

High Maturity Measurement: Workshop Overview

Software Engineering Institute
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20 March 2008



Topics

1. **Overview**
2. Interpretation of Process Performance Models & Baselines
3. The SEMA research project on CMMI high maturity



Problem Addressed

An insufficient shared understanding of *high maturity* measurement

- Confusion about what is necessary to meet the goals of CMMI based process improvement

More & better guidance needed throughout the community

- Including appraisers
- Value of improving measurement capability often not appreciated in lower maturity organizations

Need for continuous improvement as the field matures

- Understanding high maturity practices in organizational context
- Sharing experiences in the wider community



Approach₁

Two related community workshops

- Topics structured based on
 - “Focus groups” at Lead Appraiser conferences
 - Measurement State of the Practice survey results
 - Our own experiential knowledge

First workshop limited to a small number of leaders in the implementation of high maturity measurement practices will:

- Review current best practices
 - From the perspectives of the invited participants & SEI experts
- Ensure common understanding among workshop participants
- Share experiences about barriers to & facilitators of successful adoption & continued use



Approach₂

Second workshop open to a wider audience will:

- Provide guidance on current best practice
 - From SEI experts & other leaders in the field
 - Augmented by lessons learned by participants during & after the first workshop
- Presentations by participants from the first workshop will provide:
 - Descriptions of their measurement procedures
 - Examples of measurement results from their initial analyses
... Normalized & sanitized as necessary ... and feasible ...
 - Descriptions of their experiences with adoption issues & the use of their results
- Pertinent results from the 2008 SEI State of the Measurement Practice survey also may be included



Schedule

20 - 21 March 2008 ... Invited Workshop held

March - July 2008 ... Preparation for Community Workshop

~ May - June 2008 ... SEI Technical Note published

late July 2008 ... Community Workshop held

~ September - October 2008 ... SEI Technical Report published



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Essential Ingredients of CMMI Process Performance Models

Statistical, probabilistic or simulation in nature

Predict interim and/or final project outcomes

Use controllable factors tied to sub-processes to conduct the prediction

Model the variation of factors and understand the predicted range or variation of the outcomes

Enable “what-if” analysis for project planning, dynamic re-planning and problem resolution during project execution

Connect “upstream” activity with “downstream” activity

Enable projects to achieve mid-course corrections to ensure project success



All Models (Qualitative and Quantitative)

Quantitative Models (Deterministic, Statistical, Probabilistic)

