Moving from the SW-CMM® to CMMI®

Presenter:
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SEI Authorized:
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Introduction

Overview of the SW-CMM®

Why CMMI®?

CMMI® Overview

CMMI® Transition Exercise(s)

A CMMI® Process Improvement Roadmap

CBA IPI vs. SCAMPI℠

Summary

About Cooliemon, LLC

The mission of Cooliemon, LLC is:

"helping organizations achieve excellence through process improvement"

Our goal is to focus your process improvement efforts to:

- improve quality and productivity
- reduce operating costs

  (i.e., reduce rework, waste and duplicate effort)
- capture the market with high quality products and services
- help you become the industry standard by which your competitors measure themselves

Objectives

Discuss major differences & similarities between the SW-CMM® & CMMI®.

Review CMMI® Representations - Continuous and Staged, and when to use each one.

Discuss the transition from SW-CMM® to CMMI®.

Review a Quality Roadmap to successfully implement the CMMI®.

Overview of the different type of Assessment methods.

Answer any of your questions.

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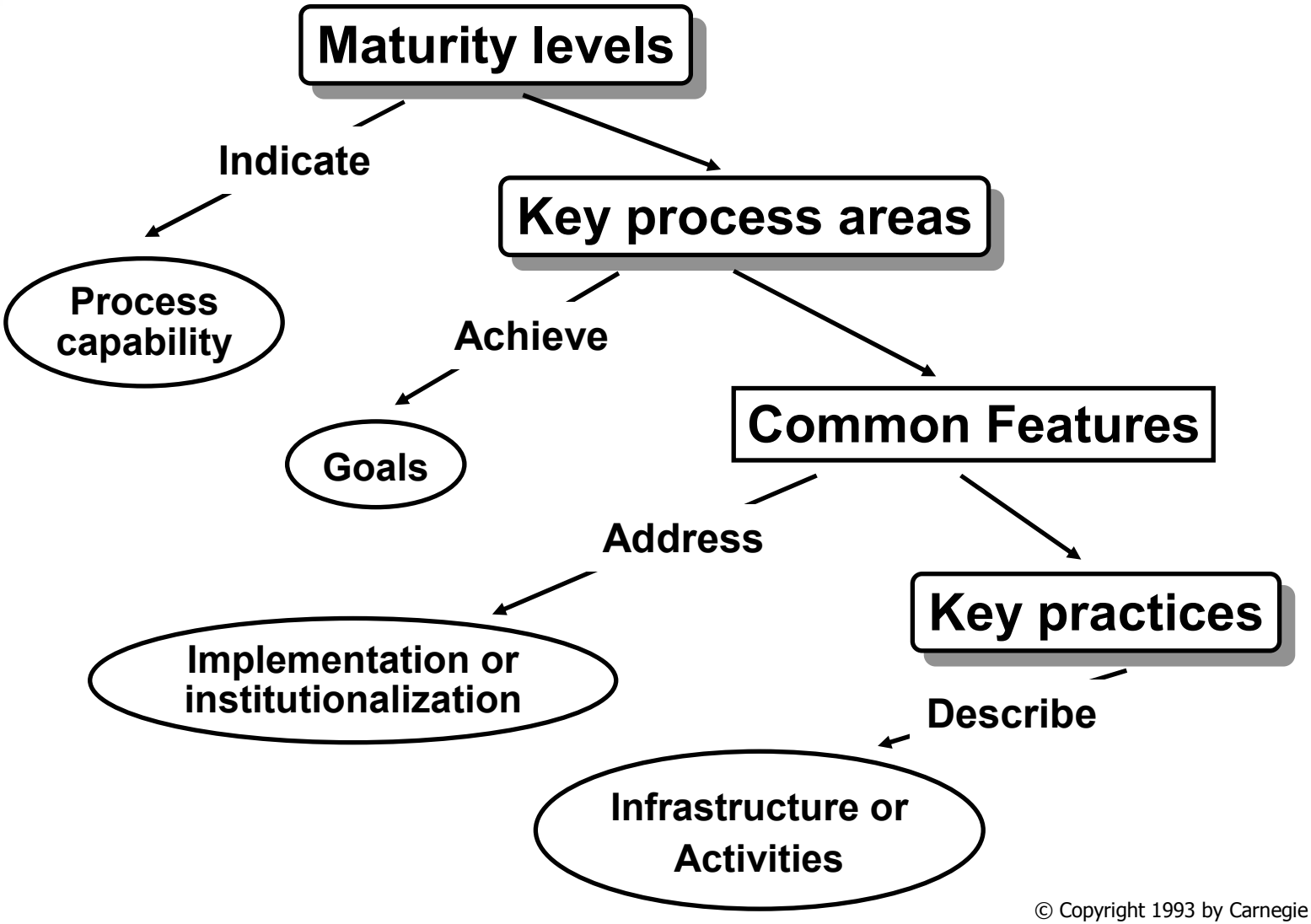
SEI Capability Maturity Model

