Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Office of the Secretary Of Defense	Date: March 2024
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 2: *Applied Research*	**R-1 Program Element (Number/Name)** PE 0602751D8Z / *Software Engineering Institute (SEI) Applied 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	-	9.788	11.168	11.310	-	11.310	11.570	11.812	12.068	12.309	Continuing	Continuing
278: *Software Engineering Institute (SEI) Applied Research*	-	9.788	10.215	10.368	-	10.368	10.607	10.828	11.063	11.284	Continuing	Continuing
817: *Cyber Security, Applied Research*	-	0.000	0.953	0.942	-	0.942	0.963	0.984	1.005	1.025	Continuing	Continuing

Note

New Start (Y/N): No

A. Mission Description and Budget Item Justification

This program supports the Department's initiative to Build Sustainable and Long-Term Advantage.

The Software Engineering Institute (SEI) Federally Funded Research and Development Center (FFRDC) was established in 1984 as an integral part of the Department of Defense's (DoD) initiative to identify, evaluate, and transition software engineering technologies and practices. The mission of the SEI is to provide the DoD with technical leadership and innovation through research and development to advance the practice of software engineering and technology. The SEI works across government, industry, and academia to improve the state of software engineering from the technical, acquisition, and management perspectives. The SEI engages in research and development of critical software technologies and tools and collaborates with the larger software engineering research community. It facilitates the rapid transition of software engineering technologies into practice and evaluates emerging software engineering technologies to determine their potential for improving software-intensive DoD systems. Since its inception, the SEI has helped to transform the fields of software engineering and acquisition, network security, real-time systems, software architectures, and software-engineering process management.

Software is critical to meeting the DoD increasing demand for national defense systems that are high quality, affordable, and deployed in a timely way. With growing global parity in software engineering, the DoD must maintain leadership in all aspects of software-based system development, operation, defense, and evolution to avoid strategic surprise. To assist the DoD in retaining a long-term differential advantage over potential adversaries, the Software Engineering Institute (SEI) Applied Research program develops and evaluates the feasibility and practicality of software and computer science concepts, with the potential to improve future DoD systems. The research conducted by this program directly benefits the technical domains Autonomous Systems and Artificial Intelligence (AI), Cyber, and Engineered Resilient Systems.

The Software Engineering Institute (SEI) Applied Research Program Element (PE) develops and evaluates the feasibility and practicality of software and computer science concepts at the applied research level, with the potential to improve future Department of Defense (DoD) systems through research, development, and application in the SEI Advanced Technology Development PE 0603781D8Z. Promising projects proceed into advanced technology development through this PE.

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B. Program Change Summary ($ in Millions)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
Previous President's Budget	10.153	11.168	11.401	-	11.401
Current President's Budget	9.788	11.168	11.310	-	11.310
Total Adjustments	-0.365	0.000	-0.091	-	-0.091
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.363	-			
• Program Adjustments	-0.002	-	-0.114	-	-0.114
• Economic Assumptions	-	-	0.023	-	0.023

Change Summary Explanation

Reduction of $0.114 million in FY 2025 was applied to meet DoD overall funding reductions, which were spread to mitigate impact. Funding increase of $0.023 million in FY 2025 for Economic Assumptions.

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense			Date: March 2024
Appropriation/Budget Activity 0400 / 2	R-1 Program Element (Number/Name) PE 0602751D8Z / *Software Engineering Institute (SEI) Applied Research*	Project (Number/Name) 278 / *Software Engineering Institute (SEI) Applied 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
278: *Software Engineering Institute (SEI) Applied Research*	-	9.788	10.215	10.368	-	10.368	10.607	10.828	11.063	11.284	Continuing	Continuing

A. Mission Description and Budget Item Justification

Work conducted under this project will enable resilient mission assurance in heterogeneous and contested environments through the verification and validation of system performance and architecture. The program will also assist the Department of Defense (DoD) in retaining a long-term advantage in the areas of software-intensive systems and cyber security by enhancing assurance, exploiting automation and Artificial Intelligence (AI), and understanding human-computer interaction.

