospatially Enabled Operational Design Adv Tech).

A. Mission Description and Budget Item Justification

This Project matures and demonstrates a suite of analytical and visualization tools designed to facilitate analysis of courses of action (COAs) through modeling and simulation (M&S) and wargames to support development of alternate COAs and approval of the operational plan (OPLAN). This Project will integrate existing M&S and wargaming applications (One Semi-Automated Forces; Infantry Warrior Simulation ; Logistics Composite Model), to assess multiple courses of action to be analyzed in a multi-domain environment.

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

Research in this Project is performed by the Unites States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Integration of intel and logistics Multi Echelon Planning	3.771	3.726	-
Description: This effort demonstrates a suite of analytical and visualization tools designed to facilitate analysis of multiple courses of action through M&S and wargames to support development of alternate COAs and approval of the operational plan.			
FY 2022 Plans: Demonstrate automated analysis and synchronization of multiple courses of action with M&S and war-games, streamlining the COA comparison and approval processes, and ultimately the operational plan approval.			
FY 2022 to FY 2023 Increase/Decrease Statement: In FY23 funding for this effort is realigned to PE 0603463A (Network C3I Advanced Technology) Project AU4 (Geospatially Enabled Operational Design Adv Tech).			
Title: FY 2022 SBIR/STTR Transfer	-	0.141	-
Description: Funding transferred in accordance with Title 15 USC ?638			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Project (Number/Name) AV1 I GEOInt/Ops Logistics Integration Planning Adv Tech				
B. Accomplishments/Planned Programs (\$ in Millions)		[FY 2021	FY 2022	FY 2023	
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638						
	Accomplishments/Planned Programs Sub	ototals	3.771	3.867	-	
C. Other Program Funding Summary (\$ in Millions) N/A Remarks N/A D. Acquisition Strategy N/A						

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army									Date: Apri	2022		
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) Project (Number/Name) PE 0603463A / Network C3I Advanced Tec AV2 / LEO Advanced Technology				ne) Technology			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AV2: LEO Advanced Technology	-	1.949	-	-	-	-	-	-	-	-	0.000	1.949
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures Low Earth Orbit (LEO) constellation management for space order-of-battle architectures and protocols. The advanced technology development will involve using two spacecraft and will leverage commercial LEO mega-constellation investments to develop capabilities, which support direct sensor-to-shooter data links while under control by a maneuver battalion commander. Technology will be optimized to enable communications and deep strikes in contested environments. This Project supports the Army's efforts to proliferate and control space assets to support the tactical ground commander. It includes exploration efforts to augment missile warning, Global Positioning System (GPS), and global communications.

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

Research in this Project is performed by the Unites States (US) Army Space and Missile Defense Command/Army Forces Strategic Command (USASMDC/ARSTRAT) Technical Center in Huntsville, AL and the Defense Advanced Research Projects Agency (DARPA), Arlington, VA.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Payload Technology Development	1.949	-	-
Description: Mature the technology for Low Earth Orbit satellites. Payload integration will be validated as well as the architecture and design of two LEO satellites for support to an Army tactical commander.			
Accomplishments/Planned Programs Subtotals	1.949	-	-

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022												
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) Pr PE 0603463A / Network C3I Advanced Tec A\ hnology Ac				Project (Number/Name) AV4 I Foundational S&T for Network C3I Advanced Tech			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AV4: Foundational S&T for Network C3I Advanced Tech	-	2.068	7.751	0.896	-	0.896	0.043	2.268	12.409	16.282	0.000	41.717
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Budget Item Justification This Project matures and demonstrates underlying technologies applicable to artificial intelligent agents and holistic network integration as applied to, but not limited to												

Inis Project matures and demonstrates underlying technologies applicable to artificial intelligent agents and holistic network integration as applied to, but not limited to autonomous manned-unmanned teaming for ground and air platforms. This Project also matures and demonstrates emerging research leading to potential technology development in areas of strategic importance to the Army in network technologies, by bringing competitively selected Universities with research teams into Technical Alliances.

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

Research in this Project is performed by the Army Futures Command (AFC).

This Research in this Project is done in coordination with (Program Element (PE) 0602146A (Network C3I Technology) / Project AV3 (Foundational S&T for Network C3I Technology).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Demonstration of emerging technologies for holistic network integration	2.068	-	-
Description: This effort matures and demonstrates underlying technologies applicable to next generation networks and integration of the same.			
Title: Demonstration of Disruptive, Innovative Research for Emerging (DIRE) Advanced Network Capabilities	-	7.468	0.896
Description: This effort demonstrates innovative network capabilities using a rapid and agile methodology to evaluate the feasibility of incorporation into Army network problem sets.			
FY 2022 Plans: Will demonstrate and evaluate innovative emerging technologies focusing on network resiliency, artificial intelligence, and autonomy enabled machine learning technologies that will be integrated into a holistic network in support a multi-domain operations (MDO) enabled environment.			
FY 2023 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Project (N AV4 / Fou Advanced	work C3I		
B. Accomplishments/Planned Programs (\$ in Millions)		F١	(2021	FY 2022	FY 2023
Completing innovative technology pilot for experimenting and demonstrating in space of network resiliency, artificial intelligence, and autonomy.	novative and disruptive network capabilities in	the			
FY 2022 to FY 2023 Increase/Decrease Statement: Decrease in funding due to fewer requirements needed to complete identified e process.	efforts during the Fiscal Year 2022 (FY22) sea	rch			
Title: SBIR/STTR Transfer			-	0.283	-
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 2638					
	Accomplishments/Planned Programs Sub	totals	2.068	7.751	0.896
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A					

Exhibit R-2A, RDT&E Project J	ustification	: PB 2023 A	Army							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progr PE 060346 hnology	am Elemen 53A <i>I Netwo</i>	t (Number / rk C3I Adva	Name) anced Tec	Project (N AV8 I Navi Advanced	P roject (Number/Name) AV8 I Navigation Warfare (NAVWAR, Advanced Technology		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AV8: Navigation Warfare (NAVWAR) Advanced Technology	-	2.535	1.927	1.949	-	1.949	6.002	3.958	5.985	-	0.000	22.356
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
an integrated approach to Electr Positioning, Navigation, and Tim Research accomplished under F Project. The cited research is consistent Research in this Project is perfo	onic Protect ing (PNT) b Program Eler with the Und rmed by the	ion (EP), El ased capab ment (PE) 0 der Secretar Unites Stat	ectronic Suț ilities to our 602146A (N ry of Defens es (U.S.) Ar	oport (ES), adversarie letwork C3 e for Resea my Futures	and Electro s, and mair I Technolog arch and Er s Command	nic Attack (I ntain Army c ny) / Project ngineering p (AFC).	EA) to rapid apabilities. AW1 (Autor riority focus	ly characte nomous Na areas and	rize the NA vigation Tec the Army M	/WAR env chnology) o lodernizati	rironment, d complement on Strategy.	eny s this
B. Accomplishments/Planned	Programs (S	in Million	<u>s)</u>						FY	2021	FY 2022	FY 2023
Title: PNT Situational Awarenes	s (SA) Adva	nced Techn	ology							2.535	1.856	1.949
Description: This effort demons Computing Environment (CE); in generates an Interface Control D PNT SA stored data for distributi FY 2022 Plans:	trates real ti proves fusio ocument (IC on on variou	me PNT Sit on algorithm CD) for PNT is platforms	uational Aw ns for at leas SA messag	areness for st two types jes; allow o	r a Commor s of PNT SA open integra	n Operating sensors (te tion and refe	Picture (CC errestrial, ain erence impl	PP) on select , space); ementation	for			
Will incorporate high altitude sen different domains. Improve existi	sor data to t ng PNT SA	ake advanta ICD to make	age of the u e use of mu	nique perfo Itidimensior	ormance cha nal data fiel	aracteristics ds.	of existing	sensors in				
FY 2023 Plans: Will mature and validate integrat systems approach at a field dem	ion of aerial onstration.	sensor data	i into data fu	ision softwa	are and will	demonstrat	e an integra	ated system	of			
FY 2022 to FY 2023 Increase/D	ecrease Sta	atement:										

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Proje AV8 / <i>Advar</i>	yject (Number/Name) 8 I Navigation Warfare (NAVWAR) vanced Technology		
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023
Funding change reflects planned lifecycle for this effort.					
Title: FY2022 SBIR/STTR Transfer			-	0.071	-
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans:					
Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	totals	2.535	1.927	1.949
N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A					

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	Army							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progr PE 060346 hnology	am Eleme r 53A / Netwo	nt (Number ork C3I Adv	/Name) anced Tec	Project (N AW4 / Doi Initiative (1	lumber/Na D PNT M&S Cl) Adv Tec	me) S Collaborati h	ive
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AW4: DoD PNT M&S Collaborative Initiative (CI) Adv Tech	-	2.888	-	-	-	-	-	-	-	-	0.000	2.888
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
PNT information in global position Research in this Project complem The cited research is consistent of Research in this Project is perfor	ning system nents Progr with the Un med by the	n (GPS) der ram Elemen der Secreta Unites Stat	t (PE) 0602 ry of Defenses (U.S.) A	aded enviro 146A (Netv se for Rese rmy Futures	onments. vork C3I Ter arch and Er s Command	chnology) / ngineering p (AFC).	Project AW	3 (DoD PN s areas and	T M&S Coll the Army N	aborative Ir Iodernizatio	nitiative (CI) on Strategy.	Technolo).
B. Accomplishments/Planned P	Programs (\$ in Million	<u>s)</u>						F	(2021	FY 2022	FY 2023
Title: DoD PNT M&S Collaborativ	e Initiative	(CI)								2.888	-	-
Description: This effort matures, information in GPS denied or deg	demonstra raded envir	ites and per ronments.	forms M&S	of PNT tec	hnologies to	o provide ac	ccess to trus	sted PNT				
					Accomplis	shments/Pl	lanned Pro	grams Sub	ototals	2.888	-	-
C. Other Program Funding Sum N/A <u>Remarks</u> D. Acquisition Strategy N/A	ımary (\$ in	<u>Millions)</u>										

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: Apri	l 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progr PE 060346 hnology	am Elemen 63A / Netwo	t (Number/ ork C3I Adva	Name) anced Tec	Project (N AW6 / Mo Advanced	lumber/Na i dular GPS I Tech	ne) ndependen	t Sensors
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AW6: Modular GPS Independent Sensors Advanced Tech	-	10.684	6.791	10.131	-	10.131	12.289	16.702	14.629	20.609	0.000	91.835
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
 A. Mission Description and Bud This Project matures and demons information, global positioning sys Research accomplished under Pr The cited research is consistent w Research in this Project is perforr B. Accomplishments/Planned P Title: Soldier-Integrated Positionir Description: This effort implemer and emerging technology integratis sensor inputs for improved PNT a algorithms incorporating alternativ frequency time differencing, signa FY 2022 Plans: Will continue to validate, and integrations Lab and maturation of accurate position and timing across navigation utilizing artificial intellig size, weight, and power (SWAP) of modular, alternative PNT sensors FY 2023 Plans: 	get Item J strates a re stem (GPS) ogram Elect vith the Uno ned by the rograms (S ng, Navigat on; incorpo ccuracy an e PNT input ls of oppor grate, initial of commerces s wireless ence techr of anti-jam s with existin	ustification silient, soldi) spoofing a ment (PE) 0 der Secreta United Stat <u>\$ in Millions</u> tion, and Tin ards-based, orates artific d reliability; uts; and den tunity, inerti I Soldier-Inte cial systems ly-connecter niques and a antennas fo ng Army dis	er-integrate wareness a 602146A (N ry of Defens es Army Fu sial intelliger demonstrates a al, gravimet egrated PNT . Will mature d soldier-bo assess exist r dismounte mounted PN	d precision nd counter letwork C3 se for Rese tures Comm architecture ace approact es Simulta alternative I ric, and ima f technolog e PNT inter rne compo ing spoof-co d users. W	a navigation measures to I Technolog arch and Er mand. e solution fo ches to agg neous Loca PNT sensor agery. gies through faces and n nent. Will im letection alg fill integrate s.	and timing s o dismounte ny) complem ngineering p or rapid com regate multi lization and s and appro technology nessaging n nprove the p gorithms for and demon	solution, pro ad warfighter nents this Pr priority focus mercial of th ple organic Mapping (S baches, inclu- discovery v necessary to performance integration. strate interco	oviding prec rs in GPS-c oject. areas and the shelf (CC and networ SLAM) base uding radio vith Army o distribute of vision a Will optimiz operability o	the Army N The Army N	cation, geos aded enviro 1odernization 10.684	spatial surve nments. on Strategy. =Y 2022 6.542	FY 2023 2.476

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: /	April 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A <i>I Network C3I Advanced Tec</i> <i>hnology</i>	 Project (Number/Name) Tec AW6 I Modular GPS Independent Sensors Advanced Tech 				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023		
Will exploit and provide technology discovery for network ranging, flexible an Will execute demonstrations and soldier touch points with anti-jam technolog	d modular Radio Frequency (RF) antenna desig ies. Will finalize fabrication and packaging.	ns.				
FY 2022 to FY 2023 Increase/Decrease Statement: A portion of funding is realigned to support task Soldier Integrated Positioning Integrated Demonstrators	g Navigation and Timing - Modular Architecture a	2				
Title: Soldier Integrated Positioning Navigation and Timing - Modular Archite	cture & Integrated Demonstrators	-	-	7.655		
Description: This effort optimizes, improves, and demonstrates the modular integrates alternative PNT sensors and approaches, including radio frequence gravimetric, and imagery; matures, integrates, demonstrates and validates a PNT technologies with Soldier interface systems.	architecture for PNT capabilities; matures and cy time differencing, signals of opportunity, inertia final Modular Handheld; integrates and demons	al, trates				
FY 2023 Plans: Will optimize and validate the Initial Modular Handheld and PNT technologies and validate sensor integration for new PNT algorithms, anti-jam capability, v alternate navigation technologies. Fabricate and demonstrate PNT open arch SWAP optimized integrated demonstrator. Execute soldier touch points with	s, including the PNT open architecture; optimize vision aided navigation, network ranging and othe nitecture, PNT technologies and validated senso the integrated demonstrator.	er rs in				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding realigned from task Soldier-Integrated PNT to provide greater visibility	ity of this ongoing effort					
Title: FY2022 SBIR/STTR Transfer		-	0.249	-		
Description: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638						
	Accomplishments/Planned Programs Sub	t otals 10.684	6.791	10.131		
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>						

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Project (Number/Name) AW6 <i>I Modular GPS Independent Sensors</i> <i>Advanced Tech</i>
D. Acquisition Strategy	· · · · ·	
N/A		

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: Apri	l 2022	
Appropriation/Budget Activity 2040 / 3	oppropriation/Budget Activity R-1 Program Element 040 / 3 PE 0603463A / Network hnology Notesting				t (Number/ ork C3I Adva	Name)Project (Nnced TecBP4 / ELEADVANCE		: ct (Number/Name) ' ELECTRONIC WARFARE ANCED TECHNOLOGIES (:A)		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BP4: ELECTRONIC WARFARE ADVANCED TECHNOLOGIES (CA)	-	64.800	55.500	-	-	-	-	-	-	-	0.000	120.300
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Buc Congressional Interest Item fund The cited work is consistent with	Iget Item J ing provided the Under S	ustification d for Electro Secretary of	nic Warfare	Advanced r Research	Technolog	ies. eering priori	ty focus are	eas and the	Army Mode	ernization S	trategy.	
B. Accomplishments/Planned P	Programs (S	in Million	<u>s)</u>					FY 2021	FY 2022]		
Congressional Add: Assured Po	osition, Nav	igation, and	Timing Tec	hnology				6.300	4.000			
FY 2021 Accomplishments: Con Technology.	nducted adv	vanced rese	arch in Ass	ured Positi	on, Navigati	ion, and Tim	ning					
Work executed by Army Futures	Command.	C										
Fy 2022 Plans: Congressional In	iterest item	tunding pro	VIDED for Al		ology			2 000		-		
FY 2021 Accomplishments: Con	nduct advar	nced resear	ch in Army	Visual and	Tactical Arc	tic Reconna	aissance.	2.000	-			
Work executed by Army Futures	Command.											
Congressional Add: Program in	crease - an	ticipating th	reats to nat	ural system	IS			6.000	-			
FY 2021 Accomplishments: Con	nduct advar	nced resear	ch in Anticip	oating Thre	ats to Natur	al Systems.						
Work executed by Army Futures	Command.											
Congressional Add: Program Increase - S?UAS cyber threat management						7.500	-	1				

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022	
Appropriation/Budget Activity 2040 / 3	Name) anced Tec	Project (N BP4 / ELEC ADVANCE	umber/Name) CTRONIC WARFARE D TECHNOLOGIES (CA)	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	
FY 2021 Accomplishments: Conduct advanced research in S-UAS Cyber Th	reat Management.			
Work executed by Army Futures Command.				
Congressional Add: Program Increase - Sub?Surface Infrastructure in Arctic	Environments	1.000	-	
FY 2021 Accomplishments: Conduct advanced research in Sub-Surface Infra	astructure in Arctic Environments.			
Work executed by Army Futures Command.				
Congressional Add: Program Increase - Mesh Network-Enabled Small Satell	ites	10.000	-	
FY 2021 Accomplishments: Conduct advanced research in Mesh Network-En	nabled Small Satellites.			
Work executed by Army Futures Command.				
Congressional Add: Program Increase - Geospatial Artificial Intelligence Anal	lytic Tools	4.000	-	
FY 2021 Accomplishments: Conduct advanced research in Geospatial Artific	ial Intelligence Analytical Tools.			
Work executed by Army Futures Command.				
Congressional Add: Program Increase - Advanced Materials and Technologic Modernization	es for Command Post	10.000	-	
FY 2021 Accomplishments: Conducted advanced research in Advanced Mat Command Post Modernization.	erials and Technologies for			
Work executed by Army Futures Command.				
Congressional Add: Program Increase - Advanced Materials for Resilient Ser	nsors	8.000	5.000	
FY 2021 Accomplishments: Conduct advanced research in Advanced Materi	als for Resilient Sensors.			
Work executed by Army Futures Command.				
FY 2022 Plans: Congressional Interest Item funding provided for Advanced Ma				
Congressional Add: Program Increase - Tactical Geospatial Information Capa	abilities	10.000	5.000	
FY 2021 Accomplishments: Conduct advanced research in Tactical Geospat	ial Information Capabilities.			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022									
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/ PE 0603463A / Network C3I Adva hnology	Project (Nu BP4 / ELEC ADVANCE	u mber/Name) CTRONIC WARFARE D TECHNOLOGIES (CA)									
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022									
Work executed by Army Futures Command.												
FY 2022 Plans: Congressional Interest Item funding provided for Tactical Geo	spatial Information Capabilities											
Congressional Add: Alternative Navigation for GPS-Denied Landing Environment	nents	-	4.500									
FY 2022 Plans: Congressional Interest Item funding provided for Alternative N Environments	avigation for GPS-Denied Landing											
Congressional Add: Edge-High Performance Computing for Multi-Domain Op	perations	-	5.000									
FY 2022 Plans: Congressional Interest Item funding provided for Edge-High P Domain Operations												
Congressional Add: HALITE	-	7.000										
FY 2022 Plans: Congressional Interest Item funding provided for HALITE												
Congressional Add: Next Generation Command Posts		-	10.000									
FY 2022 Plans: Congressional Interest Item funding provided for Next General	tion Command Posts											
Congressional Add: Receiver-Sensor Technology for Tactical Networks		-	15.000									
FY 2022 Plans: Congressional Interest Item funding provided for Receiver-Ser Networks	nsor Technology for Tactical											
	Congressional Adds Subtotals	64.800	55.500									
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A												
Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022												
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Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603463A <i>I Network C3I Advanced Tec</i> <i>hnology</i>				Project (Number/Name) CF9 / Automated IPB Adv Tech			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CF9: Automated IPB Adv Tech	-	-	0.989	-	-	-	-	-	-	-	0.000	0.989
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

<u>Note</u>

In Fiscal Year 2023 (FY23) this Project is realigned to Program Element (PE) 0603463A (Network C3I Advanced Technology) Project AU4 (Geospatially Enabled Operational Design Adv Tech).

A. Mission Description and Budget Item Justification

This Project will mature and demonstrate advanced algorithms for multi-domain visualization of explicit and implicit relationships between the populace and the theater environment. Capabilities resulting from this effort will directly and substantially support Army and Joint Global Integration Planning requirements, provide a globally accessible web based digital intelligence preparation of the battlefield (IPB) platform supporting collaborative product development, and help facilitate a shared understanding of the operational environment. Automated IPB provides an integrated Intelligence Community planning data platform for Joint Global Integration Planning requirements.

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

Research in this Project is performed by the Unites States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Automated IPB Demonstrations	-	0.953	-
Description: This effort develops and demonstrates a collaborative, adaptive planning capability that allows planners to employ resources leveraging geospatial, terrain, environmental effects, and authoritative data from distributed information databases in order to collaborate in the development and assessment of courses of action, visualize potential outcomes, make decisions and develop and disseminate plans and orders.			
FY 2022 Plans: Design and demonstrate algorithms for advanced, multi-domain visualization of explicit and implicit relationships between the populace and the theater environment.			
FY 2022 to FY 2023 Increase/Decrease Statement: In Fiscal Year 2023 (FY23), this effort is realigned to PE0603463A (Network C3I Advanced Technology) Project AU4 (Geospatially Enabled Operational Design Adv Tech).			
Title: FY 2022 SBIR/STTR Transfer	-	0.036	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022						
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Proje CF9 /	ct (Number/I Automated II	Name) PB Adv Tech		
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023	
Description: Funding transferred in accordance with Title 15 USC ?638						
<i>FY 2022 Plans:</i> Funding transferred in accordance with Title 15 USC ?638						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638						
	Accomplishments/Planned Programs Sub	totals	-	0.989	-	
C. Other Program Funding Summary (\$ in Millions) N/A Remarks N/A D. Acquisition Strategy N/A						

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army								Date: April	2022			
Appropriation/Budget Activity 2040 / 3				R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnologyProject (Number/Name) CI7 / Mobile & Survivable 					ne) Ible Comma	nd Post		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Cl7: Mobile & Survivable Command Post (MASCP) Adv Tech	-	-	7.809	13.119	-	13.119	18.609	16.332	19.729	19.724	0.000	95.322
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Project matures and demonstrates technologies to support scalable, survivable, mobile Command Posts (CP). Technologies addressed will use the Brigade CP as a baseline while providing the opportunity for solutions to scale up or down to Army tactical echelons. Research in this Project includes integrating anti-jam (AJ) and low probability of intercept (LPI)/low probability of detection (LPD) communications focused on enabling the CP to disperse, form & reform, and employ technologies for signal remoting; optimizing power generation and storage for distributed CP operations; reducing computing infrastructure footprint, size, weight, and power (SWAP), manpower, and complexity; maturing technologies to reduce CP emissions and have situational awareness of those signatures to improve CP node employment; maturing electro-magnetic spectrum (EMS) emulation technologies to improve survivability options; and optimizing emerging electronic-textiles and composite materials for CP structures.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project CI3 (Mobile and Survivable Command Post (MASCP) Tech).

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: CP Modularity and Dispersion Advanced Technology	-	3.350	2.387
Description: Increases the ability for Commanders to move and disperse the CP through improved intra-CP communications, modular CP hardware to include distributed power systems, and network solutions leveraging open systems architectures to support information flow in distributed, intermittent, and latent (DIL) environments. This effort will eliminate centralized points of failure and critical nodes that constrain CP mobility and survivability. Areas of technology development include be distributed tactical cloud architecture, mesh network security architecture, high performance computing, integrated power, and distributed collaborative technologies.			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: /	April 2022		
Appropriation/Budget Activity 2040 / 3	Project (Nu CI7 / Mobile (MASCP) A	mber/ & Sur dv Tec	Name) vivable Comm h	and Post	
B. Accomplishments/Planned Programs (\$ in Millions)		FY	2021	FY 2022	FY 2023
Will optimize subsystems of a wireless antenna remoting capability based on the Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) Electronic improve the performance of highly directional transport using wireless antenna information between a command node and the remote site; optimize component technology, and onboard vehicle power technologies to enable distributed com- hardware and software components to support distributed CP computing.	ne Command, Control, Communications, c Warfare (EW) Open Suite of Standards (CMC remoting with AJ and LPD to send and receive nt design of small power generation, storage mand post operations; validate and optimize	SS);			
<i>FY 2023 Plans:</i> Will begin demonstrations of a wireless antenna remoting capability and Commare effective with Dispersed Command Post configurations; will demonstrate in mature the vehicle mounted power systems using open standard interfaces to a power demands of dispersed command post operations.	nand Post specific communications systems that itial capabilities for dispersed collaboration; wil accurately measure and respond to changing	ıt			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding decrease in Fiscal Year 2023 (FY23) funding due to significant reducti capabilities.	on in scope of wireless antenna remoting				
Title: Signature Management and Reduction Advanced Technology			-	0.392	6.853
Description: Provides advanced technologies to reduce and manage electrom command post components.	agnetic spectrum signatures of CP platforms a	nd			
<i>FY 2022 Plans:</i> Will mature a sensor-based radio frequency (RF) awareness tool that will allow emission posture; validate the performance of sensors to detect RF emissions; providing situational awareness of CP emission status.	friendly Commanders to see and understand t optimize and demonstrate a software applicati	neir on			
<i>FY 2023 Plans:</i> Will demonstrate initial proof-of-concept hardware and software to provide real frequency emissions; will demonstrate solutions to decrease CP signature in ul frequency spectra.	time situational awareness of Command Post traviolet, visible, thermal, infrared, radar, and r	adio adio			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase in FY23 due to increased scope for the development of CP co algorithms and building additional user interface s/w for CP signature solutions.	entric sensors; demonstrating RF signal detect	on			
Title: Advanced Technology Supporting Camouflage, Concealment, and Dece	ption		-	3.782	3.879

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022		
Appropriation/Budget Activity 2040 / 3	Projec CI7 / M (MASC	:t (Number/N Mobile & Surv CP) Adv Tech	lame) rivable Comm 1	and Post	
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023
Description: This effort demonstrates innovative camouflage, concealment and (i.e. mission command platforms, battle management centers and supporting emerging adversary Intelligence, Surveillance and Reconnaissance (ISR) threa multi-domain operations. Matures physics-based models for material and systemetrics in the multi-domain operational environment.	d deception technologies, for expeditionary as quipment), in order to defeat advanced and ts, and to reduce the probability of detection in m performance that support probability of detection	sets n ection			
FY 2022 Plans: Will demonstrate the ability to provide electromagnetic shielding for complexed shielding performance, large format advanced camouflage solutions, and demoninflatable technologies and protection material solutions and demonstrate these mature and integrate mobile camouflage capabilities to mitigate CP vulnerability on autonomous systems.	shelters, while maintaining radio frequency onstrator physical asset with signatures; matur capabilities in support of rapidly deployable (y; mature and demonstrate use of EMS emula	e CPs; tions			
FY 2023 Plans: Will validate and verify ability to address signature management performance ir deployable command post solutions on targeted mobile platforms; will perform a command post situational awareness; will demonstrate increased survivability for the second	n a relevant environment; will demonstrate analysis of sensor demonstration data to infor or multi-domain operations.	m			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.					
Title: FY2022 SBIR/STTR Transfer			-	0.285	-
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	totals	-	7.809	13.119
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Tec hnology	Project (Number/Name) CI7 I Mobile & Survivable Command Pos (MASCP) Adv Tech
D. Acquisition Strategy		
N/A		

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army							Date: April	2022				
Appropriation/Budget Activity 2040 / 3		R-1 Program Element (Number/Name) Project (Number/Name) PE 0603463A / Network C3/ Advanced Tec CJ8 / Assured PNT Communication hnology Advanced Tech					R-1 Program Element (Number/Name)PPE 0603463A / Network C3I Advanced TecChnologyA				ons	
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CJ8: Assured PNT Communications Advanced Tech	-	-	16.438	11.128	-	11.128	11.640	13.208	13.830	13.903	0.000	80.147
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project will provide prototyping, development, and experimentation of High Altitude (HA) sensors and Tactical Space Layer (TSL) sensors (electro-optical, synthetic aperture radar (SAR), and radio frequency) which are designed to provide wide-area, responsive deep area sensing required for beyond line of sight (BLOS) targeting and force maneuver, significantly reducing Sensor to Shooter (S2S) timelines. This Project matures, demonstrates, and integrates lightweight materials, hardware components with reduced power consumption, and advanced data collection, processing, and dissemination capabilities. This Project also improves algorithms that process space and near space sensor data in real and near real time for integration into battlefield operating systems.

