Divide and Conquer – Marshalling the "Masses" to Tackle CMMI®

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Agenda

- The Set-up

- How CMMI® Gets Done

- Options for Implementation

- Realize the Organization is a System

- Implementing a Systems Approach to CMMI®

- Identifying the Components of the System

- Populating the Systems Framework

- Summary

® CMMI is registered in the U.S. Patent and Trademark Office by Carnegie Mellon University.

The Set-up

- Its midnight, and a small group of process experts are burning the candles, preparing for an up-coming appraisal
    - Sound familiar?

How CMMI Gets Done

- A Common Method
  - In many organizations, a small cadre of process experts develops the CMMI approach for their organization
    - Map CMMI to processes
    - Ensure processes comply
    - Identify and collect artifacts

- Understanding the Evolution of the Common Method
  - CMM® began as a Software model, so naturally a Software group generally comprised the cadre responsible for implementation
  - When the CMMI for System and Software came out, many organizations expanded the responsibility for implementation to include the larger Engineering group
    - The scope of implementation remained primarily within the Engineering disciplines

  - With the IPPD extension of CMMI, the potential for a broader implementation outside the boundaries of Engineering disciplines became a practical option for organizations

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How CMMI Gets Done

- Cultural Roadblocks to an Expanded Implementation
  - Given the evolution of the model, and its Engineering-centric legacy, process experts within Engineering disciplines typically remain at the center of implementation efforts
    - The CMM/CMMI model went through an evolutionary expansion yet that hasn't necessarily translated as a change in the size and make-up of the implementation team
      - The Engineering-centric cadre remains relatively constant in many organizations

  - The result:
    - A broad organizationally based model is often implemented by a small specialized group

Options for Implementation

- Overcoming the Roadblocks
  - How can a small cadre effectively implement a broad model so that the organization at large will understand, embrace, and institutionalize the implementation?
    - Option 1:
      - Restrict the organizational scope of the model primarily to Engineering activities
    - Option 2:
      - Acquire the necessary resources to expand the scope beyond Engineering to include other departments
        - » E.g. Program Management, Sub-Contract Management, or Human Resources

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Options for Implementation

- Option 1:
  - Consider the consequences when the scope is restricted to Engineering
    - Although the approach is easier for an Engineering-based cadre to manage, there are downsides:
      - Project management functions (e.g. PP, PMC, IPM, RSKM, CM, SAM, DAR) may be limited to technical management
        - » This is likely to exclude important higher level non-engineering functions

    - The restricted approach leaves an organization with the inability to capture:
      - » Program Management plan
      - » Non-technical risks related to program execution
      - » Staffing resources associated with contract management, customer interfaces, and program management

Options for Implementation

- Option 1:
  - Consequences - Continued
    - Other disciplines within the enterprise fail to see the value of the CMMI model when it is implemented with an engineering-centric approach
      - They view the model as something important only to engineering (engineering owns it) and of no real use to the program at large

  - The Result:
    - A restricted view of CMMI applicability
    - This may be a viable option for some organizations, but not all

Options for Implementation

- Option 2:
  - Consider expanding the scope beyond Engineering
    - Although the approach is more challenging for an Engineering-based cadre to manage, there are upsides:
      - Provides a more realistic, inclusive view of the Enterprise
      - The payoff is worth the effort
        » It results in a more robust implementation of the model, involving a greater representative cross-section of the enterprise

    - Engineering typically provides the CMMI knowledge-base and the personnel experienced in pulling appraisals together
      - The expanded approach requires bringing in players from other departments, so how does engineering steer this effort and involve these players?

    - The answer
      - You trick them
        » Develop methods and management support to solicit assistance from departments outside Engineering

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Realize the Organization is a System

- Once the decision is made to employ an expanded approach beyond Engineering, another decision must be made
  - What will be scoped in and out of the expanded model implementation?

- What are the functional elements of the "scoped" organization
  - Organizational charts and charters can help determine who has the mandate for these functions
    - Example: the CMMI model addresses resources/facilities (e.g. PP SP2.4 & IPM SP1.3) and organizational training (OT)
      - Determine which functional elements within the organization typically handle those areas.

