

How to Explain the Value of Every CMMI Practice

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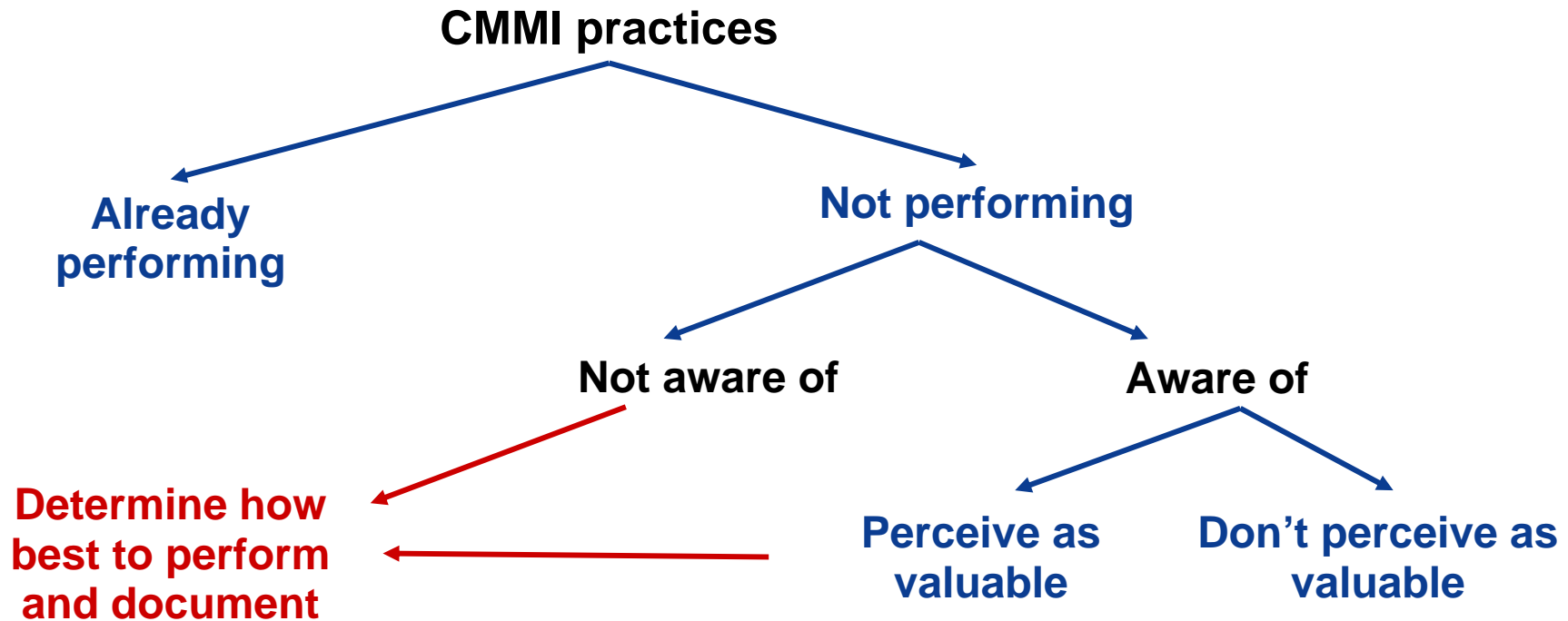
Background

- **Convincing someone to implement a CMMI practice is especially difficult when they don't believe the practice adds any value**
- **It is important that CMMI advocates can clearly explain the business value of each practice and its positive impact on project and organization performance**
- **This presentation will outline the basic benefits possible from adopting a CMMI practice**

What is CMMI?

- **The CMMI is a model of industry best-practices for engineering products**
- **When an organization decides to adopt CMMI, they commit to performing these best-practices**
 - Different than a customer-driven process, where you simply do what the customer asks you to do
- **You are performing practices in what you understand to be the best way known in industry**
 - “Best” implies predictably producing products of acceptable quality at the lowest possible cost and schedule