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

Research in this Project is performed by the United States Army Space and Missile Defense Command (USASMDC) Technical Center (TC).

Research in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Projects CK1 (Assured PNT Enabling Technologies) and Project CG3 (Assured PNT Communications Applied Research).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Assured Positioning Navigation and Timing (APNT) Communications Advanced Technology	-	16.036	11.128
Description: This effort matures and demonstrates technologies required for smaller, more responsive and direct access to space and HA deep-sensing sensors and tactical communication capabilities for soldiers at the tactical edge. Research will augment, improve, exploit, and optimize existing commercial and Department of Defense (DoD) technologies and networks.			
This effort will validate software, hardware, and algorithms used to enable Space-Based and HA platform based capabilities in support of the Army's Modernization Priorities. This effort will exploit commercial advances and opportunities in integrating Space/ HA sensors or Deep Sensing capabilities and payload management toward future Army concepts. Develop/demonstrate critical technical elements for a LEO-based global high-speed network backbone enabling highly networked, resilient, and persistent DoD payloads to provide over the horizon sensing, signals, and communication, with continuous surveillance of ground, surface, and air domains. FY 2022 Plans:			

Appropriation/Budget Activity R-1 Program Element (Number/Name) Proje 2040 / 3 PE 0603463A / Network C3/ Advanced Tec CJ8 / Advanced Tec	e ct (Number/I Assured PN1 nced Tech	lame) ⁻ Communicat	tions		
			ect (Number/Name) I Assured PNT Communications anced Tech		
3. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023		
Nill demonstrate systems during joint exercises; demonstrate a sensor designed to provide space-based situational awareness to the tactical Warfighter; develop and demonstrate small satellite capabilities, which include classified payloads, to provide APNT services to the tactical ground component Warfighters; exploit a constellation of space-based sensors that provide Tactical ISR (Intelligence, Surveillance, and Reconnaissance) and SA to the ground force commander to support multi-domain operations (MDO); develop and demonstrate optical communications for Quantum Entanglement (QE);develop and demonstrate QE including site-to-site communications from a small satellite in Space or High Altitude platform; and mature the QE technology and demonstrate optical and quantum signals passed between small spacecraft, HA platforms, and/or Space (or HA) to ground. Will complete assembly, integration, testing, and conduct a technology demonstration event; and participate in joint exercises, culminating with Technical Readiness Level (TRL) 5 payload technology demonstration in an operational environment.					
FY 2023 Plans: Nill develop and demonstrate small satellite capabilities, which include classified payloads, to provide APNT services to the actical ground component Warfighters; exploit a constellation of space-based sensors that provide Tactical ISR (Intelligence, Surveillance, and Reconnaissance) and Situational Awareness (SA) to the ground force commander to support MDO; develop and demonstrate optical communications using classical and Quantum Entanglement (QE) technologies; develop and demonstrate QE including site-to-site communications from a small satellite in Space, High Altitude platform, or ground based/launched platform; and mature the QE technology and demonstrate optical and quantum signals passed between small spacecraft, HA platforms, Space (or HA), and/or ground launched assets. Will complete assembly, integration, testing, and conduct a QE technology demonstration event tied to Army warfighter communications requirements. Will begin design and development of including long lead component orders of classified capabilities and high altitude platforms and associated payloads to support tactical ground component Warfighters with advanced APNT capabilities.					
FY 2022 to FY 2023 Increase/Decrease Statement: Funds decrease reflect completion and transition of two products to Program Executive Officer (PEO) for Intelligence, Electronic Warfare and Sensor (PEO IEW&S) after demonstrations in Fiscal Year 2022 (FY22).					
Title: SBIR/STTR Transfer	-	0.402	-		
Description: Funding transferred in accordance with Title 15 USC 638.					
F Y 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
F Y 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638.					
Accomplishments/Planned Programs Subtotals	-	16.438	11.128		

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3/ Advanced Tec hnology	Project (Number/Name) CJ8 / Assured PNT Communications Advanced Tech
C. Other Program Funding Summary (\$ in Millions) N/A		
Remarks		
<u>D. Acquisition Strategy</u> N/A		

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army											Date: April 2022			
Appropriation/Budget Activity 2040: Research, Development, Te Technology Development (ATD)	est & Evalua	ation, Army I	I BA 3: Adva	anced	R-1 Program Element (Number/Name) PE 0603464A <i>I Long Range Precision Fires Advanced Technology</i>									
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost		
Total Program Element	-	177.142	141.909	100.830	-	100.830	133.252	123.417	141.776	133.446	0.000	951.772		
AE8: Land-Based Anti-Ship Missile (LBASM) Advanced Tech	-	9.690	15.698	12.150	-	12.150	-	-	-	-	0.000	37.538		
AE9: Low-Cost Tact Ext Range Missile (LC-TERM) Adv Tech	-	9.710	-	-	-	-	-	-	-	-	0.000	9.710		
AF2: Long Range Maneuverable Fires (LRMF) Advanced Tech	-	-	-	4.663	-	4.663	18.968	27.683	34.342	34.333	0.000	119.989		
AG3: Extended Range Cannon Artillery (ERCA) Adv Tech	-	17.760	3.117	3.354	-	3.354	-	6.444	9.357	11.225	0.000	51.257		
AG5: Extended Range Artillery Munition Suite Adv Tech	-	48.822	33.828	27.461	-	27.461	31.581	9.672	-	-	0.000	151.364		
AG7: Energetic Materials and Adv Processing Adv Tech	-	2.061	2.096	1.954	-	1.954	-	-	-	-	0.000	6.111		
BO8: Long Range Precision Fires Advanced Tech (CA)	-	60.000	48.000	-	-	-	-	-	-	-	0.000	108.000		
BY2: Advanced Hypersonic Technology	-	29.099	39.170	36.517	-	36.517	63.854	49.315	74.637	74.617	0.000	367.209		
CE9: Armaments Advanced Technology*	-	-	-	-	-	-	-	9.359	13.274	13.271	0.000	35.904		
CZ8: PrSM Modular Payload Advanced Development	-	-	-	14.731	-	14.731	18.849	20.944	10.166	-	0.000	64.690		

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2023

A. Mission Description and Budget Item Justification

This Program Element (PE) matures and demonstrates Long Range Precision Fires (LRPF) technologies to destroy, neutralize, or suppress the enemy by cannon artillery and missile fire and enable integration of fire support assets into combined arms operations. Major Focus Areas for LRPF Science and Technology include: Missiles, Cannon Artillery, and Supporting LRPF Technologies covering Strategic, Operational and Tactical Lines of Effort. LRPF Missiles Advanced Development matures and demonstrates a broad range of Missile technologies to enhance Army integrated LRPF capabilities at extended range. Cannon Artillery Advanced Development matures and demonstrates critical technologies to increase range, precision, and both point and area effects for cannon artillery. Supporting LRPF

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Arm	e: April 2022								
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Technology Development (ATD)	: Advanced	R-1 Program PE 0603464 <i>A</i>	Element (Number/Name)) ires Advanced Techn	ology				
Technologies Advanced Development matures and demonstration of future LRPF munitions and systems.	ates a broad ran	ge of compone	nt technologies to address	weapon cost drivers	and enhance p	erformance			
Research in this Program Element (PE) complements PE 0602	2147A Long Rai	nge Precision F	ires Technology.						
This PE is directly aligned to the Army Long Range Precision F	Fires (LRPF) Mo	odernization Pri	ority.						
The cited research is consistent with the Under Secretary of De	efense for Rese	arch and Engir	neering priority focus areas	and the Army Moder	nization Strateg	ју.			
Research is performed by the United States Army Futures Cor	mmand (AFC).								
B. Program Change Summary (\$ in Millions)	FY 2021	<u>FY 2022</u>	FY 2023 Base	FY 2023 OCO	<u>FY 2023</u>	Total			
Previous President's Budget	177.142	93.909	0.000	-		0.000			
Current President's Budget	177.142	141.909	100.830	-	10	0.830			
Total Adjustments	0.000	48.000	100.830	-	- 100.				
 Congressional General Reductions 	-	-							
 Congressional Directed Reductions 	-	-							
Congressional Rescissions	-	-							
Congressional Adds	-	48.000							
Congressional Directed Transfers	-	-							
• Reprogrammings	-	-							
Adjustments to Budget Years	-	-	100.830	-	10	0.830			
Congressional Add Details (\$ in Millions, and Include	es General Rec	<u>luctions)</u>			FY 2021	FY 2022			
Project: BO8: Long Range Precision Fires Advanced Te	ech (CA)								
Congressional Add: Missile Rapid Demonstration Ca	apability				25.000	-			
Congressional Add: Program Increase - Composite	Cannon Tubes				5.000	_			
Congressional Add: Program Increase - Hyperveloc		20.000	25.000						
Congressional Add: Program Increase: Tactical Inter	rcepting Vehicle	for Access			10.000	-			
Congressional Add: Extended Range Artillery Muniti	ions Suite				-	20.000			
Congressional Add: Maneuvering Submunitions for	Precision Strike	Missile			-	3.000			
			Congressional Add Subto	otals for Project: BO8	60.000	48.000			

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army	: April 2022		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)	R-1 Program Element (Number/Name) PE 0603464A <i>I Long Range Precision Fires Advanced Techno</i>	blogy	
Congressional Add Details (\$ in Millions, and Includes General Re	eductions)	FY 2021	FY 2022
	Congressional Add Totals for all Projects	60.000	48.000
Change Summary Explanation			
Fiscal Year 2023 (FY23) funding increase reflects the fact that the FY	22 President's Budget request did not include out-year funding.		

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: Ap	ril 2022		
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)ProjectionPE 0603464A / Long Range Precision FiresAE8 /Advanced Technology(LBA)					e ct (Number/Name) I Land-Based Anti-Ship Missile SM) Advanced Tech			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
AE8: Land-Based Anti-Ship Missile (LBASM) Advanced Tech	-	9.690	15.698	12.150	-	12.150	-	-	-	-	0.000	37.538	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
defeat moving land or maritime su Research in this Project complem The cited research is consistent v Research in this Project is perform	urface targe nents Progr with the Une med by the	ets under all ram Elemen der Secretar United Stat	l conditions. t (PE) 0602 ry of Defens es Army Fu	147A (Long se for Rese tures Comr	g Range Pre arch and Er mand (AFC)	ecision Fires ngineering p).	Technolog	y). s areas and	the Army N	<i>l</i> odernizat	ion Strategy.		
B. Accomplishments/Planned P	rograms (\$ in Million	<u>s)</u>						F	í 2021	FY 2022	FY 2023	
Title: Land Based Anti-Ship Missi	ile (LBASM) Advanced	Technology	/						9.690	15.125	12.150	
Description: Matures and demon launch rocket system (MLRS) roc	nstrates tec ket/missile	hnologies th artillery sys	hat enable h tems to des	igh-mobility troy enemy	y artillery ro / air defense	cket system es in the lan	(HIMARS) d and the m	and multipl naritime dor	e- nains.				
<i>FY 2022 Plans:</i> Will complete demonstrations of n seeker performance; complete an begin maturation and integration of	nulti-mode alysis flight of seeker te	seeker tech t testing data echnologies	nologies in a and optim into the Pre	a surrogate ization of tr cision Strik	e missile sys racking, ider ke Missile (F	stem to obta ntification ar PrSM).	in real worl nd aim-poin	d effect on t algorithms	; and				
FY 2023 Plans: Will end demonstrations and data concepts for re-factoring multi-mo as part of the PrSM form factor th	evaluation de seeker rough hard	of multi-mo technologie: ware-in-the-	de seeker t s into PrSM -loop to veri	echnologie form factor fy operatior	s in a surro r. Will demo n when integ	gate missile nstrate mult grated with o	system. W ti-mode see other PrSM	/ill mature ker technol component	ogies is.				
FY 2022 to FY 2023 Increase/De Decrease in funding is due to com	ecrease Sta	atement: velopment a	ind fabrication	on of seeke	er compone	nts for flight	testing on s	surrogate m	iissile.				
Title: FY2022 SBIR/STTR Transfe	er									-	0.573	-	

PE 0603464A: Long Range Precision Fires Advanced Tech... Army

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hibit R-2A, RDT&E Project Justification: PB 2023 Army							
R-1 Program Element (Number/Name) PE 0603464A <i>I Long Range Precision Fires</i> <i>Advanced Technology</i>	Project (Number/N AE8 / Land-Based (LBASM) Advanced	ct (Number/Name) Land-Based Anti-Ship Missile SM) Advanced Tech					
	FY 2021	FY 2022	FY 2023				
638							
Accomplishments/Planned Programs Sub	totals 9.690	15.698	12.150				
	R-1 Program Element (Number/Name) PE 0603464A I Long Range Precision Fires Advanced Technology 338 Accomplishments/Planned Programs Subt	Date: A R-1 Program Element (Number/Name) Project (Number/Nate) PE 0603464A I Long Range Precision Fires AE8 I Land-Based. Advanced Technology FY 2021 338 338 FY 2021	R-1 Program Element (Number/Name) Project (Number/Name) AE8 I Land-Based Anti-Ship Mis Advanced Technology Image: State St				

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	Army							Date: Ap	ril 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060346 Advanced	am Elemen 64A I Long I I Technolog	i t (Number Range Prec y	Project (N AE9 / Low TERM) Ac	ect (Number/Name) I Low-Cost Tact Ext Range Missile (LC- M) Adv Tech			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AE9: Low-Cost Tact Ext Range Missile (LC-TERM) Adv Tech	-	9.710	-	-	-	-	-	-	-	-	0.000	9.710
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
effects. Additionally, technology intelligence, surveillance and rec ISR that will be able to provide ta Research in this Project compler The cited research is consistent Research in this Project is perfor	argetable da ments Progr with the Un-	nt will suppo e (ISR) pay ita for area a am Elemen der Secreta United Stat	tion component ort LRPF ca loads and a and point ta t (PE) 0602 ry of Defens tes Army Fu	apabilities b attack capal argets, and a 147A (Long se for Rese atures Com	y investigati pilities via lo attack platfo g Range Pre arch and Er mand (AFC)	ing and dev ong range m orms for targ ecision Fires ngineering p	eloping criti issiles. The gets of oppo a Technolog	y). s areas and	bgies for the	delivered p	of dedicated obayloads will	provide
B. Accomplishments/Planned F	Programs (\$ in Million	<u>s)</u>						F١	2021	FY 2022	FY 2023
Title: Low-Cost Tactical Extende	d Range Mi	ssile (LC-TE	ERM) Adva	nced Techn	ology					9.710	-	-
Description: Mature and demonstructure component technologies that red	strate propu uce depend	Ilsion techno ence on GF	ologies that PS for precis	enables ex sion.	tended rang	ge target en	gagement a	and navigati	ion			
					Accomplis	shments/Pl	anned Pro	grams Sub	totals	9.710	-	-
C. Other Program Funding Sum N/A Remarks D. Acquisition Strategy N/A	<u>nmary (\$ in</u>	<u>Millions)</u>										

Exhibit R-2A, RDT&E Project Ju	Date: April 2022												
Appropriation/Budget Activity 2040 / 3						R-1 Program Element (Number/Name)Project (NPE 0603464A / Long Range Precision FiresAF2 / LonAdvanced Technology(LRMF) A					lumber/Name) g Range Maneuverable Fires dvanced Tech		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
AF2: Long Range Maneuverable Fires (LRMF) Advanced Tech	-	-	-	4.663	-	4.663	18.968	27.683	34.342	34.333	0.000	119.989	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

A. Mission Description and Budget Item Justification

This Project directly supports Long Range Precision Fires Modernization Priority capabilities by developing, maturing and demonstrating next generation Multi-Domain Operations extended range weapon system technology for Precision Strike Missile to increase survivability, penetration, and range in complex Anti Access/Area Denial (A2/AD) and denied environments. This Project also includes both the maturation and demonstration of advanced extended range missile technology and autonomous, unmanned launcher technology. The combination of these technologies offers the potential to dramatically increase force projection through increases in range, firepower, and magazine depth.

Research in this Project complements Program Element (PE) 0602147A (Long Range Precision Fires Technology).

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Long Range Maneuverable Fires (LRMF) Advanced Tech	-	-	4.663
Description: Matures and demonstrates next generation Multi-Domain Operations extended range weapon system technology for Precision Strike Missile to increase survivability, penetration, and range in complex A2/AD and denied environments. Includes maturation and demonstration of advanced extended range missile technology and autonomous, unmanned launcher technology.			
FY 2023 Plans: Will develop and mature combined cycle extended range missile propulsion engine and autonomous unmanned launcher designs and perform critical sub-system assessments in preparation for system level integration.			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding realigned from PE 0602147A (Long Range Precision Fires Technology) / Project AF1 (Long Range Maneuverable Fires (LRMF) Technology) to mature and demonstrate missile propulsion and unmanned launcher technologies in support of multi- domain operations through extended range fires.			
Accomplishments/Planned Programs Subtotals	-	-	4.663

PE 0603464A: Long Range Precision Fires Advanced Tech... Army

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603464A <i>I Long Range Precision Fires</i> <i>Advanced Technology</i>	Project (Number/Name) AF2 I Long Range Maneuverable Fires (LRMF) Advanced Tech
C. Other Program Funding Summary (\$ in Millions)	· ·	
N/A		
Remarks		
D. Acquisition Strategy		
N/A		

Exhibit R-2A, RDT&E Project Ju	ustification	n: PB 2023 A	Army							Date: Ap	oril 2022		
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)ProjectionPE 0603464A / Long Range Precision FiresAG3Advanced Technology(ERC)					e ct (Number/Name) I Extended Range Cannon Artillery CA) Adv Tech			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 202	Cost To Complete	Total Cost	
AG3: Extended Range Cannon Artillery (ERCA) Adv Tech	-	17.760	3.117	3.354	-	3.354	-	6.444	9.35	7 11.22	25 0.000	51.257	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-		-		
This Project directly supports Lon including light weight cannon and improved sensor to shooter com environment with analytic capabi The cited research is consistent Research in this Project is perfor	ng Range F d mount stri munications ilities to sup with the Un med by the	Precision Fire uctures, high s which will i oport Fires a der Secreta united Stat	es (LRPF) M n efficiency increase rar nd Intel Sole ry of Defens res Army Fu	Aodernization recoil cylino nge and accord diers. Se for Resent tures Comm	on Priority o ders, comm curacy witho arch and Er mand (AFC	apabilities. on lower po out an increa ngineering p).	This Projec wer fire cor ase in platfo priority focus	t matures a htrol hardwa form weight. s areas and	nd demon ire, improv This Proje the Army	strates artil ed fire con ct also dev Moderniza	iery technolo rol software, elops a colla ion Strategy.	gies and borative	
B. Accomplishments/Planned F	Programs (\$ in Million	<u>s)</u>						F	Y 2021	FY 2022	FY 2023	
Title: Extended Range Cannon A	Artillery Adv	anced Tech	nology							14.754	-	-	
Description: This effort matures novel integration for automation, which will maximize range increatechnology.	and demor improved fi ses and en	nstrates exte re control, a able increas	ended range mmunition l se precision	Armamen nandling, an with next g	t technologi nd improved eneration n	es including d sensor to s nunition and	l Cannons a shooter con target acqu	and Gun Mo nmunicatior uisition	ounts, Is				
Title: Synchronized High Op-Ten	npo (SHOT) Targeting	for LRPF							3.006	3.003	3.354	
Description: This effort develops organizing planning products, and that support Course of Action dev	s a collabor d analytics /elopment.	ative enviro that automa	nment with te data disc	analytic cap overy and o	babilities to developmer	support Fire nt of targets	es and Intel and stream	Soldiers in Ilining workt	lows				
FY 2022 Plans: Will continue maturation of multi-INT intelligence algorithms capable of facilitating timely creation of intelligence to support long range fires missions. Will integrate with Fires Systems and aggregation with Advanced Field Artillery Tactical Data System (AFATDS) minimum data for effects. Will align to Program of Record (POR) data fabric concepts to automate aggregation of all relevant data necessary to identify target and present actionable fires options.									ng all				
FT 2023 Plans:													

PE 0603464A: Long Range Precision Fires Advanced Tech... Army

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022										
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603464A / Long Range Precision Fires Advanced Technology	Project (Number/Name) AG3 / Extended Range Cannon Artiller (ERCA) Adv Tech									
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023						
 Will mature software and technical documentation including drawings, concept I. Will mature and optimize draft training technology package concepts. Will de in an operationally relevant exercise environment. Will mature all technology c integrated targeting data system. 	of operation, and standard operating procedu emonstrate targeting cycle support technologie omponents for validation and demonstration ir	res. es 1 an									
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects the planned lifecycle of this effort.											
Title: FY2022 SBIR/STTR Transfer			-	0.114	-						
Description: Funding transferred in accordance with Title 15 USC ?638											
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638											
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638											
	Accomplishments/Planned Programs Sub	totals	17.760	3.117	3.354						
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A											

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	vrmy							Date: Apr	il 2022		
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)ProjePE 0603464A I Long Range Precision FiresAG5Advanced TechnologySuite					ject (Number/Name) 5 I Extended Range Artillery Munition e Adv Tech			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
AG5: Extended Range Artillery Munition Suite Adv Tech	-	48.822	33.828	27.461	-	27.461	31.581	9.672	-	-	0.000	151.364	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
A. Mission Description and Buc This Project directly supports Lor technologies including advanced The cited research is consistent v Research in this Project is perfor	ng Range P projectile p with the Uno med by the	recision Fire ropulsion ar der Secretar United Stat	es Moderniz nd guidance ry of Defens es Army Fu	ation Priori technolog se for Rese tures Comr	ty capabilitio ies to increa arch and Er mand (AFC)	es. This Pro ase range ar ngineering p	ject mature nd accuracy riority focus	s and demo areas and	onstrates ex the Army N	tended rar Iodernizati	nge artillery on Strategy.		
B. Accomplishments/Planned P	rograms (S	in Million	<u>5)</u>						FY	2021	FY 2022	FY 2023	
Title: Extended Range Artillery M	unition Suit	e Advanced	I Technolog	IУ						48.822	32.594	25.622	
Description: Matures and optimize measure, and payload technologi	zes long rar es.	nge unitary a	artillery proj	ectile syste	ms in the a	reas of rang	e, precision	, counter-					
FY 2022 Plans: Will mature and demonstrate long architectures, and component cap will continue to demonstrate integ increased range, sensor optimiza conventional and cargo munitions mature potential payload configur potential payloads and sub-munit	g-range unit babilities. W grated conce tion and inte for advance ations for e ion survivat	ary artillery /ill optimize epts for exte egration. Wi ed effects o xtended ran pility. Will va	projectile sy configuratic ended range ill improve p compatible v ige airframe lidate post	ystems to v ons of proje artillery pr performance with current e delivered gun launch	alidate syste ctile concep ojectiles inc e of extende and future effects that propulsion	em modeling ts to obtain luding: impr ed range airl artillery syst include: disprange exten	g and simul increased p oved guida frames desi ems. Will co pensing tec sion techno	ation (M&S performance nce algorith gns for pontinue to hniques, logies.), e; ims,				
<i>FY 2023 Plans:</i> Will continue demonstration of lor architectures, and component cap Will demonstrate gun launched m propulsion technologies. Will com guidance algorithms, sensors, pro conventional and cargo munitions	ng-range un pabilities. W unition surv plete demo opulsion, an s for advance	itary artiller /ill validate o /ivability and nstration of id range ext ed effects o	y projectile configuration d aeroballist integrated t ension tech compatible v	designs to ns of projec tic stability. technologie nologies. V with current	validate sys stile technolo Will mature s in extendo Vill mature e and future	tem modelir ogies for inc advanced r ed range art extended rar artillery syst	ng and simu reased perf range exten illery projec nge airframe ems. Will de	lation (M&S ormance. ding tiles includi e concepts emonstrate	S), ng: for				