- By viewing the organization as a system, the inclusion of critical organizational elements can be determined to satisfy the model
  - Example: including Program Management and Global Supply Chain can be useful in satisfying PP, PMC, IPM, and SAM

Implementing a Systems Approach to CMMI

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- An effective approach to encourage participation of non-Engineering organizations
  - Consider techniques to elicit a sense of ownership of parts of the model among other disciplines
    - Develop an initial mapping of the "owning" organizations to the CMMI processes
    - Identify the organizational entities (think system components) that might "own" portions of the CMMI model (think requirements)
    - Identify whether the organizational entities have a "project" or "organizational" responsibility in relation to the process area
      - This will tell you where artifacts will come from
    - For each "owning" organization identify the CMMI processes that they own
    - Work through executive management to identify process subject matter experts (SMEs) in each discipline to assist in the effort
    - Hold meetings with the organizational SMEs to secure their comments and concurrence on the mapping

Identifying the Components of the System

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The CMMI model (process areas and practices) can be viewed as the allocated requirements

Organizational departments can be viewed as the components of the System

| P | Indicates that activity is primarily a project activity |
| O | Indicates that activity is primarily a functional (organizational) activity |

LEVEL 2												
PROJECT PLANNING	Subject Matter Expert	SYS	SW	T&E	LOG	HW	QA	Process Grp	Eng Mgmt	Global Supply Chain	Supplier Qual	Prog Mgmt
SG-1 Establish Estimates												
SP-1.1 Estimate the scope of the project									P	P		P
SP-1.2 Establish estimates of work product & task attribute		P	P	P	P	P			P			
SP-1.3 Define project life cycle		P	P						P			P
SP-1.4 Determine estimates of effort & cost		P	P	P	P	P			P	P		
SG-2 Develop a Project Plan												
SP-2.1 Establish the budget & schedule									P			P
SP-2.2 Identify project risks		P							P			P
SP-2.3 Plan for data management												P
SP-2.4 Plan for project resources		P	P	P	P	P			P			P
SP-2.5 Plan for needed knowledge & skills		P	P	P	P	P			P			P
SP-2.6 Plan stakeholder involvement									P			P
SP-2.7 Establish the project plan		P	P	P					P			P
SG3 - Obtain Commitment to the Plan												
SP-3.1 Review plans that affect the project									P			P
SP-3.2 Reconcile work & resource levels									P			P
SP-3.3 Obtain plan commitment									P			P

Identifying the Components of the System

> The Systems approach identifies which requirements are satisfied by the project and which are satisfied by the organization

P	Indicates that activity is primarily a project activity
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SUPPLIER AGREEMENT MANAGEMENT			Subject Matter Expert	SYS	SW	T&E	LOG	HW	QA	Process Grp	EM	Global Supply Chain	Supplier Qual	Prog Mgmt
SG-1 Establish Supplier Agreements														
	SP-1.1	Determine acquisition type		P							P	P		P
	SP-1.2	Select suppliers			P			P			P	P		P
	SP-1.3	Establish suppler agreements			P			P			P	P		P
SG-2 Satisfy Supplier Agreements														
	SP-2.1	Execute the supplier agreement		P	P			P			P	P		
	SP-2.2	Monitor Selected Supplier Processes		P	P			P			P	P		P
	SP-2.3	Evaluate Selected Supplier Work Products												
	SP-2.4	Accept the acquired product			P			P			P		P	
	SP-2.5	Transition products			P			P			P		P	

Identifying the Components of the System

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> The Systems approach identifies the subject matter expert (SME) for each PA and practice

