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 0603040A *I Artificial Intelligence and Machine Learning 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**
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					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 Artificial Intelligence and Machine Learning Advanced Technologies*		
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	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 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603040A / *Artificial Intelligence and Machine Learning Advanced Technologies*	Project (Number/Name) CL1 / *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	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project will mature and demonstrate various technologies to augment human analysts using Artificial Intelligence (AI)-enabled decision support and recommendation tools supporting Long Range Precision Fires, Mission Command, and Maneuver Commanders. This Project will help bridge the research and technology gap within intelligence support to operations and the sensor to shooter thread. This Project also complements and coordinates with the applied research in Program Element (PE) 0602180A (Artificial Intelligence Technologies) / Project CL2 (AI Enhanced Intel Operations Technologies).

The cited research is consistent with the Army Modernization Strategy and is supported and coordinated with the Army Intel Community, Army Futures Command, and the Army Intelligence, Surveillance, and Reconnaissance (ISR) Task Force.

Research in this Project supports the Army Science and Technology Lethality 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: AI Enhancements for Prometheus	-	0.357	0.622
Description: Prometheus is an umbrella of capabilities to support sensor to shooter automation for the strategic, operational, and tactical levels. This effort will mature and demonstrate computer vision and deep learning capabilities to automatically triage data collection and hard-to-spot indications and warnings (I&W) to support targeting, allowing human intelligence analysts to do the higher-value work of determining if a given lead represents a valid threat.			
FY 2022 Plans: Maturation of AI algorithms for automated detection of adversarial objects of interest and automated intelligence collection management; will improve AI collection management and tasking capability, automate AI workflows, and document repeatable processes for deploying AI capabilities to meet Army needs.			
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 / *Artificial Intelligence and Machine Learning Advanced Technologies*	**Project (Number/Name)** CL1 / *AI Enhanced Intel Operations Advanced Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Will demonstrate that the algorithms matured on this project can generate artificial data, and that this artificial data is realistic enough to train an AI system in place of real data. Will validate the full methodology on a military-related problem where the system will generate artificial data and use that artificial data to re-train a military AI-system like Prometheus. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Increased funding will be used to mature and demonstrate algorithms for automated object detection and automated intelligence collection management, building on effort ending mid-year FY23 in Project CL2 (AI Enhanced Intel Operations Technologies) in this same PE.			
Title: Intelligence Fusion for Targeting ***Description:*** Will address a ?multi-INT? fusion problem and demonstrate how AI algorithms can fuse data from various military intelligence systems via simulated testing. ***FY 2023 Plans:*** Will demonstrate the ability of the algorithm to fuse data from various military intelligence systems (ARCANE series, Prometheus, and ATR-MCAS) in a simulated test. Will then demonstrate the algorithm performing fusion of real-world intelligence data to show improved target confirmation over what can be provided by any single AI-enabled sensor. Will work with product owners of TITAN and SHOT systems to exploit the fusion algorithm and the required data pipelines. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** This effort initiates in FY23.	-	-	0.802
Title: SBIR/STTR Transfer ***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	-	0.014	-
Accomplishments/Planned Programs Subtotals	-	0.371	1.424

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 0603040A / *Artificial Intelligence and Machine Learning Advanced Technologies*	Project (Number/Name) CL6 / *ATR Using Multiple Cooperative Sensors 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	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project will mature and demonstrate a team of air and ground sensors that use Artificial Intelligence (AI) and Machine Learning (ML) to autonomously navigate and collaborate through shared perception of the optical, thermal, and electromagnetic spectrums to find, identify, geo-locate, and track targets during reconnaissance missions. This Project also complements and fully coordinates with the applied research in Program Element (PE) 0602180A (Artificial Intelligence Technologies) / Project CL7 (ATR Using Multiple Cooperative Sensors App Tech).

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 Lethality 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: Collaborative Target Detection and Tracking	-	0.519	1.365
Description: This effort will mature and demonstrate an AI-enabled scalable team of autonomous air and ground vehicles that will cooperatively conduct a zone recon to identify, geolocate, and track threats using on-board electronic intelligence (ELINT) and electro optical-infrared (EO-IR) sensors.			
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 threat, terrain, and perception architecture for maneuver and threat classification at the tactical edge. Will integrate sensors to detect and geo-locate radio emissions to influence search areas and accelerate target localization. Will improve interfaces with the cloud environment by integrating ATR-MCAS with Integrated Visual Augmentation System (IVAS) voice recognition, and demonstrating a 100% cloud-based data pipeline with linkages to COEUS/cARMY on IL5.			
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 0603040A / *Artificial Intelligence and Machine Learning Advanced Technologies*	**Project (Number/Name)** CL6 / *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 and geo-locate targets and share target data among unmanned and manned teams for verification.			
Title: COEUS Advanced Technology ***FY 2023 Plans:*** Will optimize ATR-MCAS through the use of COEUS, a modular software platform (cloud native). ***FY 2022 to FY 2023 Increase/Decrease Statement:*** This effort is a new effort in Fiscal Year 2023 (FY23).	-	-	0.518
Title: SBIR/STTR Transfer ***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	-	0.019	-
Accomplishments/Planned Programs Subtotals	-	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 Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603040A / *Artificial Intelligence and Machine Learning Advanced Technologies*	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	-	-	-	-	-	-	-	-	-	-		

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 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:			

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 / *Artificial Intelligence and Machine Learning Advanced Technologies*	**Project (Number/Name)** CN6 / *Predictive Maintenance Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
This effort will mature and demonstrate the integrated development, security, and operations (DevSecOps) PMx environment. Will provide the capability to aggregate data at the point of the maintenance activity and establish multiple pipelines to transition the aggregated data to a scalable, cloud-based data management environment. Will exploit the cloud-based data management architecture and initiate scaling to ground-based systems. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** This is a new start in FY23.			
Accomplishments/Planned Programs Subtotals	-	-	2.311

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 0603040A / *Artificial Intelligence and Machine Learning Advanced Technologies*	Project (Number/Name) DA7 / *AI-Enabled Command and Coordination 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 / *Artificial Intelligence and Machine Learning Advanced Technologies*	**Project (Number/Name)** DA7 / *AI-Enabled Command and Coordination Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
ATR-MCAS and Prometheus technologies will be improved to provide additional, autonomous sensor options that can be used to identify threats and then assess effects based on the target and engagement type. This represents the simplest form of the sensor to shooter problem and will be used as a foundation for AI-enhanced operational maneuver. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** This is a new start in FY23.			
Accomplishments/Planned Programs Subtotals	-	-	0.777

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A