Level	Characteristics	Improvement Focus	Result
5 Optimizing	Continuous improvement	Still human intensive process Maintain organization at optimizing level	Productivity & Quality
4 Managed	Measured process (quantitative basis for improvement)	Defect prevention Technology change management Process change management	
3 Defined	Process defined and institutionalized (qualitative basis for improvement)	Quantitative process management Software quality management	
2 Repeatable	Process still dependent on individuals (intuitive)	Organization process focus Organization process definition Peer reviews Training program Intergroup coordination Software product engineering Integrated software management	
1 Initial	Crisis-driven (ad hoc/chaotic)	Software project planning Software project tracking Software subcontract management Software quality assurance Software configuration management Requirements management	Risk & Waste

The Structure of the CMM



CMM Structure Definitions

Maturity Level: a well-defined evolutionary plateau on the path toward becoming a mature software organization (each level is a layer in the foundation for continuous process improvement).

Key Process Area (KPA): A key process that achieves a set of goals considered to be important for establishing process capability.

Common Feature: Attributes that determine whether a KPA is effective, repeatable, and lasting.

Key Practice: The activities that contribute to effectively implementing a KPA.

QUIZ: Common Features

Implementation Common Features:

Act_____s Per_____d

Institutionalization Common Features:

Comm_____t to P_____m

Ab_____y to P_____m

M_____t and Analysis

V_____g Implementation

SW-CMM® Common Features

Commitment to Perform

Commitment to Perform describes the actions the organization must take to ensure that the process is established and will endure,

Typically involves:

- **establishing policies**
- **and leadership**

Ability to Perform

Ability to Perform describes the preconditions that must exist in the project or organization to implement the software process competently.

Typically involves:

- **resources**
- **organizational structures**
- **training and orientation**

Activities Performed

Activities Performed describes the activities, roles and procedures necessary to implement a KPA.

Typically involves:

- establishing plans and procedures
- performing the work
- tracking it
- taking corrective actions as necessary

Measurement and Analysis

Measurement & Analysis describes the basic measurement practices that are necessary to determine status related to the process. These measurements are used to control and improve the process.

Typically includes examples of the measurements that could be taken to determine the status and effectiveness of the Activities Performed common feature

Verifying Implementation

Describes the steps to ensure that the activities are performed in compliance with the process that has been established

<u>Typically includes</u> reviews and audits by

- **senior management**
- **project management**
- **software quality assurance**

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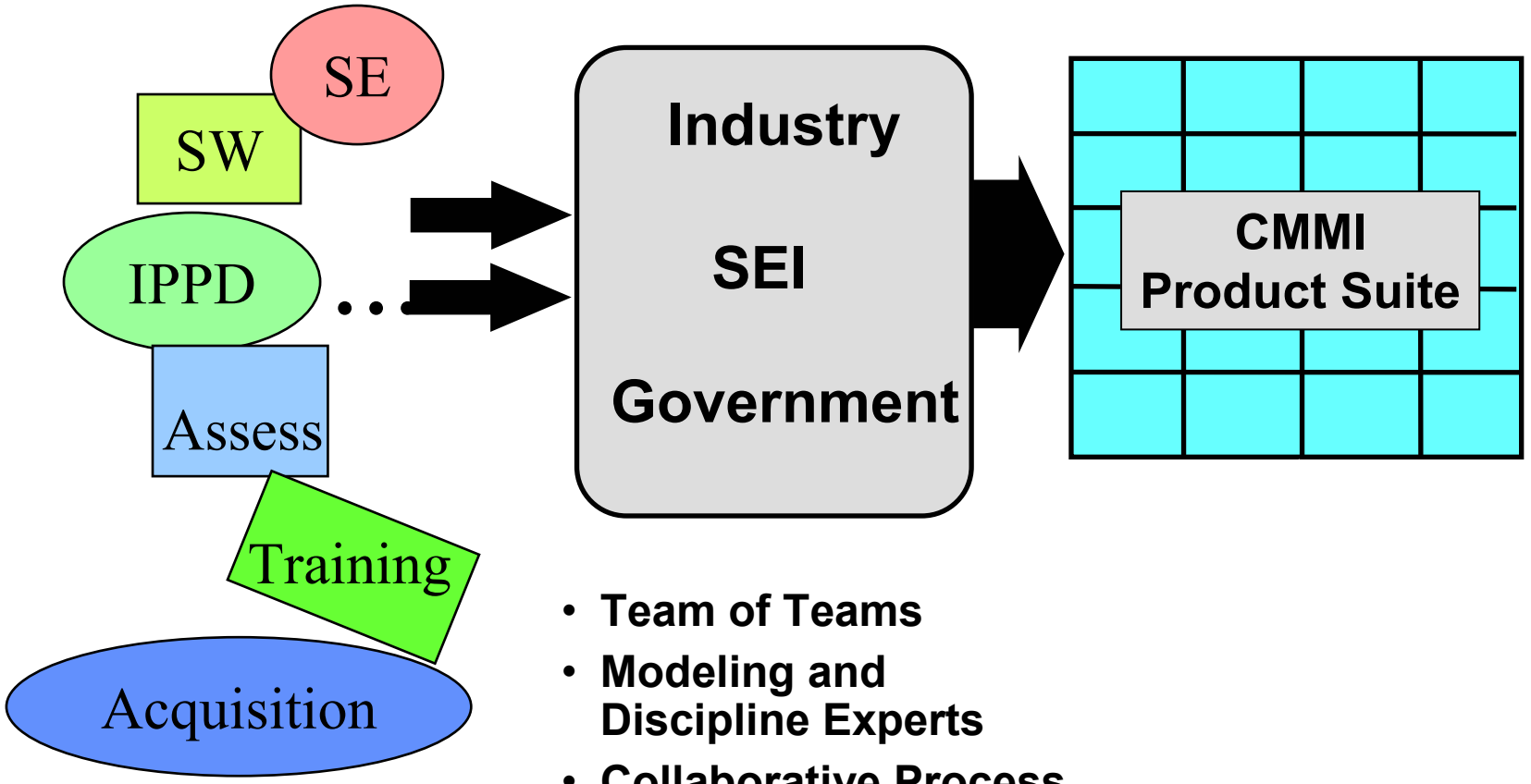
The Quality Crisis