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LEVEL 3												
TECHNICAL SOLUTION	Subject Matter Expert	SYS	SW	T&E	LOG	HW	QA	Process Grp	EM	Global Supply Chain	Supplier Qual	Prog Mgmt
SG-1 Select Product-Component Solutions												
SP-1.1 Develop alternative solutions and selection criteria		P										
SP-1.2 Select product-component solutions		P										
SG-2 Develop the Design												
SP-2.1 Design the product or product component			P			P						
SP-2.2 Establish a technical data package			P		P	P						
SP-2.3 Design interfaces using criteria			P			P						
SP-2.4 Perform make, buy, or reuse analyses		P	P			P			P	P		P
SG-3 Implement the Product Design												
SP-3.1 Implement the design			P			P						
SP-3.2 Develop product support documentation					P							

Identifying the Components of the System

	P	Indicates that activity is primarily a project activity
	O	Indicates that activity is primarily a functional (organizational) activity

ORGANIZATIONAL PROCESS DEFINITION	Subject Matter Expert	SYS	SW	T&E	LOG	HW	QA	Process Grp	EM	Global Supply Chain	Supplier Qual	Prog Mgmt
SG-1 Establish Organizational Process Assets												
SP-1.1 Establish standard processes		O	O	O	O	O	O, P	O	O		O	O
SP-1.2 Establish life-cycle model descriptions		O	O						O			
SP-1.3 Establish tailoring criteria and guidelines								O	O		O	O
SP-1.4 Establish the organization's measurement repository								O	O			O
SP-1.5 Establish the organization's process asset library								O	O			O
SP-1.6 Establish work environment standardsprocess asset library								O	O			O
SG-2 Enable IPPD Management												
SP-2.1 Establish empowerment mechanisms								O	O			O
SP-2.2 Establish rules & guidelines for integrated teams		O	O						O			
SP-2.3 Balance team and home organization responsibilities								O	O		O	O
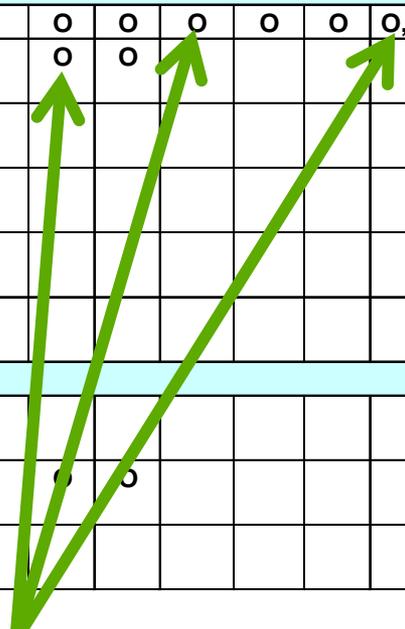
The Systems approach identifies which requirements are allocated to which components (organizational departments), and identifies whether it is an organizational or project function

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Populating the System Framework

- Mapping the Documentation to the Model (Engineering and Non-Engineering)
  - Work with designated process SMEs from each discipline/department to identify the procedures that map to process areas and practices
  - Work with the SMEs to identify specific passages in a document that address the practice
  - Assist SMEs in gap analysis to identify any document deficiencies which require remedial work to satisfy the practice
  - Work with SMEs to identify the work products their processes produce, which correspond to the "expected artifacts" cited in the model
  - Solicit SME assistance in the actual mapping of their procedures and expected artifacts into the CMMI process implementation indicator (PII)
  - Solicit SME assistance in collecting project specific artifacts, and organizing them into specified repositories
  - Work with SMEs to identify the appraisal interview candidates
  - The SMEs become points-of-contact to resolve findings generated from appraisals

Summary

- Benefits: Tangible and Intangible
  - Tangible
    - The expanded approach results in robust implementation of the CMMI model, involving critical departments and management functions outside engineering
    - The expanded implementation safeguards against "flag chasing" approaches that rely on convenient, sub-optimized mappings

  - Intangible
    - Process subject matter experts (SMEs) from participating disciplines gain exposure to and an appreciation of the benefits of CMMI
      - They become process advocates, carrying the message of the model's usefulness back to their organization
      - Communicating the benefits of CMMI to non-Engineering departments uninvolved in the appraisal process would likely represent an insurmountable challenge for a small cadre of Engineering personnel

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