

CMMI Horror Stories: When Good Projects Go Bad

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Background

- **Several recent program failures from organizations claiming high maturity levels have caused some to doubt whether CMMI improves the chances of a successful project**
- **Is the CMMI flawed?**
- **Is the staged representation bad?**
- **Does CMMI benefit the customer?**
- **This presentation will present a framework for analyzing the causes of program failure**

Topics

- **What Does a CMMI Level Guarantee?**
- **Where Could Problems Arise?**
- **The First Three Months: Essential Project Start-Up Activities**
- **Fiction or Non-Fiction: How to Read Appraisal Results for Fun and Profit**
- **How to Write a Better RFP**

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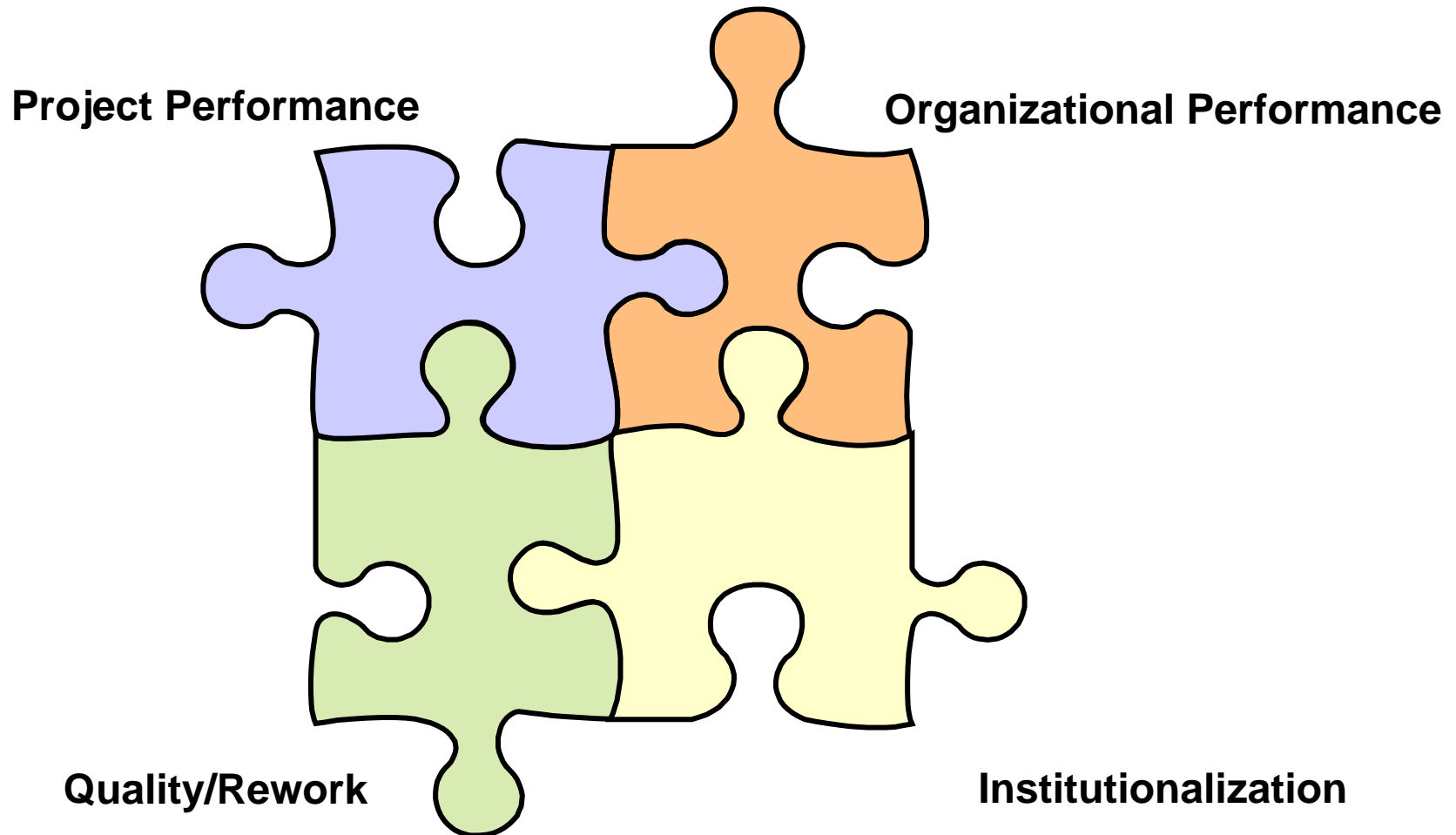
What Is the CMMI Trying to Achieve?

