

# CMMI Model Changes for High Maturity

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2008 SEPG Conference  
Tampa, Florida

## Problem Statement

- **High maturity practices are not consistently understood, applied, or appraised**
  - SEI is addressing the training and appraisal portions of the CMMI Product Suite; e.g.,
    - Understanding CMMI High Maturity Practices course
    - Several recent presentations by SEI personnel
    - High Maturity Lead Appraisers certification
  - However, there is insufficient foundation for these “raise-the-floor” interpretations in CMMI v1.2
    - Goals do not establish the requirements
    - Practices do not establish the expectations
    - Informative material purported to take on greater importance.

# Eating Your Own Dog Food

- Requirements Management SG1:
  - Requirements are managed and inconsistencies with project plans and work products are identified
- CMMI Product Suite Management SG1:
  - CMMI model requirements are managed and inconsistencies with CMMI training courses and appraisal methods are identified.

# Approach

- Draft proposed changes
  - CMMI Model & SCAMPI Method Changes for High Maturity (Herb Weiner, May 2007)
- Solicit feedback from SEI authorized people via ATLAS
  - **ATLAS = Ask The Lead AppraiserS**
    - ATLAS has been expanded to include CMMI instructors
    - Candidate lead appraisers and instructors also included
- Publish results to SEI authorized individuals
- Submit CRs to SEI for consideration
- Update model to re-align the CMMI Product Suite.

# ATLAS Feedback

- For each proposed change, respondents indicated:
  - Strongly support (It's perfect!)
  - Support (It's better)
  - Are ambivalent (It's OK either way)
  - Disagree (It's worse)
  - Strongly disagree (What were you thinking?)
- Ratings were determined on a +1 to -1 scale as follows:
  - Strongly support = +1.0
  - Support = +0.5
  - Ambivalent = 0.0
  - Disagree = -0.5
  - Strongly disagree = -1.0
- For each change, the average rating will be displayed for:
  - [High Maturity Lead Appraisers, Other SEI authorized individuals]

# Proposed OPP Changes

# OPP Proposed Change #1 of 4

Move SP 1.3 to SP 1.1 (.50, .51)

## Current:

- SP 1.1 Select Processes
- SP 1.2 Establish Process-Performance Measures
- SP 1.3 Establish Quality and Process-Performance Objectives

## Proposed:

- SP 1.1 Establish Quality and Process-Performance Objectives
- SP 1.2 Select Processes
- SP 1.3 Establish Process-Performance Measures

- MA, OPF, and QPM establish objectives in SP 1.1.

# OPP Proposed Change #2 of 4

Revise OPP SP 1.4 (.39, .42)

## Current:

Establish and maintain the organization's process-performance baselines.

## Proposed:

Conduct process-performance analyses on the selected processes and subprocesses to verify process stability and to establish and maintain the organization's process-performance baselines.

- SP 1.1 & 1.2 indicate process-performance analysis will be conducted, but that's the last we hear of it
- Baselines are established for stable processes
  - Elevate this from informative to expected.

# OPP Proposed Change #3 of 4

Revise OPP SP 1.5

(.59, .50)

## Current:

Establish and maintain the process-performance models for the organization's set of standard processes.

## Proposed:

Establish and maintain models that predict process performance related to the quality and process-performance objectives.

- The SEI's new training courses emphasize use of process-performance models with respect to quantitative objectives
  - Focusing this practice on these objectives achieves better alignment between the model and training.

# OPP Proposed Change #4 of 4

Enhance the informative material

(.36, .44)

## Proposed:

Modify informative material that suggests improving process performance such as the examples found in OPP SP 1.3 (which imply that common causes of variation be addressed)

Add new informative material should indicate that, at ML4/CL4, achieving such improvement might be addressed via OPF and GP3.1, while at ML5/CL5, it is more likely to be achieved through CAR, OID, and GP5.2

- In order to delineate level 4 from level 5, the model should avoid implying that common causes of variation are addressed at level 4
  - ML4/CL4: Process stability / execution consistency / special causes
  - ML5/CL5: Improving capability / systemic improvement / common causes.

