How Does High Maturity Benefit the Customer?

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Background

- Until recently, Level 3 has been considered an industry standard
- Now, several organizations have achieved high maturity and are touting its benefits
- Others are considering it, but little has been published about the costs and value of high maturity

*What are the differences between Level 3 and Level 5?*

*What are the advantages of a high maturity organization?*
Agenda

- Outline CMMI requirements for Levels 4 and 5
- Discuss organizational benefits of Level 4/5 versus Level 3
- Discuss customer benefits of high maturity in terms of project performance
- Identify strategic actions needed to extract value from high maturity
## CMMI Levels

<table>
<thead>
<tr>
<th>Level</th>
<th>Process Areas</th>
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<tr>
<td>5 Optimizing</td>
<td>Causal Analysis and Resolution Organizational Innovation and Deployment</td>
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<td>4 Quantitatively Managed</td>
<td>Quantitative Project Management Organizational Process Performance</td>
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<tr>
<td>3 Defined</td>
<td>Requirements Development Technical Solution Product Integration Verification Validation Organizational Process Focus Organizational Process Definition Organizational Training Risk Management Integrated Project Management (for IPPD*) Integrated Teaming* Integrated Supplier Management** Decision Analysis and Resolution Organizational Environment for Integration*</td>
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<tr>
<td>2 Managed</td>
<td>Requirements Management Project Planning Project Monitoring and Control Supplier Agreement Management Measurement and Analysis Process and Product Quality Assurance Configuration Management</td>
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<td>1 Performed</td>
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The Project Manager’s Dilemma at Level 3

I want to use the organization’s standard process, but...

... Does it’s performance and quality meet my customer’s expectations?

... If not, how should I tailor the process?
CMMI Level 4

- **Organizational Process Performance**
  - Establishes a quantitative understanding of the performance of the organization’s set of standard processes
  - Provides process performance data, baselines, and models to quantitatively manage the organization’s projects

- **Quantitative Project Management**
  - Quantitatively manage the project’s defined process to achieve the project’s established quality and process-performance objectives.
Understanding the Process

Managing by Variation

- How many errors are typically found in reviewing an interface specification?

![Chart for Errors]

- **Mean** = 4.799
- **UCL** = 12.30
- **LCL** = -2.705

- Useful in evaluating future reviews
  - Was the review effective?
  - Was the process different?
  - Is the product different?

Corrective and preventative actions
Typical Choices in Industry

- Most customers care about:
  - Delivered defects
  - Cost and schedule

- So organizations try to predict:
  - Defects found throughout the lifecycle
  - Effectiveness of peer reviews, testing
  - Cost achieved/actual (Cost Performance Index – CPI)
  - Schedule achieved/actual (Schedule Performance Index – SPI)
What Can a Level 4 Organization Do?

- Determine whether processes are behaving consistently or have stable trends (i.e., are predictable)
- Identify processes where the performance is within natural bounds that are consistent across process implementation teams
- Establish criteria for identifying whether a process or process element should be statistically managed, and determine pertinent measures and analytic techniques to be used in such management
- Identify processes that show unusual (e.g., sporadic or unpredictable) behavior
- Identify any aspects of the processes that can be improved in the organization's set of standard processes
- Identify the implementation of a process which performs best
What Does Level 5 Add to the Organization?

Level 5

**Organizational Innovation & Deployment**

- Goals are quantitative (e.g., reduce variation by X%, reduce mean by Y%)
- Incremental improvements – eliminate special causes of variation
- Innovative improvements - cause a major shift in process capability
- Potential improvements are analyzed to estimate costs and impacts (benefits)
- Improvements are piloted to ensure success
- Improvements are measured in terms of variation and mean

Level 3

**Organizational Process Focus**

- Goals are qualitative (e.g., get better)
- The effects of the improvements are not estimated or measured
Peer Reviews – Improving the Process

- Reduce the variation
  - Train people on the process
  - Create procedures/checklists
  - Strengthen process audits

- Increase the effectiveness (increase the mean)
  - Train people
  - Create checklists
  - Reduce waste and re-work
  - Replicate best practices from other projects
What Does Level 5 Add to the Project?

- Casual Analysis & Resolution
  - Identify and analyze causes of defects and other problems
  - Take specific actions to remove the causes

- The project can then take actions to prevent the occurrence of those types of defects and problems in the future

- Many projects implement Causal Analysis & Resolution at Level 4
  - Identify and eliminate special cause variations to stabilize the process
How Does Level 4 & 5 Benefit the Customer?

- Organizational process performance
- More accurate estimates
- Quantitative project management
- Problem behaviors are recognized faster, enabling quicker resolution
- Organizational innovation and deployment
- The project benefits from improvements found and proven on other projects
- Causal analysis
- The project fixes the source of defects to prevent future defects

Better Products and Services Produced Faster And Cheaper
Lessons Learned

Based on 17 Northrop Grumman CMMI Level 5 organizations

- Six Sigma is an enabler for higher maturity
  - Focus on data, measurement systems, process improvement
  - Tying improvements to business goals
  - Tools and methods support the Level 4/5 analysis tasks

- Level 3 metrics, measurement processes, and goal setting are generally inadequate for Levels 4 and 5
  - Better definitions of the measures
  - Lower level metrics of lower level subprocesses

- Having all the tools at Level 5 gives you the insight to manage each project the way the customer needs it to be managed