A model is a simplified representation of the world. Capability Maturity Models (CMMs) contain the essential elements of effective processes for one or more bodies of knowledge. These elements are based on the concepts developed by Crosby, Deming, Juran, and Humphrey.

-Introduction, CMMI

- **CMMI provides a model of industry best practices**
- **Following these practices has shown to produce software and systems faster, better, and cheaper, when properly applied**
- **The main benefits cited by CMMI users are:**
 - More predictable adherence to budgets and schedules
 - Reduced re-work (which can reduce cost and schedule)
 - Reduced risk

CMMI Provides Several Related Benefits



Rick Hefner, "Achieving the Promised Benefits of CMMI," CMMI
Technology Conference & User Group, Denver, CO, 14-17 Nov 2005

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When Good Organizations Go Bad

- Some organizations are driven to achieve a maturity level only for its marketing value

Improvement goals are not set realistically (“Level 5 in ’05”)

Focus on passing the appraisal, not understanding and deciding among possible interpretations

Only some of the projects participate in the improvement effort

Personnel/customers perceive CMMI as more expensive

Only some of the projects get appraised

The remaining projects don’t implement

Insufficient resources (e.g., training, QA, metrics, consultants)

People don’t learn or become proficient in the new behaviors

Management doesn’t enforce using processes on new programs

Benefits are not realized because projects do not start up effectively

What Does a CMMI Level Guarantee?

Decisions made on the basis of maturity level ratings are only valid if the ratings are based on known criteria.

- SCAMPI A Method Description Document

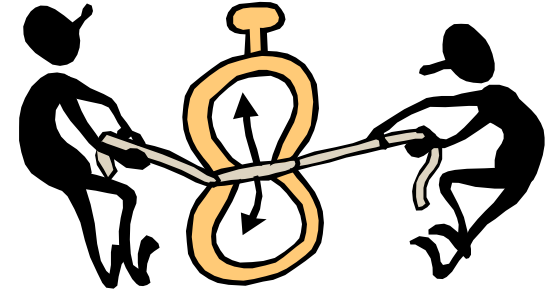
- **A CMMI appraisal indicates the organization's capacity to perform the next project, but cannot guarantee that each new project will perform in that way**
- **The CMMI methodology assumes the organization will propagating their processes to every new project**
 - An organization that gets appraised solely to demonstrate a maturity level might not have that intent
 - Organizations may not have developed the skills to roll out their processes effectively
- **A CMMI appraisal judges the maturity of the organization's processes – based upon the projects sampled**
 - Most CMMI appraisals correctly review projects in place for some time and can demonstrate adequate artifacts related to the execution of their practices
 - New projects must embrace the new processes

Where Could Problems Arise?

- **The projects within the organization may not live up to the capability**
 - Start-up problems with planning, subcontractors, and infrastructure
 - Problems with staffing, either as the prime or with subcontractors
 - Differences in domain experience
 - Back-sliding
- **The appraisal results may not be an accurate reflection of the organization's capability**
 - Sampling bias
 - Appraisal inaccuracies
 - Organization's inability to immediately apply their appraised processes
- **Note that all of these problems are equally possible with both the staged and continuous representations**

The First Three Months: Essential Project Start-Up Activities

- **Many process-related problems arise in the first few months of a project**
 - New relationships are established
 - Personnel changes and shortfalls
 - Pressure to produce quickly
 - Gaps between the planned processes and what was bid
- **If a project is going to live up to the organization's process capability, it is essential to fully implement the processes from the beginning**
 - Processes should be defined during the proposal, by tailoring the organization's standard process
 - Estimates should be based on historical data from the organization's measurement repository
 - Process assets (e.g., templates) should support detailed planning to ensure consistency with the organization's best practices
 - Evidence reviews should be used to ensure CMMI compliance



