

The magic of paradigm:

How can  
Project Management quality  
be quantified and improved?

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# Background



The quality of projects' management in an organization influences its business results.

But where as..

In contrast...

- Quality of products draws attention and resources
- Tracking of [poor] quality costs is done regularly
- Products are tangible entities

- Management quality and poor project management is yet far less attended
- The cost of "poor project management" is not yet measured
- Management is an abstract entity

**How then can quality of management  
be measured?**



**It could be measured if a way was  
found to convert the management  
abstract entity into a series of concrete  
practices that produce deliverables.**

**The conversion can be made by magic  
– the magic of paradigm.**

# The magic of paradigm



The use of a model, serving for

- Evaluation of the status of management quality components
- Identification of the needed improvements
- Guidance of process improvement (by following the model's requirements)
- Bridging the gap between the practical development process and the paradigm's demands

The paradigm follows CMMI model, the Capability Maturity Model Integration (CMMI<sup>SM</sup>) that is the state-of-art model of SEI.

# CMMI<sup>SM</sup> Advantages



- Allows for common terminology, components and style over various disciplines: software, hardware, project management, etc.
  - Enables a common, integrated vision of improvement for all elements of an organization
  - Permits to use proven standard improvement process on a discipline other than software
  - Offers two presentation styles: Staged and Continuous
- ➔ Suitable for performing improvement of Project Management Process

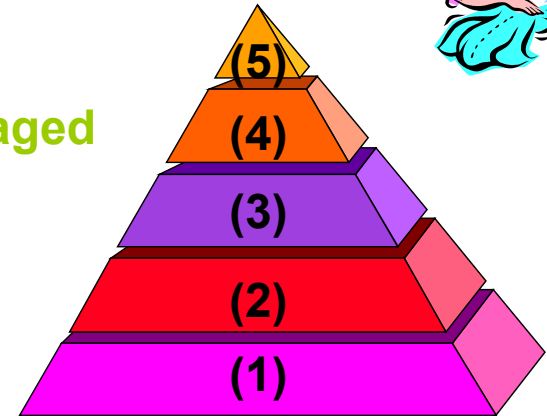
# CMMI<sup>SM</sup> is Tailorable



## Staged Model

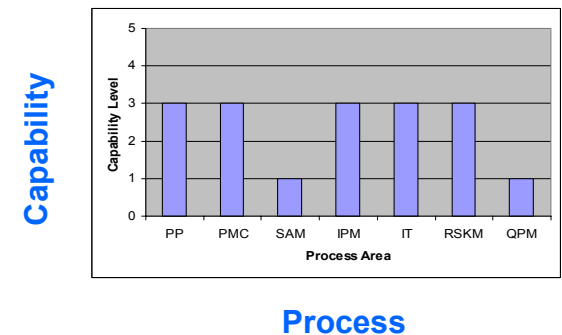
- Provides a road map for implementing:
  - Groups of Process Area
  - Sequencing of implementation
- Familiar structure for those transitioning from CMM-SW

