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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army **Date:** May 2021

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 3: Advanced Technology Development (ATD)</i>	R-1 Program Element (Number/Name) PE 0603041A / <i>All Domain Convergence Advanced Technology</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	-	-	17.743	-	17.743	-	-	-	-	-	-
CL9: <i>Collab Battlefield Networked Leth Sys Adv Tech</i>	-	-	-	8.871	-	8.871	-	-	-	-	-	-
CM2: <i>Collaborative Convergence Adv Tech Development</i>	-	-	-	0.444	-	0.444	-	-	-	-	-	-
CM8: <i>Convergence Battlefield Integration</i>	-	-	-	8.428	-	8.428	-	-	-	-	-	-

Note

This is a new start in FY 2022.

This is a new start in FY2022.

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

Work is performed by the United States Army Futures Command.

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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 3: Advanced Technology Development (ATD)</i>		R-1 Program Element (Number/Name) PE 0603041A / <i>All Domain Convergence Advanced Technology</i>			
B. Program Change Summary (\$ in Millions)	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	17.743	-	17.743
Total Adjustments	0.000	0.000	17.743	-	17.743
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	17.743	-	17.743

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Army										Date: May 2021		
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603041A / All Domain Convergence A Advanced Technology				Project (Number/Name) CL9 / Collab Battlefield Networked Leth Sys Adv Tech			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
CL9: Collab Battlefield Networked Leth Sys Adv Tech	-	-	-	8.871	-	8.871	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is a new start in FY 2022.

This is a new start Project in Fiscal Year 2022 (FY22).

A. Mission Description and Budget Item Justification

The Collaborative Battlefield Networked Lethality System advanced technology project matures and demonstrates dynamic Weapon-Target Pairing (WTP), fires planning and execution for maneuver forces, integration of fires & intelligence technologies, Artificial Intelligence (AI)-based decision aid implementation, and integration & demonstration of a role-based networked lethality architecture.

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

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

Work in this Project supports Next Generation Combat Vehicle, Tactical Network, Future Vertical Lift, and Long Range Precision Fires Army Modernization Priorities.

This work is done in coordination with PE 0602181A (All Domain Convergence Applied Research).

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: CBNLS Distributed Lethality Architecture	-	-	3.290
Description: This effort provides a decision aid architecture that will integrate with current and future sensors and weapon systems to network fires for a mounted/dismounted and tactical operation center capability for Combined Arms Maneuvers. Matures and demonstrates distributed architecture and data transmission for sensor to shooter to optimize effects-based WTP.			
FY 2022 Plans:			

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Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603041A / <i>All Domain Convergence A dvanced Technology</i>	Project (Number/Name) CL9 / <i>Collab Battlefield Networked Leth Sys Adv Tech</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Will develop a fires and air space coordination systems to support AI-based decision aids in a networked lethality architecture. Will provide AI-enhanced digital collaborative targeting capability, air space and fires de-confliction, as well as fires planning, coordination and delivery to reduce sensor to shooter timelines.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022, this is a new start.</p>				
<p>Title: CBNLS Integrated Sensor to Shooter System</p> <p>Description: Demonstrates software that ingests intelligence, sensor cueing, tasking and target hand off data from/to higher and lower echelons for sensor to shooter integration. Integrates software on combat platforms to enable on-board sensor and weapon systems to execute fires missions based on decision aids? recommendations with minimal operator input.</p> <p>FY 2022 Plans: Will integrate CBNLS with intelligence systems for theatre-net centric geolocation data while tying current and emerging weapons to execute fires at the tactical edge. Support demonstrations with Army?s system of systems joint fires architecture to enable multi-domain fires.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022, this is a new start.</p>		-	-	3.500
<p>Title: CBNLS Fires Synchronization</p> <p>Description: Provides real-time, joint airspace integration between airspace users and fires at various echelons to de-conflict airspace for emerging long range munitions. Matures and demonstrates algorithms for modeling adversary behavior for autonomous engagement using prior knowledge and real-time sensor data.</p> <p>FY 2022 Plans: Will forecast future threat positions using advanced AI algorithms to identify the optimal required airspace to be coordinated based on available long range fires for a large number of nodes and distributed entities. These AI algorithms will provide potential courses of action using reinforcement learning, intuitive role based human?machine interfaces as well as game theory based algorithms for larger data sets.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022, this is a new start.</p>		-	-	2.081
Accomplishments/Planned Programs Subtotals		-	-	8.871

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Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603041A / <i>All Domain Convergence A dvanced Technology</i>	Project (Number/Name) CL9 / <i>Collab Battlefield Networked Leth Sys Adv Tech</i>

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

N/A

Remarks

N/A

D. Acquisition Strategy

N/A

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Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603041A / All Domain Convergence A dvanced Technology				Project (Number/Name) CM2 / Collaborative Convergence Adv Tech Development			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
CM2: Collaborative Convergence Adv Tech Development	-	-	-	0.444	-	0.444	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is a new start in FY 2022.