The cost of poor quality:

- **"In most companies the costs of poor quality run at 20 to 40 percent... In other words, about 20 to 40 percent of the companies' efforts are spent in redoing things that went wrong because of poor quality"** (*Juran on Planning for Quality*, 1988, pg. 1)

- **Crosby's Quality Management Maturity Grid states that if an organization doesn't know it's cost of quality, it's probably at least 20%.** (Crosby, *Quality is Free*, 1979, pg. 38-39)

The CMMI® Solution: A Product Line Approach



- Team of Teams
- Modeling and Discipline Experts
- Collaborative Process

SEI Software Process Improvement Results

Annual Improvement Results	SEI Avg.	SEI Best
Increased Productivity	35%	67%
Reduced Time to Market	19%	23%
Reduced Post-Release Defects	39%	94%
Return on Investment	5:1	8.8:1
Early Defect Detection	22%	25%

- Data taken from “Benefits of CMM-Based Software Process Improvement: Initial Results”, CMU/SEI-TR-13

CMMI® Process Improvement Results

Website: www.sei.cmu.edu

Technical Report: CMU/SEI-2003-SR-009

Demonstrating the Impact and Benefits of CMMI®: An Update and Preliminary Results

Dennis R. Goldenson
Diane L. Gibson

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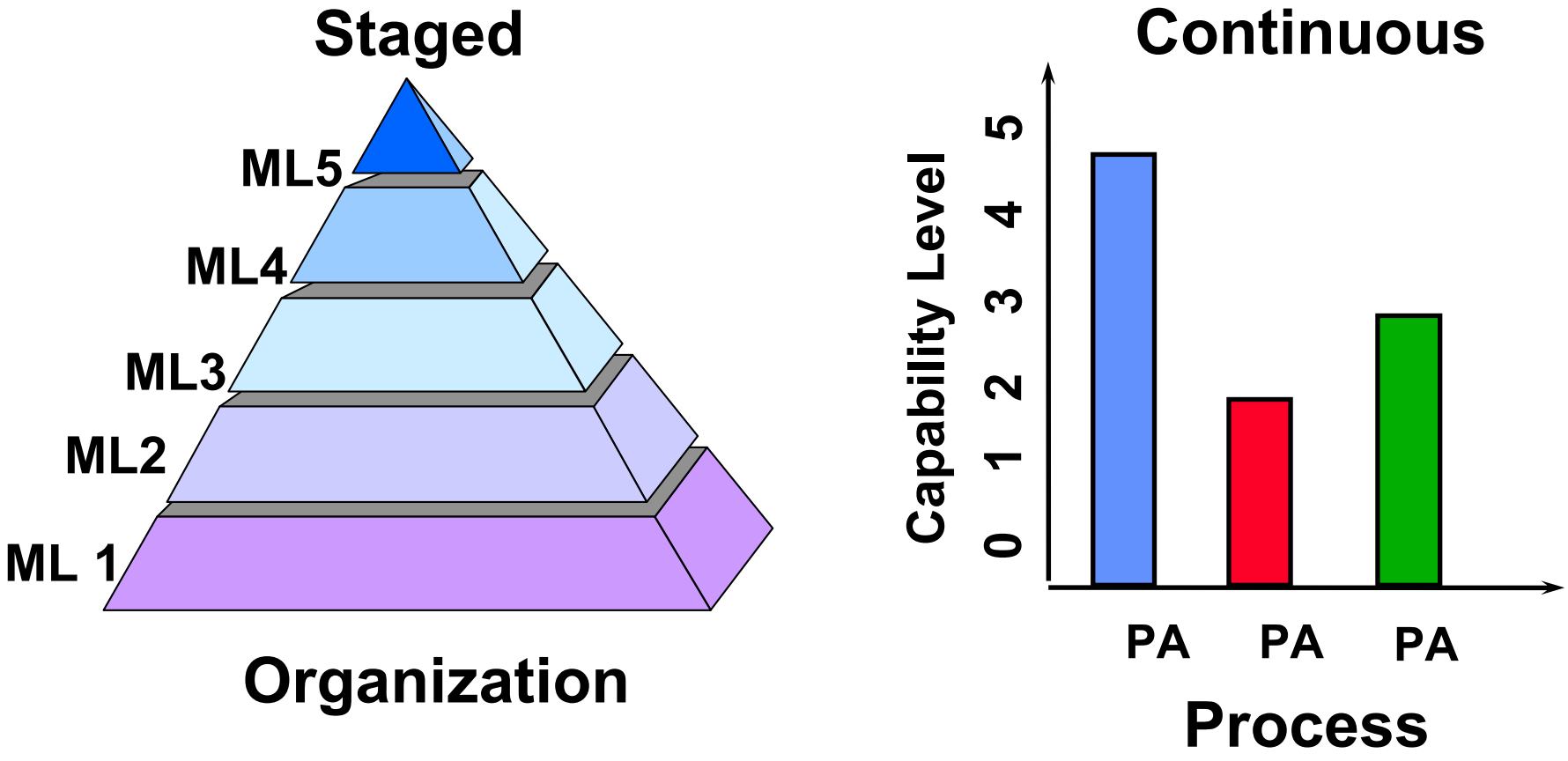
CMMI® Model Representations