Optimizing  
Quantitatively Managed  
Defined  
Managed  
Performed

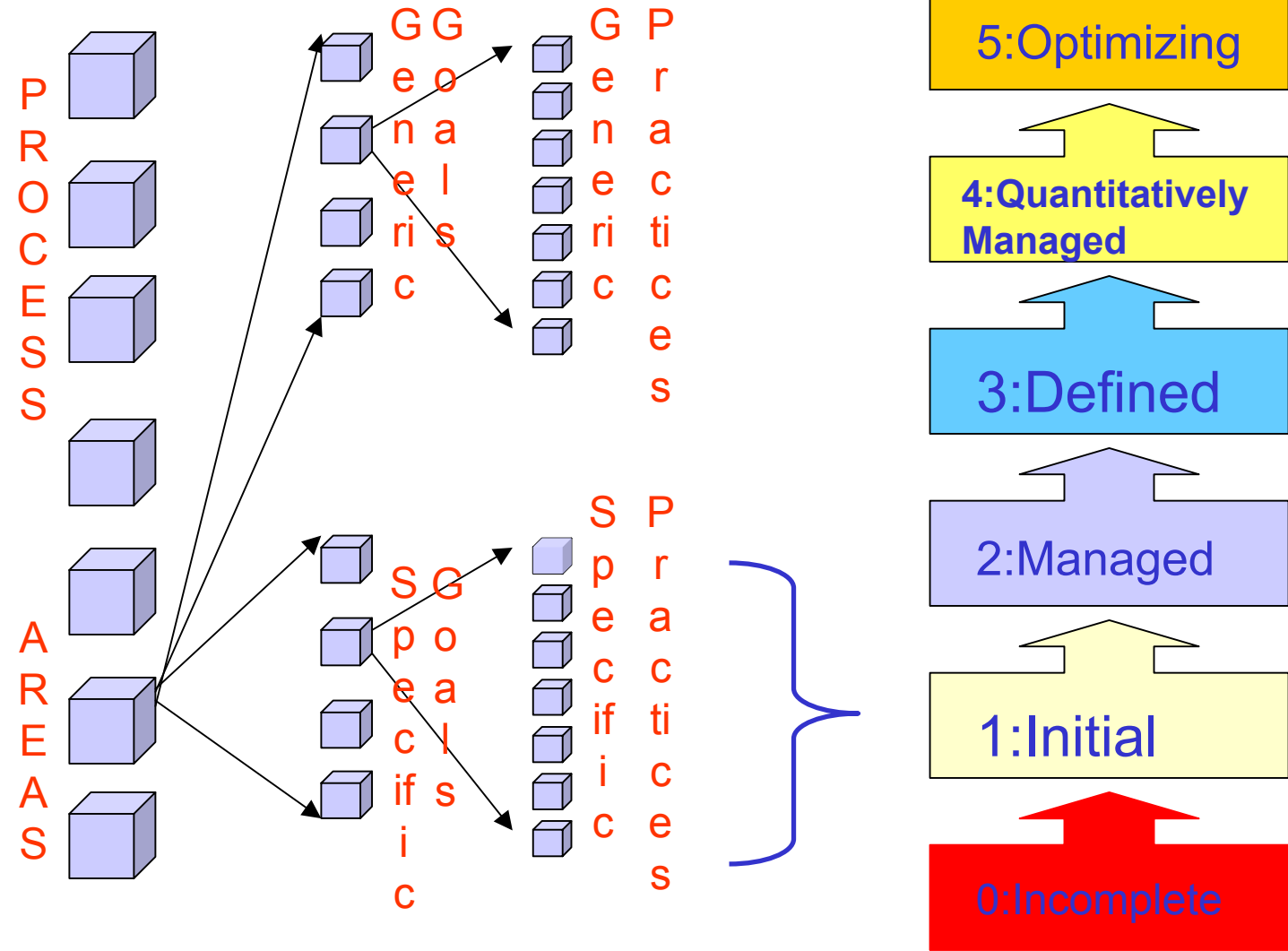


## Continuous Model

- Every PA [goal] can be at any Capability Level
- Raises the bar for high maturity organizations
- Organizations choose which PAs to focus on



# CMMI<sup>SM</sup> Structure (Continuous representation)



# Project Planning (PP) (Informal Practice Rating)

## SG 1 Establish Estimates

- Estimate the Scope of the Project ● FI
- Establish Estimates of Work Product and Task Attributes ● FI
- Define Project Life Cycle ● FI
- Determine Estimate of effort and Cost ● FI

## SG 2 Develop a Project Plan

- Establish the Budget and Schedule ● FI
- Identify Project Risks ● FI
- Plan for Data Management ● FI
- Plan for Project Resources ● FI
- Plan for Needed Knowledge and Skills ● FI
- Plan Stakeholder Involvement ● FI
- Establish the Project Plan ● FI

## SG 3 Obtain Commitment to the Plan

- Review Plans that Affect the Project ● FI
- Reconcile Work and Resource Levels ● FI
- Obtain Plan Commitment ● FI

## GG 2 Institutionalize a Managed Process

- Establish an Organizational Policy ● NI
- Plan the process ● PI
- Provide Resources ● FI
- Assign Responsibility ● FI
- Train People ● LI
- Manage Configuration ● PI
- Identify and Involve Relevant Stakeholders ● FI
- Monitor and control the process ● LI
- Objectively evaluate adherence ● FI
- Review Status with Higher Level Management ● FI

## GG 3 Institutionalize a Defined Process

- Establish a Defined Process ● NI
- Collect Improvement Information ● NI

- Fully Implemented
- Partially Implemented
- Largely Implemented
- Not Implemented