PE 0603464A: Long Range Precision Fires Advanced Tech... Army

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603464A <i>I Long Range Precision Fires</i> <i>Advanced Technology</i>	Project (Number/I AG5 / Extended Ra Suite Adv Tech	Name) ange Artillery i	Munition
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
payload concepts and configurations for extended range gun-launch dispensing techniques and survivability.	ed airframe delivered effects to include sub-munition			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding decrease in accordance with Project plan to demonstrate a	unitary warhead Extended Range Artillery Projectile.			
Title: Optionally Manned Artillery Advanced Technology		-	-	1.839
Description: Develop automated cannon artillery solutions for fuze- rate of fire and out-pace future near-peer, high operational-tempo (C	setting, firing, as well as rearming to exponentially increas OPTEMPO) engagements, and reduce Soldier burden.	e		
FY 2023 Plans: Will mature technologies for OPTEMPO long range fires concepts to re-supply, and fire control and diagnostics. Will mature modeling and improve: the performance, effectiveness, and current and future operation.	o include: automated fuze setting, automated re-arm and d simulation M&S concepts and analytical system trades to prations of automated cannon artillery solutions.)		
FY 2022 to FY 2023 Increase/Decrease Statement: Funding realigned from Program Element (PE) 0602147A (Long Rai Range Artillery Munition Suite Technology) to advance the Advance demonstrate automated cannon artillery solutions.	nge Precision Fires Technology) / Project AG4 (Extended d Technology Development research on technology effort	s to		
Title: FY2022 SBIR/STTR Transfer		-	1.234	-
Description: Funding transferred in accordance with Title 15 USC ?	2638			
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638				
	Accomplishments/Planned Programs Subt	otals 48.822	33.828	27.461
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u>				
N/A				
PE 0603464A: Long Range Precision Fires Advanced Tech	UNCLASSIFIED		Valu	

Army

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: Ap	ril 2022		
Appropriation/Budget Activity 2040 / 3					R-1 Progr PE 060346 Advanced	am Elemen 64A I Long I I Technolog	i t (Number / Range Prec y	' Name) ision Fires	Project (I AG7 / En Processir	oject (Number/Name) 37 I Energetic Materials and Adv ocessing Adv Tech			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
AG7: Energetic Materials and Adv Processing Adv Tech	-	2.061	2.096	1.954	-	1.954	-	-	-	-	0.000	6.111	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
This Project directly supports Lon materials ranging from medium ca The cited research is consistent v Research in this Project is perform	ng Range P aliber throu with the Un med by the	Precision Fire ugh large cal der Secretar United Stat	es Moderniz liber weapo ry of Defens es Army Fu	zation Priori ns. se for Rese tures Comr	ty capabiliti arch and Er mand (AFC)	es. This Pro ngineering p).	vject mature	s and demo	onstrates th	ne performa Modernizat	ance of ener	getic	
B. Accomplishments/Planned P	rograms (\$ in Million	<u>s)</u>						F	Y 2021	FY 2022	FY 2023	
Title: Scale-up of Insensitive Ene	rgetic Mate	erials								2.061	2.020	1.954	
Description: This effort matures a medium caliber (direct fire) throug	and demor jh 155mm l	nstrates the large caliber	performanc (indirect fir	e and insen e) weapons	isitivity of er 3.	nergetic mat	terials rangi	ng from 25	mm				
FY 2022 Plans: Will demonstrate advanced proce formulations; will demonstrate sca	essing meth ale-up of er	ods for incre nergetic mate	eased scale erials and a	and higher	r throughput ocessing m	t of energet iethods.	ic ingredien	ts and					
FY 2023 Plans: Will optimize energetic materials of obtain higher throughput of ingred advanced ignition components in material characterization of variou	concepts and f dients and f representa us insensitiv	nd advanced formulations itive applicative energetic	d processin . Will valida tions. Will m materials.	g methods te high-ene nature and v	to increase ergy explosiv validate high	scale of ma ve and prop n energy de	nufacture d ellant formu nsity formul	esigns and Ilations with ations and	1				
FY 2022 to FY 2023 Increase/De Funding reduced as research in th	e crease St a he area of _l	atement: propellant fo	ormulations	and materia	al character	ization is re	duced.						
Title: FY2022 SBIR/STTR Transf	er									-	0.076	-	
Description: Funding transferred	in accorda	ance with Tit	le 15 USC '	?638									
FY 2022 Plans:													

PE 0603464A: Long Range Precision Fires Advanced Tech... Army

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date	: April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603464A <i>I Long Range Precision Fires</i> <i>Advanced Technology</i>	Project (Numb AG7 I Energetic Processing Adv	r/Name) Materials and A Tech	ldv
B. Accomplishments/Planned Programs (\$ in Millions)		FY 202	FY 2022	FY 2023
Funding transferred in accordance with Title 15 USC 7638				
Fy 2022 to Fy 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638				
	Accomplishments/Planned Programs Sub	totals 2.0	61 2.096	1.954
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A				

Exhibit R-2A, RDT&E Project J	ustification	: PB 2023 A	Army							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progr PE 060340 Advanced	am Elemen 64A / Long / 1 Technolog	n t (Number / Range Prec y	Name) ision Fires	Project (N BO8 / Long Advanced	Project (Number/Name) 308 I Long Range Precision Fires Advanced Tech (CA)		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BO8: Long Range Precision Fires Advanced Tech (CA)	-	60.000	48.000	-	-	-	-	-	-	-	0.000	108.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Congressional Interest Item fund A. Mission Description and Bu Congressional Interest Item fund The cited work is consistent with	ding provide ding provide n the Under s	d for Long F ustification d for Long F Secretary of	Range Precis I Range Precis ^F Defense fo	sion Advan sion Advan r Research	ced Techno ced Techno and Engino	ology. ology. eering priori	ty focus are	eas and the	Army Mode	rnization S	trategy.	
B. Accomplishments/Planned	Programs (\$ in Million	s <u>)</u>					FY 2021	FY 2022]		
Congressional Add: Missile Ra	pid Demons	tration Cap	ability					25.000	-]		
FY 2021 Accomplishments: Co	onducted ad	vanced rese	earch in Mise	sile Rapid I	Demonstrati	ion Capabili	ty.					
Work executed by Army Futures	Command.											
Congressional Add: Program I	ncrease - Co	omposite Ca	annon Tubes	6				5.000	-	-		
FY 2021 Accomplishments: Co	onducted ad	vanced rese	earch in Con	nposite Ca	nnon Tubes	5.						
Work executed by Army Futures	Command.											
Congressional Add: Program I	ncrease - Hy	pervelocity	Projectile E	xtended Ra	ange			20.000	25.000	-		
FY 2021 Accomplishments: Co	onducted ad	vanced rese	earch in Hyp	ervelocity I	Projectile Ex	xtended Rar	nge.					
Work executed by Army Futures	Command.											
FY 2022 Plans: Congressional I	nterest Item	funding pro	vided for Hy	pervelocity	/ Projectile I	Extended R	ange					
Congressional Add: Program I	ncrease: Ta	ctical Interce	epting Vehic	le for Acce	SS			10.000	-]		
FY 2021 Accomplishments: Co	onduct adva	nced resear	ch in Tactica	al Intercept	ing Vehicle	for Access.						

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number PE 0603464A / Long Range Prec Advanced Technology	Name) ision Fires	Project (N BO8 / Long Advanced	umber/Name) g Range Precision Fires Tech (CA)
B. Accomplishments/Planned Programs (\$ in Millions) Work executed by Army Futures Command.		FY 2021	FY 2022	
Congressional Add: Extended Range Artillery Munitions Suite		-	20.000	

Congressional radio Extended Range radio y mandene Sale		20.000
FY 2022 Plans: Congressional Interest Item funding provided for Extended Range Artillery Munitions Suite		
Congressional Add: Maneuvering Submunitions for Precision Strike Missile	-	3.000
FY 2022 Plans: Congressional Interest Item funding provided for Maneuvering Submunitions for Precision Strike Missile		
Congressional Adds Subtotals	60.000	48.000

C. Other Program Funding Summary (\$ in Millions)

N/A

<u>Remarks</u>

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: April	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603464A <i>I Long Range Precision Fires</i> <i>Advanced Technology</i>				Project (Number/Name) BY2 <i>I Advanced Hypersonic Technology</i>			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BY2: Advanced Hypersonic Technology	-	29.099	39.170	36.517	-	36.517	63.854	49.315	74.637	74.617	0.000	367.209
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project directly supports Long Range Hypersonic Precision Fires Modernization Priority capabilities by developing and maturing critical technologies for strategic missiles. Technology development includes critical technologies to improve strategic missile components such as advanced structures and materials, thermal protection systems, navigation systems, data links, and seekers/terminal sensors.

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

Research in this Project is performed by the United States (U.S.) Army Futures Command (AFC) in coordination with the United States Army Rapid Capabilities and Critical Technologies Office (RCCTO).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Hypersonics Advanced Technology	29.099	37.740	36.517
Description: This effort matures and demonstrates new subsystems and components of a hypersonic weapon delivery system to defeat Anti Access/Area Denial (A2/AD) capabilities, suppress adversary Long Range Fires, and engage other payoff/ time critical targets.			
<i>FY 2022 Plans:</i> Will optimize candidate materials and material processing techniques to support critical material decisions for hypersonic weapons application; will mature simulation tools for optimization of vehicle flight performance; will mature guidance, navigation and control (GN&C) technology to dramatically reduce reliance on Global Positioning System (GPS) for navigation accuracy; will mature data links and advanced communication technologies; and will mature seeker / terminal sensor technologies.			
FY 2023 Plans: Will optimize candidate Common Hypersonic Glide Body (CHGB) thermal protection materials and material processing techniques to support critical material decisions for hypersonic weapon applications; will mature simulation tools for optimization of vehicle flight performance; will mature GN&C technology to reduce both size, weight, and power (SWAP) / packaging and reliance on GPS for navigation accuracy and will mature seeker / terminal sensor technologies.			
FY 2022 to FY 2023 Increase/Decrease Statement:			

PE 0603464A: Long Range Precision Fires Advanced Tech... Army

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603464A <i>I Long Range Precision Fires</i> <i>Advanced Technology</i>	Project BY2 / A	oject (Number/Name) /2 I Advanced Hypersonic Technology			
B. Accomplishments/Planned Programs (\$ in Millions)	s offort		FY 2021	FY 2022	FY 2023	
The funding declease is attributed to the completion of the data link capabilities	/ Transfer (STTR)			1 / 30		
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638				1.400		
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638						
	Accomplishments/Planned Programs Sub	totals	29.099	39.170	36.517	
N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A N/A						

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: Apri	l 2022	
Appropriation/Budget Activity 2040 / 3				R-1 Program Element (Number/Name) PE 0603464A <i>I Long Range Precision Fires</i> <i>Advanced Technology</i>				Project (Number/Name) CZ8 / PrSM Modular Payload Advanced Development				
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CZ8: PrSM Modular Payload Advanced Development	-	-	-	14.731	-	14.731	18.849	20.944	10.166	-	0.000	64.690
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) funding is realigned from Program Element (PE) 0603464A (Long Range Precision Fires Advanced Technology) / Project AE8 (Land-Based Anti-Ship Missile (LBASM) Advanced Tech).

A. Mission Description and Budget Item Justification

This Project directly supports Long Range Precision Fires Modernization Priority capabilities by maturing and demonstrating critical technologies for autonomous, Cluster Munition policy compliant, enhanced lethality payloads deployed from Precision Strike Missile to autonomously and cooperatively find and engage the full spectrum of deep moved, moving, dispersed, and poorly located targets in areas with contested access at extended ranges.

Research in this Project complements Program Element (PE) 0602147A (Long Range Precision Fires Technology).

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Precision Strike Missile (PrSM) Advanced Development/PrSM Modular Payload	-	-	14.731
Description: Mature and demonstrate critical technologies for the delivery of distributed and enhanced lethality capabilities via extended range missiles. Technology examples include: sensor and associated signal processing technologies for target acquisition, identification, and engagement; datalink and communications technologies to transmit targetable data; compact propulsion technologies to enable dwell time on station; payload dispensing technologies for deploying these payloads from high speed long range missiles; and advanced extended range missile propulsion and guidance technologies.			
FY 2023 Plans: Will continue enhanced lethality payload designs, initiate sub-system testing verifying expected component performance, begin development of advanced extended range missile propulsion and guidance technologies, and update high fidelity simulations to assess integrated missile performance.			
FY 2022 to FY 2023 Increase/Decrease Statement:			

PE 0603464A: Long Range Precision Fires Advanced Tech... Army

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603464A <i>I Long Range Precision Fires</i> <i>Advanced Technology</i>	Project (Number/Name) es CZ8 I PrSM Modular Payload Adv Development			dvanced
B. Accomplishments/Planned Programs (\$ in Millions) Funding realigned from Program Element (PE) 0603464A (Long Range (Land-Based Anti-Ship Missile (LBASM) Advanced Tech) to mature and increments for the PrSM enhancements.	Precision Fires Advanced Technology) / Project AE8 d demonstrate technologies for the next development	and	FY 2021	FY 2022	FY 2023
	Accomplishments/Planned Programs Sub	ototals	-	-	14.731
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A					

Exhibit R-2, RDT&E Budget Item	n Justificat	i on: PB 202	23 Army							Date: April	2022	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)					R-1 Program Element (Number/Name) PE 0603465A / Future Vertical Lift Advanced Technology							
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	220.334	261.880	177.836	-	177.836	170.020	185.821	190.893	184.028	0.000	1,390.812
Al8: Alternative Concept Engine Advanced Technology	-	2.507	3.828	2.038	-	2.038	2.174	2.211	2.211	2.211	0.000	17.180
AJ1: Future UAS Engine Advanced Technology	-	2.355	-	-	-	-	-	-	-	-	0.000	2.355
AJ3: Next Generation Rotorcraft Transmission Adv Tech	-	1.342	1.404	-	-	-	-	-	-	1.447	0.000	4.193
AJ5: Digital Vehicle Management & Control Advanced Tech	-	6.340	-	-	-	-	-	-	-	-	0.000	6.340
AJ7: Advanced Rotors Advanced Technology	-	2.407	2.477	-	-	-	-	-	-	-	0.000	4.884
AJ9: Integ Mission Equip for Vert Lift Systems Adv Tech	-	21.369	23.915	25.066	-	25.066	17.020	3.372	-	-	0.000	90.742
AK3: Aviation Survivability Advanced Technology	-	12.606	3.966	4.118	-	4.118	-	-	-	-	0.000	20.690
AK5: Multi-Role Small Guided Missile Advanced Tech	-	2.519	5.867	11.209	-	11.209	11.743	7.053	-	-	0.000	38.391
AK7: Adv Rotorcraft Armaments Protection Sys Adv Tech	-	6.177	10.541	9.580	-	9.580	3.078	-	-	-	0.000	29.376
AK8: Air Launched Effects Advanced Technology	-	28.542	28.905	28.798	-	28.798	27.895	27.869	27.878	27.871	0.000	197.758
AL1: Adv Teaming for Tactical Aviation Oper Adv Tech	-	40.157	39.953	35.579	-	35.579	42.494	47.869	60.177	49.220	0.000	315.449
AL3: HPC for Rotorcraft Applications Adv Tech	-	4.862	5.073	-	-	-	-	-	-	-	0.000	9.935
AL7: Full Spectrum Targeting Advanced Technology	-	9.610	9.381	8.619	-	8.619	8.804	9.484	10.213	10.194	0.000	66.305

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Exhibit R-2, RDT&E Budget Iten	n Justificat	tion: PB 202	23 Army							Date: April	2022		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)					R-1 Program Element (Number/Name) PE 0603465A / Future Vertical Lift Advanced Technology								
AL9: Holistic Sit Awareness and Dec Making Adv Tech	-	4.696	19.392	29.300	-	29.300	22.035	22.759	23.807	22.761	0.000	144.750	
AM5: Opt Energy Stg & Therm Mgmt for FVL Surv Adv Tech	-	1.925	-	-	-	-	-	-	-	-	0.000	1.925	
BP8: Future Vertical Lift Air Platform Adv Tech (CA)	-	68.750	82.500	-	-	-	-	-	-	-	0.000	151.250	
CA8: Adv Rotocraft Armaments Protection Sys	-	0.963	1.234	2.862	-	2.862	9.551	12.617	12.621	12.618	0.000	52.466	
CC4: FVL Radar Advanced Technologies	-	3.207	4.000	3.342	-	3.342	4.384	-	2.369	2.369	0.000	19.671	
CG1: Holistic Team Survivability Adv Tech	-	-	6.424	11.898	-	11.898	15.272	17.290	21.124	24.753	0.000	96.761	
CH6: Adapt & Resilnt Tact Autnmy Cont & Struct Adv Tech	-	-	4.561	-	-	-	-	-	-	-	0.000	4.561	
CH7: Power & Thermal Management for FVL Adv Tech	-	-	3.402	4.396	-	4.396	4.275	5.418	7.513	5.392	0.000	30.396	
CH8: UAS Survivability Adv Technology	-	-	5.057	-	-	-	-	-	-	-	0.000	5.057	
Cl8: Adaptive Avionics Advanced Technologies*	-	-	-	-	-	-	-	10.716	18.772	2 18.767	0.000	48.255	
CJ5: Future Vertical Lift Medical Advanced Technology	-	-	-	1.031	-	1.031	1.295	1.553	1.554	1.554	0.000	6.987	
CK2: High Speed Maneuverable Missile (HSMM) Adv Tech*	-	-	-	-	-	-	-	17.610	2.654	4.871	0.000	25.135	

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2023

A. Mission Description and Budget Item Justification

This Program Element (PE) matures and demonstrates manned and unmanned air vehicle and mission system technologies as well as advanced teaming capabilities to enable Army Future Vertical Lift. Emphasis is on platform and mission system technologies to enhance manned and unmanned air vehicle combat and combat support operations for attack, reconnaissance, air assault, survivability, logistics, and command and control missions. Within this PE, aviation technologies are advanced and integrated into realistic and robust demonstrations.

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 A	rmy			Date	e: April 2022					
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA Technology Development (ATD)	3: Advanced	R-1 Program Element (Number/Name) PE 0603465A I Future Vertical Lift Advanced Technology								
Research in this PE contributes to the Army Science and Te Technology), PE 0602183A (Air Platform Applied Research)	chnology (S&T) ai and PE 0603043	r systems portfolic A (Air Platform Ad	o and is fully coordinated vanced Technology).	d with efforts in PE 06	602148A (Future	e Vertical Lift				
A portion of this PE is directly aligned to the Future Vertical I	_ift (FVL) Army Mo	odernization Priorit	ty.							
The cited research is consistent with the Under Secretary of	Defense for Rese	arch and Enginee	ring S&T focus areas ar	nd the Army Moderniz	ation Strategy.					
Research in this PE is performed by the United States Army	Futures Comman	d (AFC) and the A	Army Engineering Resea	arch and Developmen	t Center (ERDC	;).				
B. Program Change Summary (\$ in Millions)	<u>FY 2021</u>	FY 2022	FY 2023 Base	FY 2023 OCO	<u>FY 2023</u>	<u>Total</u>				
Previous President's Budget	220.334	179.677	0.000	-		0.000				
Current President's Budget	220.334	261.880	177.836	-	17	7.836				
Total Adjustments	0.000	82.203	177.836	-	17	7.836				
 Congressional General Reductions 	-	-								
Congressional Directed Reductions	-	-								
Congressional Rescissions	-	-								
Congressional Adds Congressional Directed Transfers	-	82.500								
Congressional Directed Transfers Poprogrammings	-	-								
• CEPIOGIAIIIIIIIIgs	-	-								
Adjustments to Budget Vears	-	_	177 836	_	17	7 836				
FFRDC Transfer	-	-0.297	-	-		-				
Congressional Add Details (\$ in Millions, and Inclu	udes General Rec	luctions)		[FY 2021	FY 2022				
Project: BP8: Future Vertical Lift Air Platform Adv Tec	ch (CA)									
Congressional Add: Joint Tactical Aerial Resupply	v Vehicle			·	8.000	8.000				
Congressional Add: Advanced Helicopter Seating	System				15.000	-				
Congressional Add: Helicopter Emergency Oil Sys	stems			·	2.000	-				
Congressional Add: UAV Fuel Systems Enhancer		2.000	-							
Congressional Add: Surface Tolerant Advanced A		5.000	4.000							
Congressional Add: Ferrium Steels for Improved I	Drive Systems				5.000	-				
Congressional Add: Program Increase - UH-60 m	ain rotor blade mo	dernization			5.000	5.000				
Congressional Add: Program Increase - Soldier In	formation Interfac	e for Aviation Flee	et Management Tool		2.250	-				

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army	I	Date: April 2022	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advanced Technology</i>		
Congressional Add Details (\$ in Millions, and Includes General Red	uctions)	FY 2021	FY 2022
Congressional Add: Program Increase - Displays and Safety in DVE		4.000	-
Congressional Add: Program Increase - Digital Engineering Demons	stration	8.000	-
Congressional Add: Program Increase - Tethered UAS for All?Terrai	in Vehicles	12.500	-
Congressional Add: 20MM Chaingun Development for FLRAA		-	8.000
Congressional Add: Air Launched Turbojet Missile		-	15.000
Congressional Add: Composite Structures		-	5.000
Congressional Add: Data Refinement and Optimization for Aviation	Sustainment	-	4.500
Congressional Add: Degraded Visual Environment		-	3.500
Congressional Add: Digital Backbone		-	5.000
Congressional Add: Elastomeric Imaging		-	3.000
Congressional Add: Fleetspace Maintenance Tool		-	4.500
Congressional Add: Platform Digitization and Maintenance		-	5.000
Congressional Add: Stretch Broken Carbon Fiber		-	10.000
Congressional Add: UAS Fuel Systems Enhancements		-	2.000
	Congressional Add Subtotals for Project: B	P8 68.750	82.500
	Congressional Add Totals for all Proje	cts 68.750	82.500

Change Summary Explanation

Fiscal Year 2023 (FY23) funding increase reflects the fact that the FY22 President's Budget request did not include out-year funding.

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	Army							Date: Apr	il 2022		
Appropriation/Budget Activity 2040 / 3					R-1 Progr PE 060346 d Technolo	am Elemen 65A <i>I Future</i> ogy	t (Number / Vertical Lit	' Name) ft Advance	Project (Number/Name) Al8 <i>I Alternative Concept Engine Advanced</i> <i>Technology</i>				
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
Al8: Alternative Concept Engine Advanced Technology	-	2.507	3.828	2.038	-	2.038	2.174	2.211	2.211	2.211	0.000	17.180	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
Research in this Project is fully contracted to the cited research is consistent with the Strategy.	operationa oordinated with the Uno med by the	l capability. with Progran der Secretan United Stat	m Element ry of Defens es (US) Arr	(PE) 06021 se for Rese ny Futures	48A (Future arch and Er Command.	e Vertical Lif	t Technolog	gy). Technolog	y focus area	as and the	Army Mode	rnization	
B. Accomplishments/Planned P	rograms (\$ in Million	<u>s)</u>						FY	2021	FY 2022	FY 2023	
Title: Alternative Concept Engine	(ACE)									2.507	1.658	-	
Description: This effort demonst optimized performance, readiness for Future Vertical Lift (FVL) platfo applicable to current and future pl	rates altern s and afforc orms. The a latforms.	ative, adapt lability acros Ilternative co	ive, and intension intension in the second sec	elligent eng nding engin ne technolo	ine technolo e envelope ogy demons	ogies to prov for increase strations plar	vide improv d operation nned for this	ed / mission al capability s effort are	n- y				
FY 2022 Plans: Will complete engine sand ingestion and performance demonstration testing. Engine test metrics will include variable output speed, power turbine efficiency, high power to weight ratio, and durability. Engine technologies will be demonstrated to Technology Readiness Level (TRL) 6 for Future Vertical Lift applications.													
FY 2022 to FY 2023 Increase/De This effort ends in FY22.	ecrease Sta	atement:											
Title: Improved Propulsion Techn	ology Dem	onstration (IPTD)							-	2.031	2.038	

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	April 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>) Project (Number/Name) ance Al8 I Alternative Concept Engine Adva Technology				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023		
Description: Effort will develop and execute an advanced engine integration to produce key technology advancements on Future Long Range Assault A engine technologies as appropriate. Full engine validation testing will be consystem performance, maintainability, and durability while reducing integration	on, maintenance, and capability improvement strate Aircraft (FLRAA) engine systems, including the ACE ompleted to TRL 6 providing improved propulsion on risk for FVL FLRAA Platform.	ду				
FY 2022 Plans: Will perform trade-off analysis and design of advanced engine technologies to produce improved engine performance, maintainability, and durability to	s in engine integration, maintainability, and technolo meet FLRAA capability needs.	рду				
<i>FY 2023 Plans:</i> Will perform engine technology trade-off analyses to optimize improvement durability to meet FLRAA capability needs. Will perform advanced engine in onto FLRAA and enduring platforms.	nd k					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort with reduced analysis integration analysis.	is of engine technologies and a move towards					
Title: FY2022 SBIR/STTR Transfer		-	0.139	-		
Description: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638						
	Accomplishments/Planned Programs Subt	otals 2.507	3.828	2.038		
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A						