Adopting the CMMI



Key enablers

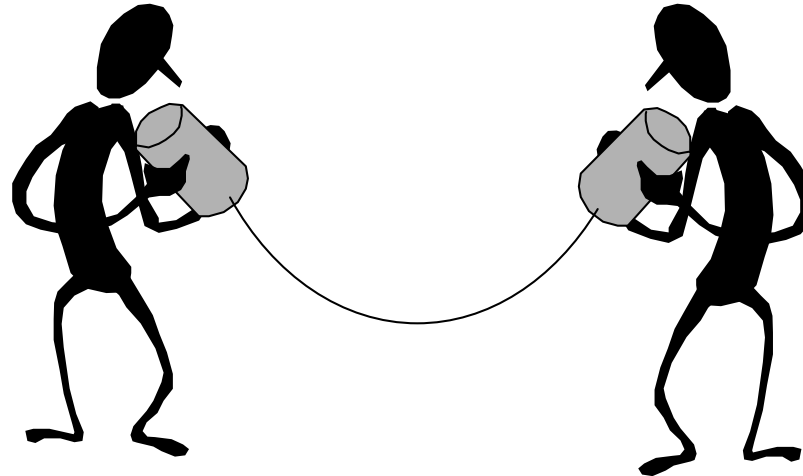
Willingness to learn unfamiliar practices
Desire to extract value not “check the box”
Ability to interpret the CMMI in your context
Understanding the value of the CMMI practices



A Typical Interchange

CMMI Change Agent

CMMI Change "Target"



"You're not doing practice X"

"So."

"You must do that practice to satisfy CMMI"

"The customer didn't say we have to do practice X"

"Practice X adds value"

"How?"

"Well, it's in the CMMI, so it must be important"

"Practice X doesn't make sense for us – we're special"

"Well..., you have to do the practice or you'll fail the appraisal!"

"\$^&*%!!!!!"

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Underlying Principles of CMMI

- 1. Process discipline leads to predictable project performance**
 - Say what you do; do what you say
 - Document the plans/processes
 - Communicate them to the performers and stakeholders
 - Audit to ensure we are following them

- 2. Conscious choices lead to better processes**
 - E.g., identify relevant stakeholders and their involvement; identify work products to be controlled and the control method; define validation procedures and criteria, ...

- 3. Organizational learning improves project performance**
 - Capture what works, and what doesn't
 - Make rules (policies) to guide projects
 - Define expected processes, and let projects tailor them to fit
 - Capture work products and measures, and learn from them

Reference: "Interpreting the CMMI: It Depends!", R. Hefner and S. Yellayi, 2005 CMMI Technology Conference and User Group

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How Do the CMMI Practices Add Value

- **Each practice provides value in 3 possible ways:**
 - **Performance** – the practice directly reduces cost and or schedule through either increased efficiency, increased effectiveness, or lowered rework
 - **Quality** – the practice produces higher quality products, by either preventing or uncovering defects
 - **Communications** – the practice helps everyone understand expected behavior, or provides insight leading to better decisions
- **Many practices effect more than one dimension**
- **Some practices provide the potential for a positive impact or reduce the risk of a negative impact**

Some CMMI Areas Offer More Potential Value than Others

- **The activities which drive cost and schedule the most provide the most potential for productivity improvement**
- **For most large software companies and large software projects, the most expensive and time consuming activities, in rank order are*:**
 - Defect removal
 - Producing documents
 - Meetings and communications
 - Coding
 - Project management

Reference: "The Schedules, Costs, and Value of Software Process Improvements," Caper Jones, 2007, used with permission