Level Descriptions

Level	CMMI Continuous Representation Capability Levels	CMMI Staged Representation Maturity Levels
0	*Incomplete*	
1	*Performed*	*Initial*
2	Managed	Managed
3	Defined	Defined
4	Quantitatively Managed	Quantitatively Managed
5	Optimizing	Optimizing

Capability vs. Maturity Level - Differences

Process area capability and organizational maturity are similar concepts.

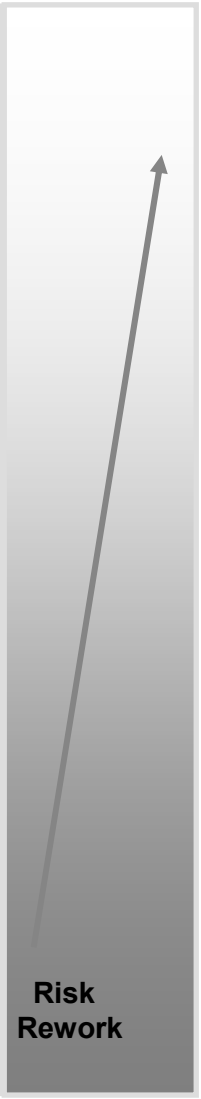
The difference between them is that:

- process area capability *(Continuous)* deals with a set of practices relating to a *single process area*, while

- organizational maturity *(Staged)* pertains to a set of process areas *across an organization*.

CMMI® Overview - Staged

Level	Focus	Process Areas *Including IPPD*
5 Optimizing	*Continuous Process Improvement*	Organizational Innovation and Deployment Causal Analysis and Resolution
4 Quantitatively Managed	*Quantitative Management*	Organizational Process Performance Quantitative Project Management
3 Defined	*Process Standardization*	Requirements Development Technical Solution Product Integration Verification Validation Organizational Process Focus Organizational Process Definition Organizational Training Integrated Project Management *(2 IPPD Goals)* Risk Management Decision Analysis and Resolution *Organizational Environment for Integration (IPPD)* *Integrated Teams (IPPD)* Integrated Supplier Management (SS)
2 Managed	*Basic Project Management*	Requirements Management Project Planning Project Monitoring and Control Supplier Agreement Management Measurement and Analysis Process and Product Quality Assurance Configuration Management
1 Initial		



CMMI® Overview - Continuous

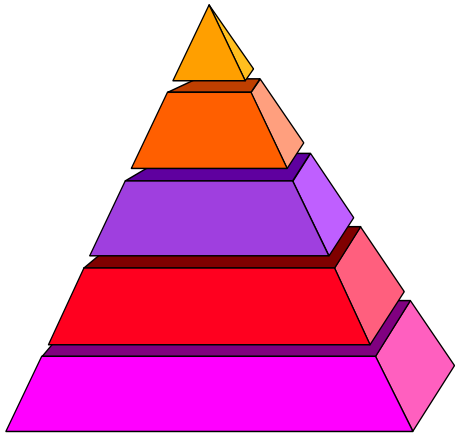
Category	Process Areas *Including IPPD*
Process Management	Organizational Process Focus Organizational Process Definition Organizational Training Organizational Process Performance Organizational Innovation and Deployment
Project Management	Project Planning Project Monitoring and Control Supplier Agreement Management Integrated Project Management *(IPPD 2 Goals)* *Integrated Teaming (IPPD)* Risk Management Integrated Supplier Management *(SS)* 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 Causal Analysis and Resolution Decision Analysis and Resolution *Organizational Environment for Integration (IPPD)*

