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# **CMMI**

## **Some Attention Getters**

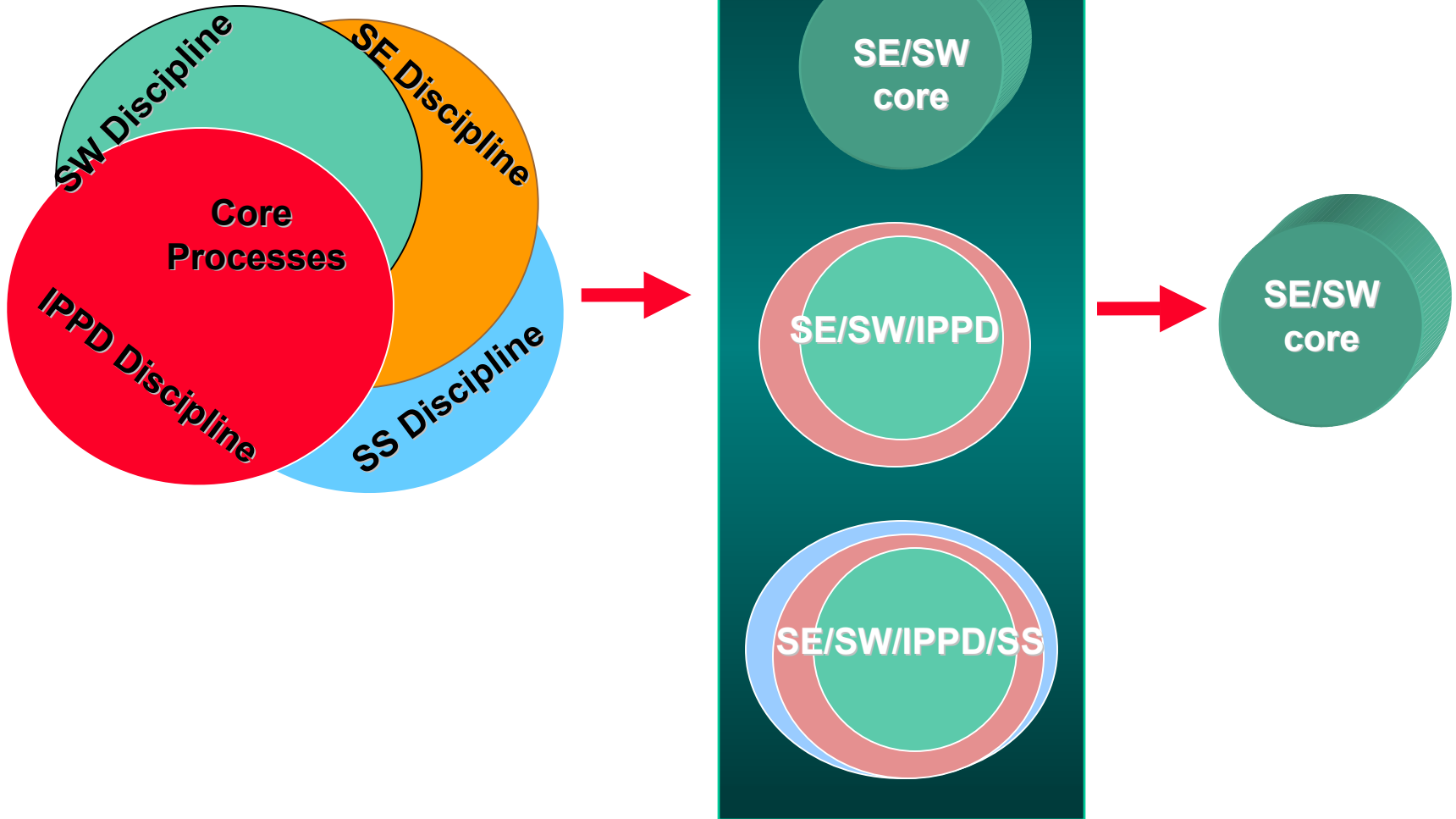
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**Omaha SPIN, Aug 20, 2002**

