CMMI® Version 1.2 and Beyond
...a Tutorial

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CMMI Today
CMMI Today

Version 1.1 CMMI Product Suite was released January 2002.

Errata sheets cover known errors and changes with book publication are available on CMMI website.

SCAMPI “classes” of methods support many needs

• internal process improvement
• supplier source selection
• contract process monitoring

SCAMPI B/C Team Leader Training available

Introduction to CMMI (Staged and Continuous) available
CMMI Adoption Trends: Website Visits

CMMI web pages hits

- 1.8M/month
- Exceeded 60K/day in August 2005

443 organizations visited the CMMI Website more than 200 times during September 2005:

- 29 Defense contractor organizations
- 12 DoD organizations
- 49 Universities
- 328 Commercial companies
- 25 Non-DoD government agencies
The following were the top viewed pages on the CMMI Website in September 2005:

- CMMI Main Page
- What is CMMI?
- CMMI Models and Modules
- Getting Started with CMMI Adoption
- CMMI Training, Events, & Forums
<table>
<thead>
<tr>
<th>Accenture</th>
<th>Bank of America</th>
<th>BMW</th>
</tr>
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<tbody>
<tr>
<td>Boeing</td>
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<td>Ericsson</td>
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<td>Dyncorp</td>
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<td>Nokia</td>
<td>Northrop Grumman</td>
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<td>SAIC</td>
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<tr>
<td>U.S. Treasury Department</td>
<td>Wipro</td>
<td></td>
</tr>
</tbody>
</table>
CMMI Transition Status – 10/31/05

Training
  Introduction to CMMI – 40,809 trained
  Intermediate CMMI – 1,777 trained
  Introduction to CMMI Instructors – 384
  SCAMPI Lead Appraisers – 577 trained

Authorized
  Introduction to CMMI V1.1 Instructors – 292
  SCAMPI V1.1 Lead Appraisers – 405
Number of SCAMPI vx.x Class A Appraisals Conducted by Year by Model Representation*
Reported as of 30 September 2005
*Where representation is reported

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Current Appraisal Synopsis

Based on SCAMPI\textsuperscript{SM} V1.1 Class A appraisals conducted since April 2002 release through August 2005 and reported to the SEI by September 2005.

- 977 appraisals
- 878 organizations
- 206 participating companies
- 86 reappraised organizations
- 3,686 projects
- 59.6% non-USA organizations

Organizations previously appraised against CMMI V1.0 and who have not reappraised against V1.1 are not included in this report.
Reporting Organizational Types

- Commercial/In-house: 64.0%
- Contractor for Military/Government: 31.3%
- Military/Government Agency: 4.7%

Based on 878 organizations
Organizational Size

Based on the total number of employees within the area of the organization that was appraised

- 25 or fewer: 10.3%
- 26 to 50: 12.8%
- 51 to 75: 9.9%
- 76 to 100: 7.9%
- 1 to 100: 40.9%
- 101 to 200: 18.5%
- 201 to 2000+: 40.7%
- 1001 to 2000: 6.3%
- 2000+: 3.7%

Based on 861 organizations reporting size data

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Countries where Appraisals have been Performed and Reported to the SEI

Argentina
Australia
Belarus
Belgium
Brazil
Canada
Chile
China
Colombia
Czech Republic
Denmark
Egypt
Finland
France
Germany
Hong Kong
India
Ireland
Israel
Italy
Japan
Korea, Republic of
Latvia
Malaysia
Mexico
Netherlands
New Zealand
Philippines
Portugal
Russia
Singapore
Slovakia
South Africa
Spain
Sweden
Switzerland
Taiwan
Thailand
Turkey
Ukraine
United Kingdom
United States

Purple country name: new additions with this reporting since Nov. 2004

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Maturity Profile by All Reporting USA and Non-USA Organizations

Based on 355 USA organizations and 523 Non-USA organizations

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Disciplines Selected for Appraisals

Based on 977 appraisals reporting coverage

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Maturity Profile by All Reporting Organizations

Number of Appraisals

- Not Given: 11.7%
- Initial: 4.7%
- Managed: 31.7%
- Defined: 25.2%
- Quantitatively Managed: 4.7%
- Optimizing: 22.1%

Based on most recent appraisal of 878 organizations

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Maturity Level of First and Latest Appraisal

Based on 86 reappraised organizations using their first and latest appraisal

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Appraisal Results Summary

977 appraisals have been reported since the April 2002 SCAMPI Class A Version 1.1 release.

Commercial/In-House organizations reporting appraisals is increasing more rapidly than other organizational categories.

Government/Military and Government/Military Contractors reporting appraisals is increasing at a stable and consistent rate.

The highest percentage of Commercial/In-House organizations reporting appraisals is from outside the USA.

The highest percentage of Government/Military Contractors reporting appraisals is from the USA.

Comparing early reports of the SW-CMM maturity profile with early CMMI data reflects a more mature CMMI profile.