Staged Representation

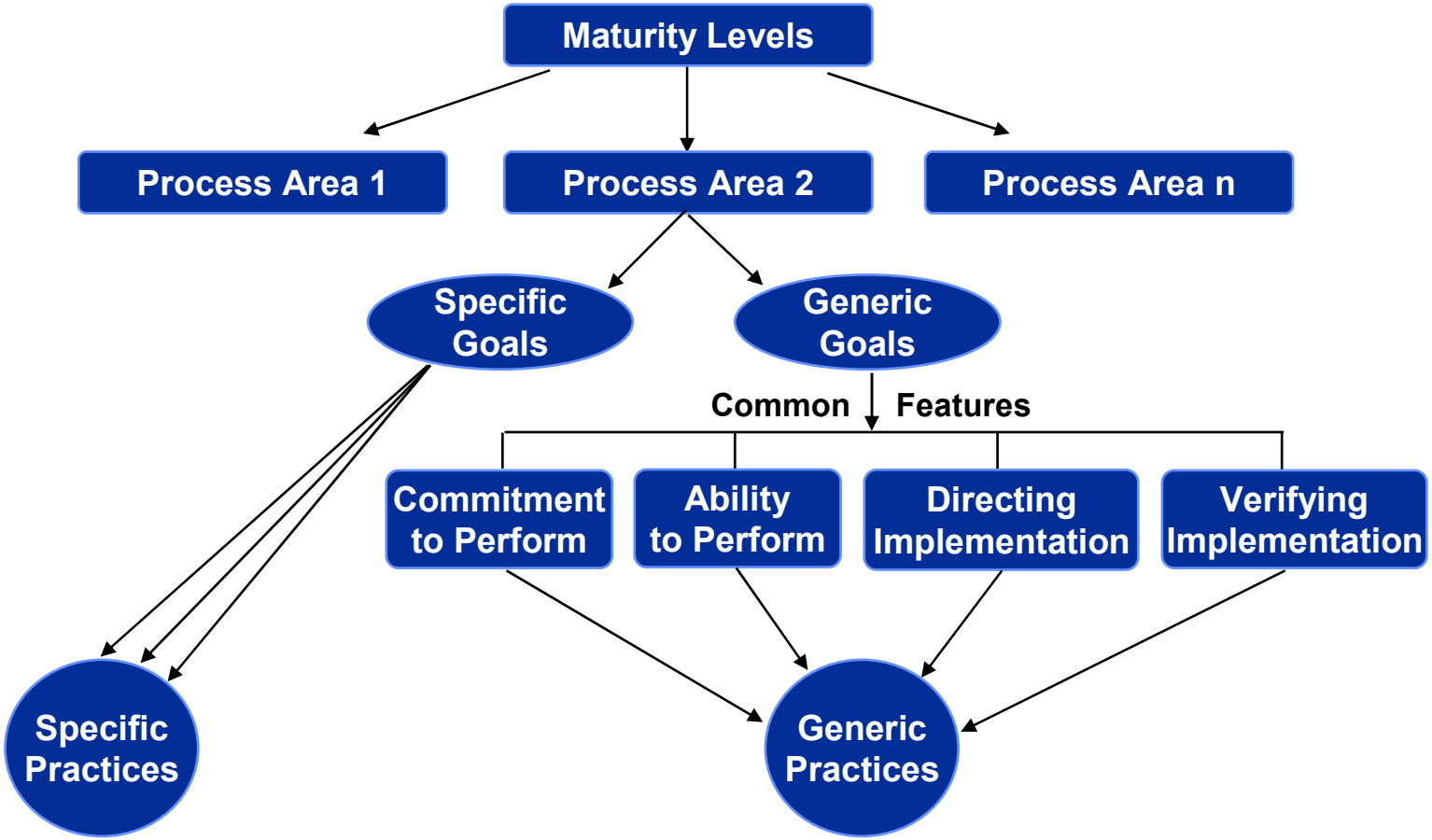
- Provides a proven sequence of improvements, each serving as a foundation for the next
- Permits comparisons across and among organizations by the use of maturity levels