# Supplier Agreement Management (SAM)

## SG 1 Establish Supplier Agreements

Determine Acquisition Type  FI

Select Suppliers  FI

Establish Supplier Agreements  FI

## SG 2 Satisfy Supplier Agreements

Review COTS Products  FI

Execute the Supplier Agreement  FI

Accept the Acquired Product  FI

Transition Products  FI

## GG 2 Institutionalize a Managed Process

Establish an Organizational Policy  NI

Plan the process  PI

Provide Resources  FI

Assign Responsibility  FI

Train People  LI

Manage Configuration  PI

Identify and Involve Relevant Stakeholders  FI

Monitor and control the process  LI





Objectively evaluate adherence  FI

Review Status with Higher Level Management  FI

## GG 3 Institutionalize a Defined Process

Establish a Defined Process  NI

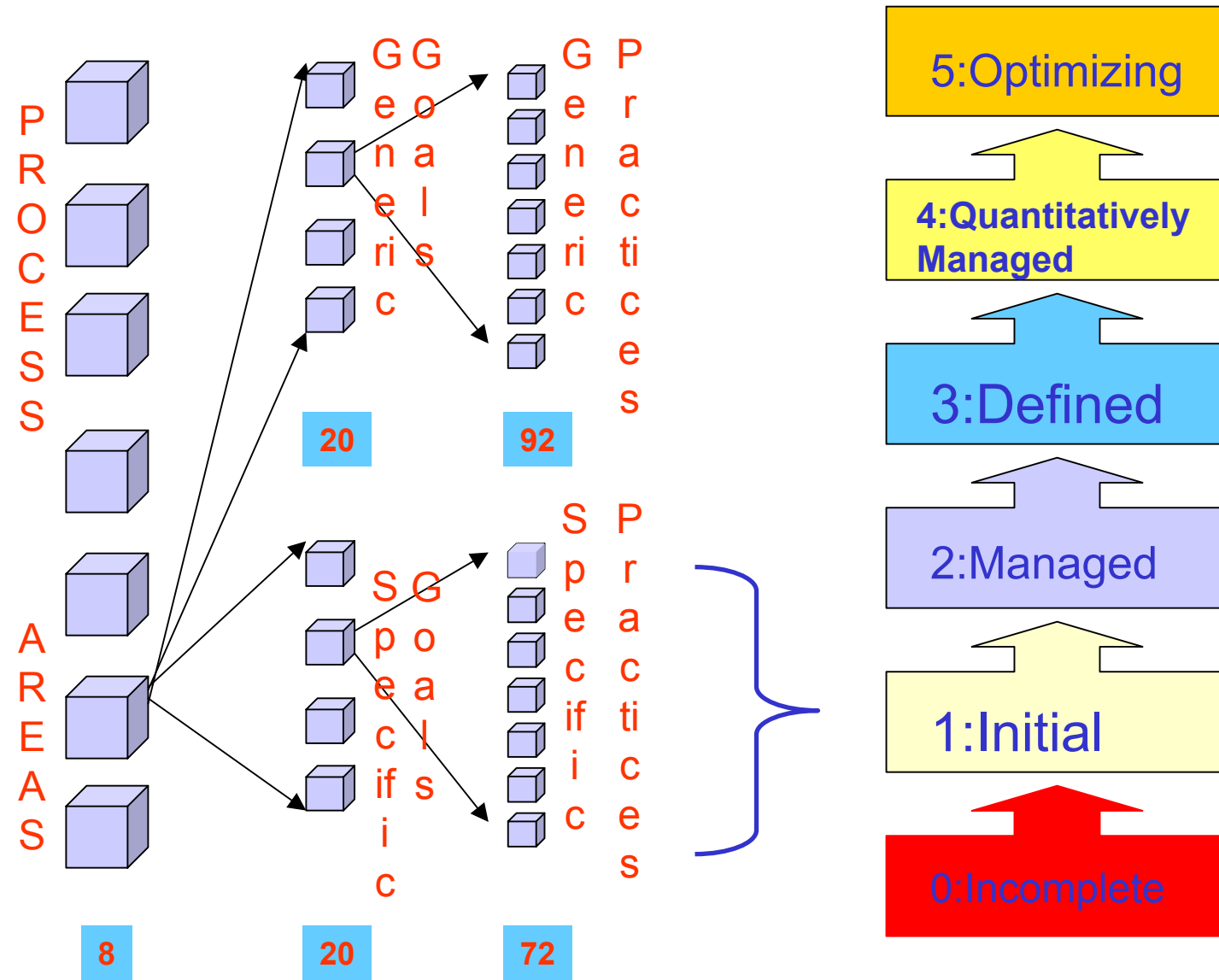
Collect Improvement Information  NI

 Fully Implemented    
  Partially Implemented  
 Largely Implemented    
  Not Implemented