Statistical or Probabilistic Models

Interim outcomes predicted

Controllable x factors involved

**Process Performance Model -
With controllable x factors tied to Processes and/or Sub-processes**

Only phases or lifecycles are modeled

Only uncontrollable factors are modeled

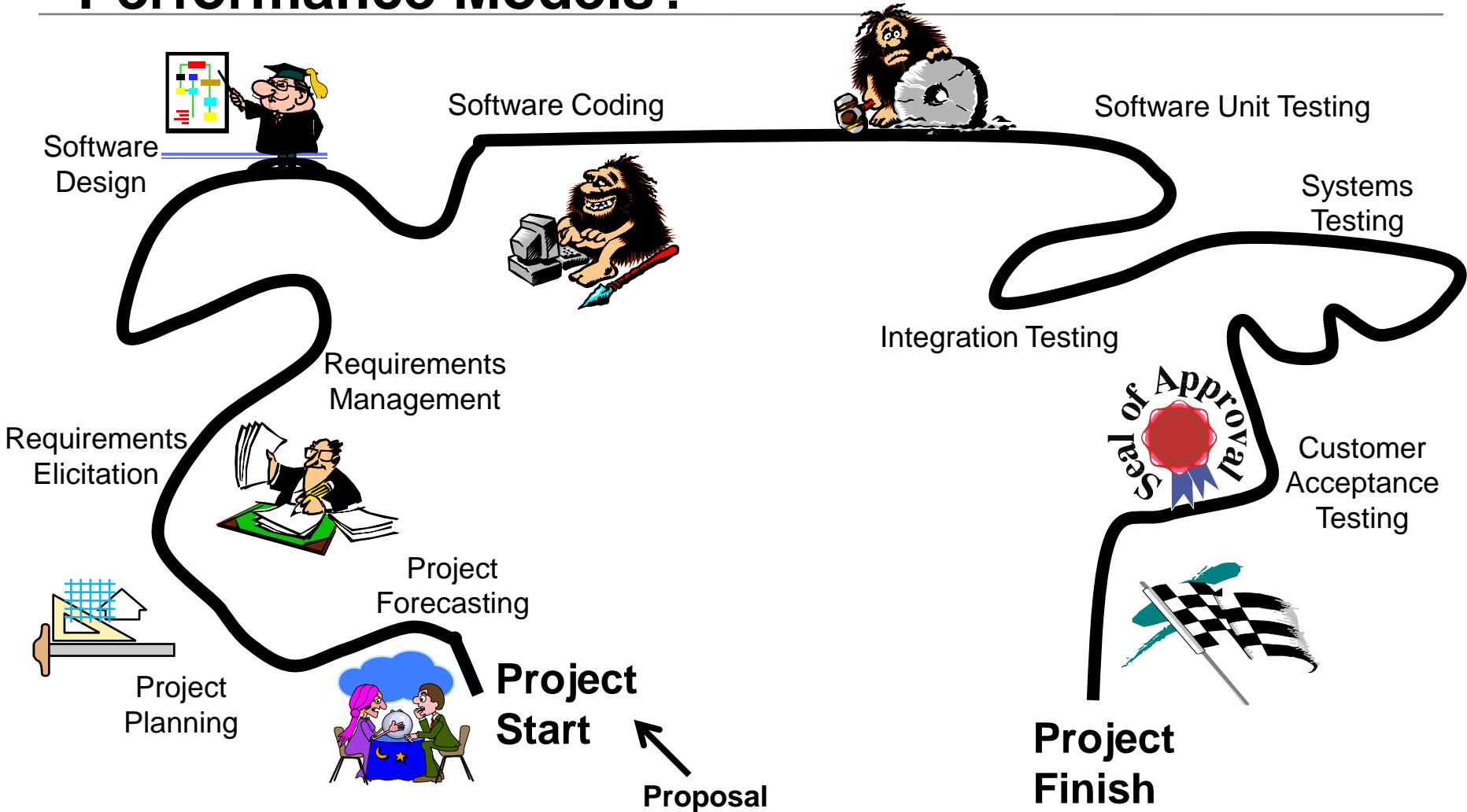
Only final outcomes are modeled

No uncertainty or variation modeled

Anecdotal Biased samples



When and Why Do We Need Process Performance Models?



Topics

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Goals, Outcomes & Deliverables₁

Provide detailed guidance & related decision support about proper implementation of high maturity measurement practices

- Leading to better practice & wider adoption throughout the community

Initial focus

- Properly selecting & correctly using appropriate measurement practices
- Examples of exemplary practices & common errors
- Indexed & cross referenced by CMMI practices
- Including “lessons learned” guidance about organizational barriers & facilitators of successful adoption & use

Initial primary deliverables:

- An SEI Technical Note & an SEI Technical Report



Goals, Outcomes & Deliverables₂

Primary technical focus

- Methods for process performance baselining & modeling
- Selection of appropriate statistical, experimental & simulation methods
- Statistical Process Control

Other likely topics for current & future work include:

- Statistical methods for modeling & hypothesis testing
 - Simple bivariate & multivariate methods
 - Structural equation modeling; missing data imputation
- Issues of data quality & integrity
- Estimating & documenting ROI & related financial measures
- Use of lessons learned repositories to assist in root cause analysis



Goals, Outcomes & Deliverables₃

Deliverables being considered for future related SEMA taskings

- SEI Technical Reports
- Publications & conference presentations
- SEI course materials
- May consider intelligent tutoring & contextual help delivery mechanisms
- Possible incorporation into decision support tools