Additional information and charts will be released as more appraisals are reported and more data is available to support the breakdowns.
## Three Classes of Appraisals

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Class C</th>
<th>Class B</th>
<th>Class A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount of objective evidence</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Ratings generated</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Resource needs</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Team Size</td>
<td>Small</td>
<td>Medium</td>
<td>Large</td>
</tr>
</tbody>
</table>
SCAMPI Family

**SCAMPI C:** provides a wide range of options, including characterization of planned approaches to process implementation according to a scale defined by the user

**SCAMPI B:** provides options in model scope and organizational scope, but characterization of practices is fixed to one scale and is performed on implemented practices

**SCAMPI A:** Is the most rigorous method, and is the only method that can result in ratings
Approach, Deployment, Institutionalization

<table>
<thead>
<tr>
<th></th>
<th>Approach</th>
<th>Deployment</th>
<th>Institutionalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- SCAMPI family methods can be used in a range from:
  - looking at the approach planned to satisfy process improvement goals to
  - examining deployment of processes in selected instances in an organizational unit (OU) to
  - benchmarking the institutionalization of CMMI in an OU

Reliability, rigor and cost may go down from A to B to C, risk may go up
Combined Appraisal Opportunities

Current ISO 9001

ISO 9001 IA

SCAMPI ‘A’ &
ISO 9001

Visit Report

Rating letter & or certificate with scope indicating “... in accordance with Level X”

... continues to demonstrate compliance with ISO 9001:2000

...no behaviours inconsistent with operating at level X

Rating letter indicating level achieved

Current CMMI

SCAMPI ‘A’

SCAMPI ‘A’

(Cat ‘C’ appraisal)

(Cat ‘C’ appraisal using Cat ‘C’ appraisal)

The possible options for assessment and surveillance
Adoption: What Else Is Happening?

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
How about SEI Publications?

Technical notes and special reports:
- Interpretive Guidance Project (Two Reports)
- CMMI and Product Line Practices
- CMMI and Earned Value Management
- Interpreting CMMI for Operational Organizations
- Interpreting CMMI for COTS Based Systems
- Interpreting CMMI for Service Organizations
- CMMI Acquisition Module (CMMI-AM) (V1.1)
- Interpreting CMMI for Marketing (in progress)
- Demonstrating the Impact and Benefits of CMMI (and web pages – www.sei.cmu.edu/cmmi/results)
## Performance Results Summary

<table>
<thead>
<tr>
<th>Improvements</th>
<th>Median</th>
<th># of data points</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>38%</td>
<td>14</td>
<td>5%</td>
<td>87%</td>
</tr>
<tr>
<td>Schedule</td>
<td>50%</td>
<td>14</td>
<td>20%</td>
<td>90%</td>
</tr>
<tr>
<td>Productivity</td>
<td>50%</td>
<td>13</td>
<td>11%</td>
<td>376%</td>
</tr>
<tr>
<td>Quality</td>
<td>50%</td>
<td>16</td>
<td>29%</td>
<td>94%</td>
</tr>
<tr>
<td>Customer Satisfaction</td>
<td>14%</td>
<td>5</td>
<td>10%</td>
<td>55%</td>
</tr>
<tr>
<td>Return on Investment</td>
<td>3 : 1</td>
<td>8</td>
<td>2 : 1</td>
<td>13 : 1</td>
</tr>
</tbody>
</table>

- N = 18, as of 5 March 2005 (out of total N = 26)
- Organizations with results expressed as change over time
CMMI V1.2...and Beyond
Version 1.2 Changes

- Eliminate concept of advanced practices and common features from text

- Bring ISM into baseline to eliminate
  - separation from SAM
  - supplier sourcing designation

- Recognize, given hardware additions, that providing separate development models no longer useful
  - “single book” approach (CMMI-DEV+IPPD)

- “Not applicable” process areas (PAs) for maturity levels will be significantly constrained (SAM/ISM, IPPD)
Version 1.2 Changes

- Clarify material based on 1000+ Change Requests (e.g., improve high maturity verbiage, appraisal terminology)

- Two work environment specific practices added:
  - one to OPD for organizational look
  - One to IPM for project specifics

- Glossary improved (e.g., higher level management, bidirectional traceability, subprocess)

- Overview text improved

- IPPD coverage consolidated and simplified
Integrated Product and Process Development (IPPD) Changes

IPPD material is being revised significantly.

- Organization Environment for Integration PA removed and material moved to Organizational Process Definition (OPD) PA.
- Integrated Teaming PA removed and material moved to Integrated Project Management (IPM) PA.
- IPPD goals have been consolidated.
  - “Enable IPPD Management” in OPD
  - “Apply IPPD Principles” in IPM
- Overall material condensed and revised to be more consistent with other PAs.
SCAMPI A Changes Being Considered for V1.2

Method implementation clarifications
- interviews in “virtual” organizations
- practice characterization rules
- organizational unit sampling

Appraisal Disclosure Statement (ADS) improvements
- reduce redundancy with other appraisal documents
- improve usability for sponsor and government
- require sponsor’s signature on the ADS

Responsibility for determination of “applicability” for SAM/ISM and IPPD

Establish maturity level and capability level shelf life – 3 years
# Published Appraisal Results

