Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Office of Secretary Of Defense											Date: March 2014	
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603781D8Z / *Software Engineering Institute (SEI)*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	28.619	19.006	15.776	-	15.776	15.778	15.799	16.292	16.792	Continuing	Continuing
P781: *Software Engineering Institute (SEI)*	-	18.605	11.658	15.776	-	15.776	15.778	15.799	16.292	16.792	Continuing	Continuing
P783: *Software Producibility Initiative*	-	10.014	7.348	-	-	-	-	-	-	-	Continuing	Continuing

The FY 2015 OCO Request will be submitted at a later date.

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. Systemic software issues are significant contributors to poor program execution, and reliance on software-intensive mobile and net based products and systems has been increasing (e.g., Joint Tactical Radio System, DDG-1000, Joint Strike Fighter, F-22, and Army Modernization). As stated in the 2010 National Research Council of the National Academy of Sciences report entitled Critical Code, "It is dangerous to conclude that we are reaching a plateau in capability and technology for software producibility." The report notes that software is "…unconstrained by traditional physical engineering limitations…" and what we can accomplish is derived "…from [the] human intellectual capacity to conceptualize and understand systems…." With growing global parity in software engineering, the DoD must maintain leadership to avoid strategic surprise. The Software Engineering Institute (SEI) Program Element (PE) addresses the critical need to research, develop, and rapidly transition state-of-the-art software technology, tools, development environments, and best practices to improve the engineering, management, fielding, evolution, acquisition, and sustainment of software-intensive DoD systems. The SEI PE's program of work seeks to coordinate across the Department and the Services and leverages expertise in industry and academia to enable the development of joint capabilities.

Software is more pervasive than ever and computer programs are growing in size and complexity. Designing, managing, and securing integrated, complex, and large-scale mission-critical systems are abilities that the DoD and Defense Industrial Base (DIB) have not yet mastered. To address this, the P781 project within this PE funds research and development within the SEI Federally Funded Research and Development Center (FFRDC) and, to access particular expertise, in the Services, industry, and academia.

The SEI FFRDC is the DoD's dedicated source for software research and development. It is an institute which enables the exploitation of emerging software technology by bringing engineering, management, and security discipline to software acquisition, development, and evolution. The SEI FFRDC focuses on software technology areas judged to be of the highest payoff in meeting defense needs. To ensure that the DoD retains a differential advantage over potential adversaries, funding at the SEI FFRDC will include a new Budget Activity 2 funding line beginning in FY 2014. The reduction in P781 in this line beginning in FY 2014 is offset by the creation of the new line, the SEI Applied Research PE. The creation of this new line 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 also increase the collaboration opportunities for the SEI FFRDC with academia and attract top research talent to the SEI.

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Office of Secretary Of Defense	Date: March 2014
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603781D8Z *I Software Engineering Institute (SEI)*

Private sector investment has created rapid advances in information technologies, but the pace of transition to DoD applications is often very slow or the commercial applications do not meet DoD unique needs, e.g., high assurance software or large-scale integrated systems. The DoD needs to create opportunities to discover emerging technologies, to evaluate their potential to fit DoD needs, and where appropriate, conduct critical tests of the technologies under DoD conditions. The P783 project within this PE funds the Software Producibility Initiative. The Software Producibility Initiative works across the Services, industry, and academia to research and transition software science and tools that address the capacity to design, produce, assure, and evolve software-intensive systems in a predictable manner while effectively managing risk, cost, schedule, quality, and complexity.

B. Program Change Summary ($ in Millions)	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total
Previous President's Budget	30.036	19.008	19.522	-	19.522
Current President's Budget	28.619	19.006	15.776	-	15.776
Total Adjustments	-1.417	-0.002	-3.746	-	-3.746
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-2.467	-			
• Congressional Rescissions	-0.040	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	1.892	-			
• SBIR/STTR Transfer	-0.790	-			
• FFRDC Adjustment	-	-0.002	-	-	-
• Strategic Efficiency Savings	-	-	-3.746	-	-3.746
• Other Program Adjustments	-0.012	-	-	-	-

Change Summary Explanation

The reduction is a strategic efficiency approach to reduce funding and staffing. As a result, we provide a better alignment of funding and provide support to a smaller military force.

Exhibit R-2A, RDT&E Project Justification: PB 2015 Office of Secretary Of Defense			Date: March 2014
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603781D8Z / *Software Engineering Institute (SEI)*	Project (Number/Name) P781 / *Software Engineering Institute (SEI)*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
P781: *Software Engineering Institute (SEI)*	-	18.605	11.658	15.776	-	15.776	15.778	15.799	16.292	16.792	Continuing	Continuing

The FY 2015 OCO Request will be submitted at a later date.

