What Can CMMI Learn From the PMBOK?

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Outline

• Overview
• Considerations for Comparison
• High Level Comparison of the PMBOK & CMMI
• Advantages of the PMBOK Process Structure
• Which PMBOK Processes Can Enhance CMMI Implementations
• How the PMBOK Supplements CMMI
• Summary
Overview

- PMBOK provides additional project management processes not addressed by CMMI
- CMMI addresses most of the PMBOK processes and CMMI provides a process management structure as well as Systems and Software Engineering Best Practices

- **Combining them will result in better and more complete project management of engineering endeavors**
Considerations for Comparison
Coverage

- **CMMI**
  - Addresses Project Management of engineering endeavors
  - Addresses a larger organization composed of engineering projects

- **PMBOK**
  - Addresses Project Management without addressing the type of project or directly addressing the larger organization

- The depth of coverage varies between the documents
Structure

• It should be noted that while both have a project management focus, the focus and structure of the documents is different
  – PMBOK supports training Project Managers for Project Management Professional (PMP) certification
  – CMMI supports organizational process improvement for achievement of maturity/capability levels
Model Components in the Staged Representation

- **Maturity Levels**
  - Process Area 1
  - Process Area 2
  - Process Area n

- **Specific Goals**
  - Specific Practices

- **Generic Goals**
  - Generic Practices
PMBOK Components

Knowledge Area (4) -> Process 5.1
Knowledge Area (5) -> Process 5.2
Knowledge Area (12) -> Process 5.n

5.2.1 Inputs
5.2.2 Tools & Techniques
5.2.3 Outputs
High Level Comparison of CMMI & PMBOK
Processes Addressed by Both

- Requirements Management or Scope Control
- Project Planning
- Managing and Controlling Project Execution
- Quality Assurance
- Supplier Management
- Risk Management
- Measurement
“Grey” Areas

• The following are implied or partly addressed by the PMBOK
  – Configuration Management
  – Causal Analysis
  – Generic Practices

• The following is partly addressed by CMMI
  – Human Resource Management
“Grey” Areas (continued)

• The following are definition or context differences
  – Verification and Validation – Definitions in both documents are basically reversed
  – Risk – In the PMBOK, risk is an uncertainty and can be positive or negative
  – Procurement Management – PMBOK considers buyer and seller points of view
  – Progressive Elaboration as opposed to Establish and Maintain
How CMMI Supplements PMBOK

- Engineering Best Practices
- Organizational Process Management
- Data Management
- Decision Analysis
Advantages of the PMBOK
Process Structure
Inputs and Outputs

• Definitions from the PMBOK
  – Input - Any item whether internal or external to the project that’s required by a process before the process proceeds. Maybe an output from a predecessor process.
  – Output - A product, result or service generated by a process. Maybe an input to successor processes.

• “Inputs” provide information necessary to perform the work of the process or a CMMI practice

• “Outputs” are similar to “Typical Work Products” in CMMI
Inputs and Outputs (continued)

- PMBOK provides a mostly consistent set of Inputs and Outputs (always references a given item the same way)

- *This improves the linkage and flow among processes and*

- *This approach can reduce the number of work products (Direct Artifacts) required for implementation*
Tools and Techniques

- Definitions from PMBOK
  - Tool – Something tangible, such as a template or software program, used in performing an activity to produce a product or result.
  - Technique – A defined systematic procedure used by a human resource to perform an activity to produce a product or result or deliver a service, that may employ one or more tools.
Tools and Techniques (continued)

• PMBOK suggests tools with descriptions and some examples
  – Provides sufficient information so you can understand how the tool works
  – In specific cases, shows examples so you can understand how to use the tool

• *This assists the implementer in determining which tools and techniques will be of benefit to their situation*
Example Tools

- Arrow Diagramming Method used to develop Project Schedule
- Graphic examples of project schedules
- Examples of risk parameters and risk analysis tools
- Earned Value Management formulas and examples used for Performance Reporting
- Statistical Control Charts used for Quality Control
- Pareto Diagrams used for Causal Analysis
PMBOK Process Groupings

• Initiating - includes project and phase startup processes
• Planning - includes planning processes and development of planning documents
• Executing - includes implementation processes
• Monitoring and Controlling – includes processes for monitoring scope, schedule, and quality
• Closing – includes project and contract closeout processes
Process Group Interactions

- Five process groups are required for the management of any project.