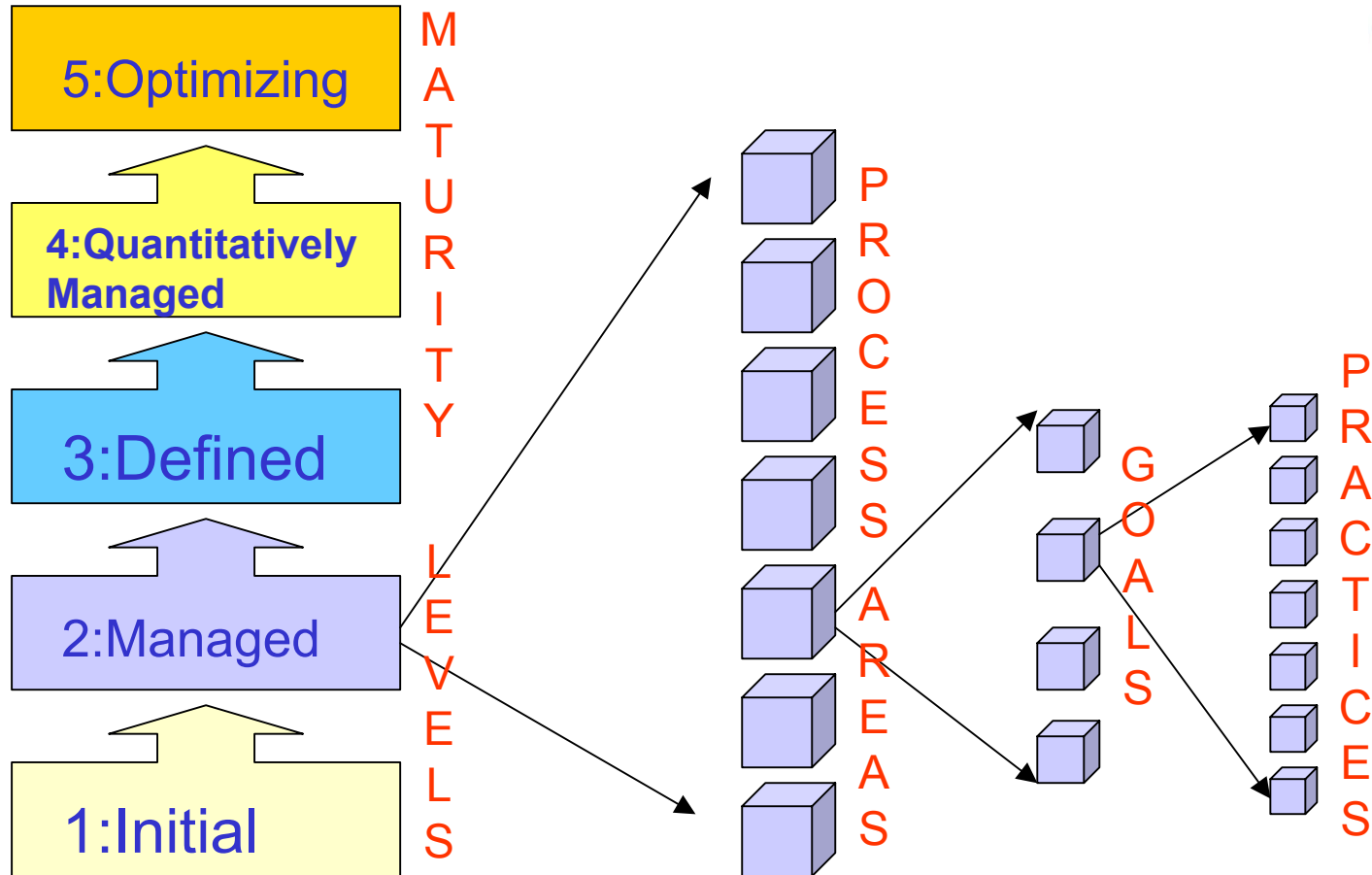
# CMM-I Content: Continuous Representation

Process Areas	
Process Management	<ul style="list-style-type: none"> <li>Organizational Process Focus</li> <li>Organizational Process Definition</li> <li>Organizational Training</li> <li>Organizational Process Performance</li> <li>Organizational Innovation and Deployment</li> </ul>
Project Management	<ul style="list-style-type: none"> <li>Project Planning</li> <li>Project Monitoring and Control</li> <li>Supplier Agreement Management</li> <li>Integrated Project Management (<i>IPPD Elements</i>)</li> <li>Risk Management</li> <li><i>Integrated Teaming (IPPD only)</i></li> <li>Quantitative Project Management</li> <li><u><i>Integrated Supplier Management (SS only)</i></u></li> </ul>
Engineering	<ul style="list-style-type: none"> <li>Requirements Management</li> <li>Requirements Development</li> <li>Technical Solution</li> <li>Product Integration</li> <li>Verification</li> <li>Validation</li> </ul>
Support	<ul style="list-style-type: none"> <li>Process and Product Quality Assurance</li> <li>Configuration Management</li> <li>Measurement and Analysis</li> <li>Decision Analysis and Resolution</li> <li><i>Organizational Environment for Integration (IPPD only)</i></li> <li>Causal Analysis and Resolution</li> </ul>