## List of Published SCAMPI Appraisal Results

**ORGANIZATION NAME:** Satyam Computer Services Ltd.

**SPONSOR NAME:** Nagaraj Chavour

**LEAD APPRAISER NAME:** Raghvan Nandyal

**SEI PARTNER:** SITARA Technologies Pvt. Ltd.

**APPRaisal END DATE:** 4/3/2004

**MATURITY LEVEL ASSIGNED:** 5

**APPRaised ORGANIZATIONAL UNIT**

- **Entity Name:** SRU BE:GDC
- **Location(s):** Secunderabad, AP, India

**CMMI MODEL USED:** CMMI-SW/PPD, V1.1, Continuous

**APPRaisal METHOD USED:** SCAMPI v1.1

## Model Scope & Capability Ratings Assigned

<table>
<thead>
<tr>
<th>Process Management</th>
<th>Project Management</th>
<th>Engineering</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPF</td>
<td>PP</td>
<td>REQM</td>
<td>CM</td>
</tr>
<tr>
<td>OPD</td>
<td>PMC</td>
<td>RD</td>
<td>PPQA</td>
</tr>
<tr>
<td>OT</td>
<td>SAM</td>
<td>TS</td>
<td>MA</td>
</tr>
<tr>
<td>OPP</td>
<td>IPM</td>
<td>PI</td>
<td>DAR</td>
</tr>
<tr>
<td>OID</td>
<td>RSKM</td>
<td>VER</td>
<td>OEl</td>
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<tr>
<td></td>
<td>IT</td>
<td>VAL</td>
<td>CAR</td>
</tr>
<tr>
<td></td>
<td>ISM</td>
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<tr>
<td></td>
<td>QPM</td>
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</table>

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CMMI Training v1.2

*Introduction to CMMI (Staged and Continuous)*
- editorial update released 9/05
- will be updated for v1.2

*Introduction to CMMI, Staged Representation* and
*Introduction to CMMI, Continuous Representation*
- sunset at the end of 2005

*Intermediate Concepts of CMMI*
- will be updated for v1.2
- will better prepare students for SCAMPI training

*CMMI Instructor Training*
- updated earlier this year to reflect “combined”
  Introduction to CMMI course
- will be updated to reflect v1.2 changes
Beyond V1.2

Improved architecture will allow post-V1.2 expansion.

- Extensions of the life cycle (Services, Outsourcing/Acquisition) could expand use of a common organizational framework:
  - allows coverage of more of the enterprise or potential partnering organizations
  - adapts model features to fit non-developmental efforts (e.g., CMMI Services, CMMI Acquisition)
CMMI v1.2 Architectural Framework

Framework
Contains all possible components

Constellation (Combined Area of Interest)

Constellation (Development)

Constellation (Services)

Constellation (Acquisition)

Product (Model)
CMMI-DEV

Product

Product
Beyond V1.2

First two constellations, CMMI Services and CMMI Acquisition, have been “commissioned” by CMMI Steering Group. Development will be in parallel with V1.2 effort; publication sequenced after V1.2 rollout.

Northrop-Grumman is leading industry group for CMMI Services.

• Initial focus will be for organizations providing “DoD services” as well as internal IT:
  - System maintenance
  - Network Management, IT Services
  - IV&V
Beyond V1.23

SEI is coordinating requirements elicitation for CMMI Acquisition.

- Will build upon existing CMMI Acquisition Module and General Motors IT Sourcing expansion
- Will add government perspectives from both DoD and civil agencies
Planned Sequence of Models
CMMI V1.2...and Beyond
...the details
The Steps

A long-term strategy, the V1.2 A-Spec, and the upgrade criteria approved by the Steering Group.

The teams review the Change Requests to identify possible Change Packages (CP) for a V1.2 of model, training, and/or method.

Change Control Boards determine which CPs, if any, should be accepted (stability goal remains).

Implementation Packages developed to create a “beta” for piloting (model, method, and training)

Piloting will be conducted in FY 06.

V1.2, incorporating piloting feedback, will be released in FY 06.
CCB Membership (for content changes)

Mike Konrad  SEI
Mike Phillips  SEI
Roger Bate  SEI
Bob Rassa  Raytheon
Bill Schoening  Boeing & INCOSE
Nils Jacobsen  Motorola
Karen Richter  OSD
Warren Schwomeyer  Lockheed Martin
Tom Bernard  USAF
Mary Beth Chrissis  SEI
Bill Peterson  SEI
Rick Hefner  Northrop Grumman
Stephen Gristock  JP Morgan Chase
Gary Wolf  Raytheon
Paul Croll  CSC
Shane Atkinson  CMMI Partner
Millee Sapp  USAF
Katie Smith  USNavy
Larry Osiecki  USArmy
Sandy Shrum  SEI
Rhonda Brown  SEI
The Model Baseline for V1.2

Textbook:

*CMMI: Guidelines for Process Integration and Product Improvement*

Continuing the “Single model, single course” strategy

V1.2 release will be as a Technical Report
Model Activities: Version 1.2

Model development team
  • completing implementation packages
  • model baseline redline

Configuration Control Board
  • actively reviewing changes

Pilot planning underway

Expected release of v1.2 is summer 2006
Major Themes

Reduce size/complexity
Increase coverage
  • in existing elements
  • discipline additions
Reduce size and complexity

Single Technical Report, not 8 as in V1.1
Common features and advanced practice distinctions eliminated
Two process areas consolidated into other PA’s
One “addition” or “discipline,” Supplier Sourcing, eliminated as a separable “model.”
Discipline distinctions reduced in amplifications
CMMI Model Combinations

V 1.1

Supplier Sourcing

Integrated Product and Process Development

SE Related Examples

CMMI Core

V 1.2

IPPD

Organizational Goal (OPD)
Project Goal (IPM)

SE Related Examples

CMMI Core (now includes SS)

SW Related Examples

Hardware Related Examples
Example Hardware Amplification

Technical Solution

SP 2.1 Design the Product or Product Component
Develop a design for the product or product component.