Exhibit R-2A, RDT&E Project	Justification	: PB 2023 A	Army							Date: Ap	oril 2022		
Appropriation/Budget Activity 2040 / 3					R-1 Progr PE 06034 d Technold	am Elemer 65A / Future ogy	n t (Number i e Vertical Lit	Imber/Name)Project (Ntical Lift AdvanceAJ1 / FutuTechnolog			t (Number/Name) Future UAS Engine Advanced blogy		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 202	6 FY 202	Cost To 7 Complete	Total Cost	
AJ1: Future UAS Engine Advanced Technology	-	2.355	-	-	-	-	-	-		-	- 0.000	2.355	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-			-		
Work in this Project is fully coor The cited work is consistent with Strategy. Work in this Project is performe B. Accomplishments/Planned <i>Title:</i> Reliable Advanced Small <i>Description:</i> This effort demons	dinated with h the Under s d by the Unit Programs (s Power Syste	PE 0602144 Secretary of red States (I <u>\$ in Million</u> ms ive and inte	BA (Future Defense fo JS) Army F <u>s)</u>	Vertical Lift or Research utures Com	Advanced ⁻ n and Engine nmand.	Technology eering Scier	Developmence and Tec	ent). chnology fo	cus areas	and the Arr Y 2021 2.355	my Moderniza FY 2022 -	ation FY 2023	
performance, readiness, and aff and 4 FUAS platforms.	ordability ac	ross an expa	anding eng	ne envelop	e for increa	sed operatio	onal capabil	lity for grou	р 3				
					Accompli	shments/Pl	anned Pro	grams Sub	ototals	2.355	-	-	
C. Other Program Funding Sur N/A <u>Remarks</u> D. Acquisition Strategy N/A	mmary (\$ in	<u>Millions)</u>											
Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy						Date: April 2022				
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Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603465A I Future Vertical Lift Advance d TechnologyProject (Number/Name) AJ3 I Next Generation Rotorcraft 								
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
AJ3: Next Generation Rotorcraft Transmission Adv Tech	-	1.342	1.404	-	-	-	-	-	-	1.447	0.000	4.193	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
Note										• •			

In Fiscal Year 2023 (FY23) this Project is administratively realigned to: Program Element (PE) 0603043A (Air Platform Advanced Research) Project CX2 (Next Generation Aviation Transmission Adv Tech)

A. Mission Description and Budget Item Justification

This Project develops and ground demonstrates variable-speed transmission technologies that can be matured and integrated into the development of Future Vertical Lift (FVL) platforms.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

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

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Next Generation Rotorcraft Transmission	1.342	-	-
Description: This effort demonstrates advanced rotorcraft drive technologies with the potential to increase the horsepower- to-weight ratio; reduce drive system noise; reduce production, operating and support costs; and provide automatic component impending-failure detection. The drive system demonstrators for this effort will be applicable to Future Vertical Lift (FVL) platforms.			
Title: High Reduction-Ratio Transmission.	-	1.353	-
Description: This effort will mature and demonstrate the technologies necessary for development, design, fabrication, and testing of a high reduction-ratio transmission in two stages or less (60:1 reduction ratio) with high efficiency and improved reliability against corrosion and seal leakage. Technology demonstrations from this effort will be applicable to FVL platforms.			
FY 2022 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: A	pril 2022					
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>	Project (Number/Name) AJ3 I Next Generation Rotorcraft Transmission Adv Tech					
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2021	FY 2022	FY 2023		
Begin design of a transmission that demonstrates a 60:1 reduction ratio two-sta weight and volume reduction for extended range and component life for manne advanced gear materials and advanced seals for high reliability and reduced life	age gearbox design that provides significant ed and unmanned applications. Design will inc e-cycle costs.	clude					
FY 2022 to FY 2023 Increase/Decrease Statement: In FY23, this effort is administratively realigned to PE 0603043A (Air Platform A Generation Aviation Transmission Adv Tech).	Advanced Research) / Project CX2 (Next						
Title: FY2022 SBIR/STTR Transfer			-	0.051	-		
Description: Funding transferred in accordance with Title 15 USC ?638							
<i>FY 2022 Plans:</i> Funding transferred in accordance with Title 15 USC ?638 <i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> Funding transferred in accordance with Title 15 USC ?638							
	Accomplishments/Planned Programs Sub	ototals	1.342	1.404	-		
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A							

Exhibit R-2A, RDT&E Project Ju							Date: April 2022					
Appropriation/Budget Activity 2040 / 3	opriation/Budget ActivityR-1 Program/ 3PE 0603465Ad Technology						ogram Element (Number/Name)Project (Number/Name)03465A / Future Vertical Lift AdvanceAJ5 / Digital Vehicle Management & C Advanced Tech					& Control
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AJ5: Digital Vehicle Management & Control Advanced Tech	-	6.340	-	-	-	-	-	-	-	-	0.000	6.340
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project designs, integrates, and demonstrates Future Vertical Lift (FVL) flight control and Vehicle Management Systems (VMS) technologies. Technologies demonstrated include: advanced flight control laws and autonomy; automatic reconfiguration for speed/damage; coupled cockpit symbology and haptic cueing; and handling qualities requirements for new platform concepts. Develops and demonstrates structures technologies and mission-adaptive autonomy and control algorithms that provide level 1 handling qualities, resilience to extreme and hostile environments, damage-mitigation by reconfiguration of redundant controls, increased agility and speed with minimal fatigue, increased payload and weight efficiency, optional pilotage and manned-unmanned teaming capabilities, cognitive off-loading, and reduction of structural maintenance burden.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

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

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Adaptive and Resilient Tactical Autonomy, Controls, and Structures (ARTACS) Adv Tech	6.340	-	-
Description: Develop, integrate, and demonstrate autonomy, controls, and advanced structures technologies to ensure mission success for manned/unmanned, multiple capability set FVL platforms in the contested environment of multi-domain operations.			
Accomplishments/Planned Programs Subtotals	6.340	-	-
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>	Project (Number/Name) AJ5 / Digital Vehicle Management & Control Advanced Tech
D. Acquisition Strategy	·	
N/A		

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: April	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060346 d Technolo	am Elemen 35A <i>I Future</i> 9gy	t (Number/ Vertical Lif	Name) t Advance	Project (N AJ7 / Adva Technolog	umber/Nar anced Rotor y	ne) s Advanced	
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AJ7: Advanced Rotors Advanced Technology	-	2.407	2.477	-	-	-	-	-	-	-	0.000	4.884
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project is administratively realigned to: Program Element (PE) 0603043A / Air Platform Advanced Research Project CX1/ Advanced Rotors Advanced Tech.

A. Mission Description and Budget Item Justification

This Project demonstrates and integrates new technologies that enable global and highly efficient/reliable operations for Future Vertical Lift (FVL) aircraft and Future Unmanned Aircraft Systems (FUAS) throughout the flight envelope.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

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

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Advanced Rotors Technology	2.407	-	-
Description: This effort demonstrates full scale, integrated rotor system technologies through the assessment of alternative designs aimed to satisfy future capability needs for FVL and FUAS increased system durability, efficiency, speed, range, and payload. Technologies include: integrated high speed, low drag rotor technologies for high speed configurations; interactional aero tailoring between rotor and body & auxiliary lift/ propulsors; light weight, low volume, efficient and high authority electromechanical actuators (EMAs); reliable and safety critical actuators/hubs/controls for Independent Blade Control (IBC)/swash plateless rotors; damage compensation/load alleviation; active/passive flow control; and automated track and balance.			
Title: High Speed, Highly Efficient Rotors	-	2.387	-
Description: This effort demonstrates full scale, integrated rotor system technologies through the assessment of alternative designs aimed to satisfy future capability needs for FVL increased system durability, efficiency, speed, range, and payload. Technologies include: integrated high speed, low drag rotor technologies for high speed configurations; interactional			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>	Project (AJ7 / Adv Technolog	c t (Number/Name) Advanced Rotors Advanced ology					
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2021	FY 2022	FY 2023			
chibit R-2A, RDT&E Project Justification: PB 2023 Army ppropriation/Budget Activity R-1 Program Element (Number/Name) pi40/3 PE 0603465A / Future Vertical Lift Advance a Technology a Technology Accomplishments/Planned Programs (\$ in Millions) a totical totica		y track						
FY 2022 Plans: Will complete detailed design of high speed, highly efficient rotor system for FV demonstration hardware. Will commence structural test planning.	/L platforms. Will commence fabrication of							
FY 2022 to FY 2023 Increase/Decrease Statement: In FY23, this effort is administratively realigned to PE: 0603043A / Air Platform Rotors Advanced Tech	Advanced Research, Project CX1 Advanced							
Title: FY2022 SBIR/STTR Transfer			-	0.090	-			
Description: Funding transferred in accordance with Title 15 USC ?638								
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638								
FY 2022 to FY 2023 Increase/Decrease Statement:								
	Accomplishments/Planned Programs Sub	totals	2.407	2.477				
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A					<u></u>			

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	vrmy							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3		R-1 Progr PE 060340 d Technolo	am Elemen 65A <i>I Future</i> 9gy	t (Number/ Vertical Lif	Project (N AJ9 / Integ Systems A	umber/Na Mission E dv Tech	me) iquip for Vert	Lift				
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AJ9: Integ Mission Equip for Vert Lift Systems Adv Tech	-	21.369	23.915	25.066	-	25.066	17.020	3.372	-	-	0.000	90.742
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
This Project is fully coordinated w The cited research is consistent w Strategy. Research in this Project is perform B. Accomplishments/Planned P	ith Progran vith the Uno ned by the rograms (S	n Element (der Secretar United Stat in Million s	PE) 060214 ry of Defens es Army Fu <u>s)</u>	8A (Future se for Rese tures Comr	Vertical Liff arch and Er mand (AFC)	t Technolog ngineering S).	y). Science and	Technolog	y focus area	as and the 2021	Army Moder FY 2022	nization FY 2023
Title: Integrated Mission Equipme	nt for Verti	cal Lift Syst	ems							21.369	23.037	25.066
Description: Develops and demo and flexible tiered architectural ap Engineering methods and Modula and developing an agile and resilie battleground.	nstrates a proach. Th r Open Sys ent digital b	mission sys e approach stems Archit backbone to	tems archite will consist ecture strat support the	ecture to su of the follo egies; insta e rapidly ch	upport FVL t wing: Matur antiating an anging threa	hrough utiliz ing and imp architecture at environm	zation of a r lementing N verification ent includin	econfigurat /lodel Base a environme g the digital	ble d ent I			
FY 2022 Plans: Will complete purchasing, assemble and verification of the Fiscal Year (MOSA) requirements. Will matur Fleet and science and technology processes and training materials fi in the AVE facility and update the route planning, digital map) to test Will expand the cloud-based Archi	ly, and che 2021 (FY2 e the verifie (S&T) dev or wider ac Digital Bac Model Bas itecture Co	eckout of the 1) National cation proce eloped artifa loption of M kbone Obje sed System llaboration I	e Architectu Defense Au ess and con acts to ident OSA. Will a ctive Archite Engineerine Environmen	re Verificati hthorization duct MOSA ify and clos acquire can ecture. Wil g (MBSE), t (ACE) cap	ion Environ Act (NDAA validation se gaps for ididate Digit acquire co airworthines pabilities an	ment (AVE)) Modular O and verifica FVL. Will d al Backbone re, reusable ss and cybe d maintain /	facility to propen System tion on FVL evelop MOS e technolog e mission ca r qualification Authority to	rovide valid ns Approac , Enduring SA enginee ies to evalu pabilities (e on methods Operate (A	ation h ring ate e.g., TO)			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		D	ate: A	pril 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>	Project (Number/Name) Lift Advance AJ9 I Integ Mission Equip for Vert L Systems Adv Tech						
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2)21	FY 2022	FY 2023			
to develop MBSE specifications for the Digital Backbone, core software infrastr Testbed (MSFTB) to be integrated on UH-60M Black Hawk . Will acquire core airworthy, and cyber security certifiable, for the MSFTB and conduct laboratory the Digital Backbone A-Kit in a UH-60M aircraft. Will design and acquire the M component assembly in the ground lab environment. Will perform a model-bas System Integrators for future down-selection based on FY21 NDAA MOSA req	ucture capabilities, and Mission Systems Flyin software infrastructure capabilities, that are integration assessments. Will acquire and ins SFTB ground and flight test equipment and be sed source selection of multiple MSFTB Missio uirements	g stall gin n						
FY 2023 Plans: Will mature and improve automation of AVE capabilities to validate and verify F requirements. Will demonstrate AVE capabilities to evaluate Future Vertical Lift conformance. Will demonstrate incremental airworthiness and cyber security of affordability and faster to field for innovative integration. Will demonstrate Digit ease mission systems installation in an experimental UH-60M aircraft. Will demonstrate components in the MSFTB lab.	FY21 National Defense Authorization Act MOS t and Enduring Fleet vendor designs for MOSA qualification for infrastructure capabilities enabl al Backbone A-Kit performance and ability to nonstrate third party integration of mission sys	A ing tem						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.								
Title: FY2022 SBIR/STTR Transfer			-	0.878	-			
Description: Funding transferred in accordance with Title 15 USC ?638								
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638								
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638								
	Accomplishments/Planned Programs Sub	totals 2	1.369	23.915	25.066			
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A								

Exhibit R-2A, RDT&E Project	Justification	: PB 2023 A	Army							Date: Ap	oril 2022	
Prior Years FY 2021 FY 2022 F COST (\$ in Millions) Years FY 2021 FY 2022 F K3: Aviation Survivability dvanced Technology - 12.606 3.966 3.966			R-1 Program Element (Number/Name)ProgramPE 0603465A / Future Vertical Lift AdvanceAK3d TechnologyTechnology					lumber/Na ation Survi y	ame) vability Adva	nced		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AK3: Aviation Survivability Advanced Technology	-	12.606	3.966	4.118	-	4.118	-	-	-	-	- 0.000	20.690
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	
Research in this Project is performed by the second signatures in the second se	ing and cour ility technolo coordinated t with the Un ormed by the	united State	es (US) Arr	(PE) 06021 (PE) 06021 se for Rese	etworked air I team base 48A (Future arch and Er Command.	r and ground d approache e Vertical Lif	d threat sys es to enable t Technolog	items. Also e operation gy). I Technolog	in contested	d demons d peer/nea	e Army Mode	ernization
B. Accomplishments/Planned	Programs (\$ in Million	s <u>)</u>						F۱	2021	FY 2022	FY 2023
Title: Survivability Against Integ	rated Netwo	rked Threats	5							5.093	3.821	4.118
Description: This effort increas counter enemy detection and tra FY 2022 Plans:	es rotorcraft acking syster	survivability ns	by reducin	g platform s	signatures,	providing the	e means to	more efficie	ently			
effectors, for demonstration. Wil Survivability Correlator capability	l integrate re ies. Will cont	levant sens	ors and effe	ectors, verify am-based s	y functional survivability	ity, and dem technologie	ionstrate ov es.	wn-ship Airo	craft			
FY 2023 Plans: Will continue to mature own-ship testing of Aircraft Survivability C Correlator at an open air range	o Aircraft Su orrelator soft with surrogat	rvivability Co tware onto a te threat sys	orrelator cap surrogate tems to avo	babilities an FVL aircrafi bid and cour	nd technolog t. Will demo nter.	gies. Will beg Instrate Airc	gin integrat raft own- sł	ion and gro nip Survivat	und pility			
FY 2022 to FY 2023 Increase/L	Decrease Sta	atement:										

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>	Project (Number/ AK3 I Aviation Sur Technology	Name) vivability Adva	anced
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
Funding change reflects planned lifecycle of this effort.				
Title: Cognitive Countermeasures Maturation and Demonstration		2.000	-	-
Description: This effort matures and demonstrates adaptive counterm against guided threats. It provides countermeasure electronics for adaptive that enable systems to counter the characteristics of agile threats.	easure technologies that provide platform protection ptive decision making and countermeasure component	ts		
Title: EW Air Sensors / Countermeasures		4.483	-	-
Description: This effort matures and demonstrates sensor and counter and integrated cueing against advanced and emerging threats to aviati capable of detecting and responding to threats with diverse signatures.	n ors			
Title: UAS Survivability Demonstration		1.030	-	-
Description: UAS Survivability Technology (UST) addresses the evolve within the Multi-Domain Battle concept. UST will develop and demonstration with minimal impacts to aircraft performance. This work survivoraft Systems.	ving threat environment to support the Maneuver Force rate increased UAS Survivability in a peer / near-peer upports Future Vertical Lift and Advanced Unmanned	9		
Title: FY2022 SBIR/STTR Transfer		-	0.145	-
Description: Funding transferred in accordance with Title 15 USC ?63	38			
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638				
	Accomplishments/Planned Programs Sub	totals 12.606	3.966	4.118
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>				
<u>D. Acquisition Strategy</u> N/A				
PE 0603465A: Future Vertical Lift Advanced Technology	UNCLASSIFIED	47	Volu	ıme 1c - 416

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: April	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)Project (Number/Name)PE 0603465A / Future Vertical Lift AdvanceAK5 / Multi-Role Small Guided Missiled TechnologyAdvanced Tech					ssile		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AK5: Multi-Role Small Guided Missile Advanced Tech	-	2.519	5.867	11.209	-	11.209	11.743	7.053	-	-	0.000	38.391
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates a holistic lethality solution for current Army Aviation and Future Vertical Lift (FVL) Modernization Priority. This Project matures and demonstrates critical technology and designs components for future affordable rockets and missiles to provide overwhelming defeat of conventional and asymmetrical threats in all environments. Matures and demonstrates component technologies to enable an expeditionary short-to-medium range loitering maneuvering missile with man-in-the-loop capability for situational awareness, targeting, and lethal effects against hard and soft targets; and matures and demonstrates critical component technology and designs for future missiles that provide simultaneous multiple launch, control, and supervised autonomous terminal engagement of multiple missiles.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

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

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Single Multi-Mission Attack Missile	2.519	-	-
Description: Matures and demonstrates component technologies for an expeditionary short-to- medium range loitering missile with man-in- the-loop capability for situational awareness, targeting, and lethal effects against hard and soft targets.			
Title: Multiple Simultaneous Engagement Technologies (MSET)	-	5.653	11.209
Description: Matures and demonstrates critical component technology and designs for future missiles that provide simultaneous multiple launch, control, and supervised autonomous terminal engagement of multiple missiles against stationary and moving hard/soft targets, image-based target discrimination/shared situation awareness/lock-on, and multi-missile control digital datalink with inter-missile cooperative networked communications. The end-state is a multi-missile Organic command and control (C2) solution that handles all aspects of sensor integration, fire control, and airspace management. This capability will support overwhelming lethal effects against anti-access/aerial denial (A2AD) / Integrated Air Defense Systems (IADS).			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>	Project (Number/Name) ⇒ AK5 / Multi-Role Small Guided Missile Advanced Tech					
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023			
FY 2022 Plans: Will mature and demonstrate component technologies through system I (HWIL) component integration. Will continue to mature and improve con with the objective to suppress, defeat and/or destroy near peer A2AD/IA	evel simulation integration and initial Hardware In the L nponent technologies utilizing simulation and HWIL res ADS threats at maximum survivable ranges.	.oop ults					
FY 2023 Plans: Will exercise flight hardware and software in the HWIL laboratory while a performance and form predictions of outcome for simultaneous missile a target acquisition, terminal engagement, and operator workload. Will conscenarios to verify subcomponent function and perform relevant trades a use simulation and HWIL results to continue developmental flight tests to the second sec	simulating flight environments to demonstrate system engagements, dynamic re-tasking of missiles in flight, ontinue high-fidelity simulation analyses against MSET to feed HWIL and flight test asset integration efforts. V to demonstrate and validate system performance.	Vill					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase advances critical technology maturation and evaluatio simultaneous multiple launches in support of the FVL Army Modernization	ons required for future missile efforts concerning on Priority area.						
Title: FY2022 SBIR/STTR Transfer		-	0.214	-			
Description: Funding transferred in accordance with Title 15 USC ?638	3						
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638 FY 2022 to FY 2023 Increase/Decrease Statement:							
Funding transferred in accordance with Title 15 USC ?638							
	Accomplishments/Planned Programs Subte	otals 2.519	5.867	11.209			
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A							

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: Apr	il 2022	
Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Appropriation/Budget Activity 040 / 3 Image: Cost (\$ in Millions) Prior Years FY 2021 FY 2022 KX7: Adv Rotorcraft Armaments - 6.177 10.541 Protection Sys Adv Tech - - - Quantity of RDT&E Articles - - - A. Mission Description and Budget Item Justification This Project investigates and demonstrates a holistic lethality solution Future Attack Reconnaissance Aircraft. Develop components for use threat agnostic countermeasures. Research in this Project is fully coordinated with Program Element (P The cited research is consistent with the Under Secretary of Defense Strategy. Strategy. Research in this Project is performed by the United States (US) Army Strategy. B. Accomplishments/Planned Programs (\$ in Millions) Title: Advanced Rotorcraft Armament and Protection System (ARAPS Description: This effort matures and demonstrates a holistic medium applications. Develops components for use in multi-role armament so unuitions. FY 2022 Plans: Will mature aviation specific fire control software and algorithms to su weapon targeting solutions including Future Vertical Lift Future Attack 20mm armament system onto a representative aviation platform. FY 2023 Plans: Will integrate medium caliber weapon with aviation specific fire c				R-1 Progr PE 060340 d Technolo	am Elemen 65A / Future ogy	t (Number/ Vertical Lif	Name) t Advance	Project (N AK7 I Adv Sys Adv Te	umber/Na Rotorcraft ech	me) Armaments	Protection	
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AK7: Adv Rotorcraft Armaments Protection Sys Adv Tech	-	6.177	10.541	9.580	-	9.580	3.078	-	-	-	0.000	29.376
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Future Attack Reconnaissance A threat agnostic countermeasures Research in this Project is fully co The cited research is consistent v Strategy. Research in this Project is perform	vith the Uno	elop compo with Progran der Secretan United Stat	m Element ry of Defens es (US) Arr	(PE) 06021 se for Rese my Futures	ole armame 48A (Future arch and Er Command.	e Vertical Lif	for fire con	trol, armam ıy). Technolog	y focus area	as and the	s and integr Army Mode	ation of
B. Accomplishments/Planned P	rograms (S	\$ in Million	<u>s)</u>						FY	2021	FY 2022	FY 2023
Title: Advanced Rotorcraft Arman	nent and Pi	rotection Sy	stem (ARA	PS) - Future	e Attack Re	connaissan	ce Aircraft (I	FARA)		5.744	9.572	6.762
Description: This effort matures applications. Develops component munitions.	and demon nts for use	strates a hc in multi-role	listic mediu armament	im caliber le solutions fo	ethality solut or fire contro	tion for Futu bl, software,	ire Vertical I armament s	_ift offensiv systems, ar	e nd			
FY 2022 Plans: Will mature aviation specific fire c weapon targeting solutions includ 20mm armament system onto a re	ontrol softw ing Future ' epresentati	vare and alg Vertical Lift ve aviation	orithms to s Future Atta platform.	support avia ck Reconna	ation require aissance Air	ements for to rcraft?s. Will	urreted med I integrate a	ium caliber nd optimize	e a			
FY 2023 Plans: Will integrate medium caliber weat caliber weapon platforms with targer Reconnaissance Aircraft.	pon with avgeting solut	viation spec ion software	ific fire cont e for use in	trol software aviation sys	e. Will matur stems incluc	re and demo ding Future '	onstrate turr Vertical Lift	eted mediu Future Atta	ım ıck			
FY 2022 to FY 2023 Increase/De	ecrease Sta	atement:										

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>	ne) Project (Number/Name) Ivance AK7 I Adv Rotorcraft Armaments Prot Sys Adv Tech					
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2021	FY 2022	FY 2023		
FY23 decrease is due to identification of requirements for FARA that are	e suitable for the Army?s needs.						
Title: ARAPS-Dispenser			0.433	0.585	2.818		
Description: This effort matures and demonstrates a dispenser counter for Future Vertical Lift defensive applications. Develop components for a software and countermeasure systems.	rmeasure, a component of the holistic survivability solu use in multi-role countermeasure solutions for fire cont	ition rol,					
FY 2022 Plans: Will optimize design of countermeasure dispenser to further address su demonstrate capabilities of an optimized counter measure dispenser.	rvivability for current and future aviation platforms. Will						
FY 2023 Plans: Will optimize tracking and dispensing capabilities for countermeasure di aviation platforms. Will mature capability of fire control systems with use	ispenser to increase survivability of current and future of countermeasure dispenser.						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase reflects planned lifecycle of this effort in design optimi	ization of dispenser.						
Title: FY2022 SBIR/STTR Transfer			-	0.384	-		
Description: Funding transferred in accordance with Title 15 USC ?638	8						
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638							
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638							
	Accomplishments/Planned Programs Subte	otals	6.177	10.541	9.580		
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A							

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	Army							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progr PE 060340 d Technolo	am Elemen 65A <i>I Future</i> ogy	it (Number / e Vertical Lif	Name) t Advance	Project (N AK8 I Air L Technolog	umber/Na .aunched E y	me) Effects Adva	nced
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AK8: Air Launched Effects Advanced Technology	-	28.542	28.905	28.798	-	28.798	27.895	27.869	27.878	27.871	0.000	197.758
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
engagement and survivability po Research in this Project is fully c The cited research is consistent Strategy. Research in this Project is perfor	rtfolios. oordinated with the Un med by the	with Program der Secretan United Stat	m Element (ry of Defens es (US) Arn	PE) PE 06 e for Rese ny Futures	02148A (Fu arch and Er Command.	iture Vertica	I Lift Techn	ology). Technolog	y focus area	as and the	Army Mode	rnization
B. Accomplishments/Planned F	Programs (\$ in Million	<u>s)</u>						FY	2021	FY 2022	FY 2023
Title: Air Launched Effects										28.542	27.850	28.798
Description: Develop and demo tactical altitudes, and to control th relevance to current Army Aviatic lethal effects including: electronic	nstrate the ane UAS from on engagem attack, dec	ability to lau n the cockpi lent and sur coy, and con	nch a future t or a crew s vivability po nmunication	unmanned station. Ass rtfolios. The s relay.	d aircraft sy ess the ena ese air-laun	stem (FUAS abled capab ched FUAS	S) from FVL ilities and d will employ	platform at etermine th a variety o	eir f non-			
FY 2022 Plans: Will integrate synthetic aperture r into air launched effects UAS, an Will integrate decoy payloads and evaluate system performance thr UAS and evaluate effectiveness (MOSA) based mission equipment technology insertion and payload launched UAS recovery system,	adar payloa d evaluate i d associate ough flight t for Joint all- nt package integration enabling co	ad, enhance increased ca d individual testing. Will domain ope in accordan on the futur st savings a	d target acq apability to c UAS autono integrate ac rations. Wil ce with appi re family of a and improve	uisition sof letect, iden omous emp dvanced co Il mature ar roved hardy air launched d mission c	tware, and tify, locate, loyment be ommunication nd integrate ware and so d effects air capability the	compliment and report t haviors into ons payload a modular oftware arch vehicles. V rough asset	ary autonon threats throu air launche into air laur open syster itectures to Will mature a reuse. Will	nous behav ugh flight te d effects, a nched effec ns approac allow rapid and evaluat	riors sting. nd ts h e air tte			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>	Project (AK8 I Air Technolo	Number/N Launchec gy	lame) I Effects Adva	anced
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2021	FY 2022	FY 2023
improvements in mission effectiveness enabled through these air launched effectiveness enabled through these air launched effectiveness enabled arms team through participation in Joint service all-domain experime	ects enhancements as a part of a multi-domair ents.	I			
FY 2023 Plans: Will integrate electronic warfare (EW) payload and employment software into a to disrupt and jam threat systems using a single human supervising teams of a integrate secure, anti-jam communications payload into air launched effects UA operations. Will verify ability to rapidly insert software and payload technologie based mission system architecture. Will demonstrate team of Detect, Identify, Lethal air launched effects UAS, equipped with advanced teaming software, extarget acquisition (RSTA), coordinated attack, decoy, and EW to disrupt or jam through participation in Joint all-domain flight experiments.	ir launched effects air vehicle and evaluate ab ir launched effects UAS through flight testing. AS and evaluate effectiveness for Joint all-dom is into the modular open systems approach (M Locate, and Report (DILR), Decoy, Disrupt, ar ecuting collaborative reconnaissance, surveill as a part of a multi-domain combined arms te	llity Will ain OSA) d ance, am			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.					
Title: FY2022 SBIR/STTR Transfer			-	1.055	-
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	totals	28.542	28.905	28.798
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A					