Possibilities for additional collaborative activities

- A continuing series of workshops
- Webinars & other web-based discussion forums
- Traditional & on-line SEI publications
- Other joint research activities



Goals & Desired Outcomes ... for this Workshop

1. List of barriers that organizations are facing
 - As well as, lessons learned in the deployment, training, adoption & institutionalization of CMMI process performance baselines & models
2. Best practices &/or alternate examples of valid, practical methods for implementing process performance models & baselines
3. List of data quality & integrity issues encountered
 - As well as plans by participants to conduct formal Measurement System Evaluations as taught in the IPPSS class
4. Participant plans for specific modeling over the next ~4 months
 - Including the nature of the performance outcomes & drivers most likely to be investigated
5. Your ideas for topics to include in the 2008 SEI of the state-of-the-measurement-practice survey



Anticipated Results of the Second Workshop

1. A coordinated empirical study of CMMI-based process performance baselines & models ... with a focus on:
 - Controllable & uncontrollable drivers of common performance outcomes
 - Lessons learned in deployment, training, adoption & institutionalization
 - Data quality & integrity issues encountered
 - Practical methods that encourage implementation & use
2. Your ideas for topics to include in future SEI studies & state-of-the-measurement-practice surveys
 - Applied to other high maturity measurement topics in addition to process performance models & baselines
3. Requirements definition for a possible SEMA course
 - “Coaching Adoption & Institutionalization of CMMI Process Performance Models & Baselines”



Preparation for the Second Workshop

Creation of participant reports for second workshop

- Selection of specific topics
- Further analysis where appropriate
- In consultation with SEI technical staff

A standard report template

- To emphasize & remind you of criteria for inclusion
- & to facilitate comparisons in presentations & other published reports
- Similar to one used for case descriptions in CMU/SEI-2006-TR-004

These are *current* plans

- Please think about what else you think is (or is not) pertinent
- Your suggestions for others who should be invited to participate in this effort



Tentative Report Template₁

Criteria for inclusion

- Sufficient detail to for others to understand what you actually did
- Without giving away the store...
- Including actual measurement results ... normalized to respect your need for non disclosure of proprietary information ... as feasible

General description of new or changed subpractices that led to the performance results

- Organizational scope of the improvement effort
- Elapsed time, staff effort or approximate budget proportion expended



Tentative Report Template₂

Performance outcome, subpractice & contextual measures used

- How & why you chose to use those measures
- Measures of process enactment or compliance
- Methods by which the data were collected & analyzed
- Actions that were taken as a result of the analyses

Type of product(s) or service(s)

- Aspects of product size, complexity, criticality or precedentedness

Organizational context

- Organization & project size, sector & application domains
- Staff skills
- Acquisition or other contractual obligations



Tentative Report Template₃

High level description of data sets & analytic methods used

- Analysis techniques used & the criteria for using them
- Number of data points & sampling criteria for selecting them
- Processes, mechanisms or tool support that facilitated timely & accurate data collection, storage, or analysis
- Evidence showing that the results can properly be attributed to CMMI based processes as opposed to other factors or unintended measurement effects

Specific quantitative results

- Short description of each individual result in quantitative terms
- Normalized or sanitized as necessary
- Special caveats, exceptions or other pertinent clarifications



The SEI State-of the Measurement Practice Study: 2008 Focus on High Maturity Measurement₁

Survey sample

- Sample stratified to include a sufficient number of respondents from organizations that have been appraised at CMMI maturity levels 4 & 5
- For comparative purposes: Including respondents from organizations that have been appraised at maturity level 3 & those that have failed to achieve maturity levels 4 or 5

Content: Important issues faced in adoption & use

- Particularly process performance baselines & models
- Selection of appropriate statistical, experimental & simulation methods
- Data quality & integrity
- Barriers to & facilitators of successful adoption & use in the respondents' organizations



The SEI State-of the Measurement Practice Study: 2008 Focus on High Maturity Measurement₂

Again, these are *current* plans

- Please think about the details of what *you'd* like to know
- Especially experience about what you & others have done (or continue to do) wrong



Thank You for Your Attention!

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