Appraisals and CMMI Gotchas

Lessons in CMMI Use and Appraisal Preparation

Neil Potter
The Process Group
help@processgroup.com

Referenced articles are at www.processgroup.com/newsletter.htm
Agenda - Part 1

• Introduction
• CMMI Premise
• Documentation
• Configuration Management
• Measurement and Analysis
• Supplier Agreement Management
• Project Planning
• Project Monitoring and Control
Agenda - Part 2

- Integrated Project Management
- Training
- Equal-weighted Process Area practices?
- Appraisal Preparation - PlIDing
- Appraisal Interview Preparation
CMMI HAZARDS!
Introduction

Using CMMI or preparing for an appraisal?

– Avoid the hazard of creating a paper factory, instead focus on organizational results

– Avoid putting the emphasis on the less important issues
  » e.g., policy recital, training records, emails that say “We assigned this to Fred”

– Spend your time making things better, not on a rote exercise

– Know some common blind spots
CMMI Premise

• CMMI practices can:
  – Reduce project risk
  – Reduce rework and costs
  – Improve output quality and predictability
  – Improve productivity through process improvement and process reuse

• CMMI:
  – Can be used to diagnose current state
  – Provides an example roadmap forward
    » Management/project, engineering/organization, statistics/prediction, variation/mean
Hazard: Drowning in Documentation

• Easy to fall into the trap of the paper factory
  – We are developers, so we develop!
  – What we really need is guidance for our jobs
    » Capture best organization engineering and management practices
    » Not necessarily repeat every book known to mankind!

• What problem are we trying to solve?
  – Make engineering easier, quicker, less hassle - NOT MORE

[Newsletter “documentation”]
Configuration Management (CM)

Hazard: over-simplification

- CM looks pretty straightforward, once people start to understand the discipline
- Don’t avoid Configuration audits - make them useful [SP 3.2]
  - Use physical audits to help ensure that products are released correctly, e.g.,
    » Verify differences between source and release = change list
    » Compare checksum value between source and release
- What problem(s) are we trying to solve?
  - Producing the right stuff and getting it to the customer
  - Keeping track of our stuff, protecting ourselves from loss

SP 3.2: Perform configuration audits to maintain integrity of the configuration baselines.
Measurement and Analysis (MA)
Hazard: skip parts or overkill

- Organizations often have metrics but entirely **skip the first half** of this Process Area:
  - Defining: objectives, metrics, analysis, reporting, information storage
- Or take the other extreme and **overdo measurement and goal definitions**
  - 34 objectives, a procedure for documenting objectives, 82 core metrics
- **Need a good balance for:**
  - Spending enough time to arrive at **appropriate goals**
  - Specifying what **measures** are needed
  - Clarifying how they will be **analyzed and stored**
- **What problem are we trying to solve?**
  - Knowing why we are measuring in order to get the most value out of it and not waste time on useless metrics

[Newsletter “measurement”]
GP 2.8/3.2 and Over-simplified MA
Hazard: I measured it because CMMI SAID I HAD TO!

😊 MA comprises of only 7 PA measures, and GP 2.8 and 3.2 are academic
  – What is it telling you?
• What problem are we trying to solve?
  – GP 2.8 (on each PA) - How’s it going this time?
  – GP 3.2 (on each PA) - Are the PA related processes as implemented meeting our needs, getting better or worse?
  – MA should help you run your business, not just CMMI!

GP 2.8: Monitor and control the <x> process against the plan for performing the process and take appropriate corrective action.

