

NORTHROP GRUMMAN

DEFINING THE FUTURE

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**

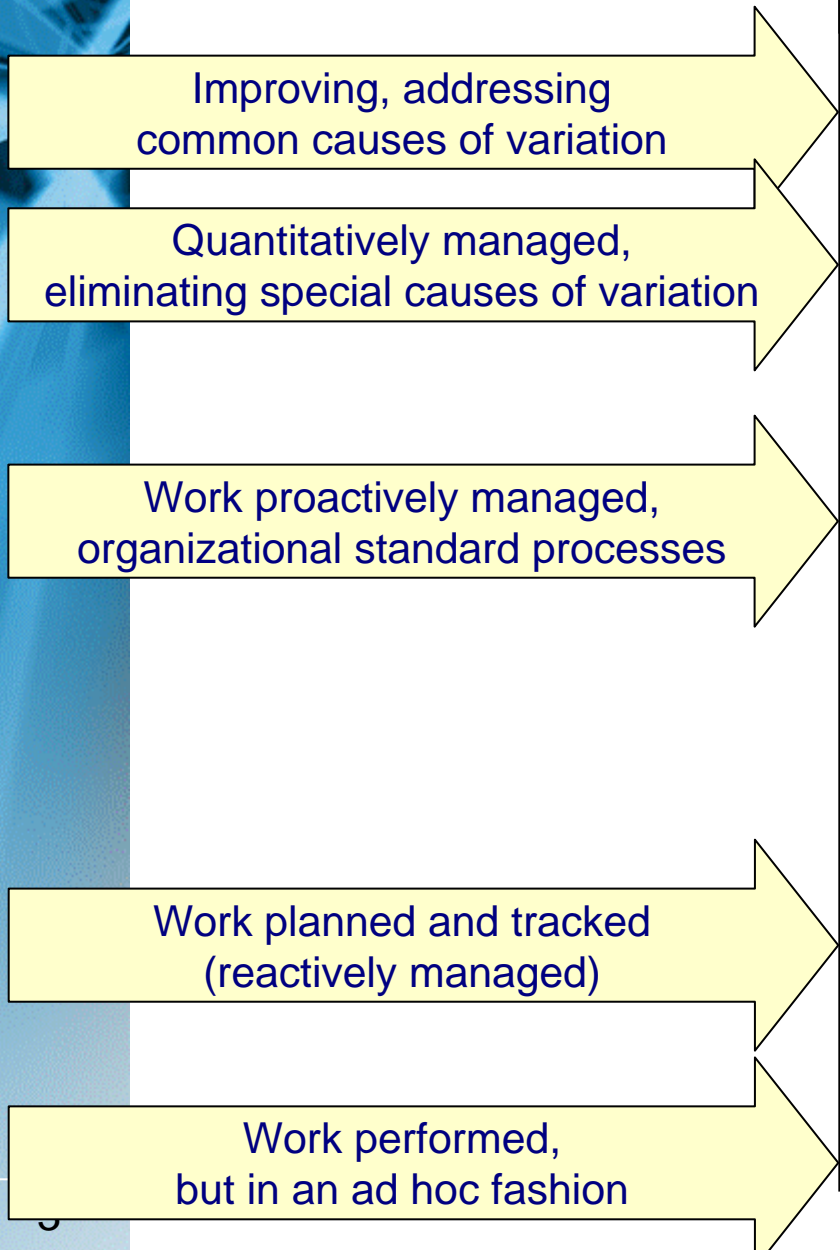
What are the differences between Level 3 and Level 5?

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



Level	Process Areas
5 Optimizing	Causal Analysis and Resolution Organizational Innovation and Deployment
4 Quantitatively Managed	Quantitative Project Management Organizational Process Performance
3 Defined	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*
2 Managed	Requirements Management Project Planning Project Monitoring and Control Supplier Agreement Management Measurement and Analysis Process and Product Quality Assurance Configuration Management
1 Performed	

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?



