Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Army											Date: March 2024	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 1: *Basic Research*					R-1 Program Element (Number/Name) PE 0601601A *I Artificial Intelligence and Machine Learning Basic Research*							
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
Total Program Element	-	7.985	10.708	10.309	-	10.309	12.397	12.405	12.540	12.666	0.000	79.010
CL3: *AI/ML Basic Research Hub*	-	7.985	10.708	10.309	-	10.309	12.397	12.405	12.540	12.666	0.000	79.010

A. Mission Description and Budget Item Justification

This Program Element (PE) executes intramural and extramural basic research in artificial intelligence (AI) and machine learning (ML) to support an AI-enabled Multi-Domain Operations (MDO) Force. The PE includes Projects that perform basic research in AI/ML with the potential to impact areas such as: Target Detection using Multiple Cooperative Autonomous Sensors (MCAS); more effective and quicker leader decision-making through use of AI-enhanced Common Operating Procedure (COP); replication of tactical behaviors to enable autonomous capabilities for maneuver; predictive maintenance; Intel support for Operations (specifically in support of long range precision fires); AI-enabled network/cybersecurity; intelligent business and process automation; and medical support. The Army's Artificial Intelligence Integration Center (AI2C) will provide strategic guidance and coordination of these basic research efforts in AI/ML across the Army Modernization enterprise.

Work in this PE contributes to the Army Science and Technology (S&T) portfolio and is fully coordinated with efforts in PE 0602180A Artificial Intelligence Technologies and PE 0603040A Artificial Intelligence Advanced Technologies.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering S&T focus areas, the Army Modernization Strategy and the Chief Digital and Artificial Intelligence Office.

B. Program Change Summary ($ in Millions)	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**
Previous President's Budget	10.078	10.708	10.288	-	10.288
Current President's Budget	7.985	10.708	10.309	-	10.309
Total Adjustments	-2.093	0.000	0.021	-	0.021
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.725	-			
• SBIR/STTR Transfer	-0.368	-			
• Adjustments to Budget Years	-	-	0.021	-	0.021

Change Summary Explanation

Minor increase in FY25 funding from the previous PB to the current PB due to economic assumptions.

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 1	R-1 Program Element (Number/Name) PE 0601601A / *Artificial Intelligence and Machine Learning Basic Research*	Project (Number/Name) CL3 / *AI/ML Basic Research Hub*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
CL3: *AI/ML Basic Research Hub*	-	7.985	10.708	10.309	-	10.309	12.397	12.405	12.540	12.666	0.000	79.010

A. Mission Description and Budget Item Justification

The Artificial Intelligence / Machine Learning (AI/ML) Basic Research Hub is a consortium of industry, government, and academia focused on AI basic research originating from world leaders in academic research pertaining to AI/ML breakthrough technologies for future application to Army-relevant areas such as object recognition using Multiple Cooperative Autonomous Sensors, leader decision-making, replication of tactical behaviors to enable autonomous capabilities for maneuver, predictive maintenance, Intel support for Operations, network and cybersecurity, AI-enhanced common operating picture, intelligent business and process automation, and medical support. Collaboration between academia, industry, and government is a key element of the Hub concept as each member brings with it a distinctly different approach to research. Academia is known for its cutting-edge innovation; the industrial partners are able to leverage existing research results for transition and to deal with technology bottlenecks; and Army AI researchers keep the program oriented toward solving complex Army technology problems.

