



Software Product Lines

Nine Army programs, including the Common Avionics Architecture System (CAAS) and Force XXI Base and Command Brigade and Below (FBCB2), are using or adopting SEI product line approaches. Benefits include greatly decreased contract to field times and up to \$200 million savings on individual programs.

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Software design, development and integration are often plagued by schedule delays, cost increases, performance problems and defects. Data indicate that 60-80% of the cost of software development is in rework—that is, fixing defects that are found during testing. And, as our systems become more interconnected in networks, the stakes are rising. Defects in products that are linked to the Internet open vulnerabilities to cyber attack and exploitation. The Software Engineering Institute emphasizes the view that you should design quality into software, not test and patch it. Since 1984, SEI has been identifying, developing and advocating engineering and acquisition practices, tools and methods to improve all aspects of software. In the fall of 2007, the SEI published CMMI® for Acquisition (CMMI-ACQ), a new comprehensive best practices model within its CMMI Product Suite which provides guidance for initiating and managing the acquisition of products and services. CMMI has become the de facto standard in process improvement for small and large software development organizations worldwide.

Capability Maturity Model Integration (CMMI)

When organizations want to improve the way they do business, they often focus on securing the best people, methods and tools. Processes are the means for coordinating those resources. Improving an organization's processes provides an effective way to lower costs, improve quality and deliver products and services predictably on budget and on time. Developed by a team with members from industry, government and the SEI, the Capability Maturity Model® Integration (CMMI®) approach comprises best practices that organizations can use to improve their processes. The newest addition to the CMMI Product Suite, CMMI for Acquisition (CMMI-ACQ), is for organizations that acquire products and services. CMMI-ACQ integrates acquisition best practices from government and Industry acquisition standards and experience.
www.sei.cmu.edu/cmmi

CERT Coordination Center (CERT/CC)

The CERT/CC improves the national cyber response and readiness capability and builds international computer security information exchange and collaborative analysis capabilities. It develops and deploys tools to improve the effectiveness of response teams. As a result, the CERT/CC enhances the ability of organizations in government and industry to protect themselves from attack and limit the damage and scope of attacks. Its key efforts include (1) improving national cyber response

and readiness capability by discovering and resolving vulnerabilities in software products used in critical information infrastructures, and (2) developing and deploying tools to improve the effectiveness of the response team and investigator communities, such as malicious code cataloging and analysis tools.
www.cert.org

The Software Architecture Technology

Initiative develops methods and techniques to ensure that organizations' business and mission goals are predictably achieved by using effective software architecture practices throughout the development life cycle. This work involves developing methods for evaluating system and system-of-systems architectures, developing assessment and improvement instruments for architecture competence and investigating technology for reconstructing architectures from source code and ensuring architectural conformance. The initiative also strives to help organizations specify, define, evaluate, document and evolve software architectures. Its approach centers on predicting the impact of software architecture decisions on product quality attributes such as performance, reliability, modifiability and usability.
www.sei.cmu.edu/architecture

Personal Software Process and Team Software Process

To foster the necessary skills, discipline and commitment required for successful software projects, organizations need powerful

tools. The SEI Personal Software ProcessSM (PSPSM) and SEI Team Software ProcessSM (TSP SM) methodologies provide such tools. The SEI PSP enables software engineers to plan their work based on personal data, to measure their work and use their results to continually improve, and to be personally responsible for the quality of the products they produce. The SEI TSP enables managers to institute empowered team environments that coordinate PSP work. Managers can build and maintain self-directed teams whose members understand business and product goals and who produce their own plans to achieve those goals. Benefits of engaging these processes include higher quality, on-track costs and schedules, reduced cycle times, increased productivity and improved security; they can also serve to accelerate CMMI implementation and advancement. www.sei.cmu.edu/tsp

Predictable Assembly from Certifiable Components

The Predictable Assembly from Certifiable Components Initiative develops repeatable techniques for predicting the runtime behavior of assemblies of software components. This work enables organizations to define design and implementation standards that, when followed, result in predictable runtime quality, use automation to enforce these standards and define objective and predictive quality standards and measures for software components developed internally or provided by third-party suppliers. The initiative targets organizations that develop and maintain software-intensive systems with critical runtime properties. It works to promote its techniques and theories through direct involvement in the software research and developer communities, publication and training. www.sei.cmu.edu/pace