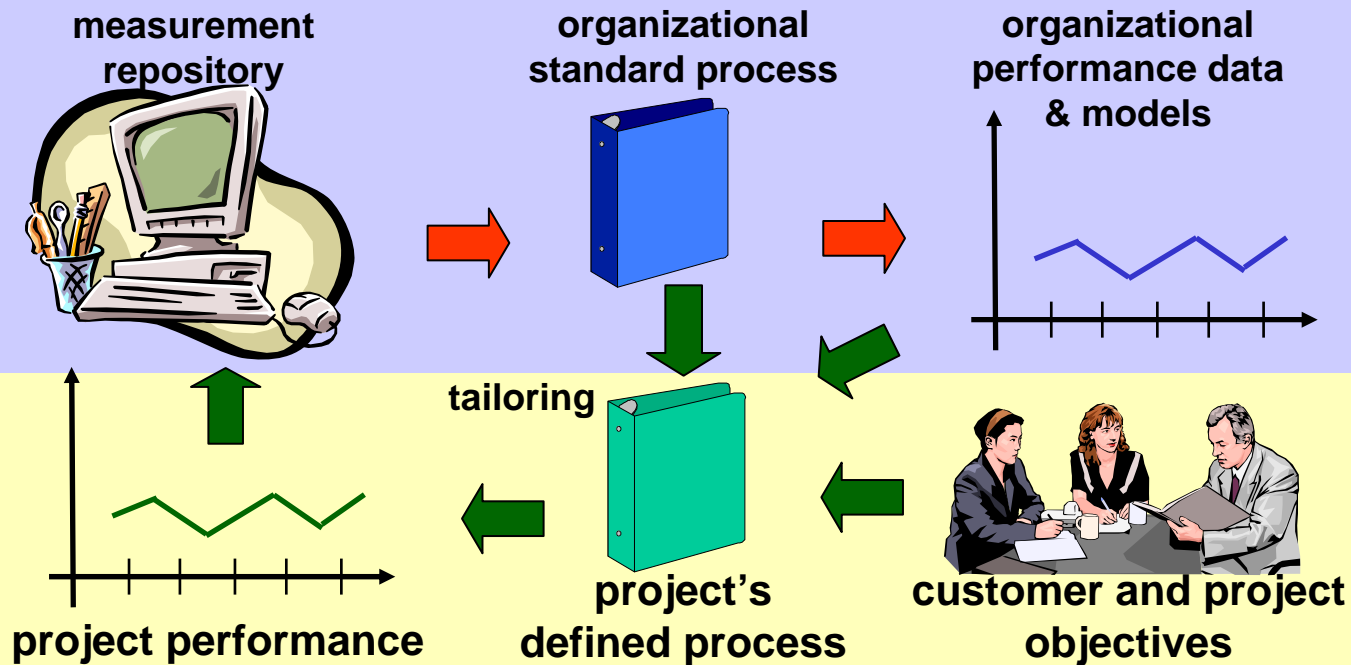
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CMMI Level 4

- **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

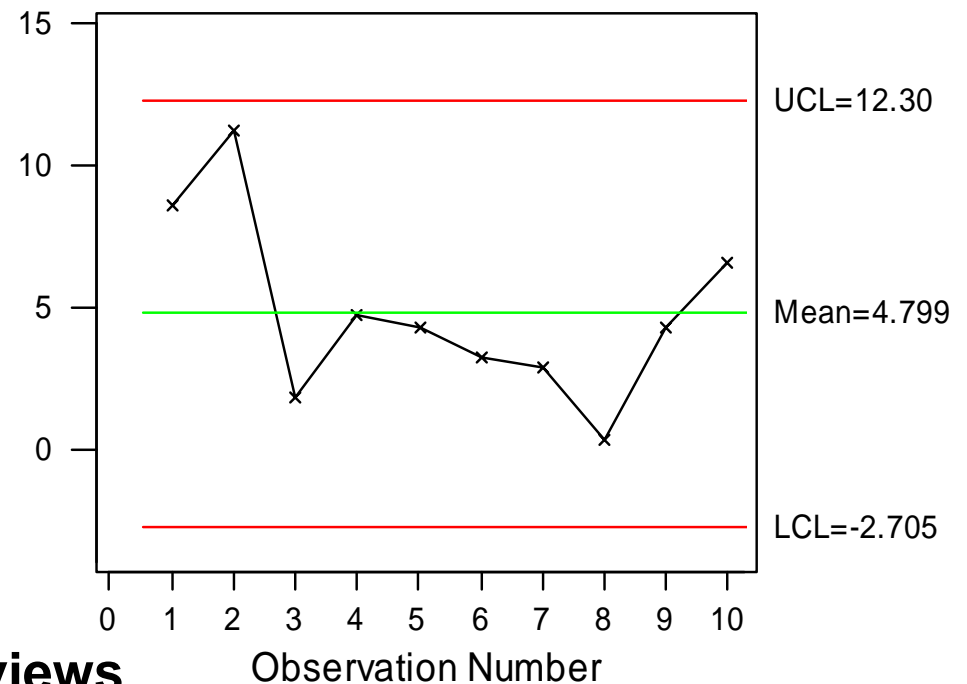
Managing by Variation

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

Expected
Variation

Average

Individual Value



- Useful in evaluating future reviews

- Was the review effective?
- Was the process different?
- Is the product different?