GP 3.2: Collect work products, measures, measurement results, and improvement information derived from planning and performing the <x> process to support the future use and improvement of the organization’s processes and process assets.
Project Planning (PP)
Hazard: skimping on size estimation and risk management

• Many people either skip size, or don’t spend enough time finding a good use for size or attribute estimation [SP 1.2]
  – “My project size is 2,000 hours”
  – “I estimate Lines of Code, but track effort”

• Others underutilize risk at the project level [SP 2.2]
  – Risks should come from the team, not just the manager
  – Risks should be more than boilerplate “We might not have resources”
  – Risks should be made very visible to customers + management

• What problem are we trying to solve?
  – Clarifying how big the project is
  – Understanding what can really go wrong
  – Thinking through potential issues ahead, while there is time to react / recover

SP 1.2 Establish and maintain estimates of the attributes of the work products and tasks.
SP 2.2 Identify and analyze project risks.

[Newsletter “attributes”]
Project Monitoring and Control (PMC)

Hazard: missing valuable information that could save the day

- No useful way to track actual work progress [SP 1.1], e.g.,
  - Actual work effort \((\text{labor})\)
  - Actual amount of work accomplished \((\text{size})\)

- What problem are we trying to solve?
  - Use data to determine if current \textit{resource} expenditure (hours or money) can be \textit{sustained}
  - Know the \textit{volume of work} and how much each project \textit{actually costs}
    » How much we lost this time, or how much future projects might cost
  - Proactively manage and identify re-planning points while there is time to recover
    » \textit{Identifying large changes in effort or size}

\textbf{SP 1.1 Monitor the actual values of the project planning parameters against the project plan.}

[Newsletter “attributes”]
Integrated Project Management (IPM)

Hazard: not having proactive visibility

• Not use **thresholds to trigger** corrective action [SP 1.5]
  – At Level 3, corrective action and escalation are more **objective** ("We are 10% behind") than **emotional** ("I think things will speed up")
  – Organizational and project knowledge are used to establish thresholds

• **Process tailoring not based on organizational learning** [SP 1.1]
  – Level 3 is often interpreted as "**Processes are standardized** across all projects," rather than "**Standard processes are tailored** for each project"

• **What problem are we trying to solve?**
  – We have **MEANINGFUL** data, let’s really use it!
  – Have organizational wisdom available and used

---

SP 1.5 Manage the project using the project plan, the other plans that affect the project, and the project’s defined process.
Integrated Project Management (IPM) Without Historical Data?
Hazard: databases full of data are not enough!

• Organizational Process Definition (OPD) and IPM not well understood
  – OPD sets up a Process Asset Library and measurement repository for use by projects (IPM)
  – Not all Lead appraisers know or communicate this

• What problem are we trying to solve?
  – Run projects based on historical and current data
Do Software Engineers Need Training?
Hazard: trivial training

• Project Planning (Sp 2.5)
  – Make sure you have the skills for THIS project
• Organizational Training
  – Make sure you have the skills for current work, and work to come
• What problem are we trying to solve?
  – Engineers and managers don’t have the skills to perform their roles correctly (as per process definition) and/or efficiently
  – Prevent mistakes due to lack of skills
Equal-weighted Process Area practices?
Hazard: each process area practice is treated as EQUAL

• Each CMMI practice should not necessarily be equally weighted during implementation. Example:
  – Policy vs. estimating effort or risk
  – Training records vs. performing validation

• The correct weighting can be given when you:
  – Focus on what you are trying to accomplish (real jobs)
  – Use the CMMI and its components to improve
  – Fix real problems

• What problem are we trying to solve?
  – Real world, day-to-day work gets better (easier, faster, higher quality, less stress, less busy-work, less rework, less risk)
Appraisal Preparation - PIIDing*
Hazard: creating documents to please the appraiser

• As an appraisal date approaches, people find themselves focused on providing required appraisal evidence:
  – A lot of time can be wasted chasing down documents
  – When practices are institutionalized correctly, the evidence needed already exists

• What problem are we trying to solve?
  – Evidence should never be created to please an appraiser
  – Artifacts examined should be the real work of the organization
  – For example, evidence of responsibilities could be an organization chart or a schedule with assignments

*Practice Implementation Indicator
Appraisal Interview Preparation
Hazard: wasting time rehearsing

