CMMI Implementation

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What is CMMI

- CMMI or Capability Maturity Model Integration is a process improvement model developed by the Software Engineering Institute, Carnegie Mellon University.
- CMMI was developed from the SW-CMM which was used widely by software organizations throughout the world.
- Additional disciplines are included in CMMI.
- Software Park introduced SW CMM to Thai SW industry in 1999 and transit to CMMI about three years ago.
- Now SIPA has set a target to have at least 20 companies appraised in the next two years.
CMMI can be used for:

- Software Engineering Discipline
- System Engineering Discipline
- Integrated Product and Process Development Discipline
- Supplier Sourcing Discipline

And

Other disciplines if appropriately implemented
CMMI Consists of Process Areas

- A Process Area is a cluster of related practices in an area that, when implemented collectively, satisfies a set of goals considered important for making significant improvement in that area.
- There are 25 Process Areas in CMMI
- Examples of process areas
  - Project Planning
  - Configuration Management
  - Risk Management
- These PA’s are organized in two ways
## Continuous Representation: PAs by Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Process Areas</th>
</tr>
</thead>
</table>
| **Process Management** | Organizational Process Focus  
Organizational Process Definition  
Organizational Training  
Organizational Process Performance  
Organizational Innovation and Deployment |
| **Project Management** | Project Planning  
Project Monitoring and Control  
Supplier Agreement Management  
Integrated Project Management for IPPD  
Risk Management  
Integrated Teaming  
Integrated Supplier Management  
Quantitative Project Management |
| **Engineering** | Requirements Management  
Requirements Development  
Technical Solution  
Product Integration  
Verification  
Validation |
| **Support** | Configuration Management  
Process and Product Quality Assurance  
Measurement and Analysis  
Decision Analysis and Resolution  
Organizational Environment for Integration  
Causal Analysis and Resolution |
# Staged Representation: PAs by Maturity Level

<table>
<thead>
<tr>
<th>Level</th>
<th>Focus</th>
<th>Process Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Optimizing</td>
<td>Continuous Process Improvement</td>
<td>Organizational Innovation and Deployment, Causal Analysis and Resolution</td>
</tr>
<tr>
<td>4 Quantitatively Managed</td>
<td>Quantitative Management</td>
<td>Organizational Process Performance, Quantitative Project Management</td>
</tr>
<tr>
<td>2 Managed</td>
<td>Basic Project Management</td>
<td>Requirements Management, Project Planning, Project Monitoring and Control, Supplier Agreement Management, Measurement and Analysis, Process and Product Quality Assurance, Configuration Management</td>
</tr>
<tr>
<td>1 Initial</td>
<td></td>
<td></td>
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</tbody>
</table>
Two Kinds of Practices

- Practices are activities that must be performed in each process area.
- There are two kinds of practices:
  - Specific Practices: Description of an activity considered important to achieve the associated specific goal of the process area. Specific Practices are the essence of the PA and are different for each PA.
  - Generic Practices: Description of an activity considered important to achieve the associated generic goal. Generic practices strengthen the institutionalization of the PA. Same Generic practices appear in all PA.
Analogy with learning

- When we study for a degree we need to take several courses.
- We can imagine each course as a Process Area.
- The specific goal of learning a course is to pass the exam with good grade, e.g., not less than C. Specific practices in learning are: attending the classes, work on exercises, sit in midterm exam, submit the project work and sit in final exam.
- The generic goal of learning a course is to have our name registered for credit. The generic practices are: register the course, pay the fee, purchase textbook, prepare learning tools, etc.
Four Features for Institutionalization

Commitment to perform
- Executives support with policies
- Staff work intelligently using standard processes

Ability to perform
- Has adequate resources and tools
- Has knowledge to perform job functions

Directing Implementation
- Perform job functions as specified in process standards

Verifying Implementation
- Review the work done and report to the executives
Two Representations

- **Staged Representation**
  - A systematic, structured way to approach process improvement one step at a time.
  - Achieving each step is a foundation for the next step.
  - There are five levels of maturity.