# Contents



- **Background**
- **CMMI SE/SW Process Areas**
- **Generic Practices**
- **CMMI History and CMM Sunset Schedule**

# CMMI Model Options



# Definitions Clarified in the CMMI (Chapter 3)

## Product

- *“The word “product” is used throughout the CMMI Product Suite to mean **any tangible output or service** that is a result of a process and that is intended for delivery to a customer or end user. A product is a work product that is delivered to the customer.”*

## Development

- *“The word “development,” when used in the CMMI Product Suite, **implies not only development activities, but also maintenance activities**. Projects that benefit from the best practices of CMMI can focus on maintenance, development, or both.”*

# Goals and Practices

- **Specific Goals (SGs) and Specific Practices (SPs)**
  - For each PA address its unique characteristics and the activities that describe what must be implemented to satisfy the PA
- **Generic Goals (GGs) and Generic Practices (GPs)**
  - The statements appear in, and apply to, multiple PAs
  - **Generic Goals**
    - Achievement of a GG in a PA signifies improved control in planning and implementing the processes associated with the PA
      - Examples
        - Maturity Level 2 - GG2: Institutionalize a Managed Process
        - Maturity Level 3 - GG3: Institutionalize a Defined Process (project process derived or tailored from an organizational set of standard processes)
  - **Generic Practices**
    - Common activities that ensure the processes associated with each PA will be effective, repeatable and lasting

# CMMI-SE/SW – Process Areas

## Optimizing (5)

- Organizational Innovation and Deployment (OID)
- Causal Analysis and Resolution (CAR)

## Quantitatively Managed (4)

- Organizational Process Performance (OPP)
- Quantitative Project Management (QPM)

## Defined (3)

- Requirements Development (RD)
- Technical Solution (TS)
- Product Integration (PI)
- Verification (VER)
- Validation (VAL)
- Integrated Project Management (IPM)

- Organizational Process Focus (OPF)
- Organizational Process Definition (OPD)
- Organization Training (OT)
- Decision Analysis and Resolution (DAR)
- Risk Management (RSKM)

## Managed (2)

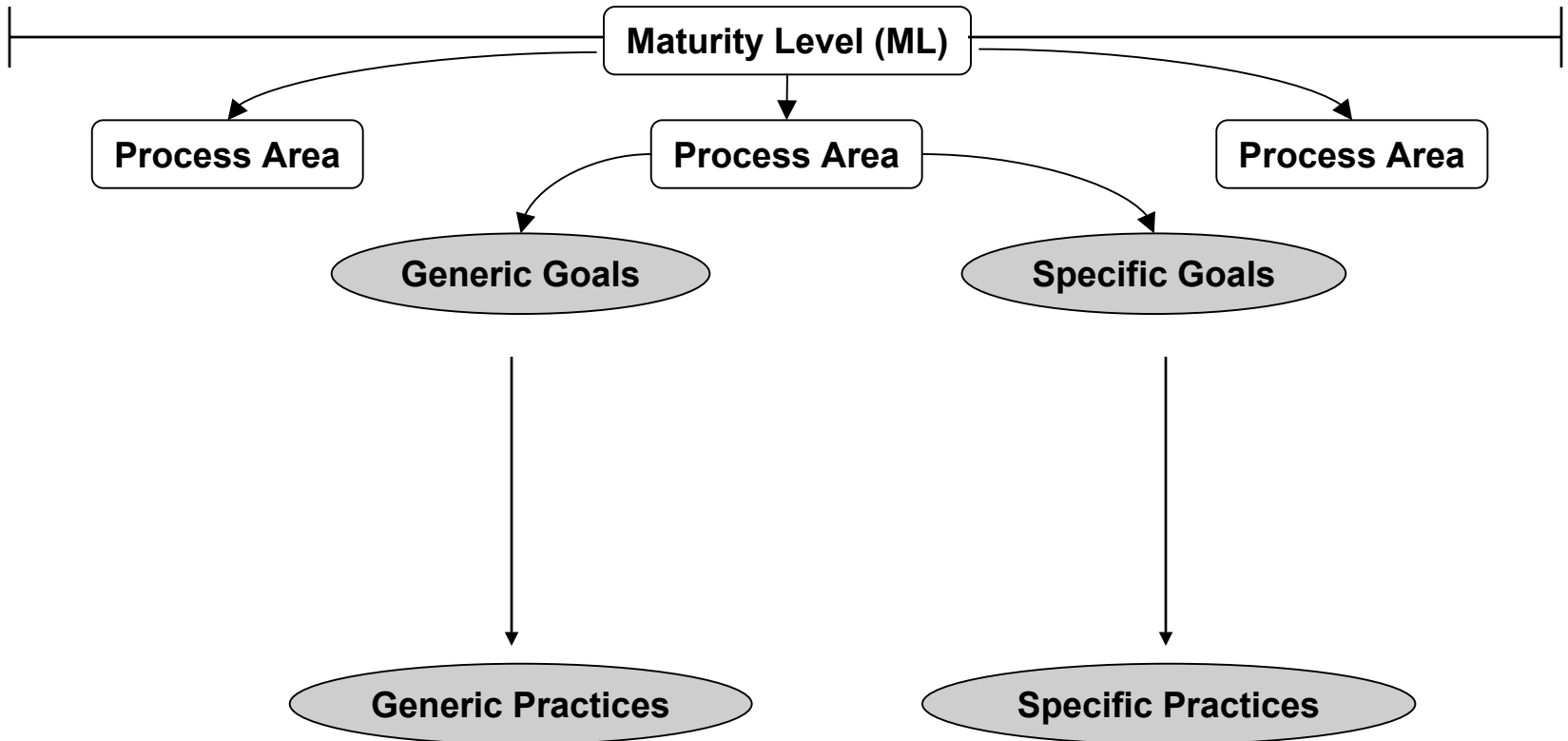
- Requirements Management (REQM)
- Project Planning (PP)
- Project Monitoring and Control (PMC)
- Supplier Agreement Management (SAM)