A. Mission Description and Budget Item Justification

The SEI Federally Funded Research and Development Center (FFRDC) was established in 1984 as an integral part of the Department of Defense's (DoD's) initiative to identify, evaluate, and transition software engineering technologies and practices. The SEI maintains unique software research and program support capabilities in a space where the Defense Industrial Base (DIB) and academia cannot as readily address challenges. The mission of the SEI is to provide DoD with technical leadership and innovation through research and development to advance the practice of software engineering and technology. The Institute 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 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.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: SOFTWARE ENGINEERING INSTITUTE (SEI) RESEARCH	18.605	11.658	15.776
Description: SEI research projects are awarded on a competitive basis across the SEI. The number of projects will vary from year to year based on the size and scope of proposed projects. Research projects cross-cut the FFRDC's experience base in order to advance existing SEI research initiatives and explore new technical ideas. SEI research focuses on the most significant and pervasive software challenges within the DoD such as computing for real-time and embedded-systems, multi-core programming, computing at the tactical edge, System of System architectures, discovering effective agile methods to develop DoD-scale systems, cyber-security, and measurement-driven methods to improve the efficiency of acquisition programs.			
FY 2013 Accomplishments: • Completed competitive awards within the SEI for novel research. • Refined economic foundations and measurable analysis of value-driven incremental software development by focusing on the role of quality-attributes and architecture risks in architecture related costs (e.g., rework or delay) and increment planning in DoD acquisition programs. • Developed a dependency analysis model and theoretical foundations for architecture decision making that reduces integration risks in iterative and incremental development for DoD acquisition programs. • Analyzed software project data to determine the efficacy of incremental and iterative practices as related to project outcomes.			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Office of Secretary Of Defense		Date: March 2014
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603781D8Z / *Software Engineering Institute (SEI)*	**Project (Number/Name)** P781 / *Software Engineering Institute (SEI)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
• Integrated architecture fault model framework with confidence maps and demonstrated derivation of assurance evidence requirements for cyber-physical system behavior from architectural safety analysis. • Developed simulations and emulations to further develop and validate theory of adaptive quality-of-service for DoD distributed systems. • Applied economic cost-benefit reasoning to develop new design methods for common software platform architectures that evolve in response to new operational needs. • Developed quality-attribute analyses for high-confidence cyber-physical DoD systems for timing of multi-core software and functional correctness of real-time and distributed coordination software. • Extended software code analysis techniques to mobile environments to detect and rectify vulnerabilities in DoD mobile systems faster than our adversaries can exploit them. • Developed an improved behavior-based malware detector and analysis approach to defend DoD mobile devices. • Developed a portability strategy that allows mobile computing components to execute across a wide spectrum of computing environments. • Explored enhanced vulnerability discovery methods by coupling symbolic execution, concrete execution, and black-box fuzz testing to facilitate the discovery of software defects. • Explored ideas to reduce latent software defects using analytics based on vulnerability and software development process data. • Collected and analyzed relevant baseline data to further validate insider threat mitigation patterns and developed a rigorous composition method as an architectural foundation for evolving the mitigation pattern language toward more systematic application by system architects in next-generation DoD systems. • Identified technical and non-technical indicators of malicious insider threat activity from large data sets. • Identified exogenous factors contributing to the perception of risk to drive improvements in network security by factoring perception into implementation of controls • Investigated how to measure the contribution of resilience practices to reducing the occurrence and impact of disruptive events using incident data • Investigated tools to detect malicious network traffic. • Identified and developed algorithms to enable flexible division of labor among humans and automation for Unmanned Aircraft Systems. • Identified relevant graph analytic algorithms and implemented a selection of them targeting Graphics Processing Unit (GPU) hardware. • Identified a set of attributes extant in public software repositories relevant to Certification and Accreditation efforts for Open Source Software using analytic techniques. • Continued early lifecycle cost estimation research for pre-Milestone A evaluations. • Developed empirically grounded, quantitative relationships between Bayesian models of program change drivers and cost estimation model inputs.			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Office of Secretary Of Defense		Date: March 2014
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603781D8Z / *Software Engineering Institute (SEI)*	**Project (Number/Name)** P781 / *Software Engineering Institute (SEI)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