# Proposed QPM Changes

## QPM Proposed Change #1 of 4

Revise QPM SP 1.4

(.54, .57)

Current:

*SP 1.4 Manage Project Performance*

Monitor the project to determine whether the project's objectives for quality and process performance will be satisfied, and identify corrective action as appropriate.

Proposed:

*SP 1.4 Analyze Project Performance*

Analyze the collective performance of the project's subprocesses to predict whether the project's objectives for quality and process performance will be satisfied and identify the need for corrective action as appropriate.

- Fixes mismatch between the current title and practice statement
- Recognizes that project management deals with both quantitatively managed, and non-quantitatively managed processes.

## QPM Proposed Change #2 of 4

Add QPM SP 1.5

(.39, .46)

Current: <None>

Proposed:

### SP 1.5 Use Process-Performance Models

Use calibrated process-performance models throughout the life cycle to identify, analyze, and execute corrective action when necessary.

- Currently, PPMs aren't expected to be used in QPM
  - But use throughout life cycle appears to be expected by SEI
- PPMs may support process or subprocess activities
  - Added practice to SG 1, but it could have been added to SG2.

## QPM Proposed Change #3 of 4

Add QPM SP 2.3

(.64, .48)

Current: <None>

Proposed:

### SP 2.3 Address Special Causes of Variation

Identify, address, and prevent reoccurrence of special causes of variation in the selected subprocesses.

- "Special causes" are featured in SEI materials
  - Currently "special causes" are only in QPM's informative material
- The Glossary definition of "stable process" includes "...and prevent reoccurrences of special causes"
- Add informative material to ensure that process performance data and statistical techniques are used appropriately.

# QPM Proposed Change #4 of 4

Revise QPM SP 2.3 (now **SP 2.4**) (.59, .46)

## Current:

### SP 2.3 *Monitor Performance of the Selected Subprocesses*

Monitor the performance of the selected subprocesses to determine their capability to satisfy their quality and process-performance objectives, and identify corrective action as necessary.

## Proposed:

### SP 2.4 *Analyze Performance of the Selected Subprocesses*

Analyze the performance of the selected subprocesses to predict their capability to satisfy their quality and process-performance objectives, and identify and take corrective action as necessary.

- “Analyze” is a much stronger word than “monitor”
- “Predict” is a much stronger word than “determine”
- Emphasize “taking corrective action,” not just identifying it.

# Proposed CAR Changes



# CAR Proposed Change #1 of 7

## Thematic Change

(.50, .46)

- Currently, there is little to suggest that CAR should target statistically managed subprocesses to identify and analyze common causes of variation to address:
  - Stable processes with unacceptably high standard deviations;
  - Stable processes not capable of achieving quality or process performance objectives; and
  - Stable and capable processes that might be improved to enhance competitive advantage
- Change the focus of CAR's specific goals and practices from "defects and other problems" to "problems"
  - By collapsing this phrase, model users will not limit their application of CAR to the subset of problem candidates called "defects"
  - Also include a discussion of "opportunities" in the informative material.

# CAR Proposed Change #2 of 7

## Revise CAR SG 1

(.56, .63)

### Current:

#### SG 1 *Determine Causes of Defects*

Root causes of defects and other problems are systematically determined.

### Proposed:

#### SG 1 *Determine and Analyze Causes*

Common causes of variation and root causes of problems are systematically analyzed.

- Reflects the Thematic Change
- "Analyzed" is a stronger word than "determined".

# CAR Proposed Change #3 of 7

Revise CAR SP 1.1

(.64, .53)

## Current:

### SP 1.1 *Select Defect Data for Analysis*

Select the defects and other problems for analysis.

## Proposed:

### SP 1.1 *Select Data for Analysis*

Select for analysis, using established criteria, quantitatively managed processes that are candidates for improvement as well as problems that have a significant effect on quality and process performance.

- Reflects the Thematic Change
- “Significant effect” emphasizes quantitatively managed processes.

# CAR Proposed Change #4 of 7

Revise CAR SP 1.2 and add SP1.3-SP 1.4

(.44, .57)

## Current:

### SP 1.2 *Analyze Causes*

Perform causal analysis of selected defects and other problems and propose actions to address them.