Corrective and
preventative actions

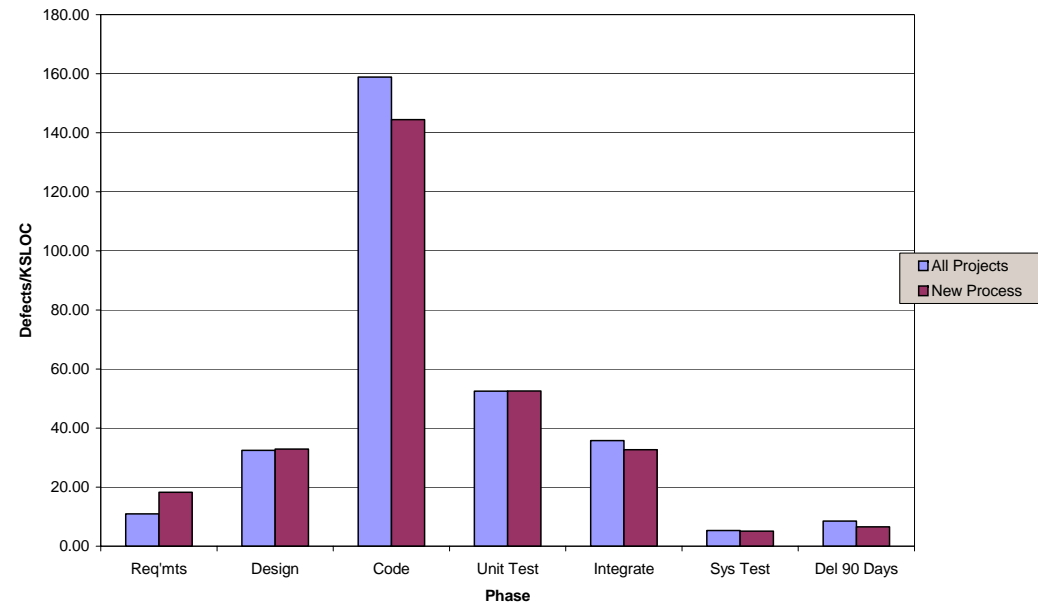
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Typical Choices in Industry

- **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)