- Planning Processes
- Executing Processes
- Monitoring & Controlling Processes
- Initiating Processes
- Closing Processes
Which PMBOK Processes Will Enhance CMMI Implementations?
Project Charter

- Provides justification for selecting a project for implementation
- Issued by sponsor external to the project organization
- Formally authorizes existence of a project
- Identifies and gives authority to project manager
Close Contract/Project

- Creates and executes administrative closure and contract closure procedures
- Procedures are part of Project Management Plan
- Administrative closure procedures
  - Contains activities and responsibilities of project participants
  - Includes procedures to transfer the product to production
  - Step-by-step methodology documents required completion and exit criteria for the project
Close Contract/Project (continued)

• Contract closure procedures
  – Step-by-step methodology documents required for the contract completion and exit criteria for the contract
  – Contains activities and responsibilities of project participants
  – Formally closes all contacts associated with the completed project

• Procurement audits

• Verification that all contract work and deliverables are acceptable
Close Contract/Project (continued)

• Formal acceptance and handover of final product
• Organizational Process Asset Updates
  – Formal acceptance documentation
  – Project/Contract files
  – Project Closure documents
  – Historical information
  – Lessons learned
How the PMBOK Supplements CMMI
How PMBOK Supplements CMMI

- More guidance and details on planning
  - Additional Planning Documents:
    - Scope Management Plan,
    - Schedule Management Plan,
    - Cost Management Plan,
    - Staffing Management Plan,
    - Communications Management Plan, and
    - Procurement Management Plan
How PMBOK Supplements CMMI

• More guidance and details on planning (continued)
  – Project Time Management:
    • Activity Definition,
    • Activity Sequencing,
    • Activity Resource Estimating,
    • Activity Duration Estimating,
    • Schedule Development, and
    • Several possible support tools
How PMBOK Supplements CMMI

• More guidance and details on management and control
  – Performance measurement analysis and forecasting using earned value calculations – formulas and examples are provided
  – Integrated change control details (emphasizes maintaining baselines and plans, implementing corrective action, defect repair, etc.)
How PMBOK Supplements CMMI

• More guidance and details on Human Resource Management
  – Human resource planning
  – Acquiring the project team
  – Developing the project team
  – Managing the project team

• Considers the personnel assigned to the project
How PMBOK Supplements CMMI

• More guidance and details on Quality Assurance
  – Quality Planning
    • Considers Cost of Quality
    • Suggests tools with descriptions: Design of Experiments, Cost-Benefit Analysis, Benchmarking
  – Quality Control
    • Suggests tools and techniques with descriptions and some examples: cause and effect diagram, control charts, flowcharting, histogram, Pareto chart, run chart, scatter diagram, statistical sampling, defect repair review
    • Links outputs back into the implementing processes
How PMBOK Supplements CMMI

• More guidance and details on risk
  – Risk planning and budgeting
  – Example risk parameters
  – More information on how to identify risks
  – Qualitative and quantitative risk analysis
  – Risk response planning
How PMBOK Supplements CMMI

• More guidance and details on contracting or Procurement Management
  – Considers buyer and seller
  – Request seller responses (solicitation)
  – Considerations for evaluation
  – Includes contract closure and payment
Summary
The Mappings Are Available

• Link to -
  https://bscw.sei.cmu.edu/pub/bscw.cgi/0/79783

• Click on “Comparisons of CMMI & Other Standards/References”

• Then click on “CMMI and PMBOK”

• There will be three files, start with “CMMI and PMBoK Mappings”
Conclusions

- PMBOK provides a more complete (end to end) Project Management set of processes, with a defined beginning and a defined ending
- PMBOK inputs and outputs provide linkage and flow among processes
- PMBOK provides tools and techniques for implementing CMMI practices including explanations and examples
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