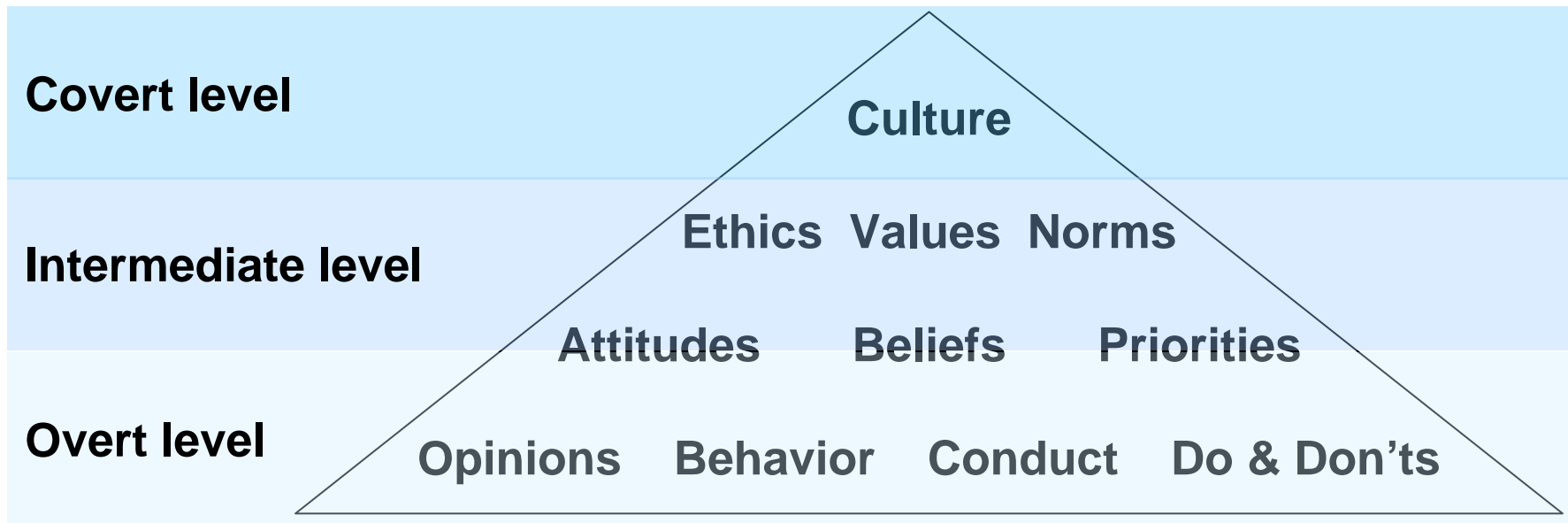
Barriers to Seeing the Value

“Sometimes you have to believe it to see it.”

- Practitioners may not have worked in an environment where the practice was performed
- Practitioners may have worked in an environment where the practice was performed poorly or in a non-value-added manner
- The practice may run counter to a long-held belief
- Believing the practice is an improvement may require an action the practitioner is not willing to take
 - Awkwardness of doing something new
 - Admit they’ve been doing it wrong
 - Loss of personal power when perceived to be an expert in the current approach

Addressing the Underlying Beliefs

- **Sponsors and performers must have a strong vision of the desired culture**
 - What are my roles and responsibilities?
 - What changes in behavior are required?
 - What are the underlying beliefs and values?
 - How do I benefit – WIIFM?



Reference: "Sustaining CMMI Compliance," Rick Hefner, 2006
CMMI Technology Conference and User Group

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Different Practitioners Needs Different Value Arguments



- **(I, EA) Explain how the practice adds value**
 - Identify a situation in which this value would be realized
- **(EM) Where possible, provide data**
 - It is difficult to find perfect data, which “proves” the value
 - Even perfect data may not convince a skeptic
- **(LM) Identify others who have seen the (qualitative) value of this practice**
- **(LM) Couch the value in ways that appeal to the practitioner**
 - Reduced risk. addressing a customer issue, reduced workload, etc.
- **(LM) Show ways that the practice can be done easily**
- **(LM) Suggest the practitioner try it and see**

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Some CMMI Areas Where the Value Isn't Obvious to Many Practitioners

- **Planning (PP, SP 2.2)**
- **Supplier Agreement Management (SAM)**
- **Stakeholder Identification and Management (GP 2.7)**
- **Manage Configurations (GP 2.6)**
- **Risk Management**
- **Decision Analysis & Resolution**
- **Level 4/5**

Planning



- **The value of planning is communication**
 - Plans provide a structured way to investigate the best approach for satisfying given objectives
 - Practitioners know what is expected of them, so fewer mistakes are made, avoiding rework
 - Interdependences are identified and negotiated which causes fewer disconnects between groups, avoiding schedule delays and wasted resources
 - We monitor progress against plans, so that corrective actions can be taken more quickly and insightfully
- **To realize the value of planning**
 - The environment has to be predictable (vs. agile “home-ground”)
 - Plans are reasonable
 - Plans are kept up-to-date
 - Plans are communicated to those involved and followed
 - The process behind the plans is communicated and followed