Provides an easy migration from the SW-CMM® to CMMI®

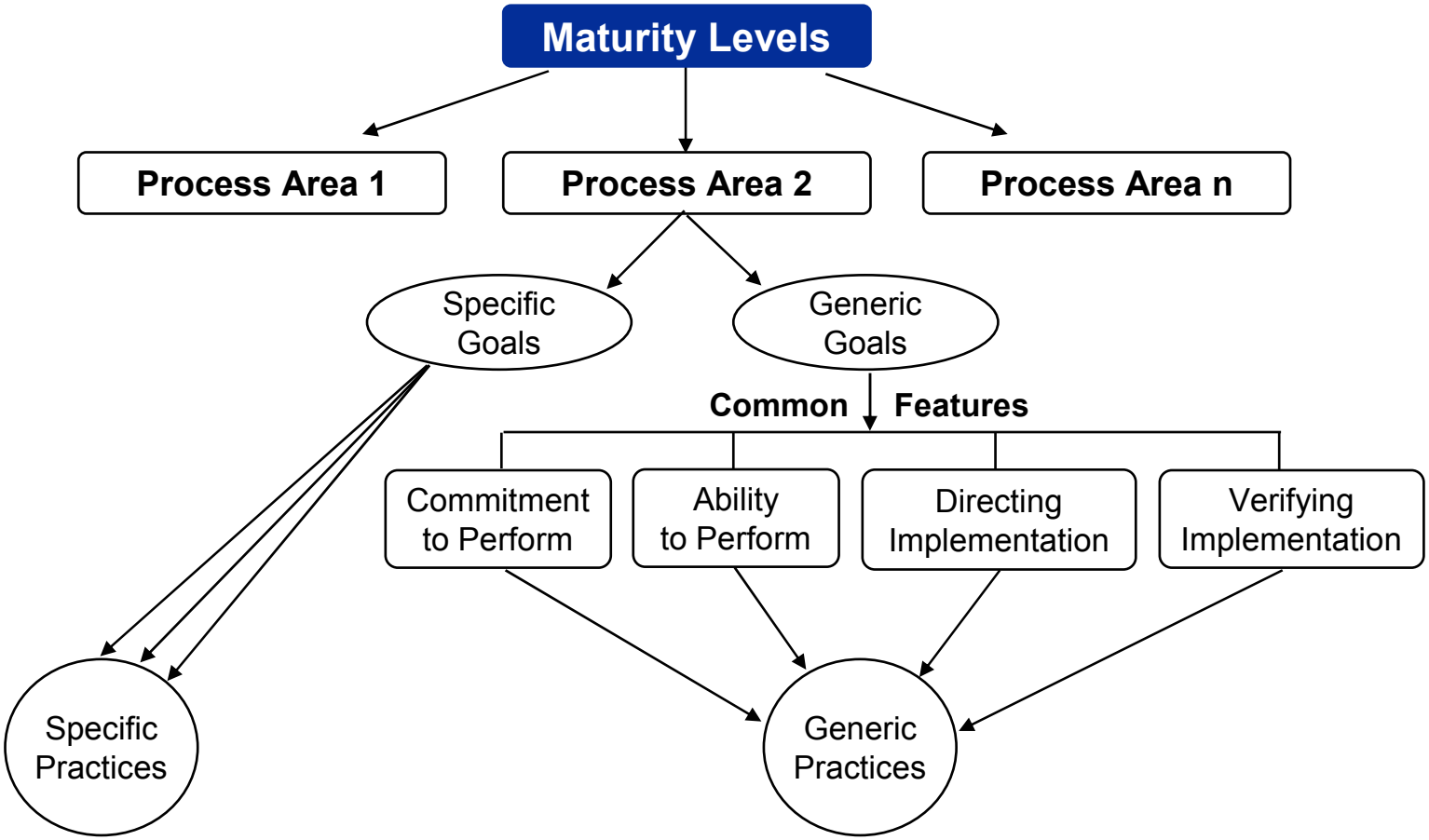
Provides a single rating that summarizes appraisal results and allows comparisons among organizations



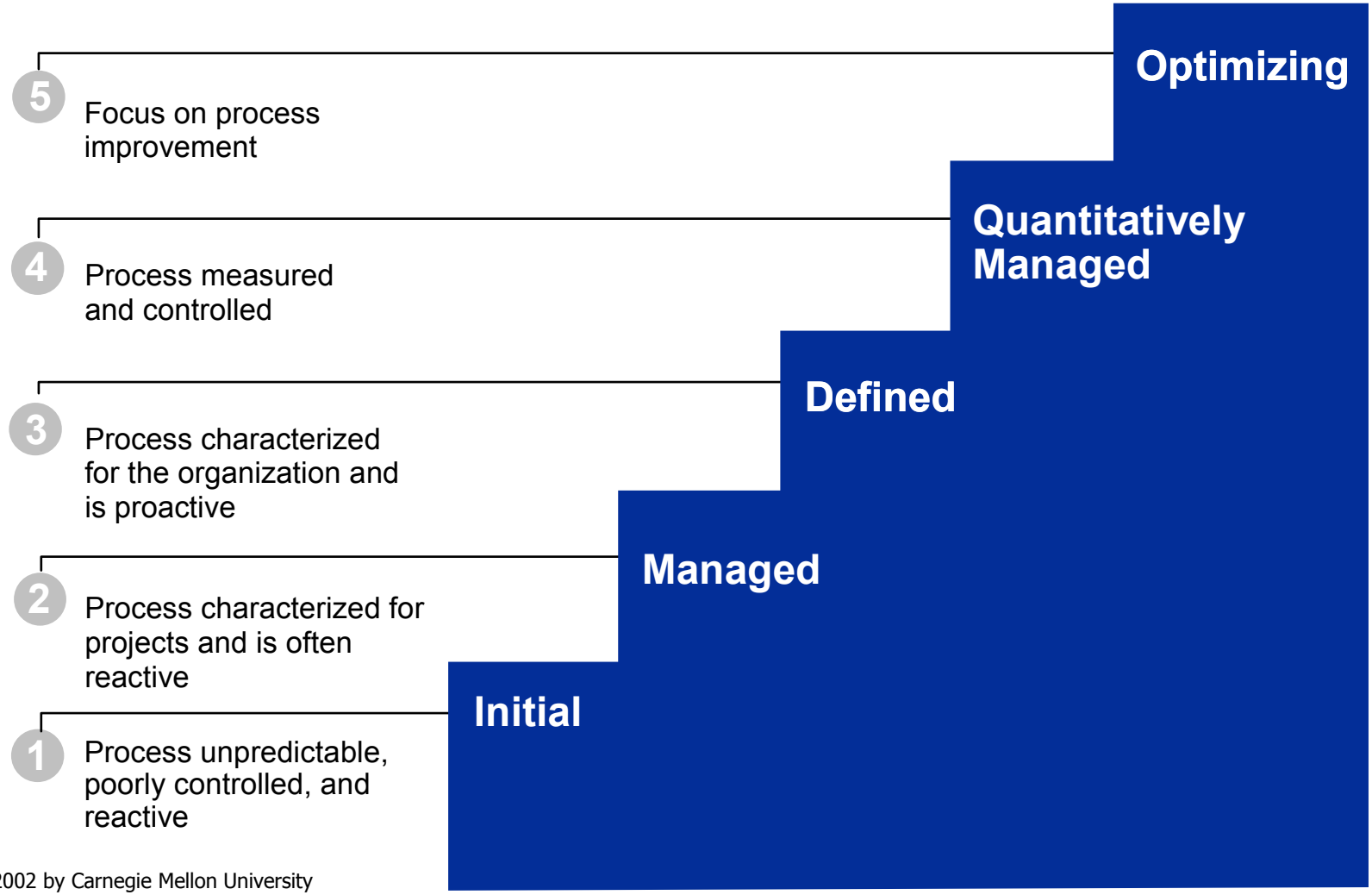
Model Components in the Staged Representation