For Hardware Engineering
Detailed design is focused on product development of electronic, mechanical, electro-optical, and other hardware products and their components. Electrical schematics and interconnection diagrams are developed, mechanical and optical assembly models are generated, and fabrication and assembly processes are developed.
Version 1.2 Changes

Amplifications improved
Amplifications Improved

Proposed Conceptual Solution: “Review amplifications and where appropriate modify the amplification to provide more insight into the discipline that is being described. For information that applies more generally and is captured as an amplification, move the information into a "note" rather than identifying it as an amplification.”

From Technical Solution V1.1

For Systems Engineering
Examples of criteria include the following:
- Maintainability
- Reliability
- Safety

Amplification removed from Technical Solution V1.2 since it is not unique to Systems Engineering
Version 1.2 Changes

Common features and advanced practices eliminated
CMMI Model Structure (V1.1)

Continuous

Process Area 1 > Specific Goals > Capability Levels > Specific Practices
Process Area 2 > Specific Goals > Specific Practices
Process Area n > Specific Goals > Specific Practices

Staged

Process Area 1 > Specific Goals > Specific Practices
Process Area 2 > Specific Goals > Specific Practices
Process Area n > Specific Goals > Specific Practices

Common Features
- Maturity Levels
- Specific Goals
- Generic Goals
- Specific Practices
- Generic Practices
- Ability to Perform
- Directing Implementation
- Commitment to Perform
- Verifying Implementation

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CMMI Model Structure (V1.2)

Continuous

- Process Area 1
  - Specific Goals
  - Capability Levels
  - Specific Practices
- Process Area 2
  - Generic Goals
  - Specific Practices
- Process Area n
  - Generic Goals
  - Specific Practices

Staged

- Process Area 1
  - Specific Goals
  - Maturity Levels
  - Specific Practices
- Process Area 2
  - Generic Goals
  - Specific Practices
- Process Area n
  - Generic Goals
  - Specific Practices
# Requirements Management

<table>
<thead>
<tr>
<th>Specific Goal</th>
<th>Specific Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manage Requirements</td>
<td>1.1 – Obtain an Understanding of Requirements</td>
</tr>
<tr>
<td></td>
<td>1.2 – Obtain Commitment to Requirements</td>
</tr>
<tr>
<td></td>
<td>1.3 – Manage Requirements Changes</td>
</tr>
<tr>
<td></td>
<td>1.4 – Maintain Bidirectional Traceability of Requirements</td>
</tr>
<tr>
<td></td>
<td>1.5 – Identify Inconsistencies Between Project Work and Requirements</td>
</tr>
</tbody>
</table>

v1.2 SP 1.4 practice statement now reads, “Maintain bidirectional traceability among the requirements and work products.” Project plans are no longer mentioned in this SP statement. Bidirectional Traceability description is improved in the notes and Glossary.
### Requirements Development -1

<table>
<thead>
<tr>
<th>Specific Goal</th>
<th>Specific Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Develop Customer Requirements</strong></td>
<td>1.1 – Elicit Needs</td>
</tr>
<tr>
<td></td>
<td>1.2 – Develop the Customer Requirements</td>
</tr>
<tr>
<td><strong>Develop Product Requirements</strong></td>
<td>2.1 – Establish Product and Product-Component Requirements</td>
</tr>
<tr>
<td></td>
<td>2.2 – Allocate Product-Component Requirements</td>
</tr>
<tr>
<td></td>
<td>2.3 – Identify Interface Requirements</td>
</tr>
</tbody>
</table>

Base practice “Collect Stakeholder Needs” is eliminated. Informative materials are added to SP1.1 to address standards and policies.
### Requirements Development -2

<table>
<thead>
<tr>
<th>Specific Goal</th>
<th>Specific Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyze and Validate Requirements</td>
<td>3.1 – Establish Operational Concepts and Scenarios</td>
</tr>
<tr>
<td></td>
<td>3.2 – Establish a Definition of Required Functionality</td>
</tr>
<tr>
<td></td>
<td>3.3 – Analyze Requirements</td>
</tr>
<tr>
<td></td>
<td>3.4 – Analyze Requirements to Achieve Balance</td>
</tr>
<tr>
<td></td>
<td>3.5 – Validate Requirements with Comprehensive Methods</td>
</tr>
</tbody>
</table>

“Evolve Operational Concepts and Scenarios” (from TS SP1.1 in v1.1) is now part of SP 3.1.
The base practice “Validate Requirements” has been eliminated.
### Technical Solutions -1