• Developed a method to support rapid analysis of changes to social networks in order to provide more timely feedback to soldiers and first responders. • Developed software for a rapidly-deployable, scalable autonomous sensor network to support soldiers in activities such as recon, ambush, and search-and-rescue operations. • Developed methods for extracting class definitions and relationships from object-oriented malware using automated semantic analysis. • Developed next generation disassembly algorithms to improve the quality of automated static analysis and build confidence in the correctness of that disassembly. • Worked with standards bodies to develop and move to ballot International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) Technical Specificaion (TS) 17961, an international technical specification for C Secure Coding Rules. • Demonstrated pointer ownership model, a technique to address incorrect memory management, for a subset of C programming language. • Improved the automated detection and analysis of secure coding violations in the Source Code Analysis Laboratory • Developed secure coding rules and analysis for applications on mobile platforms. • Developed a functional model for prioritizing malware threats based on execution behavior allowing for faster identification, analysis, and mitigation. • Demonstrated a proof-of-concept threat to the security of the attached host system, posed by malware that resides in the firmware of a solid-state hard drive. • Developed science, techniques, and tools to generate and use better synthetic data for test and evaluation of cyber-security technology. • Continued to formulate an investment model that can forecast capital requirements for software sustainment. • Investigated the use of machine learning, social network measurement, and analysis techniques to facilitate large-scale coordinated stakeholder engagement in architecture decisions and requirements elicitation. • Galvanized several community groups (e.g., government, DoD contractors, and academia) to formalize an understanding of the challenges and strategies for successfully adopting agile practices in government acquisition programs. • Demonstrated the existence and utility of acquisition quality attributes that can be derived from a program's business goals that drive its acquisition strategy. • Finalized identification of those projects that would benefit from a complimentary applied research component under the new SEI Applied Research PE (0602751D8Z). ***FY 2014 Plans:*** • Continue competitive awards within the SEI for novel research.			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Office of Secretary Of Defense		Date: March 2014
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603781D8Z / *Software Engineering Institute (SEI)*	**Project (Number/Name)** P781 / *Software Engineering Institute (SEI)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
• Investigate how value-driven incremental development analysis techniques can assist with relating requirements to architecture for improved system and software integration. • Develop quality-attribute analyses for high-confidence cyber-physical systems to ensure correctness of timing, functionality, and distributed coordination of the computational and physically-related aspects of DoD systems. • Evaluate trends in the insider threat problem based on over 15 years of Computer Emergency Response Team (CERT) case data and forecast insider threat mitigation patterns needed to support sustained protection against insider threats. • Empirically measure the contribution of select security and resilience practices to reducing the occurrence and impact of disruptive events. • Pursue assurance-at-scale; provide direct, artifact-focused means to support acceptance evaluation of software-reliant systems. • Extend dynamic testing capabilities to encompass exploit generation and cyber-defense testing to ensure secure DoD applications. • Continue investigating the detection of malicious network traffic by automating the extraction of indicators and continue to improve capabilities to discover relationships between malware artifacts. • Continue investigating disassembly algorithms to improve the quality of automated static analysis and build confidence in the correctness of that disassembly. • Expand our work on graph analytics on heterogeneous hardware to include building a library for graph analytics on Graphics Processing Units (GPUs), and provide that to relevant stakeholders. • Continue the use of analytic techniques, including research from the Mining Software Repositories (MSR) community, to build tools to assist Certification and Accreditation efforts for Open Source Software.			
FY 2015 Plans: • Expand the program's graph analytics library to target other hardware architectures relevant to the high performance computing (HPC) community and DoD stakeholders. • Design and develop models and frameworks of operational cybersecurity and resilience. • Apply data analytics on assessment and measurement data to identify characteristics, indicators, attributes, and patterns of resilience. • Develop model and metrics for resilient acquisition to measurably improve the DoD's acquisition process resulting in significant cost-savings and operationally resilient systems. • Architect, design, and develop prototypes of complex, enterprise-wide insider threat systems. • Investigate disruptive technologies with the potential to provide new operational cybersecurity capabilities for the DoD. • Continue to add members to the collaboration group and expand the understanding of the challenges and strategies for successfully adopting agile practices in government acquisition programs. • Explore new lines of research.			
Accomplishments/Planned Programs Subtotals	18.605	11.658	15.776