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	vrmy							Date: Apri	l 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060346 d Technolo	am Elemen 65A <i>I Future</i> 9gy	t (Number/ Vertical Lif	Name) t Advance	Project (N AL1 / Adv Oper Adv	umber/Nai Teaming fo Tech	ne) r Tactical Av	viation
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AL1: Adv Teaming for Tactical Aviation Oper Adv Tech	-	40.157	39.953	35.579	-	35.579	42.494	47.869	60.177	49.220	0.000	315.449
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Research in this Project is fully c The cited research is consistent Strategy. Research in this Project is perfor	oordinated with the Und	with Progran der Secretan ted States A	m Element (ry of Defens Army Future	(PE) 06021 se for Rese s Comman	48A (Future arch and Er d (AFC).	e Vertical Lif	t Technolog	ıy). Technolog	y focus area	as and the $\sqrt{2021}$	Army Moder	nization
<i>Title:</i> Advanced Teaming Demor	istration		21							32.378	30.885	27.224
Description: Develop and demo formations in combined arms ope areas include: resilient autonomo navigation. This effort will also de awareness and improved reliabili	nstrate tean erations that ous algorithn emonstrate r ty through a	ning behavio are beyond ns; self-orga nulti-platforn idaptation in	ors and auto I current Ma anizing unm m distribute autonomo	onomous de anned-Unm anned form d apertures us systems	ecision mak anned Tear aations; dist of multispe	ing for mixe ning (MUM- ributed com ectral sensoi	d FVL and I T) technolo mand and c rs for threat	FUAS platfo gies. Focus control; and detection a	orm s ind			
FY 2022 Plans: Will mature and integrate advance manned and unmanned aircraft, a reconnaissance, surveillance, tar degraded conditions. Will simula representative vignettes. Will ver autonomy. Will integrate collabor electronic warfare mission planni aided target recognition, decoy m	ed teaming and demons get acquisit te autonom rify modular rative auton ng to disrup nission man	technologie strate throug ion (RSTA), ous decoy a open syste omous beha t or jam, coo agement to	s into missi of flight test coordinate and electron ms integrati aviors incluo ordinated R divulge thre	on systems ing multi-U d attack, ar ic attack sy on approac ding team n F homing a eats, and te	s teaming an nmanned A nd decoy in vnchronized ches for rapi nission com ind sensing am adaptior	rchitecture fo ircraft Syste GPS deniec UAS team idly upgrada mand, autor using multip ns network o	or mixed for m (UAS) co l and comm behaviors ir ble and tran nomous RS ble aircraft e disruptions,	mations of ollaborative unications mission nsitionable TA executio equipped wi into teams	team on, th of			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>	Project (N AL1 / Adv Oper Adv	umber/N Teaming Tech	lame) for Tactical A	viation
B. Accomplishments/Planned Programs (\$ in Millions)		FY	2021	FY 2022	FY 2023
UAS, including air launched effects, and demonstrate advanced teaming conce effectiveness as a part of a multi-domain combined arms team through particip	epts of operations and improvements in mission ation in Joint service all-domain experiments.	n			
FY 2023 Plans: Will mature and flight-demonstrate advanced teaming technologies integrated is mission planning and synchronized execution of collaborative team reconnaiss coordinated attack, decoy, and electronic warfare (EW) to disrupt or jam using aircraft, including air launched effects, as a part of a multi-domain combined and experiments. Will test and evaluate autonomous in-stride replanning software to awareness updates, network connectivity, and team member capability. Will sin facilitating integrated air defense system (IADS) breach capability in contested Will further enhance and verify modular open systems integration approaches f autonomy.	into mission systems architecture for real-time sance, surveillance, target acquisition (RSTA), mixed formations of manned and unmanned ms team through participation in Joint all-doma that dynamically adapts battlefield situational mulate autonomous team of teams operations conditions using mission representative vigned for rapidly upgradable and transitionable team	ain ttes.			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding decrease reflects the conclusion of Subsystem Technology development integration demonstrations.	ent efforts and concentration on mission syster	ms			
Title: Sensors / Multi-Function Imagers for Future Aviation			7.779	7.610	8.355
Description: Mature and demonstrate multi-function sensing system concepts and situational awareness. This will enable the manned FVL platforms to engage and leverage autonomous behaviors of both manned and unmanned aviation p in complex environments (e.g. high threat, degraded visuals, and urban) throug multiple tactical applications. The multifunction sensor approach will mitigate the situational awareness imaging sensor modules, thus reducing the total cost and	to increase FVL manned platform survivability ge in multi-domain advanced teaming operatio platforms. This effort will enable tactical operati gh the use of sensing modules suitable for ne need for separate dedicated threat warning a d logistics burden for future aviation systems.	, ons and			
FY 2022 Plans: Will mature digital readout dual band infrared sensor technologies for both pilot mature digital readout integrated circuit based multispectral camera modules. measurements to corroborate the higher sensitivity and fast frame rate perform integrate multispectral camera modules onto a manned airborne testbed platform.	tage and threat warning applications. Will Will demonstrate both laboratory and field tes nance of the novel multispectral cameras. Will rm.	st			
FY 2023 Plans: Will demonstrate digital readout integrated circuits integrated into multispectral warning capabilities. Will validate multispectral sensing and threat warning capabilities.	camera modules for improved pilotage and the abilities against various signatures and clutter.	reat Will			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>	Project (Number/l AL1 <i>I Adv Teaming</i> Oper Adv Tech	lame) for Tactical Aviation		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023	
optimize digital readout frame integration, adjustable frame rate and image pro in varying environments and concepts of operations.	ocessing settings for improved camera perform	nance			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.					
Title: FY2022 SBIR/STTR Transfer		-	1.458	-	
Description: Funding transferred in accordance with Title 15 USC ?638					
<i>FY 2022 Plans:</i> Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	ototals 40.157	39.953	35.579	
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A					

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: Apri	l 2022	
Appropriation/Budget Activity 2040 / 3		R-1 Program Element (Number/Name)Project (Number/Name)PE 0603465A / Future Vertical Lift AdvanceAL3 / HPC for Rotorcraft Applications Advanced TechnologyTech							ons Adv			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AL3: HPC for Rotorcraft Applications Adv Tech	-	4.862	5.073	-	-	-	-	-	-	-	0.000	9.935
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project is administratively realigned to: Program Element (PE) 0603043A / Air Platform Advanced Research Project DC3/ HPC for Army Aviation Concepts.

A. Mission Description and Budget Item Justification

This Project develops and demonstrates the use of high-fidelity computational fluid dynamics for Future Vertical Lift (FVL) platforms through the utilization of Department of Defense (DoD) High- Performance Computing (HPC) and software tools for cutting-edge modeling and simulation, as well as adding software capabilities for workflow automation and design space exploration. Efforts in this Project are also applicable to the family of Future Vertical Lift (FVL) and Future Unmanned Aircraft System (FUAS) platforms.

Research in this Project is fully coordinated with Program Element (PE) PE 0602148A (Future Vertical Lift Technology).

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

Research is performed by the United States (US) Army Engineer Research and Development Center and coordinated with US Army Futures Command.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Engineered Resilient Systems (ERS) for Army Aviation	4.862	2.987	-
Description: This effort supports Future Vertical Lift by exploiting advancements in physics-based software tools to provide rapid engineering analysis of proposed rotorcraft platforms, providing high-fidelity computational modeling of candidate Future Attack Reconnaissance Aircraft (FARA) platforms during the FARA down-selection, increasing the speed of simulations by automating simulation setup and execution on DoD HPC systems, and maturing and demonstrating the use of advanced machine learning techniques for aviation datasets to inform both the development of FVL systems and current operations.			
FY 2022 Plans: Improve the accuracy and continue to optimize the execution of low, medium, and high-fidelity computational modeling that supports ongoing analysis of the FARA and Future Long-Range Assault Aircraft (FLRAA) platforms. Improve the engineering			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name)FPE 0603465A / Future Vertical Lift AdvanceFd TechnologyT	roject (Number/ L3 I HPC for Rot ech	Name) orcraft Applica	ations Adv
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
analysis of the FARA and FLRAA systems through the inclusion of aco surrogate modeling techniques to increase the speed of analysis for FV	ustic modeling and surrogate techniques. Advance /L platforms.			
FY 2022 to FY 2023 Increase/Decrease Statement: In FY23, this effort is administratively realigned to PE: 0603043A / Air F Army Aviation Concepts.	Platform Advanced Research, Project Project DC3/ HPC	for		
Title: Engineered Resilient Systems (ERS) for Advanced Army Aviation	n Concepts	-	1.901	-
Description: This effort supports Future Vertical Lift (FVL) by utilizing a design spaces and choose resilient platform variants. Advanced computing processes to expand computational testbeds in support of testing and e and simulation to optimize platforms for all operational environments ar models of candidate Future Attack Reconnaissance Aircraft (FARA), Future Tactical Unmanned Aircraft Systems (FTUAS) platforms to support acquired.	advanced machine-assisted design algorithms to explor itational techniques will leverage automated design evaluation. Increase high accuracy physics in modeling nd mission scenarios. Provide multi-fidelity computation uture Long-Range Assault Platforms (FLRAA), and Futu uisition decision-makers.	e al re		
FY 2022 Plans: Optimize the execution of low, medium, and high-fidelity computational Air-Launched Effects, and candidate FTUAS platforms. Provide tools for ability to support mission objectives and platform effectiveness through the use of advanced machine-assisted design techniques to increase the platforms. Evaluate the expansion of computational modeling capabilit	modeling that supports analysis of FVL Family of Syste or evaluating Air-Launched Effects and UAS platform's the expansion of computational testbeds. Demonstrate ne speed of analysis for FVL Family of Systems and UA y to secret and above secret high-performance computi	ms, S ng.		
FY 2022 to FY 2023 Increase/Decrease Statement: In FY23, this effort is administratively realigned to PE: 0603043A / Air F Army Aviation Concepts.	Platform Advanced Research, Project Project DC3/ HPC	for		
Title: FY 2022 SBIR/STTR Transfer		-	0.185	-
Description: Funding transferred in accordance with Title 15 USC ?63	8			
<i>FY 2022 Plans:</i> Funding transferred in accordance with Title 15 USC ?638 <i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> Funding transferred in accordance with Title 15 USC ?638				
	Accomplishments/Planned Programs Subto	tals 4.862	5.073	-
		1		

roject Justification: PB 2023 Army						
R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>	Project (Number/Name) AL3 I HPC for Rotorcraft Applications Adv Tech					
	R-1 Program Element (Number/Name) PE 0603465A / Future Vertical Lift Advance d Technology					

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	rmy							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)ProjecPE 0603465A / Future Vertical Lift AdvanceAL7 / Fd TechnologyTechnology				Project (I AL7 / Full Technolog	: (Number/Name) ull Spectrum Targeting Advanced logy		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AL7: Full Spectrum Targeting Advanced Technology	-	9.610	9.381	8.619	-	8.619	8.804	9.484	10.21	3 10.194	l 0.000	66.305
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Buc	lget Item J	ustification										
Research in this Project is fully of The cited research is consistent of Strategy. Research in this Project is perfor	with the Uno	with Prograr der Secretar United State	n Element (ry of Defens es Army Fu	(PE) 06021 se for Resea tures Comr	48A (Future arch and Er mand (AFC)	e Vertical Lif ngineering S).	it Technolog	ıy). Technolog	y focus are	as and the	Army Moder	nization
<u>B. Accomplishments/Planned P</u>	rograms (a		<u>5)</u>						F	9 610	9 038	FY 2023
Description: This effort will mature modernization priorities. Effort will optics, and multispectral system to spectral bands simultaneously to conditions. Effort will demonstrate threats with reduced cognitive work.	re and dem I leverage a echnologie: provide rob the ability rkloads thro	ionstrate key advancemen s to develop oust targeting of multispec ough sensor	y targeting s its in laser, a stabilized g and situat tral sensing fusion and	sensor syst infrared ima d, payload t ional aware g to autonor automated	em concept aging focal hat can act eness capat mously scal spectral se	ts to enable plane arrays ively and/or pilities for th n areas of ir election.	the FVL and s, compact l passively ir e prevailing nterest and i	d FUAS ong-range nage in mu battlefield dentify tacti	ltiple cal			
FY 2022 Plans: Will mature and integrate a novel passive sensors into a steerable to to conduct data collections with m for detection of hidden, obscured, demonstrate automated processin FVL and FUAS relevant target se to reduce FVL and FUAS cognitive FY 2023 Plans:	dual-band turret. Will nultiple spec and decoy ng techniqu ts. Will dev re burden.	infrared sen mature appr ctral bands a targets to ir es in multipl velop technic	sor along w oaches for against milit nprove sen le spectral b ques for ser	vith advance spectral im ary targets sor target r bands suita hsor fusion	ed active / p aging for ta in relevant ecognition a ble for dete and automa	passive option rget detection environmen and identific ction, recognated selection	cal compone on using the its. Will mat ation perfor nition and ic on of optima	ents and ac steerable t ture approa mance. Wi dentification I spectral ba	tive / urret ches Il of ands			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date:	April 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>	 Project (Number/Name) AL7 I Full Spectrum Targeting Advanced Technology 				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023		
Will demonstrate improved threat detection range performance using a steeral to novel, compact long-range optical components. Will validate approaches for in relevant environments. Will optimize automated scanning and processing te detection, recognition and identification (DRI) of FVL and FUAS relevant target automatic selection of optimal spectral bands to reduce FVL and FUAS operate and DRI performance.	ble turret with dual-band infrared sensor paired multispectral imaging to detect military targets echniques in multiple spectral bands suitable for t sets. Will optimize sensor fusion techniques a or burden. Will validate automated sensor sca	s or and nning				
FY 2022 to FY 2023 Increase/Decrease Statement: Decrease is primarily a result of reduced hardware research and development emphasis shifting to optimization and demonstration of automated scanning, sp	efforts and long-lead material purchase, with poetral modalities, and detection capabilities.	nore				
Title: FY2022 SBIR/STTR Transfer		-	0.343	-		
 Description: Funding transferred in accordance with Title 15 USC ?638 FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638 FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638 						
	Accomplishments/Planned Programs Sub	totals 9.610	9.381	8.619		
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A						

Appropriation/Budget Activity R-1 Program Element (Number/Name) PE 603465A / Future Vertical Lift Advance d Technology Project (Number/Name) PE 72023 Project (Number/Name) PE 72023 Project (Number/Name) PE 72023 Project If Advance PF 2023 Project If Advance PF 2023 Project PF 2024 Project PF 2022 Project PF 2024	Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	vrmy							Date: Apri	l 2022	
COST (\$ in Millions)Prior YearsFY 2021FY 2021FY 2023FY 2023FY 2023FY 2024FY 2025FY 2026FY 2026Cost To CompleteTotalAL.9: Holistic Sit Awareness and Dec Making Adv Tech-4.69619.39229.300-29.30022.03522.75923.80722.7610.000144.75Quantity of RDT&E Articles <td colspan="5">Appropriation/Budget Activity R-1 2040 / 3 PE d 7</td> <td>R-1 Progra PE 060346 d Technolo</td> <td colspan="4">R-1 Program Element (Number/Name) Project (N PE 0603465A / Future Vertical Lift Advance AL9 / Holis d Technology Making Ac</td> <td colspan="3">Number/Name) istic Sit Awareness and Dec dv Tech</td>	Appropriation/Budget Activity R-1 2040 / 3 PE d 7					R-1 Progra PE 060346 d Technolo	R-1 Program Element (Number/Name) Project (N PE 0603465A / Future Vertical Lift Advance AL9 / Holis d Technology Making Ac				Number/Name) istic Sit Awareness and Dec dv Tech		
AL9: Folistic Sit Awareness and	COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Quantity of RDT&E Articles - <	AL9: Holistic Sit Awareness and Dec Making Adv Tech	-	4.696	19.392	29.300	-	29.300	22.035	22.759	23.807	22.761	0.000	144.750
A. Mission Description and Budget Item Justification This Project matures and demonstrates a pilotage and decision aiding system that allows for care free operations in complex and hostile environments through: demonstration of a comprehensive human machine interface for all situational awareness (SA) domains (terrain & obstacles, threat, weather, & environment); and demonstration of decision aiding technologies to reduce cognitive loading of air crews during operations in complex and hostile environments. Research in this Project is fully coordinated with Program Element (PE) PE 0602148A (Future Vertical Lift Technology). The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy. Research in this Project is performed by the United States (US) Army Futures Command (AFC). B. Accomplishments/Planned Programs (§ in Millions) FY 2021 FY 2022 FY 2023 Prite: Holistic Situational Awareness, accurate understanding of the tactical mission, and ability to decide faster than our adversaries. 4.696 9.210 12.83 FY 2022 Plans: Will demonstrate FVL Air Mission Commander (AMC) increased effectiveness when equipped with the combined capabilities of a fused world model that includes both geo-referenced sensor output and abstract situational data, decision aiding tools, autonomous flight controls, and pilot cueing; Will participate in flight demonstration(s) to assess this capability?s impact on increasing mission effectiveness and decreased workload when equipped with a situational awareness world model it, decision aiding tools, pilo	Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
B. Accomplishments/Planned Programs (\$ in Millions)FY 2021FY 2022FY 2023Title: Holistic Situational Awareness and Decision Making4.6969.21012.83Description: This program directly contributes to Future Vertical Lift (FVL) to ensure Future Aircraft pilots have the necessary situational awareness, accurate understanding of the tactical mission, and ability to decide faster than our adversaries.4.6969.21012.83FY 2022 Plans: Will demonstrate FVL Air Mission Commander (AMC) increased effectiveness when equipped with the combined capabilities of a fused world model that includes both geo-referenced sensor output and abstract situational data, decision aiding tools, autonomous flight controls, and pilot cueing; Will participate in flight demonstration(s) to assess this capability?s impact on increasing mission effectiveness and reducing pilot cognitive workloadFY 2023 Plans: Will demonstrate FVL cockpit crew increased effectiveness and decreased workload when equipped with a situational awareness world model, decision aiding tools, pilot-on-the-loop autonomy, and multi-sensory cueing. Workload and effectiveness will be measured using both subjective and objective means including biometrics. Will participate in Fiscal Year 2023 (FY23) Project Convergence through flight demonstration to assess this capability's impact in relevant mission scenarios.FY 2023 (FY23) Project	demonstration of a comprehensiv demonstration of decision aiding Research in this Project is fully co The cited research is consistent v Strategy. Research in this Project is perform	ve human m technologie pordinated v vith the Uno med by the	with Program der Secretar	rface for all cognitive lo m Element o ry of Defens es (US) Arr	situational bading of ai (PE) PE 06 se for Rese ny Futures	awareness r crews duri 02148A (Fu arch and Er Command ((SA) domai ing operatio ture Vertica ngineering S (AFC).	I Lift Techno Science and	Complexity obstacles ex and hos plogy). Technolog	, threat, wea	as and the <i>i</i>	vironment); Army Moder	nd nization
Title: Holistic Situational Awareness and Decision Making4.6969.21012.833Description: This program directly contributes to Future Vertical Lift (FVL) to ensure Future Aircraft pilots have the necessary situational awareness, accurate understanding of the tactical mission, and ability to decide faster than our adversaries.4.6969.21012.833FY 2022 Plans: Will demonstrate FVL Air Mission Commander (AMC) increased effectiveness when equipped with the combined capabilities of a fused world model that includes both geo-referenced sensor output and abstract situational data, decision aiding tools, autonomous flight controls, and pilot cueing; Will participate in flight demonstration(s) to assess this capability?s impact on increasing mission effectiveness and reducing pilot cognitive workloadFY 2023 Plans:Volume FY 2023 Plans:Will demonstrate FVL cockpit crew increased effectiveness and decreased workload when equipped with a situational awareness world model, decision aiding tools, pilot-on-the-loop autonomy, and multi-sensory cueing. Workload and effectiveness will be measured using both subjective and objective means including biometrics. Will participate in Fiscal Year 2023 (FY23) Project Convergence through flight demonstration to assess this capability's impact in relevant mission scenarios.4.6969.21012.833	B. Accomplishments/Planned P	rograms (S	in Million	<u>s)</u>						FY	2021 F	TY 2022	FY 2023
Description: This program directly contributes to Future Vertical Lift (FVL) to ensure Future Aircraft pilots have the necessary situational awareness, accurate understanding of the tactical mission, and ability to decide faster than our adversaries. FY 2022 Plans: Will demonstrate FVL Air Mission Commander (AMC) increased effectiveness when equipped with the combined capabilities of a fused world model that includes both geo-referenced sensor output and abstract situational data, decision aiding tools, autonomous flight controls, and pilot cueing; Will participate in flight demonstration(s) to assess this capability?s impact on increasing mission effectiveness and reducing pilot cognitive workload FY 2023 Plans: Will demonstrate FVL cockpit crew increased effectiveness and decreased workload when equipped with a situational awareness world model, decision aiding tools, pilot-on-the-loop autonomy, and multi-sensory cueing. Workload and effectiveness will be measured using both subjective and objective means including biometrics. Will participate in Fiscal Year 2023 (FY23) Project Convergence through flight demonstration to assess this capability's impact in relevant mission scenarios.	Title: Holistic Situational Awarene	ess and Dec	cision Makir	ıg							4.696	9.210	12.835
FY 2022 Plans: Will demonstrate FVL Air Mission Commander (AMC) increased effectiveness when equipped with the combined capabilities of a fused world model that includes both geo-referenced sensor output and abstract situational data, decision aiding tools, autonomous flight controls, and pilot cueing; Will participate in flight demonstration(s) to assess this capability?s impact on increasing mission effectiveness and reducing pilot cognitive workload FY 2023 Plans: Will demonstrate FVL cockpit crew increased effectiveness and decreased workload when equipped with a situational awareness world model, decision aiding tools, pilot-on-the-loop autonomy, and multi-sensory cueing. Workload and effectiveness will be measured using both subjective and objective means including biometrics. Will participate in Fiscal Year 2023 (FY23) Project Convergence through flight demonstration to assess this capability's impact in relevant mission scenarios.	Description: This program direct situational awareness, accurate u	ly contribute nderstandir	es to Future ng of the tac	Vertical Lif	t (FVL) to e n, and abili	nsure Futur ty to decide	e Aircraft pi faster than	lots have th our adversa	e necessar aries.	ту			
FY 2022 to FY 2023 Increase/Decrease Statement:	FY 2022 Plans: Will demonstrate FVL Air Mission of a fused world model that includ autonomous flight controls, and p increasing mission effectiveness a FY 2023 Plans: Will demonstrate FVL cockpit crew world model, decision aiding tools measured using both subjective a Convergence through flight demo	Commande les both geo ilot cueing; and reducin w increased s, pilot-on-th ind objective nstration to	er (AMC) in p-referenced Will particip ig pilot cogn d effectivene ne-loop auto e means ind assess this atement:	creased effort d sensor out ate in flight itive worklot ess and dec nomy, and cluding bion capability's	ectiveness tput and ab demonstra ad reased wor multi-senso netrics. Will s impact in r	when equip ostract situa tion(s) to as kload when ory cueing. N participate relevant mis	ped with the tional data, sess this ca equipped v Norkload ar in Fiscal Ye ssion scenar	e combined decision aid apability?s ir with a situati nd effectiver ear 2023 (FN rios.	capabilities ling tools, mpact on onal aware ness will be (23) Projec	ness t			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022								
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>	Project (Number/Name) AL9 I Holistic Sit Awareness and Dec Making Adv Tech						
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023				
Funding increase reflects increased contracted efforts in Decision A and increased participation in demonstrations.	Aiding technology development, simulation/evaluation eve	nts,						
Title: Multi-function RF for FVL Platforms		-	7.585	14.382				
Description: This effort matures and demonstrates multi-function rafamily of systems. It provides integrated software and hardware tech system components to support varied functions, such as enhanced targeting, communications, and aircraft pilotage. This will result in ir requirements for size, weight, and power for mission equipment acr	adio-frequency (RF) sensor technologies to support the F hnologies that enable the use of common electronics and situational awareness, threat-detection and localization, mproved performance for these critical functions and redu ross FVL platforms.	VL						
FY 2022 Plans: Will analyze the technical requirements of multiple functions and pe specifications; will develop technical models of multi-function RF co requirements; will initiate development of multi-function RF components; will develop technical methods are specified.	erform engineering analysis to determine technical imponents and assess expected performance against mis ents.	sion						
FY 2023 Plans: Will develop multi-function RF components from derived technical s laboratory and analyze their expected performance against the full s resource management of multiple RF functional modes. Will complex sensor system including hardware and software.	specifications. Will characterize the components in the set of mission requirements. Will develop software to enable design of the overall RF multi-function radio-frequency	ble r (RF)						
FY 2022 to FY 2023 Increase/Decrease Statement: Funding increase reflects progression of the technology developme characterization of the hardware.	ent from design and modeling to development and							
Title: Early Human Systems Integration Demonstrations		-	1.884	2.083				
Description: Human Systems Integration (HSI) analysis assesses awareness and workload management, crew task automation and o station interfaces. The objective of this effort is to reduce crew deci mission environment.	and matures technologies to optimize pilot situational decision-aiding, information management, and advanced dision and task execution timelines in a tactically challenging	crew ng						
FY 2022 Plans:								
		,	· · · · · ·					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date	April 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>	Project (Numbe AL9 / Holistic Sit Making Adv Tecl	'/ Name) Awareness and	d Dec
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
Will perform HSI analysis during simulation and flight demonstration to assess station interfaces, pilot decision-aids, and information management to reduce d data and provide knowledge products to assess and help mature crew-enabling	and enhance technologies for advanced crew decision timelines. Will collect pilot performanc g technologies.	e		
FY 2023 Plans: Will demonstrate effects of crew task automation, decision-aiding, and augment system effectiveness by conducting human performance and human-system in evaluation of advanced technologies; will provide early (Advanced Technology for advanced crew station technology design, automation and decision-aiding, designs of highest priority Army technologies and systems including advanced enhanced Soldier performance and system effectiveness. In addition, will demo Design, more effective use of automation in command and control (C2), training design concepts to support rapid and enhanced sense-making, and a multileve Missile Defense. FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.	nted pilot displays on Soldier performance and nterface analyses via simulations, modeling, an Demonstration) assessment of HSI considerat thereby reducing life-cycle costs; will optimize crew station technology design and automatio onstrate effects of decision aides, User Center g and crew automation for accelerated expertise el performance assessment in support of Air an	d ions HSI n for ed se, d		
<i>Title:</i> FY2022 SBIR/STTR Transfer			0.713	
Description: Funding transferred in accordance with Title 15 USC ?638				
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638 FY 2022 to FY 2023 Increase/Decrease Statement:				
Funding transferred in accordance with Title 15 USC ?638				
	Accomplishments/Planned Programs Subt	otals 4.69	6 19.392	29.300
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A				