# CMMI<sup>SM</sup> Structure (Continuous representation)



# CMMI<sup>SM</sup> Structure (Staged representation)

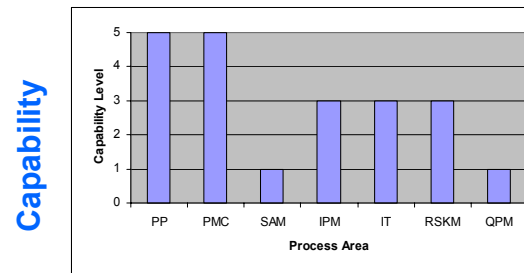


# CMM-I Content: Staged Representation

Level	Focus	Process Areas	
5 Optimizing	<i>Continuous Process Improvement</i>	Organizational Innovation and Deployment Causal Analysis and Resolution	<p>Quality Productivity</p> <p>Risk Rework</p>
4 Quantitatively Managed	<i>Quantitative Management</i>	Organizational Process Performance Quantitative Project Management	
3 Defined	<i>Process Standardization</i>	Requirements Development Technical Solution Product Integration Verification Validation Organizational Process Focus Organizational Process Definition Organizational Training Integrated Project Management ( <i>IPPD Elements</i> ) Risk Management <i>Integrated Teaming (IPPD only)</i> Decision Analysis and Resolution <i>Organisational Environment for Integration (IPPD only)</i> <u><i>Integrated Supplier Management (SS only)</i></u>	
2 Managed	<i>Basic Project Management</i>	Requirements Management Project Planning Project Monitoring and Control Supplier Agreement Management Measurement and Analysis Process and Product Quality Assurance Configuration Management	
1 Performed			

# The Continuous model's features

- Enables to choose the Process Areas which fits best the business needs of the organization
- Enables to choose the Capability Level to pursue, in each individual Process Area
- Enables to select a target profile that meets the need to focus on project management



Process

# If the magic is the paradigm, Who is the magician who did the magic?

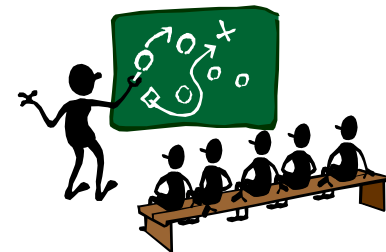


# The magician who pulled the bunny out of the hat

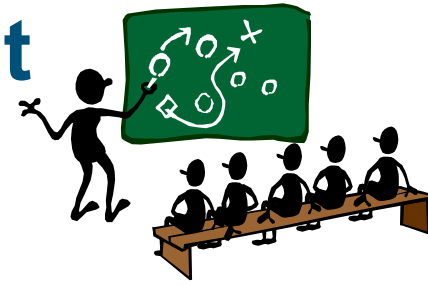
is  
the



# PM Process improvement working Group



# PM Process Improvement Working Group



- Objective: Create a PM Process
- Tactics: Use the CMMI<sup>SM</sup> model
  - Follow the success of the CMM-SW model
- Parties:
  - Motorola Israel (MIL) Design Center
  - Global Tetra subscriber organization
- Challenge:
  - How to make it without an exclusive force?

# The road to produce PM Process



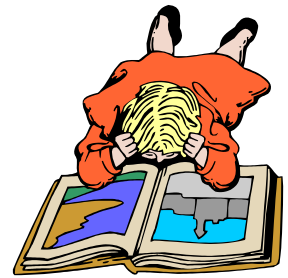
- **PM Process Group**
  - Composed of experts from the PM domain
  - Responsible for creating the formal process
- **PM Officers Forum**
  - Composed of managers of PM teams
  - Responsible for approval of the created process
  - Responsible for deployment of the PM process
- **Resources for recruitment:**
  - PM experts (rather than process experts)
  - Actual allocation of only a fraction ( 5- 10% ) of the experts' time

# Steps for establishing PM Process



- ① **Interpretation** of the CMMi practices' requirements to the terms of Motorola's environment
- ② Performing a **base-line assessment**, comparing the PM process status to the CMMI<sup>SM</sup> model's requirements
- ③ Setting a **target** for the PM process information
- ④ Preparing a **plan** to get to the target, by achieving intermediate goals
- ⑤ Preparing the **infrastructure** required for deployment (reports, scripts, etc.)
- ⑥ **Deploying** the PM process in all the projects carried out throughout the organization

