Update –
Observations of the Relationships
between
CMMI and ISO 9001:2000

September 14, 2005
This presentation summarizes points made and topics discussed at the TC176 Fall 2005 meeting.

Notice:
Selected materials were used from a presentation by David H. Kitson to the US TAG to TC176 Fall 2005 Meeting, subject: "The CMMI® Product Suite and International Standards."

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Software Engineering Institute (SEI)

Established as an FFRDC in 1984; contract awarded to CMU

Mandate to advance state of practice of software engineering in software-intensive systems

Model-based process improvement is one focal point of SEI

Began process assessments in 1987 using lessons learned from IBM programming site studies (Humphrey et al)

CMMI Overview

Product development best practice within the framework of a Capability Maturity Model
  • Special emphasis on systems engineering and software engineering
  • Reflection of the interests of SEI’s DoD sponsor

Introduced in 2002; replaces SW-CMM at end of this year

SEI “authorization” schema for model training and lead appraisers
The Maturity Levels

1. Process unpredictable, poorly controlled, and reactive
2. Process characterized for projects and is often reactive
3. Process characterized for the organization and is proactive
4. Process measured and controlled
5. Focus on continuous process improvement

- Initial
- Managed
- Defined
- Quantitatively Managed
- Optimizing
## Process Areas of Maturity Levels

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<tr>
<th>Level</th>
<th>Focus</th>
<th>Process Areas</th>
<th>Category</th>
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<tr>
<td>5 Optimizing</td>
<td>Continuous Process Improvement</td>
<td>Organizational Innovation and Deployment OID</td>
<td>Process Mgmt. Support</td>
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<td></td>
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<td>Causal Analysis and Resolution - CAR</td>
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<td>4 Quantitatively</td>
<td>Quantitative Management</td>
<td>Organizational Process Performance - OPP</td>
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<td>Managed</td>
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<td>Quantitative Project Management – QPM</td>
<td>Project Mgmt.</td>
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<td>3 Defined</td>
<td>Process Standardization</td>
<td>Requirements Development – RD</td>
<td>Engineering</td>
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<td>Technical Solution - TS</td>
<td>Engineering</td>
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<td>Product Integration - PI</td>
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<td>Verification - VER</td>
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<td>Validation - VAL</td>
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<td>Organizational Process Focus - OPF</td>
<td>Process Mgmt.</td>
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<td>Organizational Process Definition - OPD</td>
<td>Process Mgmt.</td>
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<td>Organizational Training - OT</td>
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<td>Integrated Project Management – IPM</td>
<td>Project Mgmt.</td>
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<td>Risk Management - RSKM</td>
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<td>Integrated Teaming - IT</td>
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<td>Integrated Supplier Management - ISM</td>
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<td>Decision Analysis and Resolution - DAR</td>
<td>Support</td>
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<td>Organizational Environment for Integration – OEI</td>
<td>Support</td>
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<tr>
<td>2 Managed</td>
<td>Basic Project Management</td>
<td>Requirements Management - REQM</td>
<td>Engineering</td>
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<td>Project Planning - PP</td>
<td>Project Mgmt.</td>
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<td>Project Monitoring and Control - PMC</td>
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<td>Supplier Agreement Management-SAM</td>
<td>Project Mgmt.</td>
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<td>Measurement and Analysis – MA</td>
<td>Support</td>
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<td>Process and Product Quality Assurance –PPQA</td>
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<td>Configuration Management – CM</td>
<td>Support</td>
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# Generic Goals and Associated GPs

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<th>Generic Goals</th>
<th>Generic Practices</th>
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<tr>
<td>GG1: Achieve Specific Goals</td>
<td>GP 1.1: Perform Base Practices</td>
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<td>GG2: Institutionalize a Managed Process</td>
<td>GP 2.1: Establish an Organizational Policy&lt;br&gt;GP 2.2: Plan the Process&lt;br&gt;GP 2.3: Provide Resources&lt;br&gt;GP 2.4: Assign Responsibility&lt;br&gt;GP 2.5: Train People&lt;br&gt;GP 2.6: Manage Configurations&lt;br&gt;GP 2.7: Identify and Involve Relevant Stakeholders&lt;br&gt;GP 2.8: Monitor and Control the Process&lt;br&gt;GP 2.9: Objectively Evaluate Adherence&lt;br&gt;GP 2.10: Review Status with Higher Level Management</td>
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<td>GG3: Institutionalize a Defined Process</td>
<td>GP 3.1: Establish a Defined Process&lt;br&gt;GP 3.2: Collect Improvement Information</td>
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<td>GG4: Institutionalize a Quantitatively Managed Process</td>
<td>GP 4.1: Establish Quantitative Objectives for the Process&lt;br&gt;GP 4.2: Stabilize Subprocess Performance</td>
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<td>GG5: Institutionalize an Optimizing Process</td>
<td>GP 5.1: Ensure Continuous Process Improvement&lt;br&gt;GP 5.2: Correct Root Causes of Problems</td>
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CMMI Transition Status as of 6-30-05