<table>
<thead>
<tr>
<th>Specific Goal</th>
<th>Specific Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select Product-Component Solutions</td>
<td>1.1 – Develop Detailed Alternative Solutions and Selection Criteria</td>
</tr>
<tr>
<td></td>
<td>1.2 – Select Product-Component Solutions</td>
</tr>
</tbody>
</table>

v1.1 SP 1.1 “Evolve Operational Concepts and Scenarios” is now part of RD SP 3.1.
Base practice “Develop Alternative Solutions and Selection Criteria” is eliminated.
“Identify candidate COTS products that satisfy requirements” is a new subpractice under SP1.1.
### Technical Solutions -2

<table>
<thead>
<tr>
<th>Specific Goal</th>
<th>Specific Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Develop the Design</strong></td>
<td></td>
</tr>
<tr>
<td>2.1 – Design the Product or Product Component</td>
<td></td>
</tr>
<tr>
<td>2.2 – Establish a Technical Data Package</td>
<td></td>
</tr>
<tr>
<td>2.3 – Design Interfaces Using Criteria</td>
<td></td>
</tr>
<tr>
<td>2.4 – Perform Make, Buy, or Reuse Analyses</td>
<td></td>
</tr>
<tr>
<td><strong>Implement the</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Product Design</strong></td>
<td></td>
</tr>
<tr>
<td>3.1 – Implement the Design</td>
<td></td>
</tr>
<tr>
<td>3.2 – Develop Product Support Documentation</td>
<td></td>
</tr>
</tbody>
</table>

Base practice “Establish Interface Descriptions” is eliminated.
# Product Integration -1

<table>
<thead>
<tr>
<th>Specific Goal</th>
<th>Specific Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare for Product Integration</td>
<td>1.1 – Determine Integration Sequence</td>
</tr>
<tr>
<td></td>
<td>1.2 – Establish the Product Integration Environment</td>
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<tr>
<td></td>
<td>1.3 – Establish Product Integration Procedures and Criteria</td>
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<tr>
<td>Ensure Interface Compatibility</td>
<td>2.1 – Review Interface Descriptions for Completeness</td>
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<tr>
<td></td>
<td>2.2 – Manage Interfaces</td>
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</tbody>
</table>
## Product Integration -2

### Specific Goal

Assemble Product Components and Deliver the Product

### Specific Practice

<table>
<thead>
<tr>
<th>3.1 – Confirm Readiness of Product Components for Integration</th>
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</thead>
<tbody>
<tr>
<td>3.2 – Assemble Product Components</td>
</tr>
<tr>
<td>3.3 – Evaluate Assembled Product Components</td>
</tr>
<tr>
<td>3.4 – Package and Deliver the Product or Product Component</td>
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</table>
# Verification -1

<table>
<thead>
<tr>
<th>Specific Goal</th>
<th>Specific Practice</th>
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</thead>
<tbody>
<tr>
<td>Prepare for Verification</td>
<td>1.1 – Select Work Products for Verification</td>
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<tr>
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<td>1.2 – Establish the Verification Environment</td>
</tr>
<tr>
<td></td>
<td>1.3 – Establish Verification Procedures and Criteria</td>
</tr>
<tr>
<td>Perform Peer Reviews</td>
<td>2.1 – Prepare for Peer Reviews</td>
</tr>
<tr>
<td></td>
<td>2.2 – Conduct Peer Reviews</td>
</tr>
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<td></td>
<td>2.3 – Analyze Peer Review Data</td>
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## Verification -2

<table>
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<tr>
<td>Verify Selected Work Products</td>
<td>3.1 – Perform Verification</td>
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<tr>
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<td>3.2 – Analyze Verification Results and Identify Corrective Action</td>
</tr>
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</table>
## Validation

<table>
<thead>
<tr>
<th>Specific Goal</th>
<th>Specific Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare for Validation</td>
<td>1.1 – Select Products for Validation</td>
</tr>
<tr>
<td></td>
<td>1.2 – Establish the Validation Environment</td>
</tr>
<tr>
<td></td>
<td>1.3 – Establish Validation Procedures and Criteria</td>
</tr>
<tr>
<td>Validate Product or Product Components</td>
<td>2.1 – Perform Validation</td>
</tr>
<tr>
<td></td>
<td>2.2 – Analyze Validation Results</td>
</tr>
</tbody>
</table>
Version 1.2 Addition – Work Environment Coverage

Work Environment material added to OPD and IPM

• OPD, SP 1.6: Establish Work Environment Standards
• IPM, SP 1.3: Establish the Project’s Work Environment
Integrated Product and Process Development (IPPD) Changes

IPPD material is being revised significantly
  • Organization Environment for Integration PA removed and material moved to Organizational Process Definition (OPD) PA
  • Integrated Teaming PA removed and material moved to Integrated Project Management (IPM) PA
  • IPPD goals in the IPM PA have been consolidated
    - Goal 3: Apply IPPD Principles
  • Overall material condensed and revised to be more consistent with other PAs
Organizational Process Definition

V1.1

SG 1 – Establish Organizational Process Assets
1.1 – Establish Standard Processes
1.2 – Establish Life-Cycle Model Descriptions
1.3 – Establish Tailoring Criteria and Guidelines
1.4 – Establish the Organization’s Measurement Repository
1.5 – Establish the Organization’s Process