- Measurement and Analysis (MA)
- Process and Product Quality Assurance (PPQA)
- Configuration Management (CM)

## Initial (1)

- Ad hoc , Chaotic

# Structure of Staged View



# CMMI SE/SW - Maturity Level 2

## CMMI SE/SW Process Areas (PAs)

**Clarify**

**Requirements Management**

**Project Planning**

**Project Monitoring &  
Control**

**Expand**

**Supplier Agreement  
Management**

**Process & Product Quality  
Assurance**

**Configuration Management**

**NEW**

**Measurement & Analysis**

# Noteworthy PAs

Process Area	Acronym	Description and Note
Requirements Management	REQM	<p>Manage the requirements of the project's products and product components and identify inconsistencies between those requirements and the project's plans and work products</p> <ul style="list-style-type: none"><li>• Focus is on maintaining the consistency of work products in the face of changing requirements</li><li>• Elevate (to a Specific Practice level ) the importance of bidirectional traceability among requirements, project plans and work products</li></ul>
Supplier Agreement Management	SAM	<p>Manage the acquisition of products from suppliers external to the project for which there exists a formal agreement</p> <ul style="list-style-type: none"><li>• Limited scope of subcontracts management is enlarged from managing products from subcontractors to include COTS products</li><li>• Primary focus is on acquired products to be delivered as part of the delivered product</li><li>• Could also apply to acquired tools used as to develop the product or product components</li></ul>

# Noteworthy PAs

Process Area	Acronym	Description and Note
Process and Product Quality Assurance	PPQA	<p>Provide staff and management with objective insight into the processes and associated work products</p> <ul style="list-style-type: none"><li>• Activities include objectively evaluating performed processes and services against their process descriptions, standards and procedures</li></ul>
Measurement and Analysis	MA	<p>Develop and sustain a measurement capability that is used to support management information needs</p> <ul style="list-style-type: none"><li>• Now its own PA, contributing to a Goal at Maturity Level 2<ul style="list-style-type: none"><li>• Recognition that this emphasis, missing in SW-CMM, made it more difficult to achieve Level 4 in Quantitative Project Management</li></ul></li><li>• Much more formal measurement program required than in SW-CMM<ul style="list-style-type: none"><li>• Establish Measurement Objectives</li><li>• Specify the measures, collection and storage procedures, and analysis procedures</li></ul></li></ul>