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	Army							Date: Ap	ril 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progr PE 060340 d Technolo	am Elemen 65A / Future ogy	n t (Number i e Vertical Li	/Name) ft Advance	Project (N AM5 / Opt FVL Surv	e ct (Number/Name) I Opt Energy Stg & Therm Mgmt for Surv Adv Tech		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AM5: Opt Energy Stg & Therm Mgmt for FVL Surv Adv Tech	-	1.925	-	-	-	-	-	-	-	-	0.000	1.925
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Research in this Project is fully c The cited research is consistent Strategy.	oordinated	with Program	m Element ry of Defens	(PE) 06021 se for Rese	48A (Future arch and Er	e Vertical Lif	ft Technolog Science and	gy). I Technolog	y focus are	as and the	Army Mode	nization
B Accomplishments/Planned F	Programs (s in Million	e)		Command	(/ C).			E	(2021	EV 2022	EV 2023
Title: Optimized Energy for C5IS	R Platforms	Advanced	<u>s,</u> Technoloav	/						1.925	-	-
Description: Enable advanced s energy storage technologies, high architectures.	urvivability her capacity	systems on / lower Size	FVL platfor , Weight, ar	ms through nd Power (\$	i componen SWaP) cooli	t developme ing systems	ent improve , and more	d high powe efficient ele	er and ectrical			
					Accomplis	shments/Pl	anned Pro	grams Sub	ototals	1.925	-	-
C. Other Program Funding Sum N/A <u>Remarks</u> D. Acquisition Strategy N/A	nmary (\$ in	<u>Millions)</u>										

Exhibit R-2A, RDT&E Project	Justification	: PB 2023 A	Army							Date: Apr	il 2022		
Appropriation/Budget Activity 2040 / 3	,				R-1 Progr PE 06034 d Technolo	r am Elemen 65A <i>I Future</i> ogy	n t (Number) e Vertical Lit	/Name) ft Advance	Project (N BP8 / Futu Tech (CA)	Project (Number/Name) BP8 / Future Vertical Lift Air Platform Adv Tech (CA)			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
BP8: Future Vertical Lift Air Platform Adv Tech (CA)	-	68.750	82.500	-	-	-	-	-	-	-	0.000	151.250	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
A. Mission Description and Bu Congressional Interest Item fun The cited work is consistent wit	udget Item J ding provide h the Under :	ustification d for Future Secretary of	<u>I</u> Vertical Lift f Defense fo	Air Platfor r Research	m Advance	d Technolog eering priori	gy. ity focus are	eas and the	Army Mode	ernization S	trategy.		
B. Accomplishments/Planned	Programs (\$ in Million	<u>s)</u>					FY 2021	FY 2022]			
Congressional Add: Joint Tact	tical Aerial R	esupply Ver	nicle					8.000	8.000				
FY 2021 Accomplishments: C	onducted ad	vanced rese	earch in Joir	nt Tactical A	Aerial Resu	pply Vehicle	e.						
Work executed by Army Futures	s Command.												
FY 2022 Plans: Congressional	Interest Item	funding pro	vided for Jo	int Tactical	l Aerial Res	upply Vehic	le						
Congressional Add: Advanced	Helicopter S	Seating Syst	tem					15.000) –	-			
FY 2021 Accomplishments: C	onducted ad	vanced rese	earch in Adv	anced Heli	copter Seat	ting System							
Work executed by Army Futures	s Command.												
Congressional Add: Helicopte	r Emergency	Oil System	S					2.000) _	_			
FY 2021 Accomplishments: C	onducted ad	vanced rese	earch in Heli	copter Em	ergency Oil	Systems.							
Work executed by Army Futures	s Command.												
Congressional Add: UAV Fuel	Systems En	hancements	S					2.000	- 1	1			
FY 2021 Accomplishments: C	onducted ad	vanced rese	earch in UA	/ Fuel Syst	ems Enhan	icements.							

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/ PE 0603465A / Future Vertical Lift d Technology	Name) t Advance	Project (Nu BP8 / Futur Tech (CA)	umber/Name) e Vertical Lift Air Platform Adv	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022		
Work executed by Army Futures Command.					
Congressional Add: Surface Tolerant Advanced Adhesives		5.000	4.000		
FY 2021 Accomplishments: Conducted advanced research in Surface Tolera	ant Advanced Adhesives.				
Work executed by Army Futures Command.					
FY 2022 Plans: Congressional Interest Item funding provided for FVL Surface	Tolerant Adhesives				
Congressional Add: Ferrium Steels for Improved Drive Systems		5.000	-		
FY 2021 Accomplishments: Conducted advanced research in Ferrium Steels	for Improved Drive Systems.				
Work executed by Army Futures Command.					
Congressional Add: Program Increase - UH-60 main rotor blade modernization	on	5.000	5.000		
FY 2021 Accomplishments: Conducted advanced research in UH-60 Main R	otor Blade Modernization.				
Work executed by Army Futures Command.					
FY 2022 Plans: Congressional Interest Item funding provided for UH-60 Main	Rotor Blade Modernization				
Congressional Add: Program Increase - Soldier Information Interface for Avia	ation Fleet Management Tool	2.250	-		
FY 2021 Accomplishments: Conducted advanced research in Soldier Information Management Tool.	ation Interface for Aviation Fleet				
Work executed by Army Futures Command.					
Congressional Add: Program Increase - Displays and Safety in DVE		4.000	-		
FY 2021 Accomplishments: Conducted advanced research in Displays and S					
Work executed by Army Futures Command.					
Congressional Add: Program Increase - Digital Engineering Demonstration		8.000	-		
FY 2021 Accomplishments: Conducted advanced research in Digital Engine	ering Demonstration.				

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army				Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/ PE 0603465A / Future Vertical Life d Technology	Name) t Advance	Project (Nu BP8 / Futur Tech (CA)	u mber/Name) re Vertical Lift Air Platform Adv
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	
Work executed by Army Futures Command.				
Congressional Add: Program Increase - Tethered UAS for All?Terrain Vehicl	es	12.500	-	
FY 2021 Accomplishments: Conducted advanced research in Tethered UAS	for All-Terrain Vehicles.			
Work executed by Army Futures Command.				
Congressional Add: 20MM Chaingun Development for FLRAA		-	8.000	
FY 2022 Plans: Congressional Interest Item funding provided for 20MM Chain	gun Development for FLRAA			
Congressional Add: Air Launched Turbojet Missile		-	15.000	
FY 2022 Plans: Congressional Interest Item funding provided for Air Launched	d Turbojet Missile			
Congressional Add: Composite Structures		-	5.000	
FY 2022 Plans: Congressional Interest Item funding provided for Composite S	Structures			
Congressional Add: Data Refinement and Optimization for Aviation Sustainm	nent	-	4.500	
FY 2022 Plans: Congressional Interest Item funding provided for Data Refiner Sustainment	ment and Optimization for Aviation			
Congressional Add: Degraded Visual Environment		-	3.500	
FY 2022 Plans: Congressional Interest Item funding provided for Degraded Vi	sual Environment			
Congressional Add: Digital Backbone		-	5.000	
FY 2022 Plans: Congressional Interest Item funding provided for Digital Backl	oone			
Congressional Add: Elastomeric Imaging		-	3.000	
FY 2022 Plans: Congressional Interest Item funding provided for Elastomeric	Imaging			
Congressional Add: Fleetspace Maintenance Tool		-	4.500	
FY 2022 Plans: Congressional Interest Item funding provided for Fleetspace N				
Congressional Add: Platform Digitization and Maintenance	-	5.000		
FY 2022 Plans: Congressional Interest Item funding provided for Platform Dig				
Congressional Add: Stretch Broken Carbon Fiber		-	10.000	

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i>	Project (N BP8 / Futu	umber/Name) re Vertical Lift Air Platform Adv
	a rechnology	Tech (CA)	

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022
FY 2022 Plans: Congressional Interest Item funding provided for Stretch Broken Carbon Fiber		
Congressional Add: UAS Fuel Systems Enhancements	-	2.000
FY 2022 Plans: Congressional Interest Item funding provided for UAS Fuel Systems Enhancements		
Congressional Adds Subtotals	68.750	82.500

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2023 A	Army							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3						am Elemen 65A <i>I Future</i> ogy	t (Number/ Vertical Lit	Number/Name) Iv Rotocraft Armaments Protection				
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CA8: Adv Rotocraft Armaments Protection Sys	-	0.963	1.234	2.862	-	2.862	9.551	12.617	12.621	12.618	3 0.000	52.466
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
This Project investigates and der Future Long Range Assault Aircr of threat agnostic countermeasur Research in this Project is fully co The cited research is consistent v Strategy. Research in this Project is perfor	nonstrates a aft (FLRAA res. oordinated with the Uno med by the	a holistic let). Develop c with Program der Secretar United Stat	hality soluti components m Element ry of Defens es Army Fu	on for Futur for use in 1 (PE) 06021 se for Rese tures Com	re Vertical L multi-role ar 48A (Future arch and Er mand (AFC)	ift (FVL) off mament sol Vertical Lif ngineering S).	ensive and lutions for fi t Technolog Science and	defensive a re control, a gy). Technolog	pplications, armament s y focus area	focused or ystems, mu	n but not lin initions and Army Mode	nited to integration rnization
B. Accomplishments/Planned P	Programs (\$ in Million	s)						FY	2021	FY 2022	FY 2023
Title: Advanced Rotorcraft Armar	nents Prote	ction Syster	n-Future Lo	ng Range /	Assault Airc	raft				0.963	1.189	2.862
Description: This effort matures Integrates and demonstrates com systems.	and demon ponents fo	istrates a ho r use in mul	listic small ti-role arma	caliber leth ment soluti	ality solution	n for FVL off control, soft	fensive app ware, and a	lications. rmament				
<i>FY 2022 Plans:</i> Will mature designs for enhanced applications. Will mature architec	l lethality wi ture and int	ith use of sta erfaces in c	abilization a onformance	nd holistic with Futur	fire control i e Airborne (n aviation p Capability E	latforms for nvironment	gunner (FACE).				
<i>FY 2023 Plans:</i> Will mature use of holistic aviation with FACE. Will improve stabilize	n fire contro d mount pe	ol software, a rformance tl	and demons hrough sub	strate fire co system lev	ontrol archit el testing in	ecture and i cluding mod	interfaces ir deling and s	conformar imulation.	ice			
FY 2022 to FY 2023 Increase/De Funding increase reflects planned	e crease Sta d lifecycle o	a <i>tement:</i> f this effort i	n maturatio	n of archite	cture and ir	nterfaces in	conformanc	e with FAC	E			
Title: FY2022 SBIR/STTR Transf	fer									-	0.045	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army						
iation/Budget Activity R-1 Program Element (Number/Name) Project PE 0603465A / Future Vertical Lift Advance CA8 / A d Technology Sys						
		FY 2021	FY 2022	FY 2023		
38						
Accomplishments/Planned Programs Sub	ototals	0.963	1.234	2.86		
	R-1 Program Element (Number/Name) PE 0603465A / Future Vertical Lift Advance d Technology 38 Accomplishments/Planned Programs Sut	R-1 Program Element (Number/Name) Project DE 0603465A / Future Vertical Lift Advance CA8 / At 38 38 Accomplishments/Planned Programs Subtotals	Date: Ag R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance d Technology</i> Project (Number/N CA8 <i>I Adv Rotocraft</i> Sys 38 FY 2021 38 Accomplishments/Planned Programs Subtotals 0.963	Date: April 2022 R-1 Program Element (Number/Name) Project (Number/Name) CA8 / Adv Rotocraft Armaments B Technology CA8 / Adv Rotocraft Armaments Sys Image: Sys FY 2021 FY 2022 38 Accomplishments/Planned Programs Subtotals 0.963 1.234		

Exhibit R-2A, RDT&E Project	Justification	: PB 2023 A	Army							Date: Apr	l 2022			
Appropriation/Budget Activity 2040 / 3						R-1 Program Element (Number/Name)ProjectionPE 0603465A / Future Vertical Lift AdvanceCC4d TechnologyCC4					oject (Number/Name) 4 I FVL Radar Advanced Technologies			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost		
CC4: FVL Radar Advanced Technologies	-	3.207	4.000	3.342	-	3.342	4.384	-	2.369	2.369	0.000	19.671		
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-				
A. Mission Description and Bu	udget Item J	ustification	l											
Research in this Project is fully The cited research is consistent Research in this Project is performed	coordinated t with the Union	quisition (RS with Prograr der Secretar United Stat	TA) and int TA) and int Ty of Defens es (US) Arm	elligence, s PE) 06021 e for Rese ny Futures	48A (Future arch and Er Command.	and reconn e Vertical Lif	riority focus	gy). s areas and	the Army M	lodernizatio	on Strategy.			
B. Accomplishments/Planned	Programs (\$ in Millions	<u>s)</u>						FY	2021	FY 2022	FY 2023		
Title: Multi-mission Airborne Ra	dar									3.207	3.854	3.342		
Description: Advanced Digital is radar hardware and software de FY 2022 Plans: Will leverage internal and joint p design review, market research mode, leveraging existing Air Fo identification of airborne blue & FY 2023 Plans: Will mature design component of as well as system level capabilit	radio frequer esigns. partnerships t and modelin prce airborne red forces. W characteristic ty verification	icy (RF) pro- to advance r g and simula search, sca /ill develop l s document will be com	cessing inte radar mode ation efforts an, and track Increment 1 ed in both p pleted via c	gration with software de Will deve modes, to Terrain Pro reliminary a omponent	h final demo evelopment op advance provide en ofiling radar and critical modeling ar	based upor ed Airborne hanced situ mode. design revie	ubsystem an the results Moving Tan ational awa ews. Compo n as well as	nd system l s of the sys rget Indicat reness and onent desig s bench top	evel tem or t					
demonstration. Will demonstrate modes.	e technology	readiness le	evel (TRL) 5	integrated	l componen	ts with a trac	ditional tow	er test of ra	ıdar					
FY 2022 to FY 2023 Increase/L	Decrease Sta	atement:												

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022								
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>	Project (Number/Name) CC4 <i>I FVL Radar Advanced Technologies</i>										
B. Accomplishments/Planned Programs (\$ in Millions)		[FY 2021	FY 2022	FY 2023							
Funding realigned to support PE 0603465A (Future Vertical Lift Advanced Tec Missile (HSMM) Adv Tech).	chnology) / Project CK2 (High Speed Maneuve	erable										
Title: FY2022 SBIR/STTR Transfer			-	0.146	-							
Description: Funding transferred in accordance with Title 15 USC ?638												
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638												
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638												
	Accomplishments/Planned Programs Sub	ototals	3.207	4.000	3.342							
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A												
Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: Apri	2022	
--	--	--	--	---	--	--	---	--	--	---	---	------------------------------
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)ProjectPE 0603465A / Future Vertical Lift AdvanceCG1 /d TechnologyCG1 /				Project (N CG1 / Holi	ct (Number/Name) I Holistic Team Survivability Adv Tech		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CG1: Holistic Team Survivability Adv Tech	-	-	6.424	11.898	-	11.898	15.272	17.290	21.124	24.753	0.000	96.761
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
 This Project matures and demonst environment through a multi-laye during pre-mission planning, miss Research in this Project is fully condition The cited research is consistent with Strategy. Research in this Project is perform 	strates incr red approa sion execut pordinated with the Un med by the	eased Futur ch. The app ion (combat with Progra der Secreta United Stat	e vertical Li roach focus survivability m Element (ry of Defens res (US) Arm	π (FVL) Fa es on matu γ and safet <u>y</u> PE) 060214 e for Resea	mily of Syst iring and de y), and post 48A (Future arch and Er Command.	tems Surviv emonstrating t-mission rep e Vertical Lif ngineering S	ability (FOS) g technologi pair and retu t Technolog) in an adva es for redu urn to servi yy). Technolog	inced integr cing aircraft ce. y focus area	ated air def susceptibil as and the <i>i</i>	ense syste ity and vuln Army Mode	ms erability rnization
B. Accomplishments/Planned P	rograms (\$ in Million	<u>s)</u>						FY	2021 F	Y 2022	FY 2023
Title: Advanced Radio Frequency	/ Counterm	easures								-	6.189	6.789
Description: This effort matures protection against guided threats. to aviation platforms using modeli integrated software and sensor te	and demon It develops ing and sim chnologies	strates ada s software a ulation (M& to counter t	ptive sensor nd hardware S), hardwar the characte	and count to increas to in the loo tristics of ac	ermeasure se probabilit p (HIL) ass dvanced an	technologies by of detection essment, ar d agile threa	s that provio on and defe nd field ever ats.	de platform at of threats hts. It provid	s les			
FY 2022 Plans: Will develop technical designs of will perform technical analysis of t or degrade threat performance; w specifications; will perform labora	electronics threat chara rill update to tory and fie	to support o acteristics, a echnical mo Id demonsti	detect, deco analyze threa dels of elect rations of tar	y, and disru at progress ronics to an geted paylo	upt function ion, and res nalyze perfo oads in criti	s for Future search new ormance and cal technolo	Vertical Lift attack vecto d determine ogy areas.	Platforms; ors to disrup technical	ot			
FY 2023 Plans: Will demonstrate Radio Frequenc technology readiness level (TRL)	sy (RF) pay assessmei	load via fligh nt of RF pay	nt demonstra load. Will fu	ation agains urther optim	st multiple t nize RF pay	hreat surrog load for inte	ates, conclu gration and	uding in a test in the				

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name)IPE 0603465A / Future Vertical Lift Advance0d Technology0	Project (Number/I CG1 / Holistic Tear	/ Name) Im Survivability Adv Tech		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023	
prototype Air Launched Effect (ALE) platform. Algorithms to optimize p and simulation environments with previously developed electronic warf	bayload and platform behaviors will be tested in modelin are (EW) models for advanced teaming integration.	g			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.					
Title: Holistic End to End Survivability		-	-	5.109	
FY 2023 Plans: Will continue to expand Survivability Against integrated and Networked development of Crashworthiness/Crash predictive capabilities. Will con architectures, behaviors and component technologies.	Threats, Survivability Correlator capabilities. Will begin tinue to develop and mature team based survivability	1			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding for this effort is realigned in FY23 from PE 0603465A (Future V Survivability Advanced Technology).	Vertical Lift Advanced Technology) / Project AK3 (Aviati	on			
Title: FY2022 SBIR/STTR Transfer		-	0.235	-	
Description: Funding transferred in accordance with Title 15 USC ?63	8				
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Subto	otals -	6.424	11.898	
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: Apri	l 2022	
Appropriation/Budget Activity 2040 / 3	Iget ActivityR-1 Program Element (Number/Name) PE 0603465A / Future Vertical Lift Advance d TechnologyProject (N CH6 / Ada 						Number/Name) apt & Resilnt Tact Autnmy Cont & v Tech					
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CH6: Adapt & Resilnt Tact Autnmy Cont & Struct Adv Tech	-	-	4.561	-	-	-	-	-	-	-	0.000	4.561
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project is administratively realigned to: Program Element (PE) 0603043A / Air Platform Advanced Research Project CV2/ Structures Platform Int: Resilience & Efficiency and Project CV1/ Control & Autonomy for Tactical Superiority Adv.

A. Mission Description and Budget Item Justification

This Project matures, and demonstrates advanced autonomy, controls, and structures technologies that provide manned/unmanned Future Vertical Lift (FVL) platforms the decisive tactical overmatch of near-peer adversaries needed for combat mission success. Matures and demonstrates modeling capabilities, control law development, and handling quality criteria required for fully realizing capabilities of advanced configurations of Army aircraft. Develops and demonstrates structures technologies and mission-adaptive autonomy (MAA) and control algorithms that provide level 1 handling qualities, resilience to extreme and hostile environments, damage-mitigation by reconfiguration of redundant controls, increased agility and speed with minimal fatigue, increased payload and weight efficiency, optional pilotage and manned-unmanned teaming capabilities, cognitive off-loading, and reduction of structural maintenance burden.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

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

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Adaptive and Resilient Engineered Structures (ARES) Technology Demonstration	-	3.322	-
Description: Mature, integrate, and demonstrate advanced structures technologies providing performance, survivability, and sustainment benefits with broad applicability across platform scale and role, enabling mission success for manned/unmanned FVL platforms in the contested environment of multi-domain operations.			
FY 2022 Plans: Will mature and integrate advanced structures technologies that enable multi-domain operations performance, efficiency, survivability, and sustainment, and enhance extreme environment reliability and availability. Will mature and integrate			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: /	April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>	Project (Number / CH6 / Adapt & Re Struct Adv Tech	Name) silnt Tact Autn	my Cont &
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
leveraged trade studies optimizing the synergy of applicable technologie multifunctional, and damage-tolerant configurations for primary and second				
FY 2022 to FY 2023 Increase/Decrease Statement: In FY23, this effort is administratively realigned to PE: 0603043A / Air PI Platform Int: Resilience & Efficiency.				
Title: Adaptive Tactical Autonomy and Control (ATAC) Technology Dem	nonstration	-	1.072	-
Description: Mature, integrate, and demonstrate advanced vehicle mar that enable FVL aircraft to achieve superior maneuverability and agility a environmental conditions as a force multiplier, fight and win in presence spectrum from piloted to fully autonomous.	ing-			
<i>FY 2022 Plans:</i> Will implement and demonstrate advanced flight control technologies and and operated flying laboratories to achieve Technology Readiness Leve pilot interaction with scalable autonomy as needed for optionally piloted for enhanced situational awareness and optimal cognitive loading across high-speed extensions to handling qualities criteria for military rotorcraft Elements (MTE).	d ies re sk			
FY 2022 to FY 2023 Increase/Decrease Statement: In FY23, this effort is administratively realigned to PE: 0603043A / Air PI Autonomy for Tactical Superiority Adv.				
Title: FY2022 SBIR/STTR Transfer		-	0.167	-
Description: Funding transferred in accordance with Title 15 USC ?638	8			
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638				
	otals -	4.561	-	

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>	Project (Number/Name) CH6 I Adapt & Resilnt Tact Autnmy Cont & Struct Adv Tech
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>		
<u>D. Acquisition Strategy</u> N/A		

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: April	2022	
Appropriation/Budget Activity 2040 / 3	N/Budget Activity R-1 Program Element (Number/Name) Project PE 0603465A / Future Vertical Lift Advance CH7 / Pc d Technology FVL Adv					Project (N CH7 <i>I Pow</i> FVL Adv T	Number/Name) wer & Thermal Management for Tech					
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CH7: Power & Thermal Management for FVL Adv Tech	-	-	3.402	4.396	-	4.396	4.275	5.418	7.513	5.392	0.000	30.396
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates at the system level, integrated electrical power technologies (including power generation, distribution, and control along with advanced energy storage) and thermal management technologies to provide significantly higher electrical power capability to Future Vertical Lift (FVL) aircraft while addressing consequential size, weight, pulsed power, and thermal issues. Provides power capability for advanced electric aeromechanical effectors, advanced mission systems that for example, execute algorithms for route planning and teaming, and for advanced survivability and electronic warfare capability. Will demonstrate software-in-the-loop performance of power & thermal management technologies to provide significantly higher electrical power capability to FVL aircraft while addressing consequential SWAP-C & thermal issues.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Optimized Energy for C5ISR Platforms Advanced Technology	-	1.845	2.043
Description: Enable advanced Control, Communications, Computers, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR) and survivability systems on FVL platforms through component development of improved high power and energy storage technologies, higher capacity lower Size, Weight, and Power (SWaP) cooling systems, and more efficient electrical architectures			
FY 2022 Plans: Will improve performance of energy storage technologies to meet the SWaP requirements of target air platforms. Will mature the high resolution characterization of C5ISR devices such as advanced radars and sensors to demonstrate the ability for energy storage technologies to meet the electrical power demands of the system. Will demonstrate the effectiveness of integrating power management strategies for electrical sources when powering C5ISR devices. Will demonstrate intelligent controls for platform-integrated power systems.			
FY 2023 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		D	ate: /	April 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>	Project (Number/Name) CH7 / Power & Thermal Management for FVL Adv Tech				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2)21	FY 2022	FY 2023	
Will optimize control schemes for electrical power systems to safely a FVL aircraft. Will improve performance of energy storage systems through use of hybrid schemes sized to sup	l on nize					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.						
Title: Power & Thermal Management Tech Demo			-	1.433	2.353	
Description: Exploits fabrication, and systems integration lab validati and thermal management technologies to provide significantly higher thermal issues and reducing system weight/volume	on testing to Technical Readiness Level (TRL) 6 of power electrical power capability to FVL aircraft while addressi	er ng				
<i>FY 2022 Plans:</i> Will perform design of power and thermal management system comporting platforms. Will perform design integration efforts to optimally incorporate management system, providing increased electrical power capability a aircraft.	onents to reduce Size, Weight, and Power (SWaP) of ta ate advanced system components into a power and ther and reduced weight, volume, and cost to Future Vertical	get nal Lift				
<i>FY 2023 Plans:</i> Will continue to mature the power and thermal management system of optimally incorporate advanced system components into a power and power capability while reducing weight, volume, and cost to Future Ve fabrication of advanced power and thermal management system com validation efforts.	components which includes design integration efforts to thermal management system, providing increased elect ertical Lift aircraft and the enduring fleet. Will perform ponents to be used in component level and system leve	rical				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle glide path of this effort with	ramp up of design and fabrication efforts in FY23.					
Title: FY2022 SBIR/STTR Transfer			-	0.124	-	
Description: Funding transferred in accordance with Title 15 USC ?6	38					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638						
FY 2022 to FY 2023 Increase/Decrease Statement:						

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>	Projec CH7 / FVL A	ment for		
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2021	FY 2022	FY 2023
Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	totals	-	3.402	4.396
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: Apri	l 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>				Project (Number/Name) CH8 / UAS Survivability Adv Technology			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CH8: UAS Survivability Adv Technology	-	-	5.057	-	-	-	-	-	-	-	0.000	5.057
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project is realigned to: Program Element (PE) 0603465A Future Vertical Lift Advanced Technology / Project AK3 Aviation Survivability Advanced Technology and to Project CG1 Holistic Team Survivability Adv Tech.