• Some people prepare using mock interviews
  – Appraisals should be about how you DO YOUR REAL work
  – Interview practice might make folks feel more comfortable, but this can:
    » Induce stress over remembering to say the right answers
    » Focus your people on CMMI terms and rote answers

• What problem are we trying to solve?
  – Time to practice for an appraisal takes away from getting real work done
  – Participants should be able to answer the questions because the answers describe how they do their jobs
Q & A
Additional Slides
Supplier Agreement Management (SAM)

Hazard: ill-advised avoidance

• A group might declare SAM Not Applicable:
  – They really do have a supplier, but are used to dealing with them
• Initially there are no suppliers
  – Then suppliers are added, but SAM is not invoked
• What problem(s) are we trying to solve?
  – Assessing and managing risks caused by suppliers
  – Establishing agreements and expectations for delivery
  – Providing visibility into supplier activities before it is too late
Maturity Level 4
Hazard: having a metric or statistics wizard is enough

• Assume that if we can just find that one magic metric, we will be Level 4 (maybe even 5)
  – It’s not really about a metric or two; it’s about using statistical thinking to do your work!

• Assume that a metrics person can do all of Quantitative Project Management (QPM)
  – Allowing project managers to focus on their regular day-to-day tasks!

• What problem are we trying to solve?
  – Understand statistical variation and remove special causes
  – Run projects quantitatively and sub processes statistically
  – Base decisions on what we now know and predict ahead
Level 4 Without SPC?
Hazard: numbers alone are not enough!

• Very specific words used in the model
  – Run projects quantitatively and **sub processes statistically**
    » Understand statistical variation
    » Remove special causes of variation
    » Use some type of SPC

• **What problem are we trying to solve?**
  – Make business decisions based on calculated natural bounds
  – Use data to predict outcomes statistically
Code Quality Example

Code Inspection Defect Density (with trial control limits)

- Manufacturing control system
- OO/C++
- 167 KLOC
- 13 defects/KLOC in code
- 1.38 defects/KLOC in test

[From client with permission]
Maturity Level 5
Hazard: not building on statistically stable (L4) processes

Continual improvement means measurably improving process
capability in a controlled fashion.

Chart from CMMI Intro. © 2002 by Carnegie Mellon University
© Copyright 2007-2009 The Process Group. All rights reserved.
Maturity Level 5 (Cont.)
Hazard: not building on statistically stable (L4) processes

• It is easy to interpret Level 5 Process Areas as qualitative. You might think that:
  – Casual Analysis and Resolution (CAR) could consist of brainstorming causes
  – Organizational Innovation and Deployment (OID) could be mistaken for qualitative improvement
    » Qualitative improvement is L3 Organizational Process Focus (OPF) and Organizational Process Definition (OPD)

• What problem are we trying to solve?
  – Level 4 is intended to collect and use data statistically for prediction, control and decisions. Level 5 practices build on that to:
    » Reduce variation of selected sub processes (remove common causes of variation), AND / OR shift the mean
Maturity Level 4 and 5 Crack Down?
Hazard: an SEI audit takes away your dreams of Level 4/5

• Some appraisers have been too generous
  – Did they NOT understand the Model?
  – Did they SELL a level?

• What to do now?
  – Re-educate people on the intent and details of Level 4/5?
  – Be harsh on lead appraisers now?
  – Take away levels?

• What problem are we trying to solve?
  – Devaluation of Level 4 and Level 5
    » “I have a vendor in <city X>. They say they are Level 5 but don’t even act Level 2.”
Buying a Level?
Hazard: doesn’t help run your business

• What if you choose “easy” appraiser
  – Has your business improved?
  – Giving you credit for too much can:
    » Build a poor foundation for the future
    » Upset your customer(s) who now have higher expectations about your abilities
    » Devalue the ratings
    » Cause more audits

• What problem are we trying to solve?
  – Someone told us to be at a level, so we are looking for the quick path
  – CMMI intent is to set you on an improvement path, not to pass a test