# ① Practices interpretation



- Goal: Interpretation of the CMMi practices' requirements to the terms of Motorola's environment
- Challenge: To address 168 practices required by the model to meet the selected PM level 3 requirements
- Means: Practice ID's (PIIDs)
  - Include the practices interpretations
  - Save all the knowledge required for the assessment
    - SCAMPI Assessors' requirements
    - Type of artifacts required for "proving" deployment
    - Collect [links to] projects' deployment evidences
    - Evidences evaluation
  - Enables periodic assessments
- Surprisingly, 40 process entities suffice to achieve level 3 in the PM Process Areas

## ②\* Base-Line Assessment



- Goal: Performing a base-line assessment, comparing the PM process status to the CMMI<sup>SM</sup> model's requirements
- Class B appraisal at MIL during August 2002
  - Conducted by a SEI-certified lead assessor
  - Based on documents' evaluation as well as interviewing engineers and managers
- Class C appraisal at Tetra Subscriber during Dec 2002
  - Multi sites location: Singapore, Europe, Israel
  - Internal assessors
  - Based on documents' evaluation only

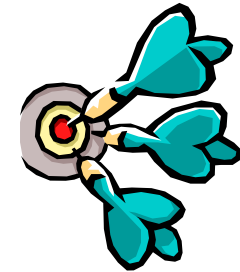
## ②\*\* Aug 02 Base-Line Assessment Results

- In most cases level 1 practices were deployed
  - achieved thanks to adopting Motorola's M gates Process
  - The M gates tells us what to do, but regrettably it does not instruct us how to do it
- A comprehensive standard project management process was not yet established