A. Mission Description and Budget Item Justification

This Project integrates the new technologies of Future Vertical Lift and Air Platform Technologies to address an evolving threat environment by improving Unmanned Aircraft System (UAS) survivability in contested environments. This is achieved without impacting UAS performance through tailored signature management for UAS missions, survivability-enhanced mission profiles, UAS survivability behaviors, resilient systems and architectures and electromagnetic (EM) vulnerability reduction. UAS Survivability Advanced Technology will mature UAS survivability technologies and demonstrate increased UAS Survivability in a peer / near-peer environment with minimal impacts to aircraft performance.

This research supports Future Vertical Lift and Advanced Unmanned Aircraft Systems.

Research in this Project is fully coordinated with Program element (PE) 0602148A (Future Vertical Lift Technology).

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: UAS Survivability Demonstration	-	4.872	-
Description: This effort focuses on maturing UAS susceptibility and vulnerability reduction technologies to provide increased UAS survivability with minimum impacts to mission performance and UAS system cost and addresses the evolving threat environment to support the Maneuver Force within the Multi-Domain Battle concept. Will develop and demonstrate increased UAS Survivability in a peer / near-peer environment with minimal impacts to aircraft performance, with objectives of tailored signature management for UAS missions, survivability-enhanced mission profiles, UAS survivability behaviors, resilient systems/architectures, and EM vulnerability reduction.			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date:	April 2022		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>	Project (Number CH8 / UAS Surviv	(Name) ability Adv Teo	chnology
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
FY 2022 Plans: Will mature Unmanned Air Systems survivability components for demon functionality; will continue to develop, for demonstration Unmanned Air s reduction technologies; will develop/leverage candidate capabilities con	nstration; will perform data collection to verify technolo Systems survivability susceptibility and vulnerability icepts for mission effectiveness analysis.	ду		
FY 2022 to FY 2023 Increase/Decrease Statement: In FY23, this effort is realigned to PE 0603465A, Project AK3 Aviation S CG1Holistic Team Survivability Adv Tech.	Survivability Advanced Technology and to Project			
Title: FY2022 SBIR/STTR Transfer		-	0.185	-
Description: Funding transferred in accordance with Title 15 USC ?638	8			
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638				
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638				
	Accomplishments/Planned Programs Sub	totals -	5.057	-
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A				

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: April 2022		
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>				Project (Number/Name) CJ5 / Future Vertical Lift Medical Advanced Technology			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CJ5: Future Vertical Lift Medical Advanced Technology	-	-	-	1.031	-	1.031	1.295	1.553	1.554	1.554	0.000	6.987
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project is realigned from: Program Element (PE) 0602148A (Future Vertical Lift Technology) Project BZ7 (Future Vertical Lift Medical Technologies)

A. Mission Description and Budget Item Justification

This Project evaluates, validates, matures and delivers medical guidelines and strategies to assure optimal Soldier performance and protection on the future technologically-intensive battlefield. Key elements of the program include: 1) tailored medical selection and retention standards for Future Vertical Lift (FVL); 2) medical strategies to maintain and enhance human performance in Multi-domain operations (MDO); 3) human-centered technology design guidance to accommodate the range of aircrew; 4) improved protection standards to reduce FVL occupant injury; and 5) operator state monitoring tools to enable scalable autonomy in FVL aircraft.

Efforts in this Project further develop work done in Program Element 0602148A (Future Vertical Lift Technology) / Project BZ7 (Future Vertical Lift Medical Technologies).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Biomedical Strategies to Support Design and Operation of Future Vertical Lift (FVL) Aircraft	-	-	1.031
 Description: This effort evaluates, validates, matures and delivers medical guidelines and strategies to assure optimal Soldier performance and protection on the future technologically-intensive battlefield. Key elements of the program include: 1) tailored medical selection and retention standards for FVL; 2) medical strategies to maintain and enhance human performance in MDO.); a) human-centered technology design guidance to accommodate the range of aircrew; 4) improved protection standards to reduce FVL occupant injury; and 5) operator state monitoring tools to enable scalable autonomy in FVL aircraft. FY 2023 Plans: Will validate Health Hazard Assessment methods and criteria to protect FVL occupants from Head Supported Mass, impulsive noise/ shock, and repeated jolt to maintain FVL occupant performance and prevent injury. Will validate human variables for operator state assessment and mature a holistic aircrew workload/ performance stress model. Validate recommendations for 			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	khibit R-2A, RDT&E Project Justification: PB 2023 Army							
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A <i>I Future Vertical Lift Advance</i> <i>d Technology</i>	Project CJ5 / Fu Technolo	(Number/I iture Vertic ogy	lame) al Lift Medica	l Advanced			
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023			
Anthropomorphic Test Device (ATD) use in military environments. Valida crew seat requirements. Validate standards for assessing flight helmet st	te revised spinal fracture thresholds and FVL aviate ability and crash retention.	or/						
FY 2022 to FY 2023 Increase/Decrease Statement: Increase in funding due to realignment from Program Element 0602148A Vertical Lift Medical Technologies) to support advanced technology resea	(Future Vertical Lift Technology) / Project BZ7 (Fut rch in this topic area.	ure						
	totals	-	-	1.031				
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A								

Exhibit R-2, RDT&E Budget Iten	n Justificat	tion: PB 202	23 Army							Date: April 2022			
Appropriation/Budget Activity 2040: Research, Development, Te Technology Development (ATD)	Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Fechnology Development (ATD)					R-1 Program Element (Number/Name) PE 0603466A <i>I Air and Missile Defense Advanced Technology</i>							
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
Total Program Element	-	173.244	145.826	11.147	-	11.147	9.715	9.603	4.766	3.329	0.000	357.630	
AD1: High Energy Laser Tactical Vehicle Demo Adv Tech	-	26.247	26.089	-	-	-	-	-	-	-	0.000	52.336	
AD4: Maneuver Air Defense Advanced Technology	-	16.937	19.737	-	-	-	-	-	-	-	0.000	36.674	
AD6: Next Generation Fires Radar Advanced Technology	-	6.899	-	-	-	-	-	-	-	-	0.000	6.899	
AE1: Close Combat High Energy Laser Advanced Technology	-	2.407	-	-	-	-	-	-	-	-	0.000	2.407	
AE3: Unconventional Countermeasures-Survivability ATech	-	1.254	3.000	0.512	-	0.512	1.159	1.773	0.780	0.780	0.000	9.258	
BN7: Weapons Components Adv Technology (CA)	-	119.500	97.000	-	-	-	-	-	-	-	0.000	216.500	
CV6: Optimized High Energy Laser Source Adv Tech	-	-	-	7.112	-	7.112	5.505	4.157	-	-	0.000	16.774	
DB3: Radar Survivability through Dis Sensing Adv Tech	-	-	-	3.523	-	3.523	3.051	3.673	3.986	2.549	0.000	16.782	

Note

In Fiscal Year 2023 (FY23) Project CV6 (Optimized High Energy Laser Source Adv Tech) and Project DB3 (Radar Survivability through Dis Sensing Adv Tech) are New Start Projects.

A. Mission Description and Budget Item Justification

This Program Element (PE) matures demonstrates technology in support of Army Modernization Priority Air and Missile Defense by maturating, demonstrating and conducting system level experimentation for the development of advanced air defense technologies that reduce the cost curve of missile defense, restore overmatch, survive volley-fire attacks, and operate within sophisticated Anti-Access/Area Denial (A2/AD) and contested domains.

Research in this PE complements PE 0602150A (Air and Missile Defense Technology).

This PE is directly aligned to the Air & Missile Defense (AMD) Army Modernization Priority.

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army	Date: April 2022						
Appropriation/Budget Activity	R-1 Program Element (Number/Name)						
2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced	PE 0603466A I Air and Missile Defense Advanced Tech	0603466A I Air and Missile Defense Advanced Technology					
Technology Development (ATD)							

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

Research is performed by the United States (U.S.) Army Futures Command (AFC), the United States Army Space and Missile Defense Command/Army Forces Strategic Command (SMDC/ARSTRAT), and the Engineer Research and Development Center (ERDC), and the United States Army Rapid Capabilities and Critical Technologies Office (RCCTO).

Program Change Summary (\$ in Millions)	<u>FY 2021</u>	<u>FY 2022</u>	FY 2023 Base	FY 2023 OCO	<u>FY 2023</u>	Total
Previous President's Budget	175.703	48.826	0.000	-		0.000
Current President's Budget	173.244	145.826	11.147	-	1	1.147
Total Adjustments	-2.459	97.000	11.147	-	1	1.147
 Congressional General Reductions 	-	-				
 Congressional Directed Reductions 	-	-				
 Congressional Rescissions 	-	-				
 Congressional Adds 	-	97.000				
 Congressional Directed Transfers 	-	-				
Reprogrammings	-2.459	-				
SBIR/STTR Transfer	-	-				
 Adjustments to Budget Years 	-	-	11.147	-	1	1.147
Congressional Add Details (\$ in Millions, and Inclu	udes General Redu	<u>ictions)</u>			FY 2021	FY 2022
Project: BN7: Weapons Components Adv Technolog	y (CA)					
Congressional Add: Silicon Carbide Power Electro	onics Packaging			-	8.000	-
Congressional Add: Enterprise Science and Tech	nology Demonstrati	on Prototyping		-	7.000	-
Congressional Add: Program Increase				-	20.000	-
Congressional Add: HEL for All-Terrain Vehicles				-	-	5.000
Congressional Add: Program Increase - cUAS Int	egration with Robot	ic Vehicles		-	5.000	-
Congressional Add: Program Increase - Thermal	Management Syste	m for High Energ	yy Laser	-	7.500	12.000
Congressional Add: Program Increase - HEL Risk	Reduction			-	50.000	46.000
Congressional Add: Program Increase - HEL Syst	tem Characterizatio	n Lab		-	22.000	-
Osus ana sisa si Asidi. Anna ana d Osuah at Mahiala 115						44.000
Congressional Add: Armored Compat Venicle HE	L Integration				-	11.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army	Da	ate: April 2022						
Appropriation/Budget Activity	R-1 Program Element (Number/Name)							
2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)	PE 0603466A I Air and Missile Defense Advanced Technology							
Congressional Add Details (\$ in Millions, and Includes General Re	ductions)	FY 2021	FY 2022					
Congressional Add: Silicon Carbide Electronics	-	8.000						
	Congressional Add Subtotals for Project: BN	7 119.500	97.000					
	Congressional Add Totals for all Projec	s 119.500	97.000					
<u>Change Summary Explanation</u> FY23 funding increase reflects the fact that the FY22 President's Budg	get request did not include out-year funding.							

Exhibit R-2A, RDT&E Project Ju				Date: April	2022							
Appropriation/Budget ActivityR-1 Program Element (Number/Name)Project (Number/Name)2040 / 3PE 0603466A / Air and Missile Defense Ad vanced TechnologyAD1 / High Energy Laser Tac Demo Adv Tech						n e) ser Tactical	Vehicle					
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AD1: High Energy Laser Tactical Vehicle Demo Adv Tech	-	26.247	26.089	-	-	-	-	-	-	-	0.000	52.336
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates a greater than 100 kW-class mobile high energy laser (HEL) weapon system on a tactical platform to protect fixed and semifixed sites from rocket, artillery and mortar (RAM), unmanned aerial system (UAS), and advanced air defense threats. The major effort under this Project is the phased approach for mobile high power solid state laser (SSL) technology demonstrations that are traceable to the form, fit, and function requirements for a HEL weapon. This effort utilizes open systems architecture to ensure growth, interoperability, and opportunity for technology insertions for maturation of laser, beam control, sensor/radar, integration of power and thermal management subsystems, as well as Battle Management Command, Control, and Computers (BMC3).

Research in this Project complements Program Element (PE) 0602150A (Air and Missile Defense Technology) / Project AC9 (High Energy Laser Tactical Vehicle Demonstrator Te).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas, and the Army Modernization Strategy, and supports the Army's future capability opportunities for leap-ahead technology for directed energy.

Research is performed by the United States (US) Army Rapid Capabilities and Critical Technologies Office (RCCTO).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: High Energy Laser Tactical Vehicle Demonstrator (HEL TVD) Advanced Technology	26.247	25.137	-
Description: This effort integrates and demonstrates HEL technologies on an Army tactical platform for transition to the future Indirect Fire Protection Capability Increment 2-Intercept Program of Record. Effort includes integrating technologies developed under PE 0602307A/AC9 into HEL TVD and demonstrating the system against an array of RAM and UAS targets. Technology and knowledge gained from demonstration will be used to inform prototyping decisions by Army Rapid Capabilities and Critical Technologies Office and future material development decisions by Program Executive Office Missiles and Space.			
FY 2022 Plans: Will demonstrate a HEL-TVD system integration and a laboratory demonstration of a greater than 100kW laser weapon system for transition to the future Indirect Fire Protection Capability Program of Record. FY 2022 to FY 2023 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022.				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603466A <i>I Air and Missile Defense Ad vanced Technology</i>	Project AD1 <i>I Hi</i> Demo A	Project (Number/Name) AD1 I High Energy Laser Tactical Vehi Demo Adv Tech				
wit R-2A, RDT&E Project Justification: PB 2023 Army opriation/Budget Activity R-1 Program Element (Number/Name) /3 PE 0603466A I Air and Missile Defense Activity /3 vanced Technology complishments/Planned Programs (\$ in Millions) in the High Energy Laser Tactical Vehicle Demonstrator (HEL TVD) Advanced Technology effort is realigned to PE 019A (Expanded Mission Area Missile (EMAM)) / Project BU9 (IFPC High Energy Laser) in FY23. SBIR/STTR Transfer ription: Funding transferred in accordance with Title 15 USC ?638 202 Pins: ng transferred in accordance with Title 15 USC ?638 202 to FY 2023 Increase/Decrease Statement: ng transferred in accordance with Title 15 USC ?638 202 to FY 2023 Increase/Decrease Statement: ng transferred in accordance with Title 15 USC ?638 Meter Program Funding Summary (\$ in Millions) rtks quisition Strategy quisition Strategy			TY 2021	FY 2022	FY 2023		
t R-2A, RDT&E Project Justification: PB 2023 Army priation/Budget Activity 3 R-1 Program Element (Number/Name) PE 0603466A1 Air and Missile Defense Ad vanced Technology omplishments/Planned Programs (\$ in Millions) n the High Energy Laser Tactical Vehicle Demonstrator (HEL TVD) Advanced Technology effort is realigned to PE 19A (Expanded Missile CEMAM)) / Project BU9 (IFPC High Energy Laser) in FY23. SBIR/STTR Transfer iption: Funding transferred in accordance with Title 15 USC ?638 22 Plans: g transferred in accordance with Title 15 USC ?638 22 to FY 2023 Increase/Decrease Statement: g transferred in accordance with Title 15 USC ?638 ter Program Funding Summary (\$ in Millions) ks uisition Strategy							
Title: SBIR/STTR Transfer			-	0.952	-		
Description: Funding transferred in accordance with Title 15 USC ?638							
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638 FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638							
	Accomplishments/Planned Programs Sub	totals	26.247	26.089	-		
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A							

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army											Date: April 2022		
Appropriation/Budget Activity 2040 / 3						R-1 Program Element (Number/Name) PE 0603466A <i>I Air and Missile Defense Ad vanced Technology</i>				Project (Number/Name) AD4 I Maneuver Air Defense Advanced Technology			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost	
AD4: Maneuver Air Defense Advanced Technology	-	16.937	19.737	-	-	-	-	-	-	-	0.000	36.674	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

<u>Note</u>

This Project is Terminated in Fiscal Year 2023 (FY23).

A. Mission Description and Budget Item Justification

This Project directly supports Army Modernization Priority Air and Missile Defense capabilities. Matures and demonstrates key missile technologies for an affordable short range interceptor to defeat advanced Maneuver-Short Range Air Defense (M-SHORAD) threats (e.g. Rotary Wing, Fixed Wing, Tactical / Lethal Unmanned Aerial Systems, and Subsonic Cruise Missile.

Research in this Project complements Program Element (PE) 0602150A (Air and Missile Defense Technology).

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Maneuver Air Defense Advanced Technology	16.937	19.016	-
Description: Mature and demonstrate missile technologies and components necessary for an affordable short range air defense interceptor capability to defeat Rotary Wing, Fixed Wing, Tactical / Lethal Unmanned Aerial System, and cruise missile threats.			
<i>FY 2022 Plans:</i> Will continue integration of an interceptor Control Test Vehicle (CTV), then will conduct a CTV flight test to demonstrate expected control, navigation, and mid-course guidance performance; will complete Guidance Test Vehicle (GTV) Integration in a dynamic Hardware-in-the-loop (HWIL) environment to verify performance of all major Guidance Electronics Unit (GEU) and control subsystems prior to GTV flight test.			
FY 2022 to FY 2023 Increase/Decrease Statement: This effort Terminates in FY23.			
Title: FY2022 SBIR/STTR Transfer	-	0.721	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603466A <i>I Air and Missile Defense Ad</i> <i>vanced Technology</i>	Project (Number/Name) AD4 I Maneuver Air Defense Advanced Technology			vanced
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	totals	16.937	19.737	-
N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A N/A					

Exhibit R-2A, RDT&E Project J	ustification	: PB 2023 A	Army							Date: Ap	ril 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progr PE 06034 vanced Te	am Elemer 66A I Air an echnology	n t (Number i d Missile De	/ Name) efense Ad	Project AD6 / A Advanc	(Number/Na ext Generati ed Technolog	ame) on Fires Rad gy	ar
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 202	6 FY 2027	Cost To Complete	Total Cost
AD6: Next Generation Fires Radar Advanced Technology	-	6.899	-	-	-	-	-	-			- 0.000	6.899
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-				
Research in this Project comple The cited research is consistent Research in this Project is perfo	ments Progr with the Un rmed by the Programs (am Elemen der Secreta United Stat	t (PE) 0602 ry of Defen res Army Fu s)	150A (Air a se for Rese utures Com	and Missile I earch and Er mand (AFC)	Defense Te ngineering p).	chnology) / priority focus	Project AD: s areas and	5 (Next G	eneration Fi	res Radar Te ion Strategy.	EX 2023
Title: Next Generation Fires Rad	lar Advance	d Technolog	<u>5)</u> 1V							6 899	FT 2022	
Description: This effort matures generation capability, flexibility a and scalable open architecture t semi-fixed site protection.	and demon nd supporta hat is extens	strates the bility to the sible to multi	architecture fires family iple radar s	es, processi of radar sys ystems tech	ing and com stems. Effor nnologies in	ponents ne ts focus on support of a	cessary to o developme air defense	deliver next nt of a mod and fixed- a	ular and			
					Accomplis	shments/P	lanned Pro	grams Sub	ototals	6.899	-	-
<u>C. Other Program Funding Sur</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A	<u>nmary (\$ in</u>	<u>Millions)</u>										

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: April	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)ProjectPE 0603466A / Air and Missile Defense AdAE1 / 0vanced TechnologyAdvant				Project (N AE1 / Clos Advanced	(Number/Name) lose Combat High Energy Laser ed Technology		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AE1: Close Combat High Energy Laser Advanced Technology	-	2.407	-	-	-	-	-	-	-	-	0.000	2.407
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates technologies for compact, highly efficient lasers, and compact beam control for close-combat platforms. This Project investigates and develops advanced technologies for High Energy Laser (HEL) weapon systems to enable more efficient laser systems with greater power output, which in-turn enables laser weapons on smaller platforms for additional missions. This includes technologies to support development of alternate laser sources, precision optical pointing and tracking components, adaptive optics to overcome laser degradation due to atmospheric effects, more compact and lighter weight energy generation and storage devices, and more efficient thermal management systems to remove excess heat.

Research in this Project complements Program Element (PE) 0602150A (Air and Missile Defense Technology) / Project AD9 (Close Combat High Energy Laser Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas, and the Army Modernization Strategy, and supports the Army's future capability opportunities for leap-ahead technology for directed energy.

Research is performed by the United States (US) Army Rapid Capabilities and Critical Technologies Office (RCCTO).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Close Combat High Energy Laser Advanced Technology	2.407	-	-
Description: This effort develops laser and beam control technologies with extremely low size, weight, and power (SWaP) requirements enabling high energy lasers in smaller, close combat platforms. Extremely low SWaP laser systems will expand the laser weapons mission set. Reduction in SWaP also benefits higher power systems on the large tactical vehicles to counter the current threat set as well as laser-hardened threats more quickly or at longer ranges.			
Accomplishments/Planned Programs Subtotals	2.407	-	-
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>			

xhibit R-2A, RDT&E Project Justification: PB 2023 A	Army	Date: April 2022
ppropriation/Budget Activity 040 / 3	R-1 Program Element (Number/Name) PE 0603466A <i>I Air and Missile Defense Ad</i> <i>vanced Technology</i>	Project (Number/Name) AE1 / Close Combat High Energy Lase Advanced Technology
Acquisition Strategy		
I/A		

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: Apr	ril 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Progr PE 060346 vanced Te	am Elemen 56A I Air an chnology	t (Number / d Missile De	Name) efense Ad	Project (I AE3 / Uno Survivabi	Number/Na conventiona ity ATech	me) al Counterme	easures-
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AE3: Unconventional Countermeasures-Survivability ATech	-	1.254	3.000	0.512	-	0.512	1.159	1.773	0.78	0.78	0 0.000	9.258
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
The cited research is consistent of Research in this Project is condu Research in this Project complem Survivability Tech).	with the Un cted by the nents Progr	der Secreta United Stat am Elemen \$ in Million	nore manage ologies to se ry of Defens tes (U.S.) A t (PE) 0602 <u>s)</u>	enent using elect and as se for Rese rmy Engine 150A (Air a	arch and Er er Research nd Missile I	inetic protecting participation of the second se	riority focus opment Ce	res. areas and nter and co Project AE2	the Army I ordinated v ? (Unconve	Modernizati vith U.S. Ar ntional Cou	on Strategy. my Futures ontermeasure FY 2022	Command. es- FY 2023
Title: Development of Unconvent	ional Count	termeasures	s for Enhand	ced Surviva	bility (DeUC	CES) Demo	nstrations			0.970	2.652	-
Description: This effort matures computational simulations and ph	and demon lysical cour	nstrates cour ntermeasure	ntermeasure s and enha	es to detect nced toned	t and defeat own measu	near-peer a res.	advanced w	eapons thro	ough			
FY 2022 Plans: Demonstrate integrated unconver fixed Air and Missile Defense ass	ntional cour ets, and do	ntermeasure ocument bes	e solutions a t practices f	and optimize for employr	e their desig nent.	in and empl	oyment in f	xed and se	mi-			
FY 2022 to FY 2023 Increase/De Funding change reflects planned	ecrease Sta lifecycle of	a <i>tement:</i> this effort co	ompleting ir	n Fiscal Yea	ar 2022.							
Title: Applications of Environmen	tally-Inspire	ed Unconve	ntional Cou	ntermeasur	es					0.284	0.238	-
Description: This effort matures obscure underlying target spectra	and demon Il signatures	istrates rapi s.	dly-deploya	ble, eco-frie	endly materi	als with spe	ectral signat	ures that al	ter or			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: A	pril 2022		
Appropriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name) 2040 / 3 PE 0603466A / Air and Missile Defense Ad vanced Technology AE3 / Unconventional Counternor Survivability ATech					
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023	
FY 2022 Plans: Make use of modeling and simulation tools to optimize countermeasure senvironments.	spectral feature selection matching for specific opera	iting			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort completing in Fisc	al Year 2022.				
Title: Advanced Integrated Unconventional Countermeasures Application	ns Demonstrations	-	-	0.512	
Description: This effort demonstrates methods and materials to defeat p methods through advancements in material science and computational p targeting systems.	peer advanced reconnaissance, surveillance, targetin rototyping to reduce targetable signatures and confu	ng use			
FY 2023 Plans: Will demonstrate a system incorporating organic materials for targeting h demonstrate advanced thermal generation technologies for lightweight st enhancement systems.					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects the planned lifecycle for this Project to provide for computational prototyping.	or application of advancements in material science a	ind			
Title: FY 2022 SBIR/STTR Transfer		-	0.110	-	
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Sub	totals 1.254	3.000	0.512	
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> N/A					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army	Date: April 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603466A <i>I Air and Missile Defense Ad</i> <i>vanced Technology</i>	Project (Number/Name) AE3 / Unconventional Countermeasures- Survivability ATech
D. Acquisition Strategy N/A		