## Proposed:

### SP 1.2 *Analyze Common Causes*

Analyze common causes of variation to understand the inherent quality and process performance constraints.

### SP 1.3 *Analyze Root Causes*

Perform causal analysis on selected problems to determine their root causes.

### SP 1.4 *Propose Actions to Address Causes*

Propose actions to address selected common causes of variation and to prevent recurrence of selected problems.

- Reflects the Thematic Change.
- Establishes expectations for BOTH common causes and root causes.

# CAR Proposed Change #5 of 7

Add CAR SP 1.5 (.52, .58)

Current: <None>

Proposed:

*SP 1.5 Predict Effects of Proposed Actions*

Use process performance models and statistical techniques to predict, in quantitative terms, the effects of the proposed actions, as appropriate.

- Reflects the SEI's expected use of PPMs and statistical methods in high maturity organizations
- Supports proper cost/benefit analysis.

# CAR Proposed Change #6 of 7

Revise CAR SG 2, SP 2.1 – SP 2.2

Current:

*SG 2 Analyze Causes*

Root causes of defects and other problems are systematically addressed to prevent their future occurrence.

*SP 2.1 Implement the Action Proposals*

Implement the selected action proposals that were developed in causal analysis.

*SP 2.2 Evaluate the Effect of Changes*

Evaluate the effect of changes on process performance.

Proposed:

*SG 2 Address Causes*

Common causes of variation and root causes of problems are systematically addressed to quantitatively improve quality and process performance.

*SP 2.1 Implement the Action Proposals*

Implement selected action proposals that are predicted to achieve a measurable improvement in quality and process performance.

*SP 2.2 Evaluate the Effect of Implemented Actions*

Evaluate the effect of implemented actions on quality and process performance.

# CAR Proposed Change #6 of 7

Proposed: (Copied from previous slide)

(.46, .64)

## SG 2 Address Causes

Common causes of variation and root causes of problems are systematically addressed to quantitatively improve quality and process performance.

### SP 2.1 Implement the Action Proposals

Implement selected action proposals that are predicted to achieve a measurable improvement in quality and process performance.

### SP 2.2 Evaluate the Effect of Implemented Actions

Evaluate the effect of implemented actions on quality and process performance.

- Reflects the Thematic Change
- Wording enhanced to focus on measurable improvement of “quality and process performance” – a phrase reserved for high maturity practices
- SP 2.2 modified to include quality as well as process performance
  - A perceived oversight in the current practice.

# CAR Proposed Change #7 of 7

Revise CAR SP 2.3

(.48, .41)

## Current:

### SP 2.3 Record Data

Record causal analysis and resolution data for use across the project and organization.

## Proposed:

### SP 2.3 Submit Improvement Proposals

Submit process- and technology-improvement proposals based on implemented actions, as appropriate.

- Proposed practice relies on OID to determine “use across the project and organization”
  - Recognizes that CAR may have been applied locally but the resulting improvements may be more broadly applicable.

## CAR Proposed Change #8 of 7

- CAR is the only high maturity process area with no lower-level foundation
  - OPP – OPD & MA
  - QPM – PP, PMC & IPM
  - OID – OPF & OPD
- Several alternatives were explored via ATLAS:
  0. Leave CAR exactly as it is (-.08,-.19)
  1. Add “Causal Analysis” PA at ML2 (-.45,-.55)
  2. Add “Causal Analysis” PA at ML3 (-.45,-.26)
  3. Add “Causal Analysis” practice to PMC SG2 (+.09,+0.16)
  4. ADD “Issue & Causal Analysis” PA at ML2 (-.55,-.22)
  5. Add “Causal Analysis” goal to OPF (-.45,-.22)

## Proposed OID Changes

# OID Proposed Change #1 of 7

Revise OID SG 1 (.66, .63)

## Current:

### SG 1 *Select Improvements*

Process and technology improvements, which contribute to meeting quality and process-performance objectives, are selected.

## Proposed:

### SG 1 *Select Improvements*

Process and technology improvements are identified proactively, evaluated quantitatively, and selected for deployment based on their contribution to quality and process performance.