In Fiscal Year 2022 (FY22). This is a new start Project.

A. Mission Description and Budget Item Justification

This Project develops and integrates critical Project Convergence technologies and the architecture through which the Project Convergence technologies will operate. This is accomplished using adaptive data fusion and task allocation algorithm to support the development of Artificial Intelligence (AI) decision support agents. This project includes development of advanced methods for processing and information extraction for mission oriented tasks in support of tactical decision makers. Additionally, this project will develop the scalable architecture solutions necessary to facilitate tactical data collection, movement, processing, storage and modeling and simulation necessary to enable mission command in multi-domain operations. Also, the project will shape early programs to accelerate technologies and achieve sensor to shooter dominance.

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

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

Work in this Project supports Next Generation Combat Vehicle, Long Range Precision Fires, Air and Missile Defense, Tactical Network, and Future Vertical Lift Army Modernization Priorities.

This work is done in coordination with PE 0602181A (All Domain Convergence Applied Research).

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Air and Missile Defense Joint Kill Chain Decision Support Modeling and Simulation	-	-	0.444
Description: Demonstrate interoperability of missile interceptor, sensor, and fire control enabling technology contribution to Joint Kill Chain Air and Missile Defense scenarios in support of Multi-Domain Operations (MDO).			
FY 2022 Plans:			

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
Will demonstrate enabling missile technology in user defined Joint Kill Chain Air and Missile Defense scenarios by employing high fidelity models within the integrated air and missile defense simulation architecture.				
FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022, this is a new start.				
Accomplishments/Planned Programs Subtotals		-	-	0.444
C. Other Program Funding Summary (\$ in Millions) N/A				
Remarks N/A				
D. Acquisition Strategy N/A				

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Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603041A / All Domain Convergence A dvanced Technology				Project (Number/Name) CM8 / Convergence Battlefield Integration			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
CM8: <i>Convergence Battlefield Integration</i>	-	-	-	8.428	-	8.428	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is a new start in FY 2022.

In Fiscal Year 2022 (FY22). This is a new start Project.

A. Mission Description and Budget Item Justification

This Project integrates and demonstrates aided target detection and recognition, autonomous tactical behaviors, Artificial Intelligence (AI)-enabled decision support agent, and data management technologies in Multi-Domain Operations (MDO) field experiments. This Project integrates these technologies on tactical ground, air, air and missile defense, fires, network platforms and other missions to demonstrate reduced sensor to shooter timelines and evaluate operational performance in representative MDO scenarios during annual field experiments.

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

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

Work in this Project supports Next Generation Combat Vehicle, Tactical Network, and Future Vertical Lift Army Modernization Priorities.

This work is done in coordination with PE 0602181A (All Domain Convergence Applied Research).

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Convergence Ground Platform System Integration	-	-	6.293
Description: Integration of ground efforts in direct support of maturing and demonstrating Project Convergence capabilities. This effort matures and demonstrates ground vehicle technologies as an integrated system and system of systems to reduce sensor to shooter targeting time, increase real-time battlefield understanding and ensure communications across all echelons.			
FY 2022 Plans: Will develop Convergence integration and assessment capability with networked aided target detection and recognition, autonomous tactical behaviors, AI-enabled decision support agent, and data management technologies on multiple ground platforms. Will also mature and demonstrate ground vehicle integration, multi-platform network communication and perform			

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Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603041A / <i>All Domain Convergence A dvanced Technology</i>	Project (Number/Name) CM8 / <i>Convergence Battlefield Integration</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
analytics to inform requirements for both present and future tactical and combat military vehicles against a complex enemy in an MDO environment. FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022, this is a new start.				
Title: Convergence Aviation Platform Integration Description: Integration of Aviation/Future Vertical Lift efforts in direct support of maturing and demonstrating Project Convergence capabilities. Focus is on integration of capabilities such as geo-location and identification of targets from Army aviation assets, air to ground situational awareness and target data exchange, exchange of unmanned asset control, advanced tactical and teaming behaviors, synchronized data management, and efficient usage of air lethality assets. FY 2022 Plans: Will integrate individual capabilities developed under Full Spectrum Targeting effort (detection, recognition and identification of hidden and decoy targets, sensor fusion), MSET (multiple simultaneous engagement technologies to engage targets autonomously), Advanced Teaming (supervised autonomous mission commands, various payloads), XM915 20 mm cannon, and Integrated Mission Equipment (platform-agnostic architecture for various S&T efforts integrated with each other) in support of Project Convergence (PC) capability demonstrations. Will select for integration from listed efforts based on technology maturity and applicability to overall PC kill chain scenarios in the demonstration. FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022, this is a new start.		-	-	2.135
Accomplishments/Planned Programs Subtotals		-	-	8.428
C. Other Program Funding Summary (\$ in Millions) N/A				
Remarks N/A				
D. Acquisition Strategy N/A				