Planning Example

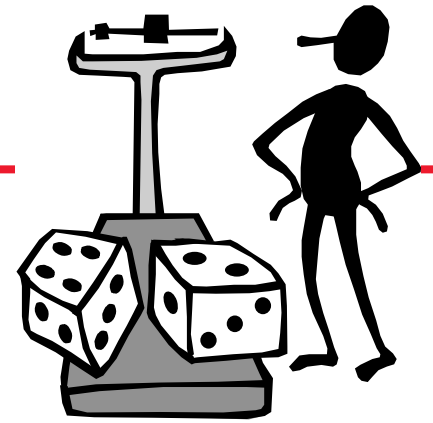
Project Planning - Specific Practice 1.2

Establish and maintain estimates of the attributes of the work products and tasks.

Measures of size of complexity that contribute to determining effort and cost

- **Frequently heard:**
 - “It’s not important to estimate or track code size, it changes anyway”
 - “We don’t use attributes, we just know it’s a X week effort”
- **Explaining the value**
 - Everyone uses attributes, perhaps subconsciously – we just want to make it conscious

Risk Management



- **The value of risk management is performance**
 - By identifying potential risks and mitigating them, you prevent schedule delays caused by a problem
 - Without risk management, effectiveness is hindered because things outside your control un-do your good work
 - Must appreciate that some mitigation actions will be “wasted” because the risk is never realized
- **To realize the value of risk management**
 - The culture must support an open discussion of risks
 - Must be effective at identifying ALL risks, ALL perspectives
 - Risk mitigations must offer a reasonable return on investment
 - Solid plans must be written so the risks (of not meeting the plans) can be determined

Reference: “Relationship Between Risk Management and Project Performance,” Warren Scheinin, Wednesday, 3:30 PM

Risk Management Example

Risk Management - Specific Practice 1.1

Determine risk sources and categories.

What sources of risk should we consider in identifying risk?

How should we categorize the risks once they are identified?

- Urgency
- Assignee

- **Frequently heard:**
 - “The sources are the same as the categories”
 - “Anybody can identify a risk at any time”
 - “Risks are categorized by impact: cost, schedule, performance”
- **Explaining the value**
 - Setting expectations for the types of risk to consider helps ensure that ALL risks get identified
 - How the risks will be categorized helps ensure they are managed appropriately

SEI Risk Taxonomy

A. Product Engineering

1. Requirements

- a. Stability
- b. Completeness
- c. Clarity
- d. Validity
- e. Feasibility
- f. Precedent
- g. Scale

2. Design

- a. Functionality
- b. Difficulty
- c. Interfaces
- d. Performance
- e. Testability
- f. Hardware
- g. Non-Developmental SW

3. Code and Unit Test

- a. Feasibility
- b. Testing
- c. Coding/Implementation

4. Integration and Test

- a. Environment
- b. Product
- c. System

5. Engineering Specialties

- a. Maintainability
- b. Reliability
- c. Safety
- d. Security
- e. Human Factors
- f. Specifications

B. Development Environment

1. Development Process

- a. Formality
- b. Suitability
- c. Process Control
- d. Familiarity
- e. Product Control

2. Development System

- a. Capacity
- b. Suitability
- c. Usability
- d. Familiarity
- e. Reliability
- f. System Support
- g. Deliverability

3. Management Process

- a. Planning
- b. Project Organization
- c. Management Experience
- d. Program Interfaces

4. Management Methods

- a. Monitoring
- b. Personnel Management
- c. Quality Assurance
- d. Configuration Mgmt

5. Work Environment

- a. Quality Attitude
- b. Cooperation
- c. Communication
- d. Morale

C. Program Constraints

1. Resources

- a. Schedule
- b. Staff
- c. Budget
- d. Facilities

2. Contract

- a. Type of Contract
- b. Restrictions
- c. Dependencies

3. Program Interfaces

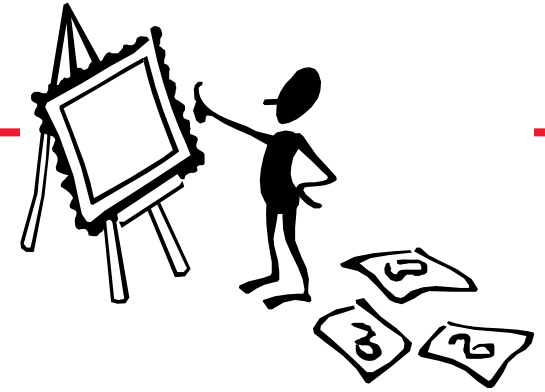
- a. Customer
- b. Associate Contractors
- c. Subcontractors
- d. Prime Contractor
- e. Corporate Management
- f. Vendors
- g. Politics

Reference: "Taxonomy-Based Risk Identification," Marvin J. Carr, et al, Software Engineering Institute, CMU/SEI-93-TR-6, ESC-TR-93-183, June 1993.

