Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Office of Secretary Of Defense											DATE: April 2013	
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*					R-1 ITEM NOMENCLATURE PE 0602751D8Z: *Software Engineering Institute (SEI) Applied Research*							
COST ($ in Millions)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	0.000	0.000	11.107	-	11.107	11.330	11.614	11.766	11.970	Continuing	Continuing
P278: *Software Engineering Institute (SEI) Applied Research*	-	0.000	0.000	11.107	-	11.107	11.330	11.614	11.766	11.970	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

This is a new start program in FY 2014. To ensure that the Department of Defense (DoD) retains a differential advantage over potential adversaries, the Department will split funding for Defense-wide software research at the Software Engineering Institute (SEI) Federally Funded Research and Development Center (FFRDC) across two program elements (PEs): this new Budget Activity (BA) 2 PE 0602751D8Z and the continuing BA 3 PE 0603781D8Z. The goals are to address both longer-term challenges in software technology and engineering (PE 0602751D8Z) and to continue to benefit from the proven experience the SEI FFRDC has with developing and transitioning advanced technology (PE 0603781D8Z).

A. Mission Description and Budget Item Justification

Software is key to meeting the DoD's increasing demand for high-quality, affordable, and timely national defense systems. With growing global parity in software engineering, the DoD must maintain leadership to avoid strategic surprise. To assist the DoD in retaining a long-term differential advantage over potential adversaries, the SEI Applied Research PE will develop and evaluate the feasibility and practicality of software and computer science concepts with the potential to improve future DoD systems.

This PE represents a pivot toward more fundamental research that will enable the DoD to address longer-term challenges in software technology and engineering. The SEI Applied Research PE will fund the SEI Federally Funded Research and Development Center (FFRDC) as the leading DoD center for addressing these longer term challenges. The SEI Applied Research PE will bolster the organic research at the SEI FFRDC, enable stronger collaborations between the SEI FFRDC and academia, attract top researchers to the SEI, and generally enhance the DoD's ability to benefit from the military applications of research in software and computer science.

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B. Program Change Summary ($ in Millions)	FY 2012	FY 2013	FY 2014 Base	FY 2014 OCO	FY 2014 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	11.107	-	11.107
Total Adjustments	0.000	0.000	11.107	-	11.107
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Baseline Adjustments	-	-	11.107	-	11.107

Change Summary Explanation

FY 2014 baseline adjustments are in compliance with the Department of Defense new Strategic Guidance on the Asia-Pacific re-balance.

Exhibit R-2A, RDT&E Project Justification: PB 2014 Office of Secretary Of Defense			DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602751D8Z: *Software Engineering Institute (SEI) Applied Research*	PROJECT P278: *Software Engineering Institute (SEI) Applied Research*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
P278: *Software Engineering Institute (SEI) Applied Research*	-	0.000	0.000	11.107	-	11.107	11.330	11.614	11.766	11.970	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

Software is key to meeting the Department of Defense's (DoD's) increasing demand for high-quality, affordable, and timely national defense systems. With growing global parity in software engineering, the DoD must maintain leadership 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 Element (PE) seeks to establish a program of applied research that will develop and evaluate the feasibility and practicality of software and computer science concepts with the potential to improve future DoD systems.

The SEI Applied Research PE will initially have four main research thrusts: (1) measurement techniques for the effectiveness of software technologies and methods; (2) design principles and tools for evolvable, scalable ecosystems; (3) models of computational behaviors; and (4) cyber-tradecraft and analytics. These thrusts have known military applications and can be associated with active areas of basic research. The SEI Applied Research PE seeks to translate this promising basic research into solutions for broadly defined military needs. This PE will leverage the expertise of the SEI Federally Funded Research and Development Center (FFRDC) in advanced technology development and technology transition to design, develop, and improve tools, prototypes, and new processes that meet general requirements for software-intensive DoD systems.

