

CAPABILITY MATURITY MODEL INTEGRATED CMMI

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POP QUIZ

Choose the most correct answer.....

⦿ What is CMMI?

A. Costly Management Made Interesting

B. Computer Minds Might be Intoxicating

C. Continuous Measures for Making Improvements

D. Capability Maturity Model Integration

QUIZ ANSWER

Capability Maturity Model Integration

- An approach to process integration and product improvement.
- Is NOT a process. It is a process model that provides guidance to organizations with process improvement objectives and custom implementations.
 - The process model is a collection of practices that describe the characteristics of effective processes.
 - Organizations/projects must define their own process using CMMI for guidance.
- CMMI is based on the premise that the quality of a system is strongly related to the quality of the process used to create or maintain the system.

CMMI PRESENTATION

- ◉ How CMMI came about
- ◉ CMMI Maturity Levels
- ◉ CMMI Framework
- ◉ CMMI Process Areas
- ◉ CMMI Process Area Model Components
- ◉ CMMI Training
- ◉ CMMI Appraisals and Certifications
- ◉ CMMI Scope/Influence
- ◉ CMMI Appraisal Results for two local organizations

HOW CMMI CAME ABOUT - 1

- ◉ Through the 1970s computer technology evolved/ expanded rapidly in organizations.
- ◉ At this time, DOD -- one of the largest customers of contracted software systems at that time (mostly embedded systems software) -- was experiencing delivery of unreliable software, delivery of software that did not meet requirements, and cost overruns to the extent that only a small portion of total software expenses (billions of dollars) was associated with software systems that met their needs.

HOW CMMI CAME ABOUT - 2

- ◎ DOD was not able to fix or maintain software systems that were poorly documented and written in many (approx. 450) different high-order and assembly languages—many were tied to obsolete technologies.
- ◎ In 1975 DOD established an international working group to identify requirements for a DOD high-order programming language, to compare these requirements to existing languages, and to recommend adoption or implementation of a minimal set of programming languages to meet their specific needs.

HOW CMMI CAME ABOUT - 3

- ◎ 1980: DOD standard for Ada was published.
- ◎ 1983: ANSI standard and DOD memorandum mandating use of Ada were published.
- ◎ In 1987, the ISO standard was published and DOD issued Ada mandate for all software developed for DOD. Waivers/exceptions could be requested for software systems that were NOT mission-critical, command and control, weapons systems, or real-time, embedded systems.
 - Many waivers were granted—Ada met with some criticism and resistance—high learning curve.

HOW CMMI CAME ABOUT - 4

- ◉ Mid-late 90's emphasis on the use of COTS in conflict with DOD Ada mandate.
- ◉ 1997: End of DOD Ada mandate—choice of language part of Engineering process.
- ◉ Ada used in commercial where software bugs can cause fatalities (e.g., the fly-by-wire system software in the Boeing 777, Canadian Automated Air Traffic System).
- ◉ So if the design of a phenomenal new language wasn't the best solution for the software quality problems.... what was?

HOW CMMI CAME ABOUT - 5

- ◉ During the late 70's-early 80's computer scientists (e.g., Edward Yourdon, Larry Constantine, Gerald Weinberg, Tom DeMarco, and David Parnas, Phil Crosby) published articles/books with research results in attempt to professionalize the software development process.
- ◉ 1986: U.S. Department of Defense Software Engineering Institute began work on a process model.
- ◉ 1989: Watts Humphrey published his book on CMM- originally intended to be used as a tool to evaluate the ability of government contractors to perform software development on government projects.

HOW CMMI CAME ABOUT - 6

- ◎ 1997: Revisions to CMM halted in support of CMMI.
- ◎ CMMI model integrated:
 - The Capability Maturity Model for Software (SW-CMM) v2.0
 - The Systems Engineering Capability Model (SECM)
 - The Integrated Product Development Capability Maturity Model (IPD-CMM) v0.98

CMMI MATURITY LEVELS

- ◎ Process characteristics of process maturity levels.....