Exhibit R-2A, RDT&E Project Justification: PB 2015 Office of Secretary Of Defense		Date: March 2014
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603781D8Z / *Software Engineering Institute (SEI)*	**Project (Number/Name)** P781 / *Software Engineering Institute (SEI)*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
• BA 2, PE # 0602751D8Z, P278: *Software Engineering Institute Applied Research*	-	11.106	9.156	-	9.156	9.158	9.325	9.857	10.682	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

• Transition of tools and practices for use in DoD programs of record and to the Defense Industrial Base (DIB), and number of agencies and organizations sponsoring work.
• Number of publications in refereed journals and peer reviewed reports.
• Number of external research collaborations and interactions with the broader software engineering research community.
• Adoption of coding standards and process techniques by standards bodies, working groups, and software/systems engineering organizations.
• Number of training courses and curricula developed to contribute to the growth of capability in the software engineering research and development community and software/system acquisition workforce.
• Development of new scalable technical and software-enabled cyber security approaches that address software assurance and improve enterprise resiliency.
• Reduced number of mission-critical software-reliant acquisition program failures and cost and schedule overruns, as well as quantitative improvements in overall system cost, time to develop, and performance – this will be evidenced by: reductions in time to test software and the amount of rework required; improved ability to articulate software requirements; development of techniques that offer orders of magnitude improvement in software productivity; development of new software algorithms and abstractions; and decreased number of software defects found through application of effective process and software development methods.

Exhibit R-2A, RDT&E Project Justification: PB 2015 Office of Secretary Of Defense			Date: March 2014
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603781D8Z / *Software Engineering Institute (SEI)*	Project (Number/Name) P783 / *Software Producibility Initiative*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
P783: *Software Producibility Initiative*	-	10.014	7.348	-	-	-	-	-	-	-	Continuing	Continuing

The FY 2015 OCO Request will be submitted at a later date.