The Software Engineering Institute (SEI) Applied Research PE has two main research thrusts with known military applications: (1) Software Engineering, Systems Verification and Validation, and Mission Assurance; and (2) Information Assurance. This area is increasingly being applied to AI and autonomous systems.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: SEI Applied Research in the Area of Software Engineering, Systems Verification and Validation, and Mission Assurance	7.257	7.567	7.677
Description: Increasingly complex and AI-enabled systems will require a commensurate increase in sophistication of verification and validation mechanisms. This thrust seeks to develop verification techniques for requirements identification, systems of systems architectures, and virtual integration of components. Additionally, research in this area will enable requirements verification for software assurance, analysis and control of unverified code, and automated repair of damaged code. Software production and code analysis methods developed through this program will also improve the accuracy of behavior prediction of complex software, including AI-enabled systems, in untested environments.			
FY 2024 Plans: Integrate techniques in system measurement, software development and operations, and model-based systems engineering for an automated assessment, modeling, and software deployment process. Focus on strategies for resilience and mission assurance in large complex infrastructures and determine methods to manage and de-conflict resource requirements between applications from the physical to the application layer.			
FY 2025 Plans: Continue to integrate techniques in system measurement, software Development and Operations, and model-based systems engineering for an automated assessment, modeling, and software deployment process. Continue to focus on strategies for resilience and mission assurance in large complex infrastructures and determine methods to manage and de-conflict resource requirements between applications from the physical to the application layer.			
FY 2024 to FY 2025 Increase/Decrease Statement:			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
The increase of $0.112 million between FY 2024 and FY 2025 reflects minor budget fluctuations.			
Title: Software Engineering Institute (SEI) Applied Research in the areas of Information Assurance (IA) ***Description:*** To gain full advantage from data and information generated by software for use in missions, DoD needs to assure its software is free of vulnerabilities. In its complex systems, DoD may use software developed from an unknown supply chain that may include intentionally or unintentionally introduced vulnerabilities. This thrust seeks to develop scalable automated methods to locate, understand, and mitigate the effects of these vulnerabilities. Automated solutions developed through this thrust will be used to discover vulnerabilities in system software source code and to generate proofs of correctness or fault. Additionally, these solutions will be used to model and simulate operational environments to support software and cyber tactics, techniques, and procedures testing. ***FY 2024 Plans:*** Enable combined risk analysis between software, machine learning, and cyber security to enable assessment and management of automated systems. These risk metrics will be used to govern system configuration and management, particularly in the case of applications and embedded systems in contested environments. ***FY 2025 Plans:*** Enable large scale verification of machine learning functions for risk analysis between software, machine learning, and cyber security to enable assessment and management of automated systems. These risk metrics will be used to govern system configuration and management, particularly in the case of applications and embedded systems in contested environments. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** The increase of $0.043 million between FY 2024 and FY 2025 reflects minor budget fluctuations.	2.531	2.648	2.691
Accomplishments/Planned Programs Subtotals	9.788	10.215	10.368

C. Other Program Funding Summary ($ in Millions)

Line Item	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
• RDT&E, BA 3, PE 0603781D8Z: *Software Engineering Institute*	11.874	16.605	16.982	-	16.982	17.383	17.743	18.130	18.494	Continuing	Continuing

Remarks

The SEI Applied Research PE represents a pivot toward more fundamental research that enables the DoD to address longer-term challenges in software technology and engineering. The SEI Applied Research PE bolsters the organic research at the SEI Federally Funded Research and Development Center (FFRDC), enables

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C. Other Program Funding Summary ($ in Millions)

Line Item	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

stronger collaborations between the SEI FFRDC and academia, attracts top researchers to the SEI, and gives the DoD access to top experts in information science, which generally enhances the DoD's ability to benefit from the military applications of research in software and computer science.

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense			Date: March 2024
Appropriation/Budget Activity 0400 / 2	R-1 Program Element (Number/Name) PE 0602751D8Z / *Software Engineering Institute (SEI) Applied Research*	Project (Number/Name) 817 / *Cyber Security, Applied 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
817: *Cyber Security, Applied Research*	-	0.000	0.953	0.942	-	0.942	0.963	0.984	1.005	1.025	Continuing	Continuing

A. Mission Description and Budget Item Justification

Work conducted under this project will enable resilient mission assurance in heterogeneous and contested environments through the verification and validation of system performance and architecture. The program will also assist the Department of Defense (DoD) in retaining a long-term advantage in the area of cybersecurity by enhancing assurance, exploiting automation, and understanding human-computer interaction.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Cyber Security	0.000	0.953	0.942
Description: Warfighting in the cyber domain often operates at sub-second timescales and across multiple domains of authority. Methods used to accomplish many tasks (e.g., malware analysis, coordinating multiple agents) demand large amounts of time, attention, and special skills and are not scalable. This thrust seeks to develop and increase the use of automation to simplify the completion of these tasks. Example activities include automation of moving target defenses, code artifact reverse engineering, analysis of network flows at enterprise scale, assessing the operating boundaries for Artificial Intelligence (AI) and Machine Learning (ML) algorithms, and development and assessment of workforce skills. ***FY 2024 Plans:*** Expand the notion of automated cyber defense to include second and third order effects of data compromise and effects in the context of machine learning and artificial intelligence software systems. ***FY 2025 Plans:*** Expand the notion of safety and verification for automated cyber defense to include second and third order effects of data compromise and effects in the context of machine learning and artificial intelligence software systems. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** The decrease of $0.013 million between FY 2024 and FY 2025 was applied to meet DoD overall funding reductions, which were spread to mitigate impact.			
Accomplishments/Planned Programs Subtotals	0.000	0.953	0.942

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
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D. Acquisition Strategy

N/A