V1.2

SG1 – Establish Organizational Process Assets
1.1 – Establish Standard Processes
1.2 – Establish Life-Cycle Model Descriptions
1.3 – Establish Tailoring Criteria and Guidelines
1.4 – Establish the Organization’s Measurement Repository
1.5 – Establish the Organization’s Process
1.6 – Establish Work Environment Standards

SG2 – Enable IPPD Management
2.1 – Establish Empowerment Mechanisms
2.2 – Establish Rules and Guidelines for Integrated Teams
2.3 – Establish Guidelines to Balance Team and Home Organization Responsibilities

Consolidated from V1.1 OEI PA

New
## Organizational Process Definition -1

<table>
<thead>
<tr>
<th>Specific Goal</th>
<th>Specific Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establish Organizational Process Assets</td>
<td>1.1 – Establish Standard Processes</td>
</tr>
<tr>
<td></td>
<td>1.2 – Establish Life-Cycle Model Descriptions</td>
</tr>
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<td></td>
<td>1.3 – Establish Tailoring Criteria and Guidelines</td>
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<td>1.4 – Establish the Organization’s Measurement Repository</td>
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<td></td>
<td>1.5 – Establish the Organization’s Process Asset Library</td>
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<tr>
<td></td>
<td>1.6 – Establish Work Environment Standards</td>
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</table>

*New*
Organizational Process Definition -2

<table>
<thead>
<tr>
<th>IPPD Specific Goal</th>
<th>Specific Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable IPPD Management</td>
<td>2.1 – Establish Empowerment Mechanisms</td>
</tr>
<tr>
<td></td>
<td>2.2 – Establish Rules and Guidelines for Integrated Teams</td>
</tr>
<tr>
<td></td>
<td>2.3 – Establish Guidelines to Balance Team and Home Organization Responsibilities</td>
</tr>
</tbody>
</table>

NOTE: This Specific Goal and its associated Specific Practices are part of IPPD Addition.
Integrated Project Management -1

V1.1

SG1 – Use the Project’s Defined Process
  1.1 – Establish the Project’s Defined Process
  1.2 – Use Organizational Process Assets for Planning Project Activities
  1.3 – Integrate Plans
  1.4 – Manage the Project Using the Integrated Plans
  1.5 - Contribute to the Organizational Process Assets

SG2 – Coordinate and Collaborate with Relevant Stakeholder
  2.1 – Manage Stakeholder Involvement
  2.2 – Manage Dependencies
  2.3 – Resolve Coordination Issues

V1.2

SG1 – Use the Project’s Defined Process
  1.1 – Establish the Project’s Defined Process
  1.2 – Use Organizational Process Assets for Planning Project Activities
  1.3 – Establish the Project’s Work Environment
  1.4 – Integrate Plans
  1.5 – Manage the Project Using the Integrated Plans
  1.6 - Contribute to the Organizational Process Assets

SG2 – Coordinate and Collaborate with Relevant Stakeholder
  2.1 – Manage Stakeholder Involvement
  2.2 – Manage Dependencies
  2.3 – Resolve Coordination Issues

New
Integrated Project Management -2

V1.1

SG 3 – Use the Project’s Shared Vision for IPPD
3.1 – Define the Project’s Shared Vision Context
3.2 – Establish the Project’s Shared Vision

SG 4 – Organize Integrated Teams for IPPD
4.1 – Determine Integrated Team Structure for the Project
4.2 – Develop Preliminary Distribution of Requirements to Integrated Teams
4.3 – Establish Integrated Teams

V1.2

SG3 – Apply IPPD Principles
3.1 – Establish the Project’s Shared Vision
3.2 – Establish Integrated Team Structure for the Project
3.3 – Allocate Requirements to Integrated Teams
3.4 – Establish Integrated Teams
3.5 – Establish Coordination among Interfacing Teams

Consolidated from V1.1 IPM PA SG3 and SG4
Consolidated from V1.1 Integrated Teaming PA
# Integrated Project Management -1

<table>
<thead>
<tr>
<th>Specific Goal</th>
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<tr>
<td>Use the Project’s Defined Process</td>
<td>1.1 – Establish the Project’s Defined Process</td>
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<td>1.4 – Integrate Plans</td>
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<td>1.5 – Manage the Project Using the Integrated Plans</td>
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<td>1.6 - Contribute to the Organizational Process Assets</td>
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**New**
## Integrated Project Management -2

<table>
<thead>
<tr>
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<tr>
<td>Coordinate and Collaborate with Relevant Stakeholder</td>
<td>2.1 – Manage Stakeholder Involvement&lt;br&gt;2.2 – Manage Dependencies&lt;br&gt;2.3 – Resolve Coordination Issues</td>
</tr>
<tr>
<td>Apply IPPD Principles</td>
<td>3.1 – Establish the Project’s Shared Vision&lt;br&gt;3.2 – Establish Integrated Team Structure for the Project&lt;br&gt;3.3 – Allocate Requirements to Integrated Teams&lt;br&gt;3.4 – Establish Integrated Teams&lt;br&gt;3.5 Establish Coordination among Interfacing Teams</td>
</tr>
</tbody>
</table>