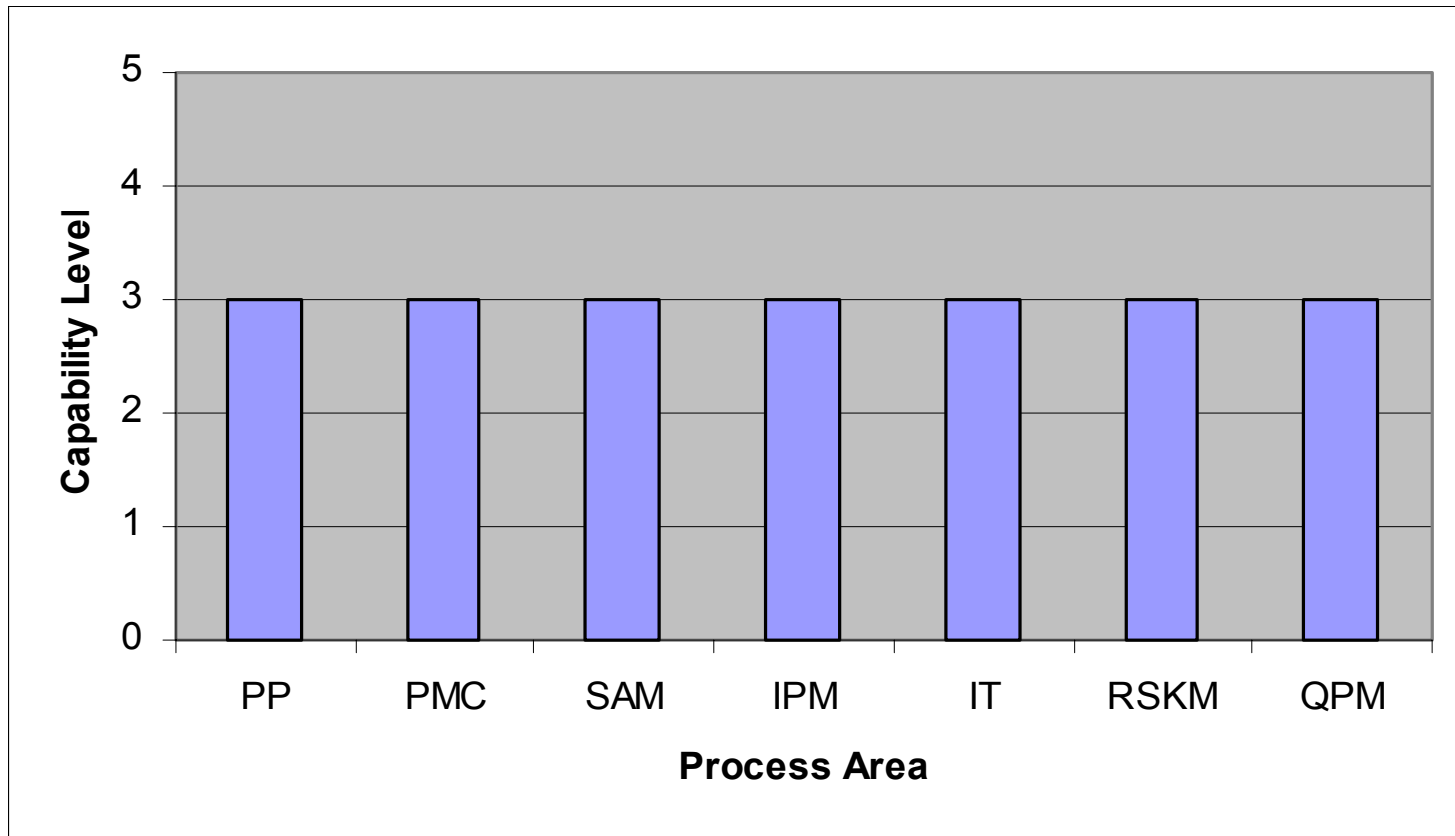


## ③ Setting a PM Process Target

- Goal: Setting a target for the PM process information
- Utilizing a competent PM process, meaning following at least CMMI<sup>SM</sup> level 3
- CMMI<sup>SM</sup> level 2 requirements:
  - Establish an organizational policy
  - Plan the process
  - Provide resources to carry it out
  - Assign responsibilities
  - Train people
  - Manage configuration
  - Involve stakeholders
  - Monitor, control and evaluate the process
- CMMI<sup>SM</sup> Level 3 requirements:
  - Level 2 further requirements:
    - Establishing a defined process
    - Collecting improvement information.



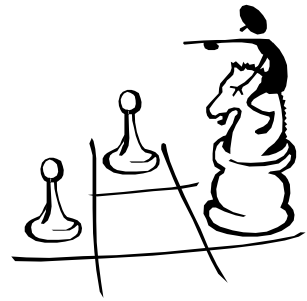
# The Selected Target Profile



PP – Project Planning  
PMC – Project Monitoring & Control  
SAM – Supplier Agreement Management

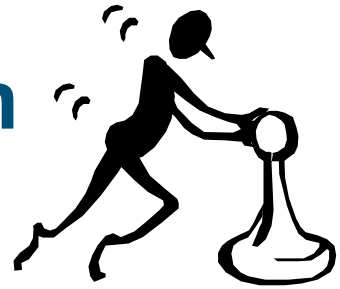
IPM – Integrated Project Management  
IT – Integrated Teaming  
RSKM – Risk Management  
QPM – Quantitative Project Management

## ④ Prepare a Plan



- Goal: Preparing a plan to get to the target, by achieving intermediate goals
- A Four-Steps Plan
  1. **Effort Estimation**, which identifies the required components of the PM process and estimates the duration (working days) required for each component
  2. **Recruiting proper staff** for carrying out the plan; Owing to the creation of an expanded European-Israeli team, it was possible to divide the work among a growing number of members
  3. **Determining a detailed list of sequence of events**; allotting individual assignments to contributors and allocating the time duration
  4. **Performing quarterly assessments** to monitor the progress

## ⑤ Infrastructure Preparation



- Goal: Preparing the infrastructure required for deployment (reports, scripts, etc.)
- The infrastructure consists of templates for documents, measurements, reports and metrics
  - Saves the necessity of expertizing in CMMI<sup>SM</sup> model
  - At the disposal of managers and engineers managing projects
  - Ensures unity of projects' management.
- PM Process on Motorola's Intranet:
  - PM policies and guidelines
  - PM training
  - Project/Program Review template
  - Automatic Scripts for metrics producing and reports
  - PM Process Audit
  - ...