Level	Process Characteristics
5	Process improvement is institutionalized
4	Product and process are quantitatively controlled
3	Software engineering and management processes are defined and integrated
2	Project management system is in place; performance is repeatable
1	Process is informal and unpredictable

CMMI FRAMEWORK - 1

◎ Constellations

- CMMI-DEV Version 1.2 released 2006
 - Development: Addresses product development
 - CMMI-ACQ Version 1.2 released 2007
 - Acquisition: Addresses supply chain management, and outsourcing
 - CMMI-SVC will be released 2009
 - Services: Addresses delivering of services within and external to an organization
- ◎ The constellations have some process areas in common and some process areas uniquely defined.
- ◎ The courses we took focused on CMMI-DEV

CMMI FRAMEWORK - 2

◎ CMMI-DEV

- Two models, one model that addresses integrated teams and one model that does not.

◎ Two representations for each model

■ Staged

- Consists of predefined sets of related process areas on which organizations/projects focus their improvement efforts depending on their current maturity level.

■ Continuous

- Consists of capabilities levels for each process area that organizations select based on their own priorities for process improvement. Levels are not attained.

CMMI FRAMEWORK - 3

- ◎ The heart of the CMMI model are the process areas (PAs)
 - A process area is a cluster of related practices that when implemented collectively satisfy process goals.
 - There are 16 core process areas in the CMMI. Core process areas are those that are common to all three constellations.
 - The next slide shows the CMMI-DEV process areas organized by maturity levels across the rows, and by process category in the columns.

CMMI-DEV PROCESS AREAS

	Engineering	Project Mgmt	Process Mgmt	Support
5			OID	CAR
4		QPM	OPP	
3	RD TS PI VER VAL	IPM RSKM	OPF OPD OT	
2	REQM	PP PMC SAM		CM PPQA MA

PA MODEL COMPONENTS

- ⦿ All process areas are described within the model with the following components.
- ⦿ Required Components
 - Goals: Specific and Generic
- ⦿ Expected Components
 - Practices: Specific and Generic
- ⦿ Informative Components
 - Notes, Amplifications, Elaborations, Examples....

SAMPLE PA FROM MODEL

◎ Configuration Management

- Pg. 191 of the model in Chrissis, M.B., Konrad, M., Shrum, S. (2003). Guidelines for Process Integration and Product Improvement. Boston, MA: Addison-Wesley.

TRAINING

Capability Maturity Model Integration (CMMI®) Related Courses

[Introduction to CMMI Version 1.2](#)

[Acquisition Supplement for CMMI v1.2](#)

NEW! [Services Supplement for CMMI v1.2](#)

[Intermediate Concepts of CMMI Version 1.2](#)

[Understanding CMMI High Maturity Practices
\(formerly called \)](#)

NEW! [CMMI and Six Sigma: Strategies for Joint Implementation](#)

[CMMI Version 1.2 Instructor Training](#)

[SCAMPI Lead Appraiser Training](#)

[SCAMPI B and C Team Leader Training](#)

[^ top](#)

APPRAISAL AND CERTIFICATION

- ◉ An organization can undergo three different levels of appraisal of their capabilities levels/maturity level by appraisers certified by SEI.
- ◉ SCAMPI is an acronym for Standard CMMI Assessment Method for Process Improvement
- ◉ SEI doesn't actually "certify" the maturity level of organizations/projects. When organizations/projects claim "level 3" that indicates that they were appraised at level 3 by a SCAMPI A appraisal reported in an Appraisal Disclosure Statement.

SCOPE/IMPACT OF CMMI

- ◎ Organizations can choose to have their results published on SEI's *List of published SCAMPI Appraisal Results* web page
- ◎ Some government organizations DO consider an organization's CMMI maturity level when contracting for development.
- ◎ Two local organizations: DRS and Tybrin. *List of published SCAMPI Appraisal Results* web page <http://sas.sei.cmu.edu/pars/pars.aspx>

SUMMARY

- ◎ CMMI is a process model that provides an guidance for process improvement.
- ◎ Organizations develop their own processes using the CMMI for guidance.
- ◎ Original work concurrent with development of Ada –both in response to software quality problems.
- ◎ An organization’s appraisal results reflect the maturity of their process/capability of their process areas.
- ◎ Process areas represent best practices of related practices that when satisfy contribute to process improvement/software product quality.

RESOURCES

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- ◉ CMM&CMMI Knowledge. History of CMM. Retrieved December 28, 2008, from <http://cmmcmmi.wordpress.com/2007/01/16/history-of-cmm/>
- ◉ Garcia, S., Turner, R., (2007). CMMI Survival Guide: Just Enough Process Improvement. Boston, MA: Addison-Wesley.