The Specific Goal, “Apply IPPD Principles,” and the associated Specific Practices are part of IPPD Addition.
CMMI Model Combinations

**V 1.1**

- Supplier Sourcing
  - Integrated Product and Process Development
    - SE Related Examples
      - SW Related Examples
      - CMMI Core

**V 1.2**

- IPPD
  - Organizational Goal (OPD)
    - Project Goal (IPM)
  - SE Related Examples
    - SW Related Examples
      - Hardware Related Examples
      - CMMI Core (now includes SS)
Other Specific Practice Statement
Changes

Revised Practices

• OID, SP 1.4: Select process and technology improvements [not “improvement proposals”] for deployment across the organization
• OPP, SP 1.1: Select the processes or subprocesses [not “process elements”] in the organization’s set of standard processes that are to be included in the organization’s process performance analysis
Other Informative Changes  --

High capability practice elaborations
• Improvements being created for more significant process areas (engineering, project management)
• Continuous equivalent appraisals have shown the need…
High-leverage elements of the constructed process are identified to provide strategic management options in order to support timely and predictably beneficial control of project performance.
<table>
<thead>
<tr>
<th>Name</th>
<th>Abbr</th>
<th>ML</th>
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<th>CL3</th>
<th>CL4</th>
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<td>Causal Analysis and Resolution</td>
<td>CAR</td>
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</table>

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Example – Maturity Level 3

Equivalent to CMMI-SE/SW/IPPD/SS ML 3
Example – Maturity Level 4

Equivalent to CMMI-SE/SW/IPPD/SS ML 4
Example – Maturity Level 4

Equivalent to CMMI-SE/SW/IPPD/SS ML 4
Example – Maturity Level 4

Equivalent to CMMI-SE/SW/IPPD/SS ML 4

Plus 8,388,607 other combinations!!
Example – Maturity Level 5

Equivalent to CMMI-SE/SW/IPPD/SS ML 5
Example – Maturity Level 5

Equivalent to CMMI-SE/SW/IPPD/SS ML 5
Example – Maturity Level 5

Equivalent to CMMI-SE/SW/IPPD/SS ML 5

Plus 847,288,609,442 other combinations!!
Additional Complexity

Contractor A
ML 3 or
CLs 3,3,3…

Contractor B
ML 4 or
CLs 3,3,3…

Contractor C
ML 5 or
CLs 3,3,3…

Acquirer
ML ? Or
CLs ?,?,?...

My Program

CMMI Math: 3 + 4 + 5 + ? = ?
“Not applicable” process areas (PAs) for maturity levels will be significantly constrained.
The “Not Applicable” Dilemma

The Problem
The significance of an organization being appraised to be at Maturity Level x is affected by the model scope used for the appraisal. Process areas can be classified as not applicable.

The Solution
The model core is now defined to include all components of the model except the IPPD components. For a staged appraisal only Supplier Agreement Management and Integrated Supplier Management can be classified as not applicable in the core and only then after careful analysis.
Version 1.2 Changes

Bring ISM into baseline and incorporate into SAM
CMMI Model Combinations

V 1.1

Supplier Sourcing

Integrated Product and Process Development

SE Related Examples

SW Related Examples

CMMI Core

V 1.2

IPPD

SE Related Examples

SW Related Examples

Hardware Related Examples

CMMI Core (now includes SS)
## Supplier Agreement Management (before incorporation of ISM)

### Specific Goal

**Establish Supplier Agreements**

1.1 – Determine Acquisition Type  
1.2 – Select Suppliers  
1.3 – Establish Supplier Agreements

**Satisfy Supplier Agreements**

2.1 – Execute the Supplier Agreement  
2.2 – Accept the Acquired Product  
2.3 – Transition Products

---

v1.1 SP2.1 “Review COTS Products,” was eliminated. “Identify candidate COTS products that satisfy requirements” is a new subpractice under the Technical Solutions Process Area SP1.1, “Develop Alternative Solutions and Selection Criteria.”
Version 1.2 Changes - Recap

Major changes to expect for Version 1.2 include:

- Addison-Wesley book used as starting baseline
  - “single book” approach (CMMI-Development + IPPD)
- Hardware amplifications added
- Amplifications improved
- Common features and advanced practices eliminated
- “Not applicable” process areas (PAs) for maturity levels will be significantly constrained
- Glossary improved (e.g., higher level management, bidirectional traceability, subprocess)
- Overview text improved
- Work Environment material added to OPD and IPM
- IPPD coverage consolidated and simplified
- ISM will be brought into SAM
Generic Practice Changes

GP 1.1: The practice title and statement changed from Perform Base Practices to Perform Specific Practices.

GP 2.2: The informative material was condensed to be more similar in size to other generic practices.

GP 2.4, Subpractice 1: “Authority” was added to stress assigning both responsibility and authority.

GP 2.6: “Levels of configuration management” was changed to “under appropriate levels of control” in the GP statement.