# CMMI SE/SW - Maturity Level 3

## CMMI SE/SW Process Areas (PAs)

Organizational Process Focus  
Organizational Process Definition  
Organizational Training

Risk Management

Integrated Project Management

Requirements Development

Technical Solution

Product Integration

Validation

Verification

Decision Analysis & Resolution

Add Industry  
Best Practice

Engineering

Clarify  
and Expand

From SE CMM

# Noteworthy PAs

Process Area	Acronym	Description and Note
Risk Management	RSKM	<p>Identify potential problems before they occur, so that risk-handling activities may be planned and invoked as needed across the life cycle to mitigate adverse impacts on achieving objectives</p> <ul style="list-style-type: none"><li>• Elevation to its own PA matches the emphasis within the DoD and industry</li><li>• Activities include<ul style="list-style-type: none"><li>• Determine Risk Sources and categories, and parameters</li><li>• Establish risk management strategy</li><li>• Develop plans for handling and controlling the risks</li><li>• Monitor the risks to track effectiveness of handling and controlling</li></ul></li><li>• Risk Radar is a tool that can be used to implement these procedures</li></ul>

# Noteworthy PAs

Process Area	Acronym	Description and Note
Requirements Development	RD	Produce and analyze customer, product, and product component requirements <ul style="list-style-type: none"><li>• This is the elicitation and development (engineering) of requirements and their allocation to products and products components</li></ul>
Technical Solution	TS	Develop, design, and implement solutions to requirements. Solutions, designs and implementations encompass products, product components, and product related processes either singly or in combinations as appropriate and knowledge of people so they can perform <ul style="list-style-type: none"><li>• Importance elevated from a practice level in SW-CMM to a PA level to provide a more appropriate place for engineering processes</li><li>• Includes practices addressing the identification and selection of design alternatives via established criteria and processes</li></ul>

# Noteworthy PAs

Process Area	Acronym	Description and Note
Verification	VER	Assure that selected work products meet their specified requirements (I.e., The product is built right) <ul style="list-style-type: none"><li>• Includes testing (e.g., qualification testing)</li><li>• Includes peer reviews (at a work product's early stage of development it must satisfy certain standards (I.e., its requirements))</li></ul>
Validation	VAL	Demonstrate that a product or product component fulfills its intended use when placed in its intended environment (I.e., We built the right product)

# Noteworthy PAs

Process Area	Acronym	Description and Note
Decision Analysis and Resolution	DAR	<p>Make decisions using a structured approach that evaluates identified alternatives against established criteria</p> <ul style="list-style-type: none"><li>• Applies the underlying principles for performing a 'Tradeoff Study'<ul style="list-style-type: none"><li>• Guidelines are established as to which issues are subjected to a formal evaluation process</li><li>• Process exist for evaluating identified alternatives against established criteria</li></ul></li><li>• This PA comes from the SE CMM . It is new for people familiar with the SW-CMM. It is not intended to be invoked on every decision – only on the significant ones</li></ul>

# CMMI SE/SW – Higher Maturity

## CMMI SE/SW Process Areas (PAs)

### Maturity Level 4

Organizational Process  
Performance

Quantitative Project  
Management

### Maturity Level 5

Causal Analysis and  
Resolution

Organizational Innovation  
and Deployment

# Noteworthy PAs

Process Area	Acronym	Description and Note
Organizational Process Performance	OPP	Establish and maintain a quantitative understanding of the performance of the organization's set of standard processes, and provide the process performance data, baselines, and models to quantitatively manage the organization's projects <ul style="list-style-type: none"><li>• Establish a Process Capability Baseline</li></ul>
Quantitative Project Management	QPM	Quantitatively manage the project's defined process to achieve the project's established quality and process performance objectives