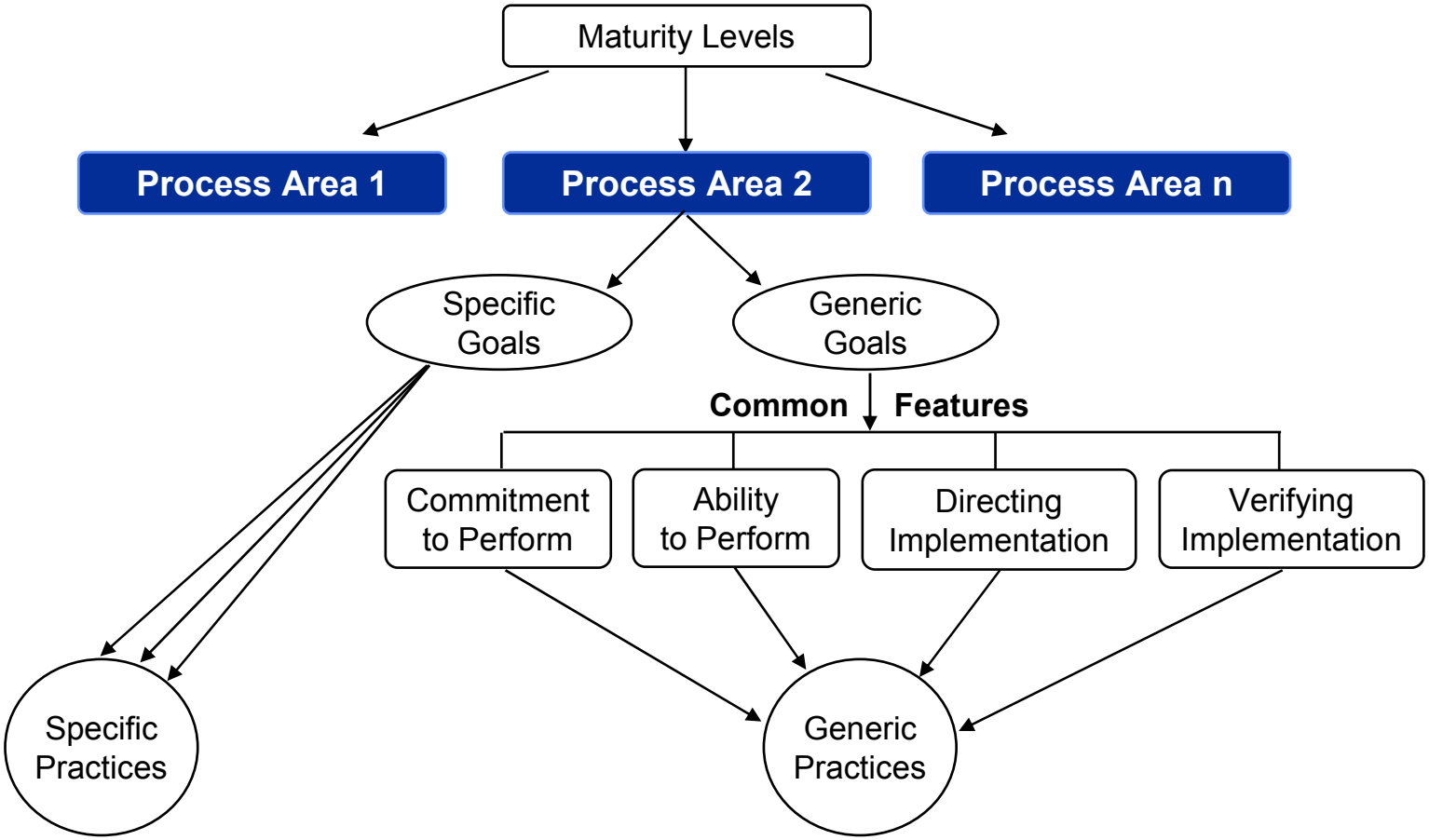
Model Components: Maturity Levels



The Maturity Levels



Model Components: Process Areas (PA)