Work in this PE contributes to the Army Science and Technology (S&T) portfolio and is fully coordinated with efforts in PE 0602180A Artificial Intelligence Technologies and PE 0603040A Artificial Intelligence Advanced Technologies.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering S&T focus areas, the Army Modernization Strategy and the Chief Digital and Artificial Intelligence Office mission initiatives.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Intelligence support to Operations	1.192	1.600	-
Description: Research AI / ML methodologies to perform object detection on imagery to augment operations. Investigate meeting the challenge of recognition of surrogate targets in S&T test ranges that are not absolute visual representations, using AI capabilities trained on real operational objects. Perform basic research in the area of intelligence support for operations in support of long range precision fires.			
FY 2024 Plans: Will continue research into improving artificial intelligence (AI) integration into the battlespace awareness and force application Joint Capability Area (JCA). This will include research on massive multi-modal data management to efficiently store, transport, and perform operations on data relevant to AI use cases that is captured and processed by devices throughout the battlespace. We will continue research into customized topical machine learning algorithm development, deployment, monitoring and security. In addition, will research planning and acting to improve situational awareness, decision-making, and command and coordination			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
through user experience and user interface experimentation. Will conduct research into autonomy and coordination of sensors distributed throughout the battlespace. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding decrease reflects a realignment to Foundation Models.			
Title: Artificial Intelligence Hub ***Description:*** The AI Hub is located at Carnegie Mellon University as a consortium of industry, government, and academia focused on building and optimizing the Army's AI and ML initiatives with the goal of accelerating the fielding of capability. The AI Hub will utilize the Army Artificial Intelligence Innovation Institute (A2I2) data and AI/ML algorithms and software tools to investigate AI and ML capabilities to address the Army's unique problems. The AI Hub will focus on research into AI technologies for future application to Army-relevant areas such as, but not limited to, replication of tactical behaviors to enable autonomous capabilities for maneuver, robotics, predictive maintenance, multi-domain Command, Control, Communications, and Computers(C4), network resiliency and cybersecurity, AI-enhanced common operating picture (CoP), intelligent business and process automation, decision support, AI-enabled collaborative data infrastructure platform, medical support and force protection. Will conduct research in distributed AI fabric, algorithms, and human-computer interaction enables operations in multiple Joint Capability Areas (JCA), including command and control, force application, and logistics. The current centralized AI model can be improved with a distributed AI architecture that will: autonomously search for and discover heterogenous data sources; optimize AI processing across dynamic and opportunistic resources; fuse AI capabilities between the enterprise, the edge, and AI-enabled sensors and systems embedded on platform; model the availability and reliability of critical network and computational resources to autonomously adapt and optimize algorithmic processing; and use efficiently distributed learning without the need to move data across the network. No distributed AI solutions currently exist to comprehensively mitigate the identified vulnerabilities. AI2C will conduct foundational research in the ability of distributed AI to address these vulnerabilities to set the conditions for use in Army systems and downstream advanced AI-applications. ***FY 2024 Plans:*** Will investigate research into applying artificial intelligence (AI) to multiple Joint Capability Areas (JCA), including, but not limited to, force integration, force application, logistics, and command and control. With a focus on AI-application that leverage a distributed AI-fabric and enabling technologies, will conduct research on AI-enabling computing infrastructure, devices, algorithms, and human interaction in support of logistics, command and control, and force integration. Will conduct research in other novel AI-enabling technologies across the AI Stack, to include, but not limited to, computing, massive data management, machine learning, modeling, decision support, planning and acting, autonomy, and ethics in support of research priorities including AI development environments; understanding and leveraging social networks; force operations and decision support in modeling and simulation environments; analysis of text, photo, video, and audio data; and improving Soldier performance. Will identify and characterize phenomena in the cyber domain and information environment. Will conduct research toward using AI to integrate	4.253	5.752	-

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
force generation and sustainment data with mission-specific operational requirements and situations with the goal of identifying mission-specific personnel, equipment, and logistics options. Will conduct foundational research into employing AI-enabled platforms in support of Join Capability Areas (JCA) including force integration, battlespace awareness, logistics, and command and control. Will conduct foundational research to improve the efficiency, survivability, resiliency, accuracy, and usefulness of AI-enabled platforms to commander priorities, understanding, and decision-making. Research will be conducted throughout the AI stack, focusing on efficient application of machine learning algorithms employed on devices and computing infrastructure distributed in denied, degraded, intermittent, or limited (DDIL) environments to improve data management and reduce network requirements. Will conduct research toward developing the Army's Command and Control architecture as a system of integration enabled by a framework to integrate and optimize data for more effective decision making. Will conduct research toward improving sensor and shooter capabilities with AI-enabled mission command systems. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding decrease reflects a realignment to Distributed AI, Foundation Models, and Human AI Interactions.			
Title: ATR-MCAS ***Description:*** Combat Formations require the ability to autonomously maneuver to identify threats and enable friendly forces to disintegrate and exploit enemy forces in the close and deep maneuver areas. This effort researches AI-based, multi-system approaches to aided threat recognition (ATR) using a combination of autonomous air and ground sensors to build a more accurate operating picture when given zone recon missions. ATR and situational awareness is improved through the direct cooperation and autonomous mobility of the sensors. ***FY 2024 Plans:*** Will continue foundational research in emerging artificial intelligence (AI)-based applications to collaborative decentralized autonomy operation and force application. Will continue research in AI-based autonomy and machine learning algorithms that scale and connect sensors/systems for shared perception and communication to maneuver in complex environments to include, but not limited to, varied terrain, dense urban, low/no light, and GPS-denied environments. Will investigate novel approaches in AI/human interaction for maneuver and force application in multi-domain operations. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding decrease reflects a realignment to Distributed AI and Foundation Models.	2.540	3.356	-
Title: Foundation Models ***Description:*** Foundation models are the bedrock of modern machine learning development. These machine learning models train on vast amounts of data and capture patterns that generalize beyond their training set. This enables the quick development of accurate models across a wide range of tasks and domains through techniques such as few-shot learning and transfer learning.	-	-	3.162