A. Mission Description and Budget Item Justification

Shortcomings in software development often lead to schedule slippage, cost growth, and mission compromise. These shortcomings can frequently be traced to software development technologies which are not capable of addressing the scale and complexity of the software needed in today's systems. The Software Producibility Initiative seeks to conduct an integrated program of research from applied research through demonstration and evaluation to advance the state-of-the-art in the producibility of software for DoD systems, particularly those systems characterized by high complexity, need for robustness, information assurance, real-time performance, and physical distribution. The Initiative maintains a portfolio of work relevant to the Warfighter and DoD needs by periodically evaluating technology development efforts, retiring those that are under performing, and starting new efforts based on risk-reward priority. The Initiative demonstrates new underlying software technology and tools in various domains, e.g., Networks, Modeling and Simulation, Avionics, Signal Intelligence, where DoD can benefit and enhance the transition paths for the underlying technology.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: SOFTWARE PRODUCIBILITY INITIATIVE	10.014	7.348	-
Description: The Software Producibility Initiative seeks to improve the DoD's ability to design, build, test, and sustain software-intensive systems which meet mission critical requirements, exhibit predictable behavior, and enable evolution and interoperability. Technology thrust areas include specification of complex requirements; "correct-by-construction" software development; scalable composition; high-confidence software and middleware; system architectures for network-centric environments; technologies for system visualization, testing, verification, and validation; model-driven development approaches; timing techniques for real-time embedded-systems; static and run-time analysis of software; design tools and development environments; and secure and efficient coding practices. Major performers include the Space and Naval Warfare Center (SPAWAR), Naval Research Laboratory (NRL), U.S. Army Aviation and Missile Research Development and Engineering Center (AMRDEC) and the Air Force Research Laboratory (AFRL), as well as academia and industry.			
FY 2013 Accomplishments: • Evaluated responses from the open solicitation and made new awards. • Introduced, through open source software, high-level language-level support for exposing and managing node failure in high performance computing systems and commodity clusters. • Established techniques and principles for design-time and run-time tools that anticipate change and exhibit resilience • Began establishing an environment for formal verification of quasi-synchronous systems.			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Office of Secretary Of Defense		Date: March 2014
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603781D8Z / *Software Engineering Institute (SEI)*	**Project (Number/Name)** P783 / *Software Producibility Initiative*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
• Began establishing a modeling environment for the automated synthesis of safety-critical applications. • Explored automated generation of formally verifiable requirements. • Designed model-based, hardware-agnostic work flow specifications. • Sped the transition of software research and development that increases the affordability of acquisition programs in accordance with the DoD's Better Buying Power initiative. • Transitioned the responsibility for the software engineering collaboration environment to the SEI FFRDC and the DoD's Cyber Security and Information Systems Information Analysis Center. •Completed transition of the underlying software techniques for graphical composition of scalable models developed by non-domain experts, with a focus on legacy systems integration. • Engaged an industry and academia consortium to transition techniques supporting model-based design of complex, heterogeneous, software intensive systems. • Explored model-based design for systems of systems to allow scaling-up to DoD-scales. • Investigated tools for constructing and analyzing timed models of cyber-physical systems, integrated with tools for untimed models, and evaluated the utility and expressiveness of the timing constructs. • Extended work to reduce software bloat and speed up execution time in C, C++, and other-languages. • Built a framework to objectively assess two qualitatively different techniques for providing Adaptive Quality of Service. • Continued analysis of software engineering acquisition data to determine Return on Investment. • Began development of a technology roadmap that identifies critical capability thresholds to improve software producibility. • Initiated the establishment of a tool chain supporting the design and implementation of aviation system architectures including mixed Integrated Modular Avionics and federated architectures. • Conducted a study of the use of genetic algorithms for learning polychronous timing within systems of linear time invariant systems. • Completed analysis of heuristic and meta-heuristic optimization algorithms. • Assessment of existing Engineered Resilient Systems (ERS) software products. • Expanded the capability of the existing of Framework for Assessing Cost and Technology (FACT) tool. • Completed an air vehicle and sea vehicle design demonstration for ERS that integrated physics-based analysis tools, trade-space analysis tools, and probability-based analysis.			
FY 2014 Plans: • Evaluate responses from the open solicitation; however, plan to initiate work with only a single performer. • Analyze open-source, high-level language-level support for exposing and managing node failure in high performance computing systems and commodity clusters. • Analyze techniques and principles for design-time and run-time tools that anticipate change and exhibit resilience. • Establish an environment for formal verification of quasi-synchronous systems.			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Office of Secretary Of Defense		Date: March 2014
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603781D8Z / *Software Engineering Institute (SEI)*	**Project (Number/Name)** P783 / *Software Producibility Initiative*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
• Establish a modeling environment for the automated synthesis of safety-critical applications. • Automatically generate formally verifiable requirements. • Complete a model-based, hardware-agnostic work flow specification environment. • Speed the transition of software research and development that increases the affordability of acquisition programs in accordance with the DoD's Better Buying Power initiative. • Improve the efficiency of existing Department of Defense (DoD) sustainment activities by investing in new tools and techniques to make correcting, upgrading, or adapting legacy code more efficient. • Explore model-based design for systems-of-systems to allow scaling-up to DoD-scales. • Assess the effectiveness of the software engineering collaboration environment. • Identify which techniques supporting model-based design of complex, heterogeneous, software intensive systems are sufficiently mature for transition into industrial practice, which require further research investment, and which should be abandoned. • Continue work to reduce software bloat and speed up execution time in C, C++, and other-languages. • Continue analysis of software engineering acquisition data to determine Return on Investment. • Complete development of a technology roadmap that identifies critical capability thresholds to improve software producibility. • Establish a tool chain supporting the design and implementation of aviation system architectures including mixed Integrated Modular Avionics (IMA) and federated architectures. • Investigate integrating strategies from probabilistic verification and temporal logic verification for risk mitigation in distributed architectures. • Analyze static-analysis methods to detect and mitigate a large class of defects that occur due to the differences between the intended semantics of design models and the actual behavior of the software. • Develop a new model for composing parallel applications in a heterogeneous multicore environment. • Develop an open source bridge from Unified Modeling Language (UML) to A Computational Logic for Applicative Common Lisp (ACL2). • Successfully conclude the Software Producibility Initiative by transitioning technologies where able and completing plans in remaining execution years.			
Accomplishments/Planned Programs Subtotals	10.014	7.348	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Office of Secretary Of Defense		Date: March 2014
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603781D8Z / *Software Engineering Institute (SEI)*	**Project (Number/Name)** P783 / *Software Producibility Initiative*

E. Performance Metrics

- Number of tools developed which enable the specification of interface formalisms, the definition of component interfaces, and the checking of correct composition.
- Demonstrable reduction in the number of vulnerabilities and errors detected in software code of large software systems.
- Number of transitions of promising systems and software engineering technologies to the DoD and Defense Industrial Base (DIB), and successful adoption of technologies by early adopter partners.
- Observed improvements in cost, schedule, and performance via advances in the producibility of software for complex DoD systems and the productivity of software developers.
- Number of multiple, active collaborations achieved between Software Producibility performers and the broader software engineering research community.
- Number of coordinated and Joint activities across research efforts.