Experiences in the Application of MDD v1.3 Sampling Factors

Bradley Bittorf
Raytheon Missile Systems
Abstract #13485
Topic Overview, Objectives

- Raytheon Missile Systems Organizational Unit overview
- About the v1.3 Method Definition Document (MDD) scoping and sampling provisions
- Case study: RMS’ experience with applying scoping and sampling
- Experiences and Lessons
  - Questions
  - Biography
Raytheon Missile Systems CMMI® Background

- Raytheon Missile Systems
  - One business of Raytheon
    - Characterized by high-volume, complex systems--“Rocket Science”
    - A large organization
  - Appraised at Maturity Level 5 for CMMI® for Development version 1.2 +IPPD in 2009
  - Next appraisal in 2012
    - Selected CMMI-DEV v1.3 using v1.3 of the Method Definition Document (MDD)
    - To use MDD v1.3, we must satisfy the scoping and sampling provisions
Summary of v1.3 Sampling and Scoping

- MDD version 1.3 calls out scoping and sampling in section 1.1.4 (Implementation Guidance)

- How does this guidance affect my organization? (How bad is it?)
  - Sources of information
    - Software Engineering Institute (SEI) webinars
    - SEI staff and others at conferences
    - Lots of reading of the MDD and its appendices
    - Try things
    - Ask questions!
Applying MDD v1.3 Sampling Factors

- Sampled projects / basic units (always were) representative of the Organizational Unit (OU)

- Define and evaluate dimensions which cause behavior within OU to vary
  - Set of required (to be considered) sampling factors is described in MDD Appendix F
  - Select those sampling factors which make a difference in process execution in your OU
    - Use sampling factors to determine your subgroups
  - Determine whether support functions exist in your organization
  - Use selected sampling factors, subgroups and support functions to construct a representative sample of your OU
    - Document these in your appraisal plan and package
    - Might result in more, or fewer, instantiations than appraisals conducted under MDD v1.2

Note: Terms in italics can be found in MDD glossary

For instance, “Basic Unit,” “Sampled Basic Unit (SBU),” “Support function,” “[Sampled] Subgroup”
Tips for Applying the v1.3 Sampling and Scoping Provisions

- Become familiar with the case studies in MDD Appendix F
- Gather information about your OU
- Construct various scenarios related to your own organization
  - Remember to base appraisal objectives on your goals
  - Peer review
  - Have others ask questions
  - Iterate as necessary
- Vary parameters and OU dimensions to see how factors affect your appraisal
  - Constraining the OU is a useful tool
    - You may find that two appraisals is a better solution than one big appraisal
- Declare and use appropriate support functions to reduce instantiations
  - Effort is required to initially adjudge whether appropriate to declare a support function
  - Probable effort savings over the appraisal life cycle
- Don’t give up!
Once Approach is Decided, Share with Stakeholders

- Share approach with lead appraiser
  - Process will be iterative
  - Don’t assume your lead appraiser has already applied all the provisions of sampling and scoping at other sites
    - Your OU is (probably) unique

- Share with appraisal team
  - Also iterative process
  - Start with internal team members
  - Use internal members to educate external team members
  - Involve all members of team
    - Including any who don’t often lead
    - Ensure understanding and buy-in

- Share with other stakeholders
  - Appraisal team members can brief sponsors, managers, basic unit leaders
Sampling Factors to be Considered

- The MDD requires organizations to construct a representative sample of the organization. Sampling factors serve to identify meaningful differences in the conditions under which work is performed in the organization. The following sampling factors must be considered:
  - Location
  - Customer
  - Size
  - Organizational Structure
  - Type of work
  - [Others]
Case Study: RMS Application of SEI

RMS appraisal team considered the potential influential contributors to variation in the conditions under which our work is performed.

<table>
<thead>
<tr>
<th>Sampling Factor</th>
<th>Applicability to RMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Single location, scope of appraisal is defined as “RMS, Tucson, Arizona.”</td>
</tr>
<tr>
<td>Customer</td>
<td>Product lines account for different customers.</td>
</tr>
<tr>
<td>Size</td>
<td>Period of performance accounts for size.</td>
</tr>
<tr>
<td>Organizational structure</td>
<td>Product lines account for different organizational structure.</td>
</tr>
<tr>
<td>Type of work</td>
<td>Tiers account for the type of work.</td>
</tr>
</tbody>
</table>
Case Study: RMS Factor Analysis
Summary

- All criteria which are within scope are subsumed by RMS program tiers
  - RMS has defined “tiers” as categories of like programs based on their end use

- The RMS appraisal team mapped sampling factors and selected tiers as the critical factor used to attain the representative sample for RMS
Observations and Experiences

- Become familiar with the intent and details of the sampling algorithm
  - Examples and case studies helped us more than explanations
    - Some of our most applicable examples came from Services rather than Development
  - Always go back to the MDD explanations to understand what flexibility exists

- Version 1.3 will probably drive a change in your appraised set of instantiations
  - More diverse work and project / basic unit types can anticipate a more complex appraisal, or more separate appraisals
  - More consistent, homogenous organizations probably have a smaller appraisal burden using v1.3

- Support functions can reduce the appraisal burden
  - You must decide which support functions are appropriate to declare for your appraisal
    - Gain consensus with the appraisal team regarding the use of support functions in your appraisal
    - Invest early work to demonstrate support function appropriateness to save downstream work over the appraisal lifetime
  - You can still appraise support function disciplines the “traditional” way
Questions?
Presenter Biography

Bradley Bittorf

• Senior Principal Multi-discipline Engineer, Raytheon Missile Systems, Tucson, AZ
  • bjbittorf@raytheon.com
  • +1.520.545.9359

Recent roles

• Raytheon Missile Systems CMMI project team
• Raytheon Business Point of Contact to SEI
• Member of several CMMI appraisal teams

28 years engineering experience

• Functions: software, systems engineering, program management liaison, process improvements
• Industries: cell phones, industrial automation, missile systems
  • 3 patents – high-reliability systems, redundancy, inter-process communication

Personal

• Long-time science fair judge
• Officer of the International Lilac Society
• Together with his wife Debbie, is a rated geocacher in the desert southwest
• Cat rescue