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

Generic Goals

Specific Practices

Generic Practices
PMBOK Components

Knowledge Area (4)
- Process 5.1

Knowledge Area (5)
- Process 5.2
  - 5.2.1 Inputs
  - 5.2.2 Tools & Techniques
  - 5.2.3 Outputs

Knowledge Area (12)
- Process 5.n

...
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
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 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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