GP 5.2: Added informative material explaining the need for at least one quantitatively managed process.
Translations

Japanese
- sponsored by Information-Technology Promotion Agency (IPA)
- CMMI models available
- *Introduction to CMMI* course available to authorized instructors

Traditional Chinese
- sponsored by the Institute for Information Industry (III)
- CMMI models available
- translation of *Introduction to CMMI* course underway

German Translation
- plans are being developed
Applying CMMI in Small Settings

Where are we with our work in small settings?
- completed technical feasibility pilots in Huntsville, Alabama with two small companies in the US Army supply chain
- posted the toolkit from this pilot for review: [http://www.sei.cmu.edu/ttp/publications/toolkit](http://www.sei.cmu.edu/ttp/publications/toolkit)
- chartered a project to further research in and evolve guidance for CMMI in Small Settings (CSS)

Where are we going?
- International Research Workshop for Process Improvement in Small Settings held October 19-20, 2005
- call for Interest in CSS project is posted on SEI web: [http://www.sei.cmu.edu/cmmi/acss/participation.html](http://www.sei.cmu.edu/cmmi/acss/participation.html)
SCAMPI A Changes Considered for v1.2

Affirmation Clarifications
• clarify the use of “virtual” vs. “live” interviews
• change “face-to-face” affirmations to “oral” affirmations

Alternative Practice Characterization
• clarify how alternative practices are mapped and characterized

Practice Characterization Rules
• revise and clarify practice characterization rules in the SCAMPI Method Definition Document (MDD) Section 2.2.2

Incremental appraisals
• conduct appraisal in organization or model increments

Organizational unit sampling

Maturity level and capability level shelf life
Proposed ARC V1.2 Changes

Remove requirement for instruments
• Only two types of Objective Evidence – Documents and Interviews
• Thus presentations may be either documents or interviews

Clarify “Not Rated”
• Process Areas out of the model scope are “Out of Scope”
• Process Areas that cannot be rated are “Not Rated”
Proposed Method Definition Document (MDD) v1.2 Changes-1

Affirmation Clarifications
- clarify the use of “virtual” vs. “live” interviews
- change “face-to-face” affirmations to “oral” affirmations

Alternative Practice Characterization
- clarify how alternative practices are mapped and characterized
- described in new Appendix C

Practice Characterization Rules
- revise and clarify practice characterization rules in the SCAMPI MDD Section 2.2.2
- change “substantial” weakness to “weakness”
- make rules consistent
- add “Not Yet” characterization to table
## Practice Characterization Rules-1

<table>
<thead>
<tr>
<th>Label</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| **Fully Implemented (FI)**   | • One or more direct artifacts are present and judged to be adequate and  
                                 • at least one indirect artifact and/or affirmation exists to confirm the implementation and  
                                 • no weaknesses are noted.                                                            |
| **Largely Implemented (LI)** | • One or more direct artifacts are present and judged to be adequate, and  
                                 • at least one indirect artifact and/or affirmation exists to confirm the implementation and  
                                 • one or more weaknesses are noted.                                                    |
### Practice Characterization Rules-2

<table>
<thead>
<tr>
<th>Label</th>
<th>Meaning</th>
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<tbody>
<tr>
<td><strong>Partially Implemented (PI)</strong></td>
<td></td>
</tr>
</tbody>
</table>
• Direct artifacts are absent or are judged to be inadequate, and  
• one or more indirect artifacts or affirmations suggest that some aspects of the practice are implemented, and  
• one or more weaknesses are noted  

OR  
• one or more direct artifacts are present and judged to be adequate, and  
• no other evidence (indirect artifacts, affirmations) supports the direct artifact(s), and  
• one or more weaknesses are noted. |
| **Not Implemented (NI)** |  
• Direct artifacts are absent or judged to be inadequate, and  
• no other evidence (indirect artifacts, affirmations) supports the practice, and  
• one or more weaknesses are noted. |
| **Not Yet (NY)** |  
• The project has not yet reached the stage in the lifecycle to have implemented the practice |
Incremental appraisals
  • conduct appraisal in organization or model increments

Organizational unit sampling, including for Enterprise appraisals

Maturity Level and Capability Level shelf life

Require Sponsor to sign the Appraisal Disclosure Statement
  • agrees that CMMI Steward may review any appraisal artifacts and conduct any audits deemed necessary
Beyond CMMI v1.2 – Training

The SEI plans the following enhancements to CMMI training:

- update the *High Maturity with Statistics* course
- create a new course that addresses interpretation and implementation issues
- make a new course available that provides insight into using Team Software Process℠/Personal Software Process℠ and CMMI
For More Information…

For more information about CMMI
- [http://www.sei.cmu.edu/cmmi/](http://www.sei.cmu.edu/cmmi/) (main CMMI site)

Other Web sites of interest include
- [http://seir.sei.cmu.edu/seir/](http://seir.sei.cmu.edu/seir/) (Software Engineering Information Repository)
- [http://dtic.mil/ndia](http://dtic.mil/ndia) (annual CMMI Technology Conferences)
- [http://seir.sei.cmu.edu/pars](http://seir.sei.cmu.edu/pars) (publicly released SCAMPI appraisal summaries)
- [https://bscw.sei.cmu.edu/pub/bscw.cgi/0/79783](https://bscw.sei.cmu.edu/pub/bscw.cgi/0/79783)

Or, contact
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Phone: 412 / 268-5800
Email: customer-relations@sei.cmu.edu