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
This research seeks to further develop foundation models of various modalities such as language, vision, and segmentation to provide tools and capabilities that extend to solve many problems, including ones that have not yet been identified. These models will include but are not limited to generative methods. Additionally, this research extends to advanced techniques for more effectively adapting existing foundation models (such as those for language, vision, and segmentation) to other domains applicable to the Army. This unlocks more capabilities in both internally developed models as well as the growing set of public and proprietary foundation models developed elsewhere. ***FY 2025 Plans:*** Research techniques to efficiently and accurately transfer foundation models to improve automated threat recognition. Expand on current research to improve methods for making robust predictions in domains with limited observations and labels. Develop new methods to synthesize multi-modal data for use-cases such as querying the data through natural language, question-answering, semantic segmentation, and product generation. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding was realigned from Intelligence Support to Operations, Artificial Intelligence Hub, and ATR-MCAS			
Title: Distributed AI ***Description:*** Effectively leveraging modern artificial intelligence (AI) and machine learning (ML) techniques for both enterprise and tactical applications requires robust distributed AI capabilities. This research improves these capabilities with a focus on quickly and efficiently training and deploying models across enterprise and tactical systems, federated learning implementations, deploying state-of-the-art AI and ML algorithms onto ruggedized edge hardware and small form-factor devices with computing capabilities, improving robotic autonomous systems and models deployed on robotic platforms, and governing a large portfolio of distributed ML models. As the distributed network of data and AI/ML models grows and becomes more integrated into warfighting functions, it becomes a bigger attack vector for adversaries. In order to keep ongoing AI and ML developments secure, this research also investigates techniques to attack and compromise AI and ML systems as well as to defend them from attacks. ***FY 2025 Plans:*** Research improvements to AI-enabling computing infrastructure, devices, and algorithms for both enterprise and tactical computing environments. Research autonomy for robotic systems and methods for training, deploying, retraining, and governing machine learning models hosted on robotic platforms and edge devices. Conduct foundation research into methods for attacking and compromising machine learning and artificial intelligence systems as well as for defending against similar attacks. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding was realigned from Artificial Intelligence Hub and ATR-MCAS	-	-	5.764
Title: Human AI Interactions	-	-	1.383

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Description: The modern operational environment is complex with vast amounts of available data, but current processes can be improved to more effectively leverage data to generate better decisions and reduce uncertainty. Artificial intelligence (AI) and machine learning (ML) tools have the potential to find useful information in these data, but they need to be able to effectively communicate this to human decision makers, staffs, and operators. This research focuses on the interaction of human and AI systems, especially in high-stakes environments with complex tasks and high uncertainty. As components of this, the research investigates how to make AI more understandable to humans, how to evaluate the outputs of AI and ML, the safety of interactions between humans and robotic or AI systems, how AI and ML impact decision-making, how to effectively integrate AI into current Army processes, how to train users at various technical skill-levels to interact more effectively with AI and ML, how to use AI and ML to process and summarize large amounts of data for human consumption, and how to ethically apply AI to decision making. ***FY 2025 Plans:*** Research human and non-human behavior and interactions in various online social settings. Extend current research on effective occupational training in artificial intelligence and machine learning for an audience with diverse technical skills to improve the Army's capability to deploy and use AI/ML products. Research methods for making machine learning output more interpretable for human consumption and the effects these techniques have on human decision making. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding was realigned from Artificial Intelligence Hub			
Accomplishments/Planned Programs Subtotals	7.985	10.708	10.309

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A