- Somewhat passive vs. very proactive
- Focus on quantitative evaluation and ongoing improvement.

# OID Proposed Change #2 of 7

Revise OID SP 1.1 (.66, .43)

## Current:

### SP 1.1 *Collect and Analyze Improvement Proposals*

Collect and analyze process- and technology-improvement proposals.

## Proposed:

### SP 1.1 *Solicit Improvement Proposals*

Solicit proposals for incremental process and technology improvements.

- “Solicit” is more proactive than “collect”
- “Analysis” is deferred to SP 1.3 and SP 1.4
- Explicitly targets incremental improvements.

## OID Proposed Change #3 of 7

Revise OID SP 1.2

(.65, .50)

### Current:

#### *SP 1.2 Identify and Analyze Innovations*

Identify and analyze innovative improvements that could increase the organization's quality and process performance.

### Proposed:

#### *SP 1.2 Seek Innovations*

Seek and investigate innovative processes and technologies that have potential for significantly improving the organization's quality and process performance.

- “Seek and investigate” is more proactive than “identify”
- “Analysis” is deferred to SP 1.3 and SP 1.4
- Focuses on “significant” performance enhancement.

## OID Proposed Change #4 of 7

Add OID SP 1.3

(.68, .44)

Current: <None>

### Proposed:

#### *SP 1.3 Model Improvements*

Use process performance models, as appropriate, to predict the effect of incremental and innovative improvements in quantitative terms.

- Adds modeling as an additional “filter”
- Supports quantitative cost/benefit analysis.

## OID Proposed Change #5 of 7

Revise OID SP 1.3 (now SP 1.4) (.70, .61)

### Current:

#### SP 1.3 *Pilot Improvements*

Pilot process and technology improvements to select which ones to implement.

### Proposed:

#### SP 1.4 *Pilot Improvements*

Pilot proposed improvements, as appropriate, to evaluate the actual effect on quality and process performance in quantitative terms.

- Piloting performed “as appropriate”
- Provides rationale for implementation.

## OID Proposed Change #6 of 7

Revise OID SP 1.4 (now SP 1.5) (.67, .51)

### Current:

#### SP 1.5 *Select Improvements for Deployment*

Select process and technology improvements for deployment across the organization.

### Proposed:

#### SP 1.4 *Select Improvements for Deployment*

Select process and technology improvements for deployment across the organization based on an evaluation of costs, benefits, and other factors.

- Provides cost and benefits as the basis for selection
- “Other factors” provides flexibility.



# OID Proposed Change #7 of 7

Replace OID SP 2.3 (.70, .63)

## Current:

### SP 2.3 *Measure Improvement Effects*

Measure the effects of the deployed process and technology improvements.

## Proposed:

### SP 2.3 *Measure Improvement Effects*

Evaluate the effects of deployed improvements on quality and process performance in quantitative terms.

- Specifies evaluation criteria
- Indicates “quantitative” evaluation
- New informative material – update baselines/models.

# What's Next?

# Change Requests

1. Since the feedback related to the proposed changes was primarily supportive, all will be submitted as Change Requests to the SEI for consideration.
2. Change request submitted for UCHMP course – add exercise to re-write high maturity practices using ATLAS results as the base.

# Now It's YOUR Turn!

- Handout contains ATLAS #12Z proposing:
  - Consolidating ML5 PAs into ML4
  - Changing ML5 to “Sustaining Excellence”
    - Achieve ML4
      - ML4 = OPP, QPM, CAR, & OID
      - No additional process areas at ML5
    - Perform at high maturity for 2 contiguous years
    - Demonstrate sustained business benefit as well
  - Submit your input to [PACT.otoole@att.net](mailto:PACT.otoole@att.net)
    - Results will be published to all submitters.

# Questions?



## Download & Contact Information

Refer to the following websites to:

- Contact the authors
- Download the final SEPG 2008 presentation
- Download the supporting ATLAS 12A – 12D results
- Download the *CMMI Model and SCAMPI Method Changes* presentation from the May 2007 San Francisco Beyond CMMI v1.2 Workshop

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