## ⑥ PM Process Deployment

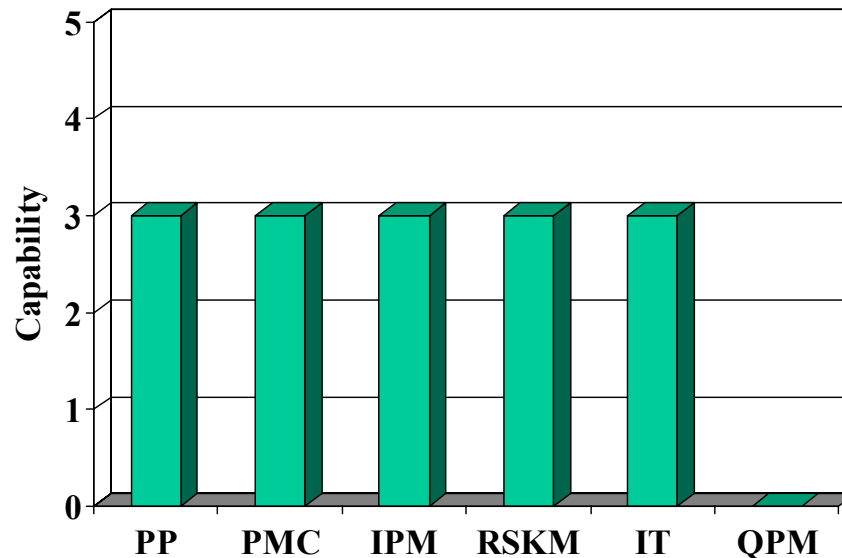


- Goal: Deploying the PM process in all the projects carried out throughout the organization
- Incremental nature of deployment
- Monthly PM Officers meeting
  - Approve the created processes
  - Track Deployment
- Periodic Audits

# Results (1/2)



- Formal appraisal at MIL during Jan 2004
  - Conducted by a SEI-certified lead assessor
  - More than 90% of the Level 3 practices are deployed
  - Formal level 3 in Project Management (PM)



# Results (2/2)



- **Class B appraisal at Tetra Subscriber during Nov 2003**
  - **Multi sites location**
  - **External assessors (including Lead Assessor from SEI)**
  - **Based on documents' evaluation only**
  - **More than 90% of the Level 3 practices are deployed**



# Conclusions

- The CMMI<sup>SM</sup> model is adequate for non-software discipline use
  - **Merits utilization for the purpose of PM quality improvement**
  - **Encouraged by our success – Other organizations are implementing the CMMI<sup>SM</sup> for hardware engineering process improvement**
- The working group chairperson should be an expert both in:
  - **Process Management**
  - **The specific domain**
- **Class C assessment lessons learned**
  - **Use interviews, although not mandatory by the process**
  - **It is not as easy as one may estimate (“Quick look..”)**



# Recommendations

- CMMI<sup>SM</sup> adopters should start with a benchmarking among experienced utilisers of the model.
- Achieve senior management buy-in before first step is taken
- Start with a pilot before running into wide deployment
- Determine qualifications of a non-software process improvement leader
  - **Both a process and domain expert**
  - **Possess determination, persistence, perseverance**
  - **Manifest leading skills and capability to induce enthusiasm**



# Backup slides



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# Classes of Appraisals

## Class A (10-15 days):

SCAMPI

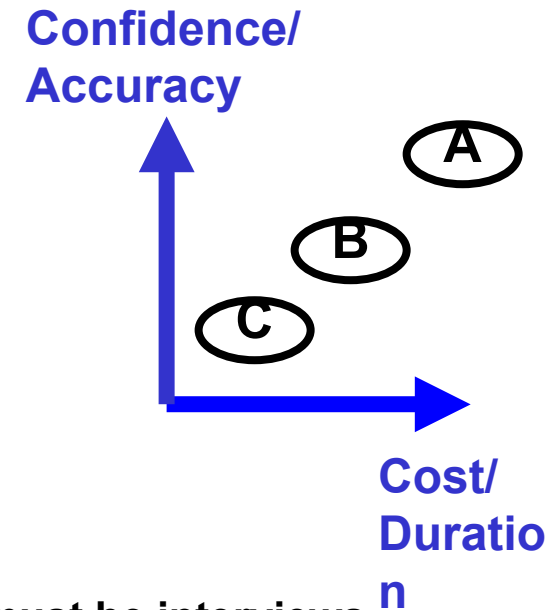
- Full comprehensive method
- Thorough model coverage
- Provides maturity or capability level
- Data from instruments, interviews, and documents

## Class B (5-10 days):

- Less comprehensive, less expensive
- Initial, partial, self-assessment
- Focus on areas needing attention
- No maturity or capability level rating
- Data from “at least two sources of data”, one of which must be interviews

## Class C (3-7 days):

- Quick look
- Checking for specific risk areas
- Inexpensive, little training needed
- Gap Analysis
- Data from “at least one source of data”



# MIL CMMI Appraisals

Aug 2002

Jan 2004

Class B

SCAMPI “A”

2 Organizations (Cellular and Tetra)

5 Organizations (Cellular Tetra, DDC, NAG, Fixed Data)

5 Process Areas

6 Process Areas (QPM added)

2 Assessors

5 Assessors

Program management

Program and Project Management