Preventing Back-Sliding

- **The CMMI generic practices ensure that processes are institutionalized – sustained over time**
- **The approach for implementing the generic practices must reflect:**
 - Efficiency
 - Effectiveness
 - Applicability to ALL projects
- **Frequent appraisals can be used to assess the effectiveness of the institutionalization**

| Commitment to Perform | Ability to Perform |
|---|--|
| <i>Policies and sponsorship</i> | <i>Project and/or organizational resources</i> |
| GP 2.1 Establish Organizational Policy | GP 2.2 Plan the Process GP 2.3 Provide Resources GP 2.4 Assign Responsibility GP 2.5 Train People GP 3.1 Establish a Defined Process |
| Directing Implementation | Verifying Implementation |
| <i>Managing performance of the process</i> | <i>Management review, process conformance</i> |
| GP 2.6 Manage Configurations GP 2.7 Identify/Involve Relevant Stakeholders GP 2.8 Monitor and Control the Process GP 3.2 Collect Improvement Info. | GP 2.9 Objectively Evaluate Adherence GP 2.10 Review Status with Higher Level Management |

Geoff Draper and Rick Hefner, "Applying CMMI Generic Practices with Good Judgment," SEPG Conference, 2004.

Sampling Bias

The size and number of instantiations investigated should be selected to form a valid sample of the organizational unit to which the results will be attributed.

- SCAMPI A Method Description Document

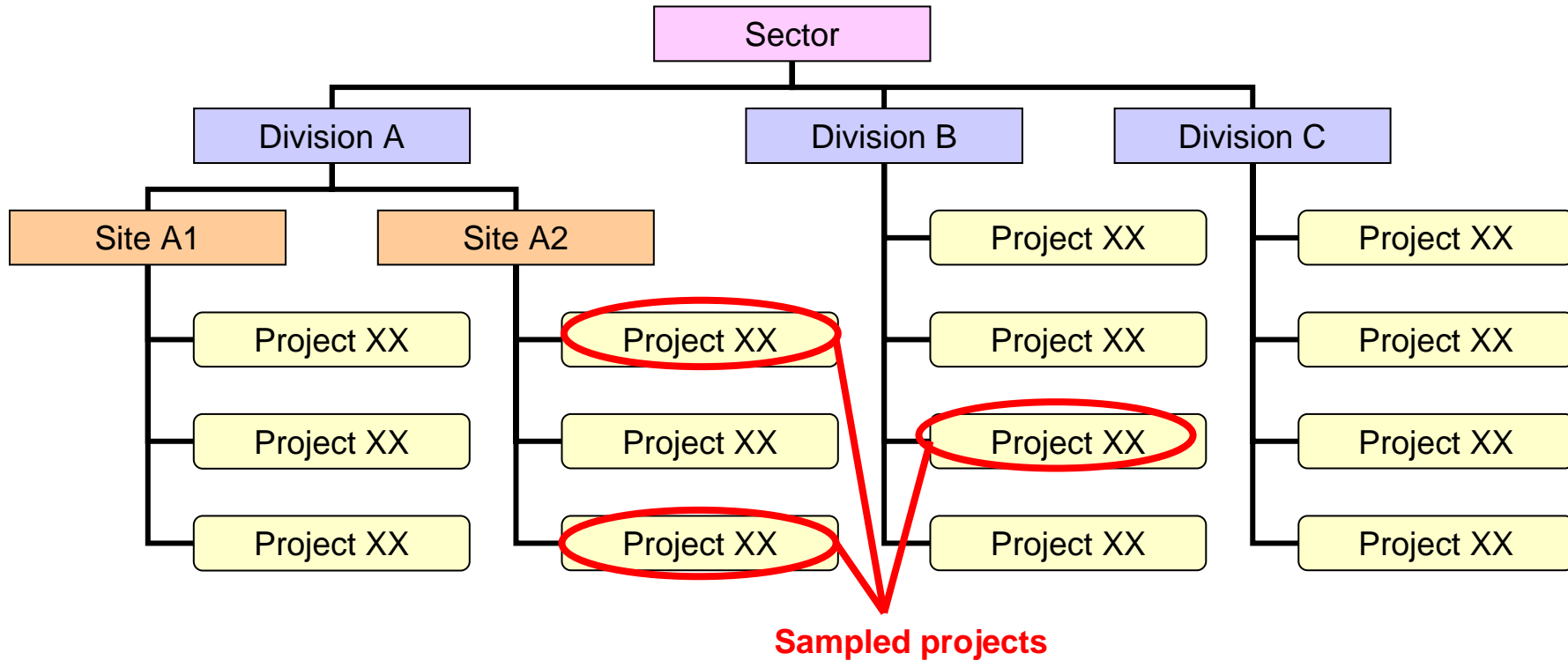
- **The Lead Appraiser is permitted to select sample projects as “representative” of the organization as a whole**
 - Little guidance in the MDD
 - Wide variation among Lead Appraisers