Product Line Practice Initiative

The Product Line Practice Initiative creates, refines, codifies and transitions technical and

management practices of demonstrated effectiveness for exploiting commonalities that exist across families of software-intensive systems in particular domains. Through its published guidance, methods, diagnostics, patterns and adoption support, the initiative enables organizations to use a product line approach to predictably achieve business and mission goals. A product line approach to software has been proven to dramatically reduce development systems, improve return on software investments, improve software system integration and give an organization more options in the future. The initiative directly engages the community. It provides focused assistance to customers to address key product line challenges. And it trains developers, acquirers and educators and licenses transition partners to accelerate widespread use. www.sei.cmu.edu/productlines

SEI Partner Network

The SEI Partner Network is a group of organizations and individuals trained and authorized or certified by the SEI to deliver official SEI services worldwide. These services include courses, consulting methods and management processes that aid in the implementation of the SEI's software engineering technologies. Individuals who deliver SEI services on behalf of SEI Partners are trained and evaluated by the SEI to ensure that they have the necessary knowledge and skills to deliver SEI services successfully. Currently, SEI Partners provide training and services in software process improvement, software architecture, software measurement and analysis and network security and survivability. www.sei.cmu.edu/partners

Integration of Software-Intensive Systems

The purpose of the Integration of Software-Intensive Systems (SIS) Initiative is to identify, mature, and transition software engineering practices and technologies to accomplish sus-

tainable integration and interoperability across systems of systems. Once interoperability is achieved, it must be sustained when upgrades are applied and capabilities enhanced. ISIS seeks to identify practices that assure sufficient sharing of information, make developers aware of how their systems interoperate with others and make requirements for interoperability clear and available. ISIS work is targeted to acquisition or procurement practices as well as to development. www.sei.cmu.edu/isis

Software Engineering Measurement and Analysis (SEMA)

Measurement and analysis techniques help organizations identify problem areas, track their efforts to improve software processes, lower costs, reduce defects, maintain schedule and gather valuable return-on-investment information. From introducing basic measurement principles to helping high-maturity organizations master advanced analytical methods, SEMA provides the guidance necessary to improve efficiency, effectiveness and quality. www.sei.cmu.edu/sema

Acquisition Support Program

Acquiring systems that deliver mission capabilities on their promised date is a national imperative. However, acquisition programs frequently have difficulty meeting aggressive cost, schedule and technical objectives. The SEI's Acquisition Support Program helps acquisition program managers face the challenges of risk management, use of commercial off-the-shelf (COTS) components, process use and application, program management, architecture, survivability, interoperability, source selection, and contract monitoring. Through the ASP, the SEI works directly with acquisition programs to help them achieve their objectives. Teams of SEI experts work in acquisition contexts in the Army, Navy and Air Force intelligence agencies as well as other DoD and civil agencies. www.sei.cmu.edu/programs/acquisition-support

CERT's Clustered-Computing Analysis Platform (C-CAP)

CERT's Clustered-Computing Analysis Platform (C-CAP) is a state-of-the-art forensics analysis environment that allows for a complete suite of tools for host-based and network investigations by law enforcement, the defense and intelligence communities, other federal agencies and state and local agencies. The environment maximizes the application of specialized computing resources to the forensic and incident response missions. Analysts and investigators enjoy flexible, secure access to high-performance systems, increasing productivity and enabling distributed collaboration.

By combining the following four attributes, C-CAP addresses a variety of needs:

- Scalable Resources—This attribute allows the addition of functionality, storage and processing power to meet changing mission demands.
- Collaborative Environment—Multiple analysts can focus on the same or related events in concurrent examinations. This attribute also enables organizations to coordinate analysts who are geographically dispersed.
- Centralized Management—This attribute provides rapid allocation of platform resources to tasks or analysts and ensures that resources can be flexibly and securely reassigned on demand.
- Augmented Capabilities—Analysts have integrated access to a comprehensive array of analytical tools and resources.