Training
Introduction to CMMI – 34,501 trained
Intermediate CMMI – 1,575 trained
Introduction to CMMI Instructors - 346 trained
SCAMPI Lead Appraisers - 543 trained

Authorized
Introduction to CMMI V1.1 Instructors – 275
SCAMPI V1.1 Lead Appraisers – 379
Intro to the CMM and CMMI Attendees (Cumulative)
Adoption—What’s Available?

The Addison-Wesley SEI Series Book and:

- CMMI Distilled: Second Edition
- Practical Insight into CMMI
- Interpreting the CMMI
- Real Process Improvement Using the CMMI
- Making Process Improvement Work
- CMMI: Un Itinéraire Fléché
- A Guide to the CMMI
- CMMI: A Framework…
- CMMI SCAMPI Distilled
- CMMI Assessments
- Balancing Agility and Discipline
Examples of CMMI Impact: Return on Investment

- 5:1 ROI for quality activities (Accenture)
- 13:1 ROI calculated as defects avoided per hour spent in training and defect prevention (Northrop Grumman Defense Enterprise Systems)
- Avoided $3.72M in costs due to better cost performance (Raytheon North Texas Software Engineering)
  - As the organization improved from SW-CMM level 4 to CMMI level 5
- 2:1 ROI over 3 years (Siemens Information Systems Ltd, India)
- 2.5:1 ROI over 1st year, with benefits amortized over less than 6 months (reported under non disclosure)
Synergy With Selected International Standards

Key standards identified to date are

- ISO 900x:2000 family of standards (as well as selected domain derivatives)
- ISO/IEC 12207 SW Life Cycle Processes
- ISO/IEC 15288
- ISO/IEC 15504 SPICE

Note that 15504 provides a mechanism for establishing important relationships to other important process-related international standards
Usage Scenarios

Initial pilots this year and next are focused on addressing the following scenarios:

• “we are also working towards ISO 9001 compliance – how are we doing?

• “we have already achieved ISO 9001 certification and we would like to see how our [CMMI initiative, ISO 9001 certification] is supporting our [ISO 9001 accomplishments, CMMI initiative]”

• Variations of above:
  - If we are CMMI maturity level x, what are the implications for ISO 9001 certification?
  - If we are ISO9001 certified, what are the implications for CMMI maturity?
Shows that ISO 9001 does not include "risk assessment" or "decision analysis & resolution." What about "preventive action" and "corrective action?"
CMMI and ISO 9001 Discussion Topics

Synergy between CMMI and ISO 9001
• Equipment Calibration as an omission within CMMI,
• Customer satisfaction – is it emphasized enough in CMMI?

Inter-operability and cross-fertilization
• Could an organization get “credit” towards ISO 9001 certification as a result of a SCAMPI appraisal?
• Are there outputs from a ISO 9001 audit which could be useful as inputs to a SCAMPI appraisal?
• What are the right parties to such discussions?

Stove-piped communities – should we be paying more attention to one another?

CMMI approach to Generic Goals – some ISO 9001 clauses map well to GPs while some do not. Any action appropriate?
Points at Issue

Areas where our CMMI-ISO 9001 mapping diverges:
- Control of Records
- Customer Focus / Customer Satisfaction
- Internal Communication
- Infrastructure and Work Environment
- Control and Monitoring of Measuring Devices
- Internal Audit
- Control of Nonconforming Product
- Preventive Action
Considerations…from TC 176 Fall Meeting

**CMMI**
- Extensive number of audits
- “Shelf life” of maturity level
- No requirement to measure customer satisfaction
- Level of information: Required, Expected, Informational
- Number of required auditors: 4

**ISO 9001**
- Surveillance audits required
- Level of information: Normative, Informative
- Evaluation reporting for 19011 could learn from CMMI
- Number of required auditors: 1

**Common Concerns & Nice-to-haves**
- How auditors are paid (who’s buying?) ==> risk of bias to registration
- Cross reference table [would assist implementers and auditors]
- Cross training of auditors [single visit versus separated, redundant audits]
- Common definitions of terms
- Ability of TC 176 and SEI to cooperate