Only some of the projects get appraised

The remaining projects don't implement

- **If an organization is only interested in a good appraisal result, they will appraise large organizations with a handful of samples, and/or exclude/hide inferior projects**
- **Note that this can be happen with both staged and continuous representations**

Organizational Sampling



- An organization with 50 projects at multiple sites may select 4-5 sample projects
- Are the appraisal results representative of the organization?

Appraisal Inaccuracies

- **Methodology**
 - SCAMPI A appraisals are the only approach that provides benchmark quality appraisal results
 - SCAMPI B, C, and other appraisal methods may be useful, but they are not designed to provide the same accuracy
- **Appraiser Skill**
 - There is wide variation in appraiser skill, experience and insight
 - Although appraisal experience is a crucial contributor to accuracy, the appraisal methods do little to ensure sufficient experience
 - There is also wide variation in how the model is interpreted
- **Appraiser Independence**
 - Appraiser independence is needed to ensure unbiased results
 - It is difficult to establish a completely independent situation

Fiction or Non-Fiction: How to Read Appraisal Results for Fun and Profit

The ADS is a summary statement describing the appraisal results that includes the conditions and constraints under which the appraisal was performed. It contains information considered essential to adequately interpret the meaning of assigned maturity level or capability level ratings.

- SCAMPI A Method Description Document

- **The Appraisal Disclosure Statement (ADS) provides keys to assessing an appraisal's accuracy**
 - Organizational unit appraised (the unit to which the ratings are applicable and the domains examined)
 - Appraisal team leader and appraisal team members and their organizational affiliations
 - Process areas rated and process areas not rated
 - Dates of on-site activity
- **Not included - sampling approach or percentage of projects sampled**

How to Write a Better RFP

Acquirers seeking to ensure that the proposed project will implement mature practices should request the following:

- **SCAMPI A Appraisal Disclosure Statement**
 - Organizational unit appraised
 - Appraisal team leader affiliation
 - Process areas rated and not rated
 - Dates of on-site activity
- **Explanation of sampling approach used in appraisal**
- **Approach to be used to ensure proper project start-up**
- **Data to demonstrate the speed with which new projects adopt and execute the organization's processes**
- **Approach to be used to prevent back-sliding**

Northrop Grumman Mission Systems

Sampling bias

- ✓ Appraisals are done at the business unit level (typically 5-6 projects)
- ✓ All projects participate in SCAMPI A appraisals

Appraisal inaccuracies

- ✓ 50+ SCAMPI A's performed to date
- ✓ Six Sigma projects conducted to optimize appraisal cost and accuracy
- ✓ External lead appraisers used to reduce bias

Start-up problems

- ✓ Planning templates capture mature practices
- ✓ Review planned processes for compliance
- ✓ Evidence reviews performed 90 days after start and annually after that

Summary

- **CMMI benefits can be achieved for all the projects within an organization if the focus is on true improvement and institutionalization**
- **The organization must ensure:**
 - Project start-up takes full advantage of the organization's capability
 - Sampling bias is eliminated/minimized
 - Appraisal accuracy is maintained
- **Acquirers can request the information needed to understand a set of appraisal results**