# Noteworthy PAs

Process Area	Acronym	Description and Note
Organizational Innovation and Deployment	OID	Select and deploy incremental and innovative improvements that measurably improve the organization's processes and technologies <ul style="list-style-type: none"><li>• Continue to measure to ensure improvements are being sustained</li></ul>
Causal Analysis and Resolution	CAR	Identify causes of defects and other problems and take action to prevent them from occurring in the future <ul style="list-style-type: none"><li>• Identify defects in the product development process areas</li><li>• Analyze the causes with the relevant stakeholders</li><li>• Take actions to remove causes</li><li>• Prevent “defects” (actual results not meeting objectives) from being introduced by integrating these CAR activities into each project phase</li></ul>

# Generic Practices - Required for all PAs

## ■ Generic Practices

- Correspond to the institutionalization practices of the CMM, but are more detailed and numerous
- They are applicable to every one of the PAs – the “bar has been raised”
- Important GP GP 2.2 *Identify and involve the relevant stakeholders of the X process as planned.*
  - This implies that on a project and in the organization this must be performed for each of the 18 activities (X) at the right

## ■ ML2

- Requirements Management
- Project Planning
- Project Monitoring and Control
- Supplier Agreement Management
- Process and Product Quality Assurance
- Configuration Management
- Measurement and Analysis

## ■ ML3

- Requirements Development
- Technical Solution
- Product Integration
- Verification
- Validation
- Integrated Project Management
- Risk Management
- Decision Analysis and resolution
- Organizational Process Focus
- Organizational Process Definition
- Organizational Training

# Generic Practices - Required for all PAs

- GP 2.1** Establish and maintain an organizational policy for planning and performing the **X** process.
- GP 2.2** Establish and maintain the plan for performing the **X** process.
- GP 2.3** Provide adequate resources for performing the **X** process, developing the work products, and providing the services of the process.
- GP 2.4** Assign responsibility and authority for performing the process, developing the work products, and providing the services of the **X** process.
- GP 2.5** Train the people performing or supporting the **X** as needed.
- GP 2.6** Place designated work products of the **X** process under appropriate levels of configuration management.
- GP 2.7** *Identify and involve the relevant stakeholders of the **X** process as planned.*
- GP 2.8** Monitor and control the **X** process against the plan for performing the process and take appropriate corrective action.
- GP 2.9** Objectively evaluate adherence of the **X** process against its process description, standards and procedures, and address noncompliance.
- GP 2.10** Review the activities, status, and results of the **X** process with higher-level management and resolve issues.
- GP 3.1** Establish and maintain the description of a defined **X** process.
- GP 3.2** Collect work products, measures, measurement results, and improvement information derived from planning and performing the **X** process to support the future use and improvement of the organization's processes and process assets.

# CMMI Background on Stakeholders

- **Stakeholder** – a group or individual that is affected by or in some way accountable for the outcome of an undertaking
  - project members.
  - suppliers – CMMI Appendix definition: (1) Delivering products (*or services*) being acquired. (2) There is some sort of agreement (contract) with the acquirer for supplying items (*or services*) under the terms of the agreement.
  - customers – responsible for accepting the product or authorizing payment. External to the project but not necessarily external to the organization (e.g., a next higher level project).
  - end users.
- **Relevant stakeholders** – stakeholder that is identified for involvement in specified activities and is included in an appropriate plan.
  - Their involvement must be monitored against the plan.
- **Appropriate involvement may include planning, approval, review, participation**

# CMMI History and CMM Sunset Schedule

- Aug 2000 Released CMMI-SE/SW V1.0 for initial use
- Aug 2000 Released CMMI-SE/SW/A to stakeholders for review
- Oct 2000 Released CMMI-SE/SW/IPPD V1.0 for initial use
- Nov 2000 Released CMMI-SE/SW/A for initial piloting
- Dec 2001 Publish CMMI Version V1.1
  - CMMI-SE/SW
  - CMMI-SE/SW/IPPD
- Begin sunset period for precursor models
- Jan 2002 Release V 1.1 Training Materials to Transition Partners
- Mar 2002 Publish CMMI-SE/SW/IPPD/SS V1.1
- .....
- Dec 2003 Complete sunset period for precursor models
  - End SEI SW-CMM training & Lead Assessor certification
- Dec 2005 Last SCE and CBA IPI certifications run out