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2023 A	Army							Date: Apr	il 2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603466A <i>I Air and Missile Defense Ad</i> <i>vanced Technology</i>				Project (Number/Name) BN7 I Weapons Components Adv Technology (CA)			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BN7: Weapons Components Adv Technology (CA)	-	119.500	97.000	-	-	-	-	-	-	-	0.000	216.500
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Bud Congressional Interest Item fundi The cited work is consistent with t	ng provide get Item J ng provide the Under 3	ustification d for Weapc Secretary of	ons Compor ons Compor	nents Advar nents Advar or Research	nced Techn nced Techn n and Engine	ology. ology. eering priori	ty focus are	eas and the	Army Mode	rnization S	trategy.	
B. Accomplishments/Planned P	rograms (\$ in Million	<u>s)</u>					FY 2021	FY 2022]		
Congressional Add: Silicon Carb	oide Power	Electronics	Packaging					8.000	-			
FY 2021 Accomplishments: Prop Electronics Packaging.	gram Incre	ase support	ed advance	ed research	on Silicon	Carbide Pov	wer					
Work executed under the direction	n of the Arr	my Futures (Command.									
Congressional Add: Enterprise S	Science an	d Technolog	gy Demonst	ration Prote	otyping			7.000	-			
FY 2021 Accomplishments: Prog Technology Demonstration Protot	gram Incre yping.	ase support	ed advanc	ed researcl	h on Enterpi	rise Science	e and					
Work executed under the direction	n of the Arr	my Futures (Command.									
Congressional Add: Program Inc	crease							20.000	-			
FY 2021 Accomplishments: Prop Laser Systems.	gram incre	ase support	ing advance	ed technolc	ogy developi	ment of Higl	h Energy					
This effort has performed research energy laser system for vehicles s Weight, and Power/Cost (SWaP-0	h and deve supporting , C) and targ	elopment on Army Brigac et requireme	advanced v le and belov ents for enh	weapons te w operatior anced capa	chnology le ns. It further abilities of c	ading to a h addressed urrent direct	iigh Size, ted energy					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022				
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/ PE 0603466A <i>I Air and Missile De</i> <i>vanced Technology</i>	R-1 Program Element (Number/Name) Project PE 0603466A / Air and Missile Defense Ad BN7 / vanced Technology Technology				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022]		
prototyping efforts. The effort builds upon the advanced laser techn larger vehicles.	nologies being developed and integrated on					
Work performed by the Rapid Capabilities and Critical Technologie	es Office (RCCTO), in Huntsville, Alabama.					
Congressional Add: HEL for All-Terrain Vehicles		-	5.000			
FY 2022 Plans: Program increase supporting advanced technolog terrain vehicles.	y development of high energy lasers for all-					
Furthers efforts executed under FY 2021 \$20M congressional add	Program Increase.					
This project will perform research and development on coherently of advanced weapons technology to support the mobile Counter-sma efforts at Army Brigade and below operations. The effort matures of and will perform graded field demonstrations against relevant targe	combined phased array high energy laser III Unmanned Aircraft Systems (C-sUAS) current Joint C-sUAS Office supported efforts ets.					
Congressional Add: Program Increase - cLIAS Integration with R	obotic Vehicles	5 000		-		
FY 2021 Accomplishments: Program increase supporting advance Unmanned Aerial Systems Integration with Robotic Vehicles.	ced technology development of Counter-Small	3.000				
This effort supports the integration of proven Commercial-Off-The- modular multi-mission capability to include surveillance (with small Counter-sUAS (C-sUAS) electronic warfare & other hard kill capab This effort will produce a single integrated prototype system deliver demonstration.	Shelf (COTS) technologies to provide a Unmanned Aerial Systems (sUAS) detection), ilities including High Energy Laser (HEL). red and demonstrated in support of an initial					
Work performed by the Rapid Capabilities and Critical Technologie	es Office (RCCTO), in Huntsville, Alabama.					
Congressional Add: Program Increase - Thermal Management S	7.500	12.000				
FY 2021 Accomplishments: Program increase supporting advance management systems for high energy lasers.	ced technology development of thermal					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022								
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/I PE 0603466A <i>I Air and Missile De</i> <i>vanced Technology</i>	Name) efense Ad	Project (N BN7 / Wea Technology	u mber/Name) pons Components Adv ⁄ (CA)				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022					
This effort improves laser diode fiber amplifier cooling with smaller, lighter and management technology. Recent developments in parallel Army programs has materials, coordinative complex compound sorption technology, and integrated vapor compression technology, can dramatically reduce size, weight and powe weapons systems.								
Work performed by the Rapid Capabilities and Critical Technologies Office (RC	CCTO), in Huntsville, Alabama.							
FY 2022 Plans: Congressional Interest Item funding provided for Thermal Man 50KW Lasers Program increase supporting advanced technology development of thermal material energy lasers.								
This project will improve laser diode fiber amplifier cooling with smaller, lighter a management technology and demonstrate that capability in a relevant environmin phase change materials and vapor compression technologies to reducing the direct energy weapons technologies.	and more energy efficient thermal nent. This effort continues work e size, weight, power, and cost of							
Work performed by the Rapid Capabilities and Critical Technologies Office (RC	CCTO), in Huntsville, Alabama.							
Congressional Add: Program Increase - HEL Risk Reduction		50.000	46.000					
FY 2021 Accomplishments: Program increase supporting advanced technolo Laser Risk Reduction.	gy development of High Energy							
The Indirect Fire Protection Capability-High Energy Laser (IFPC-HEL) pre-prote a 300 kW HEL system in a laboratory by the end of FY2022. This effort acceler and integration of HEL, Beam Control System (BCS), Beam Director Assembly thermal technologies. Integration of these subsystems into an enclosure and or demonstrations. Enabling final verification of the system against its defined three potential path forward for follow-on prototype systems delivery to the Warfighte								
Work performed by the Rapid Capabilities and Critical Technologies Office (RC								
FY 2022 Plans: Congressional Interest Item funding provided for IFPC HEL Ris Program increase supporting advanced technology development of High Energy	sk Reduction gy Laser Risk Reduction.							

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022			
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/I PE 0603466A <i>I Air and Missile De</i> <i>vanced Technology</i>	Name) fense Ad	Project (N BN7 / Wea Technology	roject (Number/Name) N7 I Weapons Components Adv echnology (CA)		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022			
The Indirect Fire Protection Capability-High Energy Laser (IFPC-HEL) pre-proto out a 300 kW HEL system in a laboratory by the end of FY 2022. This effort su demonstration system integration of all subsystems into an enclosure and onto demonstrations to enable final verification of the system against its defined thre forward for follow-on prototype systems to be delivered to the warfighter as resi Work performed by the Rapid Capabilities and Critical Technologies Office (RC						
Congressional Add: Program Increase - HEL System Characterization Lab		22.000	-			
 FY 2021 Accomplishments: Program increase supporting advanced technologilaser systems characterization lab. This effort has worked to develop the equipment and instrumentation for a direct Characterization Lab (SCL), integrate SCL equipment within High Energy Laser capability for government validation of Science & Technology (S&T) performance and weapons. Additionally, developed government owned surrogate HEL weapon subsystem frameworks necessary for the stimulation, test, and assessment of new HEL co Finally, this effort is developing laboratory instrumentation to measure HEL Weapons. Work performed in Huntsville, Alabama by the United States Army Space and M (USASMDC), with the Rapid Capabilities and Critical Technologies Office (RCC) 						
Congressional Add: Armored Combat Vehicle HEL Integration		-	11.000			
FY 2022 Plans: Program increase supporting advanced technology developmenting high energy laser integration. This project will provide a system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the system representative high energy laser asset to independent of the sys						
score Direct Energy systems to validate weapon effectiveness as part of develor as well as Outside Continental United States (OCONUS) operational assessme	opmental and operational testing, ents. This effort will inform					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army				Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/ PE 0603466A <i>I Air and Missile De</i> <i>vanced Technology</i>	l umber/Name) apons Components Adv y (CA)		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	
engagement tactics against threat representative Unmanned Aircraft Systems Rapid Capabilities and Critical Technologies Office (RCCTO) test events for co Work performed by the Rapid Capabilities and Critical Technologies Office (RC	(UAS) and UAS swarms. Enables unter UAS activities. CCTO), in Huntsville, Alabama.			
Congressional Add: Missile Mentor		-	15.000	
FY 2022 Plans: Congressional Interest Item funding provided for Missile Mento	or			
Congressional Add: Silicon Carbide Electronics	-	8.000		
FY 2022 Plans: Congressional Interest Item funding provided for Silicon Carbio	de Electronics			
	Congressional Adds Subtotals	119.500	97.000]

C. Other Program Funding Summary (\$ in Millions)

N/A **Remarks**

D. Acquisition Strategy

N/A

xhibit R-2A, RDT&E Project Justification: PB 2023 Army Data									Date: Apri	2022		
Appropriation/Budget Activity 2040 / 3					R-1 Progra PE 060346 vanced Te	am Elemen 66A I Air and chnology	t (Number / d Missile De	Name) efense Ad	Project (N CV6 I Opti Adv Tech	Project (Number/Name) CV6 / Optimized High Energy Laser Soun Nov Tech		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CV6: Optimized High Energy Laser Source Adv Tech	-	-	-	7.112	-	7.112	5.505	4.157	-	-	0.000	16.774
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is a new start in FY 2023.

A. Mission Description and Budget Item Justification

This Project matures and demonstrates Optimized High Energy Laser Source advanced technology establishing a more affordable laser source for application in High Energy Laser weapon systems. This Project will deliver a lower cost laser weapon source and leverages prior laser source development work to ruggedize and integrate for transition into the Maneuver-Short Range Air Defense Program of Record.

Research in this Project compliments other Army Directed Energy efforts conducted under Program Element (PE) 0602150A (Air and Missile Defense Te	echnology) and
PE 0603466A (Air and Missile Defense Advanced Technology).	

The cited research is consistent with the Army's 31+4 programs, the Under Secretary of Defense for Research and Engineering priority focus areas, the Army Modernization Strategy, and supports the Army's future capability opportunities for leap-ahead technology for Directed Energy.

Research is performed by the United States Army Space and Missile Defense Command - Technical Center (USASMDC-TC).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Optimized High Energy Laser Source Advanced Technology	-	-	7.112
Description: This effort matures and demonstrates Optimized High Energy Laser Source Advanced Technology to demonstrate a more affordable laser source for application in High Energy Laser weapon systems. This effort will provide a low-cost, rugged and compact laser source. Delivering an affordable direct replacement 50 kW-class laser subsystem with 50% efficiency and 80% fractional Power in the Bucket enabling improvements in efficiency and Size, Weight, and Power laser source resulting in a smaller footprint while reducing logistics requirements.			
FY 2023 Plans: This effort will design and integrate a 50 kW class semiconductor high energy laser subsystem module by leveraging commercially available single mode laser diodes. This effort builds on current industry capabilities that utilize spectral beam			

Appropriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name) 2040/3 PE 060366A / Air and Missile Defense Ad CV61 Optimized High Ener B. Accomplishments/Planned Programs (\$ in Millions) FY 2021 FY 2021 combining of multimode diode lasers for manufacturing capabilities. Current research efforts in the Army that have proven this concept is feasible will be leveraged in this effort. FY 2021 FY 202 FY 2022 to FY 2023 Increase/Decrease Statement: This is a New Start Project in FY23. Accomplishments/Planned Programs Subtotals - C. Other Program Funding Summary (\$ in Millions) N/A N/A Remarks D. Acquisition Strategy N/A	<pre>chibit R-2A, RDT&E Project Justification: PB 2023 Army</pre>		Date:	April 2022		
B. Accomplishments/Planned Programs (\$ in Millions) Combining of multimode diode lasers for manufacturing capabilities. Current research efforts in the Army that have proven this Concept is feasible will be leveraged in this effort. FY 2022 to FY 2023 Increase/Decrease Statement: This is a New Start Project in FY23. C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A	opropriation/Budget Activity 140 / 3	R-1 Program Element (Number/Name)FPE 0603466A / Air and Missile Defense Ad vanced TechnologyA	Project (Number/Name) CV6 I Optimized High Energy Laser Source Adv Tech			
combining of multimode diode lasers for manufacturing capabilities. Current research efforts in the Army that have proven this concept is feasible will be leveraged in this effort. FY 2022 to FY 2023 Increase/Decrease Statement: Fry is a New Start Project in FY23. Accomplishments/Planned Programs Subtotals - C. Other Program Funding Summary (\$ in Millions) - N/A Remarks D. Acquisition Strategy N/A	Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023	
FY 2022 to FY 2023 Increase/Decrease Statement: This is a New Start Project in FY23. Accomplishments/Planned Programs Subtotals c. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A	mbining of multimode diode lasers for manufacturing capabilities. Curre procept is feasible will be leveraged in this effort.	arch efforts in the Army that have proven this				
Accomplishments/Planned Programs Subtotals - C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A	Y 2022 to FY 2023 Increase/Decrease Statement: nis is a New Start Project in FY23.					
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A		ccomplishments/Planned Programs Subto	tals -	-	7.112	
	/A marks Acquisition Strategy /A					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: April	2022	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name)Project (Number/Name)PE 0603466A / Air and Missile Defense Ad vanced TechnologyDB3 / Radar Survivability through Sensing Adv Tech				ne) ility through	Dis		
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
DB3: Radar Survivability through Dis Sensing Adv Tech	-	-	-	3.523	-	3.523	3.051	3.673	3.986	2.549	0.000	16.782
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

<u>Note</u>

This is a new start in FY 2023.

A. Mission Description and Budget Item Justification

This Project matures, and demonstrates critical radar capability enhancements to defeat advanced Air and Missile threats and protect Army maneuver forces and critical assets. Radar enhancements are required for advanced Electronic Protection (EP) techniques against advanced jammers, electronic Combat Identification (CID), and resource optimization across the threat spectrum while retaining 360 degree coverage capability. Technology maturation in the project includes providing capabilities for: dispersed multi-static operation, classifying/tracking emerging threats and high volume threats; adaptive digital beam forming to enable resource efficiency, performance in a dynamic clutter environment and enhanced survivability in a contested battlespace; and multi-modal tracking and additional discrimination models to support diverse and emerging threats, such as swarms and guided munitions. Multiple soldier touchpoints and demonstrations of developed technology to autonomously synchronize multiple radars across a distributed battlefield in the presence of countermeasures and the denial of Global Positioning System (GPS) will be performed in lab and field environments.

This research is coordinated with Army Program Element (PE) 0602141A (Lethality Technology) / Project CG4 (Advanced Radar Concepts and Technologies); PE 0602148A (Future Vertical Lift Technology) / Project CC3 (FVL Radar Technologies); PE 0602150A (Air and Missile Defense Technology) / Project AD5 (Next Generation Fires Radar Technology); and PE 0601102A (Defense Research Sciences) / Project AA8 (Sensing and Electromagnetics).

This Research complements Program Element (PE) 0602141A (Lethality Technology) / Project CJ7 (Future Air Defense Missile Enabling Tech) and PE 0602150A (Air and Missile Defense Technology) / Project DA9 (Radar Survivability through Dis Sensing Tech).

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Radar Survivability through Dis Sensing (RSDS) Adv Tech	-	-	3.523
Description: Matures, and demonstrates critical radar capability enhancements to defeat advanced Air and Missile threats and protect Army maneuver forces and critical assets.			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Dat	e: April 2022		
Appropriation/Budget Activity 2040 / 3	Project (Numb DB3 / Radar Sensing Adv Te	oject (Number/Name) 33 I Radar Survivability through Dis ensing Adv Tech			
B. Accomplishments/Planned Programs (\$ in Millions)		FY 202	1 FY 2022	FY 2023	
FY 2023 Plans: Will mature RSDS software and evaluate utilizing high fidelity simulation radars. Will begin to generate test concepts and demonstration plans for	ns representative of current and future Army Air Defer or multi-static radar operations.	nse			
FY 2022 to FY 2023 Increase/Decrease Statement: This is a new start effort, initiated as high priority critical effort to mature advanced Air and Missile threats and protect Army maneuver forces an	e and demonstrate radar capability enhancements to ond critical assets.	defeat			
	Accomplishments/Planned Programs Sub	ototals		3.523	
N/A Remarks D. Acquisition Strategy N/A					

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army									Date: April	2022		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: AdvancedR-1 Program Element PE 0603920A I Huma Development (ATD)					t (Number/ nitarian Den	Name) nining						
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	16.690	19.000	8.933	-	8.933	9.028	9.201	9.297	9.294	0.000	81.443
CD5: Humanitarian Demining	-	16.690	19.000	8.933	-	8.933	9.028	9.201	9.297	9.294	0.000	81.443

A. Mission Description and Budget Item Justification

This Program Element (PE) develops, demonstrates and validates cost-effective technologies for use in humanitarian demining via Outside Continental United States (OCONUS) operational field evaluations. This PE's low-cost and highly effective technology reduces the landmine and unexploded ordnance (UXO) / improvised explosive devise (IED) threat to deployed United States (US) forces and the local population. This PE coordinates with the Department of State's Weapons Removal and Abatement Program, the Department of Defense (DoD) Humanitarian Mine Action (HMA) programs of the Combatant Commands (CCMDs), and international mine action organizations and foreign militaries. New technology requirements and areas of emphasis are identified and validated at annual Requirements Workshop and UXO/IED Working Group Meetings. Technology investments are prioritized using the results of these meetings and CCMD security cooperation and theater campaign plan HMA objectives. This PE advances the state-of-the-art of demining technologies and evaluates these technologies utilizing host nation humanitarian demining partners.

This PE supports and bolsters the CCMD stability operations mission as directed under Department of Defense Instruction (DODI) 3000.05 to foster mil-to-mil engagement, and bolster economic security and development with partner nations worldwide. Additionally, this PE fosters nations' mine action capacity while improving DoD's visibility and access, generating long-term positive perceptions of DoD and the US, and fostering collaborative relationships with host nation governments. It also directly supports the National Defense Strategy through ensuring common domains remain open and free.

This PE utilizes a research and development plan based on operational test data gained through Operational Field Evaluations (OFEs). These OFEs provide this PE a unique capability to collect this data against live mines/UXO in actual minefields around the world. This data is unavailable to any other DoD organization. This OFE data drives future humanitarian demining investment decisions and is shared and leveraged by the U.S. Army's Army Futures Command programs to further improve U.S. forces' technologies. In addition, this PE provides mine and UXO detector training to the CCMDs at the Humanitarian Demining Training Center (HDTC) in support of Military to Military training and partnerships. Since 1995 the program has fielded technologies for 234 evaluations in 43 countries, including Afghanistan, Angola, Cambodia, Colombia, Iraq, Kosovo, Ukraine, and Vietnam. This program's technologies have cleared 71.2 million square meters of the world's toughest minefields, and found or destroyed 213,220 mines and UXO.

This PE supports the DoD's strategic guidance to address instability and reduce the demand for significant US force commitments to stability operations; with DOD) 3000.05 (Stability Operations) and Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3207.01C (Department of Defense Support to Humanitarian Mine Action) to reduce the social, economic and environmental impact of landmines and unexploded ordnance.

This PE will be executed by the Army Futures Command (AFC).

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army	Date	e: April 2022				
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 3: Advan Technology Development (ATD)	ced	R-1 Program PE 0603920 <i>A</i>	Element (Number/Name)	I		
B. Program Change Summary (\$ in Millions)	Y 2021	<u>FY 2022</u>	FY 2023 Base	FY 2023 OCO	<u>FY 2023</u>	Total
Previous President's Budget	16.690	8.649	0.000	-		0.000
Current President's Budget	16.690	19.000	8.933	-		8.933
Total Adjustments	0.000	10.351	8.933	-		8.933
 Congressional General Reductions 	-	-				
 Congressional Directed Reductions 	-	-				
 Congressional Rescissions 	-	-				
 Congressional Adds 	-	10.351				
 Congressional Directed Transfers 	-	-				
 Reprogrammings 	-	-				
SBIR/STTR Transfer	-	-				
 Adjustments to Budget Years 	-	-	8.933	-		8.933
Congressional Add Details (\$ in Millions, and Includes Gen	eral Rec	luctions)			FY 2021	FY 2022
Project: CD5: Humanitarian Demining				·		
Congressional Add: Program Increase					8.485	10.351
			Congressional Add Subtota	als for Project: CD5	8.485	10.351
			Congressional Add To	otals for all Projects	8.485	10.351

Change Summary Explanation

Fiscal Year 2023 (FY23) funding increase reflects the fact that the FY22 President's Budget request did not include out-year funding.
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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022												
Appropriation/Budget ActivityR-1 Program Element (I2040 / 3PE 0603920A / Humanita				(Number/Name)Project (Number/Name)itarian DeminingCD5 I Humanitarian Demining								
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CD5: Humanitarian Demining	-	16.690	19.000	8.933	-	8.933	9.028	9.201	9.297	9.294	0.000	81.443
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project develops, demonstrates and validates cost-effective technologies for use in humanitarian demining via Outside Continental United States (OCONUS) operational field evaluations. This Project's low-cost and highly effective technology reduces the landmine and unexploded ordnance (UXO) / improvised explosive devise (IED) threat to deployed United States (US) forces and the local population. This Project coordinates with the Department of State's Weapons Removal and Abatement Program, the Department of Defense (DoD) Humanitarian Mine Action (HMA) programs of the Combatant Commands (CCMDs), and international mine action organizations and foreign militaries. New technology requirements and areas of emphasis are identified and validated at annual Requirements Workshop and UXO/IED Working Group Meetings. Technology investments are prioritized using the results of these meetings and CCMD security cooperation and theater campaign plan HMA objectives. This Project advances the state-of-the-art of demining technologies and evaluates these technologies utilizing host nation humanitarian demining partners.

This Project supports and bolsters the CCMD stability operations mission as directed under Department of Defense Instruction (DODI) 3000.05 to foster mil-tomil engagement, and bolster economic security and development with partner nations worldwide. Additionally, this Project fosters nations' mine action capacity while improving DoD's visibility and access, generating long-term positive perceptions of DoD and the US, and fostering collaborative relationships with host nation governments. It also directly supports the National Defense Strategy through ensuring common domains remain open and free.

This Project utilizes a research and development plan based on operational test data gained through Operational Field Evaluations (OFEs). These OFEs provide this Project a unique capability to collect this data against live mines/UXO in actual minefields around the world. This data is unavailable to any other DoD organization. This OFE data drives future humanitarian demining investment decisions and is shared and leveraged by the U.S. Army's Army Futures Command programs to further improve U.S. forces' technologies. In addition, this Project provides mine and UXO detector training to the CCMDs at the Humanitarian Demining Training Center (HDTC) in support of Military to Military training and partnerships. Since 1995 the program has fielded technologies for 234 evaluations in 43 countries, including Afghanistan, Angola, Cambodia, Colombia, Iraq, Kosovo, Ukraine, and Vietnam. This program's technologies have cleared 71.2 million square meters of the world's toughest minefields, and found or destroyed 213,220 mines and UXO.

This Project supports the DoD's strategic guidance to address instability and reduce the demand for significant US force commitments to stability operations; with DOD) 3000.05 (Stability Operations) and Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3207.01C (Department of Defense Support to Humanitarian Mine Action) to reduce the social, economic and environmental impact of landmines and unexploded ordnance.

This Project will be executed by the Army Futures Command (AFC).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Humanitarian Demining Technologies	8.205	8.333	8.933

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: A	pril 2022	
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603920A / Humanitarian Demining	Project CD5 / H	(Number/N lumanitaria		
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2022	FY 2023
Description: This effort adapts commercial-off-the-shelf equipment, integrates and development activity within the Army, particularly the AFC CCDC Commar Systems, Intelligence, Surveillance, and Reconnaissance (C5ISR) Tactical Con DoD HMA programs of the CCMDs and aims to improve existing technologies reduction, mechanical mine/UXO clearance, vegetation clearance, and mechanical	mature technologies, and leverages researd ad, Control, Communications, Computers, Co untermine mission area. This effort supports for mine/UXO detection, technical survey/arc nical mine neutralization.	ch ombat the ea			
FY 2022 Plans: Will identify, develop, and assess new technologies that provide individual minuvegetation clearance, and mechanical mine neutralization. Will demonstrate en capabilities in relevant environments. Will execute threat surveys and country a workshop to define global technology needs for humanitarian mine action. Will evaluations from FY21.	e/UXO detection, mechanical mine/UXO and nerging mine/UXO defeat technologies and assessments. Will execute HD R&D requiren continue the ongoing successful operationa	l nents			
<i>FY 2023 Plans:</i> Will develop and mature technologies to improve mine/UXO detection, vegetat capabilities. Will demonstrate and validate emerging mine/UXO defeat technolog Will continue execution of threat surveys and site assessments. Will execute a global technology needs for humanitarian mine action. Will continue the ongoin	ion clearance, and mechanical mine neutrali ogies and capabilities in live threat environm nnual HD R&D requirements workshop to de ng successful operational evaluations from F	zation ents. efine Y22.			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.					
Title: FY2022 SBIR/STTR Transfer			-	0.316	-
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
	Accomplishments/Planned Programs Su	ıbtotals	8.205	8.649	8.933
	FY 202	1 FY 202	2		
Congressional Add: Program Increase	8.48	35 10.3	51		
FY 2021 Accomplishments: Program Increase supported advanced research Technologies.	on Humanitarian Demining				

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army Date: April 2022						
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/ PE 0603920A <i>I Humanitarian Der</i>	Project (Number/Name) CD5 / Humanitarian Demining				
		FY 2021	FY 2022]		
Work executed by Army Futures Command.						
FY 2022 Plans: Congressional Interest Item funding provided						
	Congressional Adds Subtotals	8.485	10.351			
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>						
<u>D. Acquisition Strategy</u> N/A						