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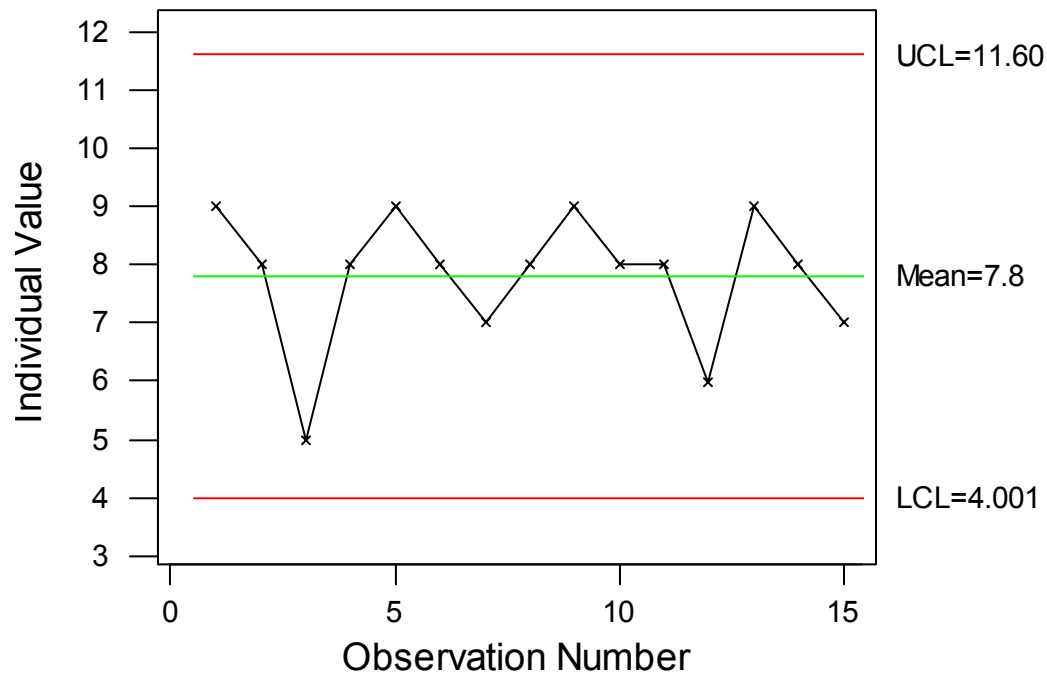
Level 4/5



- The value of Level 4/5 is **communication** and **quality**
 - Level 4/5 is 10-20% cheaper than Level 3, even though more is being done
 - Quantitative management establishes expected ranges of process performance
 - Processes are stable and predictable – allows un-usual process behaviors to be quickly identified, so that effective corrective action can be taken
- To realize the value of Level 4/5
 - Processes have to be stable (performed consistently)
 - Processes under statistical control must support business objectives
 - Data has to be useful and clean
 - Analysis has to lead to actions

Quantitative Management Example

- Suppose your project conducted several peer reviews of similar code, and analyzed the results
 - Mean = 7.8 defects/KSLOC
 - $+3\sigma$ = 11.60 defects/KSLOC
 - -3σ = 4.001 defects/KSLOC



- What would you expect the next peer review to produce in terms of defects/KSLOC?
- What would you think if a review resulted in 10 defects/KSLOC?
- 3 defects/KSLOC?

Reference: "A Practical Guide to Implementing Levels 4 and 5 (tutorial)," R. Hefner, 2006 CMMI Technology Conference and User Group

Summary

- **Convincing someone to implement a CMMI practice is easier when you can explain how the CMMI practices add value**
- **Insight comes from observing practical, value-added implementations**