Defect Detection Profile



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 3

Organizational Process Focus

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

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

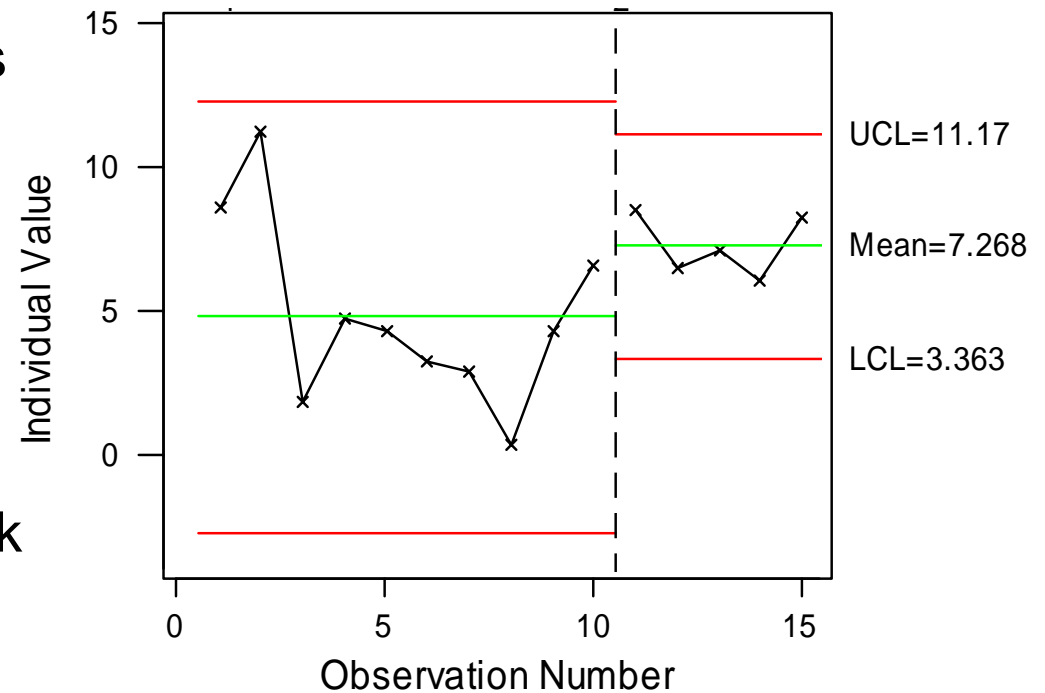
Peer Reviews – Improving the Process

- **Reduce the variation**

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

- **Increase the effectiveness (increase the mean)**

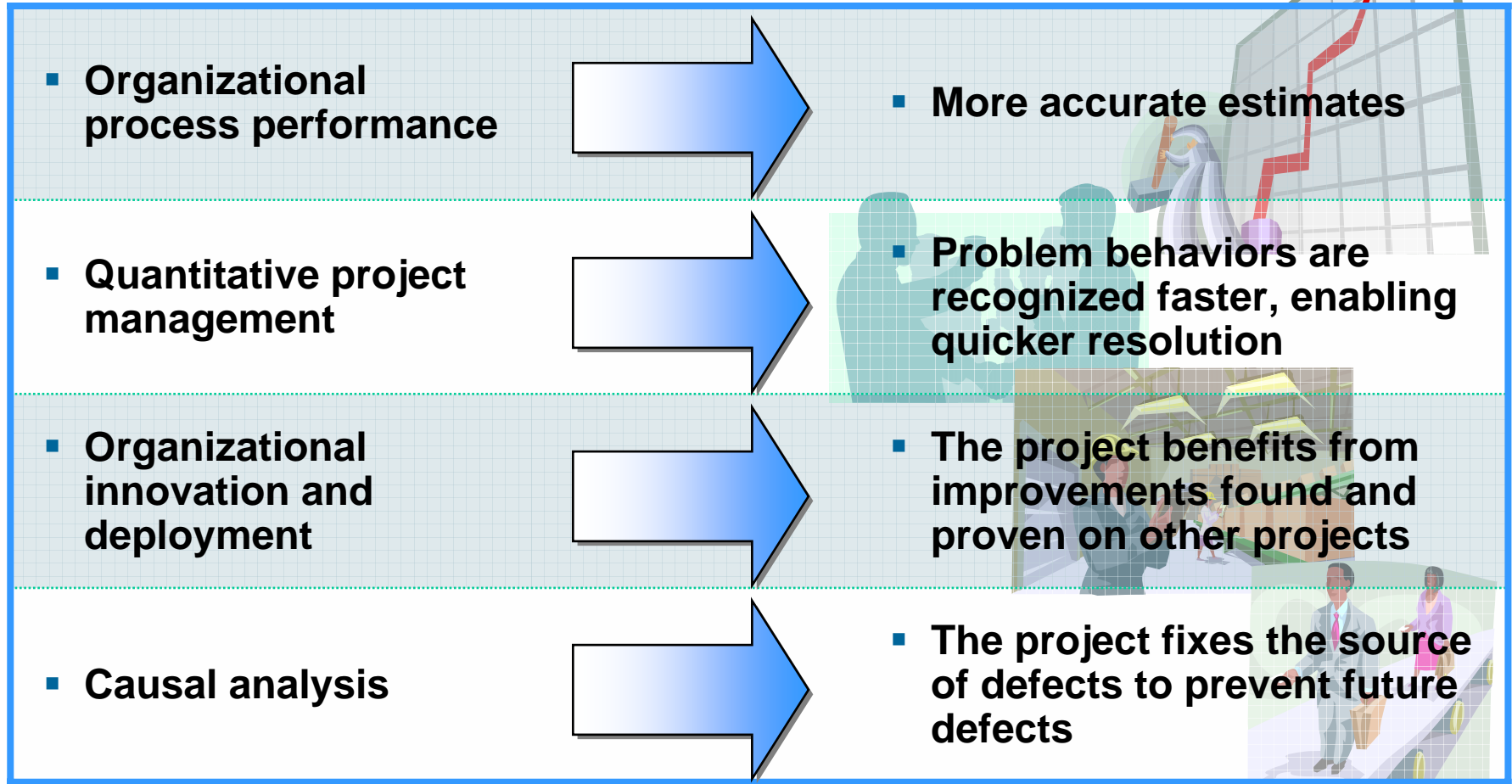
- Train people
- Create checklists
- Reduce waste and re-work
- Replicate best practices from other projects



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?



Better Products and Services Produced Faster And Cheaper

Lessons Learned

Based on 18 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**