- **Continuous Representation**
  - A flexible approach to improve process performance. The organization may choose to improve a single PA or a group of PA’s.
  - Organization may improve each PA at different rates.
  - There are six levels of process capability.
Process Area Components

- Process Area (PA)
  - Specific Goals (SG)
    - Specific Practices (SP)
      - Typical Work Products
      - Subpractices
  - Generic Goals (GG)
    - Generic Practices (GP)
  - Purpose Statement
  - Introductory Notes
  - Related Process Areas

Legend:
- Required
- Expected
- Informative
CMMI Model Structure

Continuous

- Process Area 1
- Process Area 2
- Process Area n

- Specific Goals
- Generic Goals
- Capability Levels
- Specific Practices
- Generic Practices

Staged

- Process Area 1
- Process Area 2
- Process Area n

- Specific Goals
- Generic Goals
- Maturity Levels
- Common Features
- Ability to Perform
- Directing Implementation
- Commitment to Perform
- Verifying Implementation

Generic Practices

Specific Practices
CMMI – Staged Representation

Main ideas are to improve organization processes.

- Five Maturity Levels
  - Initial
  - Managed
  - Defined
  - Quantitatively Managed
  - Optimizing

- Each maturity level must have clear and rigorous processes
Capability Levels -

5  Optimizing
4  Quantitatively Managed
3  Defined
2  Managed
1  Performed
0  Incomplete
CMMI Implementation

- Lobby for executive support
- Select staff to attend Intro to CMMI course
- Create **EPG (Engineering Process Group)**
- Employ CMMI consultants
- Create appropriate organization policies
- Attend SPIN Group Meeting (at SW Park)
- Study materials in SEI website
Select Staged Representation

- Software organizations should select stage representation.
- Fundamental process areas are specified at Maturity Level 2 and are not too difficult to implement. These are
  - Requirements Management
  - Project Planning
  - Project Monitoring and Control
  - Supplier Agreement Management
  - Measurement and Analysis
  - Process and Product Quality Assurance
  - Configuration Management
SEPG Tasks

- Study organization processes
- Write process standards
- Develop SDLC stages and details
- Create meeting procedures
- Create estimation procedures
- Create planning procedures
- Create Quality Assurance procedures
- Create Configuration Management Procedures
Executive’s Support

- Sending staff to learn Project Management
- Sending staff to learn Quality Assurance
- Sending staff to learn Configuration Management
- Allocate resources to acquire tools
- Select pilot projects for implementation
Managing Projects

- Executive announces objectives of implementing CMMI
- Executive appoint a Project Leader to manage a selected project following the CMMI model
- Staff members are appointed as team members with appropriate roles. A project must have QA and CM.
- Customers must be informed of the intention to follow the CMMI model so that customers will appropriately participate in the project processes.
- Standard processes are followed strictly until the project is over.
Learn and Improve

- After implementing CMMI in a few pilot projects, EPG should discuss the results and improve the software processes.
- All project staff should share the experience in using CMMI and recommendations must be given on improving the processes at the end of the projects.
- More projects should be implemented using the improved processes.
Thinking about Appraisal

- Organization should think about Appraisal which is called SCAMPI-A.
- Appraisal can confirm that the organization implement CMMI correctly and provide insight into process improvement.
- Appraisal must be led by SCAMPI Lead Appraisor.
- Appraisal Team Members must be appointed to help LA to review documents and to interview staff members working in the projects.
Three Phases of SCAMPI-A

- First Phase: Objective setting, Planning, Contracting
- Second Phase: Training of ATM, Document Review
- Third Phase: Onsite SCAMPI, Interviewing, Evidence Consolidation, Rating, Recommendation
SPIN Group

- Software Process Improvement Network
- The group tries to help members to understand improvement processes through:
  - Discussion
  - Special lecture
  - Site visit