The SEI Applied Research PE will also conduct research in multicore computing, architecture-led iterative incremental development (Agile at scale); and emerging software and computer science areas that can act as catalysts for acquiring DoD systems with improved performance.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Software Engineering Institute Applied Research	0.000	0.000	11.107
Description: Research projects at the SEI FFRDC will be awarded under this PE beginning in FY 2014 on a competitive basis across the SEI. The "Heilmeier" assessment criteria will form the basis for selection at the SEI FFRDC. Therefore, funding levels in each thrust area may vary from year to year. Research will address the PE goal of assisting the DoD to retain a long-term differential advantage over potential adversaries in the area of software-intensive systems. The four main thrust areas are: 1) Design principles and tools for evolvable, scalable ecosystems. The commercial world has many successful examples of software ecosystems, but the DoD has not capitalized on these to the same extent. This thrust looks beyond implementing			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
ecosystems in a DoD context and seeks to implement the underlying principles in a way that makes automated creation, evolution, and scaling of ecosystems easier. 2) Measurement techniques for the effectiveness of software technologies and methods. Modern tools, integrated development environments, and software engineering processes have captured large data sets about development activities. This thrust seeks to study the metrics that affect cost, schedule, quality, and performance based on real-world observation and experiment. 3) Models of Computational Behaviors. System performance depends on end-to-end models of computational behavior that include the user, architecture, source and object code, firmware components, and processor hardware. This thrust seeks to study emerging ideas that better model end-to-end computational behavior. 4) Cyber-tradecraft and analytics. Cyberwarfare is an increasingly important and rapidly evolving dimension on the modern battlefield. This thrust seeks to investigate methods that will give the DoD enduring advantages in the cyber battlespace such as reverse software engineering, automated code & malware analysis, code-level software resiliency (e.g., randomizing and time variant techniques), and other techniques such as those found in the Software Security Assurance State-of-the-Art Report. The SEI Applied Research PE will also conduct research in multicore computing, architecture-led iterative incremental development (Agile at scale); and emerging software and computer science areas that can act as catalysts for acquiring DoD systems with improved performance. ***FY 2014 Plans:*** • Begin research on the design principles and tools for evolvable, scalable ecosystems. • Begin research on measurement techniques for the effectiveness of software technologies and methods. This effort creates an applied research component to complement the measurable analysis of value-driven incremental development started under the SEI PE (0603781D8Z). • Begin research on measurement techniques for the effectiveness of software technologies and methods. • Begin research on models of computational behaviors. • Begin research on cyber-tradecraft and analytics. • Begin research on assurance-at-scale. This effort creates an applied research component to compliment work started under the SEI PE (0603781D8Z). • Begin research on quality-attribute analyses for high-confidence timing of multicore software systems with greater scalability. This effort creates an applied research component to compliment work started under the SEI PE (0603781D8Z). • Make competitive awards within the SEI for novel research under this project.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
• Broadly investigate emerging software and computer science areas that can act as catalysts for acquiring DoD systems with improved performance.			
Accomplishments/Planned Programs Subtotals	0.000	0.000	11.107

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2012	FY 2013	FY 2014 Base	FY 2014 OCO	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
• BA 3, PE# 0603781D8Z: *Software Engineering Institute (SEI)*	27.189	30.036	19.008		19.008	19.522	20.162	18.528	18.953	Continuing	Continuing

Remarks

Together with PE 0603781D8Z, Software Engineering Institute (SEI), the SEI Applied Research PE represents a pivot toward more fundamental research that will enable the DoD to address longer-term challenges in software technology and engineering. The SEI Applied Research PE will fund the SEI FFRDC as the leading DoD center for addressing these longer term challenges. The SEI Applied Research PE will bolster the organic research at the SEI FFRDC, enable stronger collaborations between the SEI FFRDC and academia, attract top researchers to the SEI, and generally enhance the DoD's ability to benefit from the military applications of research in software and computer science.

D. Acquisition Strategy

N/A

E. Performance Metrics

- Transition of tools, methods, and practices for use in DoD technology development programs and programs of record.
- Transition of tools, methods, and practices to the Defense Industrial Base to support DoD technology development programs and programs of record.
- Number of citations in peer reviewed journals and reports.
- Number of external research collaborations and interactions with the broader software and computer science community.