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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army **Date:** March 2023

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 1: Basic Research</i>	R-1 Program Element (Number/Name) PE 0601121A / <i>Cyber Collaborative Research Alliance</i>
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	5.067	5.355	5.459	-	5.459	5.514	5.521	5.525	5.585	0.000	38.026
CB5: <i>Cyber Collaborative Research Alliance</i>	-	5.067	5.355	5.459	-	5.459	5.514	5.521	5.525	5.585	0.000	38.026

A. Mission Description and Budget Item Justification

This Program Element (PE) fosters research performed through the Cyber Security Collaborative Research Alliance (CSEC CRA), a competitively selected consortium, formed to advance the theoretical foundations of cyber science in the context of Army networks. This CRA consists of academia, industry and government researchers working jointly with the objective of developing a fundamental understanding of cyber phenomena so that fundamental laws, theories, and theoretically grounded and empirically validated models can be applied to a broad range of Army domains, applications, and environments. This research focuses on three interrelated aspects of cyber security and is conducted using a trans-disciplinary approach that takes into account the human element of the network. The three aspects of cyber that are addressed are: 1) vulnerabilities and risks of cyber networks to malicious activities, 2) anticipating, detecting, and analyzing malicious activities, and 3) agile cyber maneuver to thwart and defeat malicious activities. Overarching goals of cyber security are to significantly decrease the adversary's return on investment when considering cyber attack on Army networks, and minimizing the impact on (Army) network performance related to implementing cyber security. The CRA research creates a framework that effectively integrates the knowledge of cyber assets and potential adversary capabilities and approaches, and provides defense mechanisms that dynamically adjust to changes related to mission, assets, vulnerability state, and defense mechanisms.

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

B. Program Change Summary (\$ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	5.067	5.355	5.435	-	5.435
Current President's Budget	5.067	5.355	5.459	-	5.459
Total Adjustments	0.000	0.000	0.024	-	0.024
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	0.024	-	0.024

Change Summary Explanation

Increased funding due to revised economic assumptions.

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army										Date: March 2023		
Appropriation/Budget Activity 2040 / 1					R-1 Program Element (Number/Name) PE 0601121A / <i>Cyber Collaborative Research Alliance</i>				Project (Number/Name) CB5 / <i>Cyber Collaborative Research Alliance</i>			
COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
CB5: <i>Cyber Collaborative Research Alliance</i>	-	5.067	5.355	5.459	-	5.459	5.514	5.521	5.525	5.585	0.000	38.026

A. Mission Description and Budget Item Justification

This Project fosters research performed through the Cyber Security Collaborative Research Alliance (CSEC CRA), a competitively selected consortium, formed to advance the theoretical foundations of cyber science in the context of Army networks. This CRA consists of academia, industry, and government researchers working jointly to develop a fundamental understanding of cyber phenomena so that fundamental laws, theories, and theoretically grounded and empirically validated models can be applied to a broad range of Army domains, applications, and environments. This research focuses on three interrelated aspects of cyber security and is conducted using a trans-disciplinary approach that takes into account the human element of the network. The three aspects of cyber that are addressed are: 1) adaptive reasoning for deception, 2) anticipating, detecting, and analyzing malicious activities, and 3) agile cyber maneuver to thwart and defeat malicious activities. Overarching goals of cyber security are to significantly decrease the adversary's return on investment when considering cyber attack on Army networks, and minimizing the impact on (Army) network performance related to implementing cyber security. The CRA research creates a framework that effectively integrates the knowledge of cyber assets and potential adversary capabilities and approaches, and provides defense mechanisms that dynamically adjust to changes related to mission, assets, vulnerability state, and defense mechanisms.

The cited work is consistent with the Assistant 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 Futures Command (AFC).

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

	FY 2022	FY 2023	FY 2024
Title: Cyber Security Collaborative Research Alliance	5.067	5.355	-
Description: The CSEC CRA supports basic research to enable capabilities for rapid development and adaptation of cyber tools for dynamically assessing cyber risks, detecting hostile activities on friendly networks, and supporting agile maneuver in cyber space in spite of the emergence of novel threats.			
FY 2023 Plans: Investigate fundamental theories and models for intelligent and resilient cyber security intrusion monitoring and detection in uncertain and resource constrained environments; conduct foundational research to understand adversarial machine learning techniques and defenses; investigate generalized game-theoretic models, and intelligent network-system techniques to enable adaptive cyber maneuvers and misdirection strategies against dynamic cyber threats.			
FY 2023 to FY 2024 Increase/Decrease Statement:			

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2022	FY 2023	FY 2024
In FY 2024, funding for this effort is realigned to the Adversarial-resilient Cyber Effects for Decision Dominance effort within this Project.			
<p>Title: Adversarial-resilient Cyber Effects for Decision Dominance</p> <p>Description: Conduct foundational research to create innovative theories, models, and methods to understand, create, predict, and exploit Windows of Superiority (WoS) across the cyberspace-network to achieve operational advantage for Multi-Domain Operations (MDO) synchronization and convergence across domains. This effort seeks to identify, formalize, and measure the key attributes/features in the cyber domain that can identify and predict WoS. This effort will develop theories and methods to identify and predict emerging WoS and techniques to shape the cyber domain to achieve WoS, including cyber resilience and deception to mitigate adversarial deception, intrusions, and adversarial machine learning (AML) attacks.</p> <p>FY 2024 Plans: Will create an initial formalization for defining and reasoning about cyber domain Windows of Superiority; investigate methodologies to identify and exploit information from the network, network intrusion detection systems, information assets, and intelligence needed to assess cyber-network state and characterize a Window of Superiority in the cyber domain; develop techniques to detect adversarial deception in the cyber domain; explore techniques to provide cyber resilience for machine learning based algorithms for intrusion detection and network state estimation.</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: In FY 2024, funding is realigned from Cyber Security Collaborative Research Alliance within this Project to support this effort.</p>	-	-	5.459
Accomplishments/Planned Programs Subtotals	5.067	5.355	5.459

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

N/A

Remarks

D. Acquisition Strategy

N/A