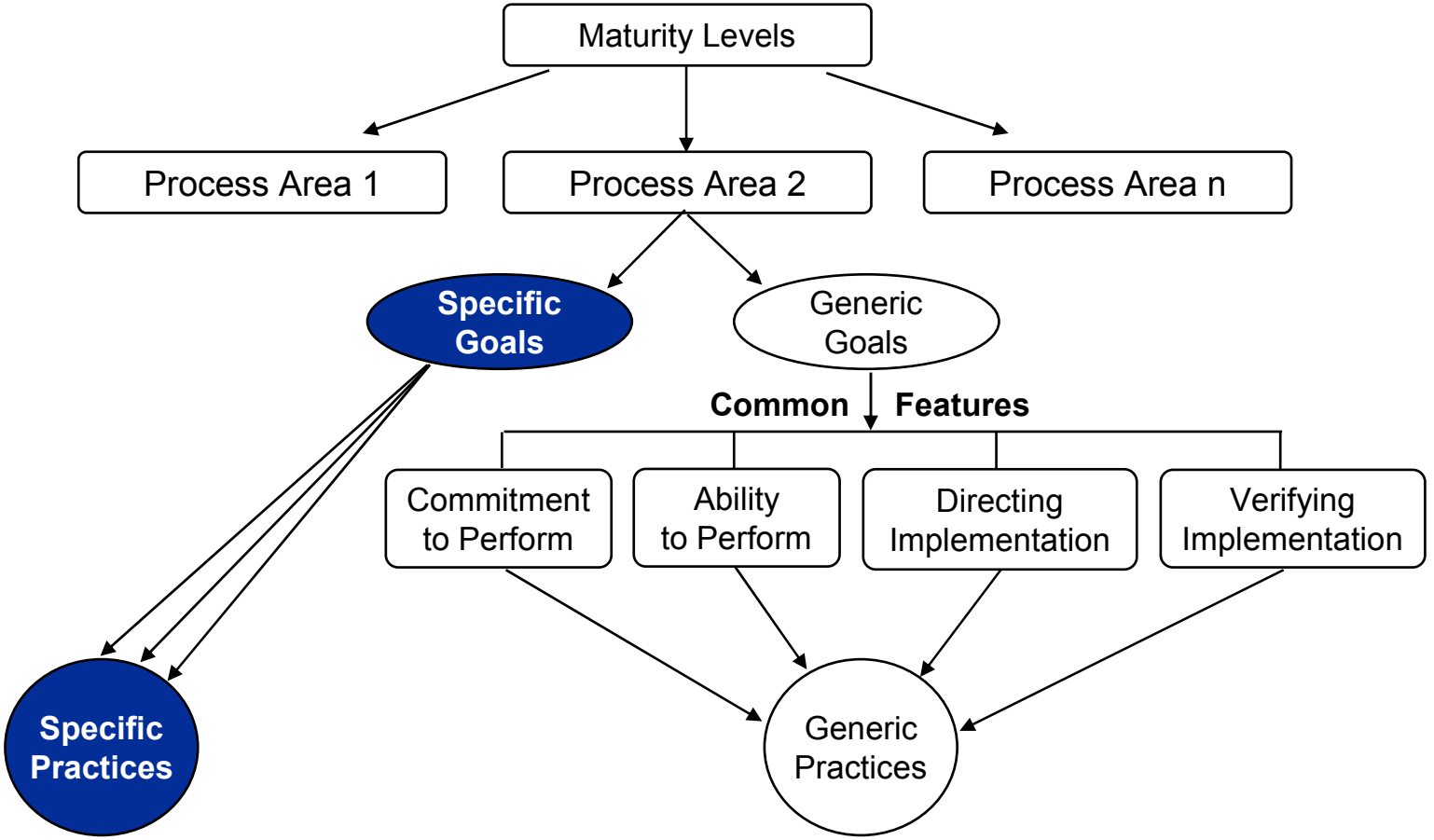
Process Area

A PA is a cluster of related practices in an area that, when performed collectively, satisfy a set of goals considered important for making significant improvement in that area.

Practices are actions to be performed to achieve the goals of a PA.

All CMMI® PAs are common to both continuous and staged representations.

Model Components: SG & SP



Specific Goals (SGs)

A SG applies to a PA and addresses the unique characteristics that describe what must be implemented to satisfy the PA.

Example from the Requirements Management PA

SG 1: Requirements are managed and inconsistencies with project plans and work products are identified.

Specific Practices (SPs)

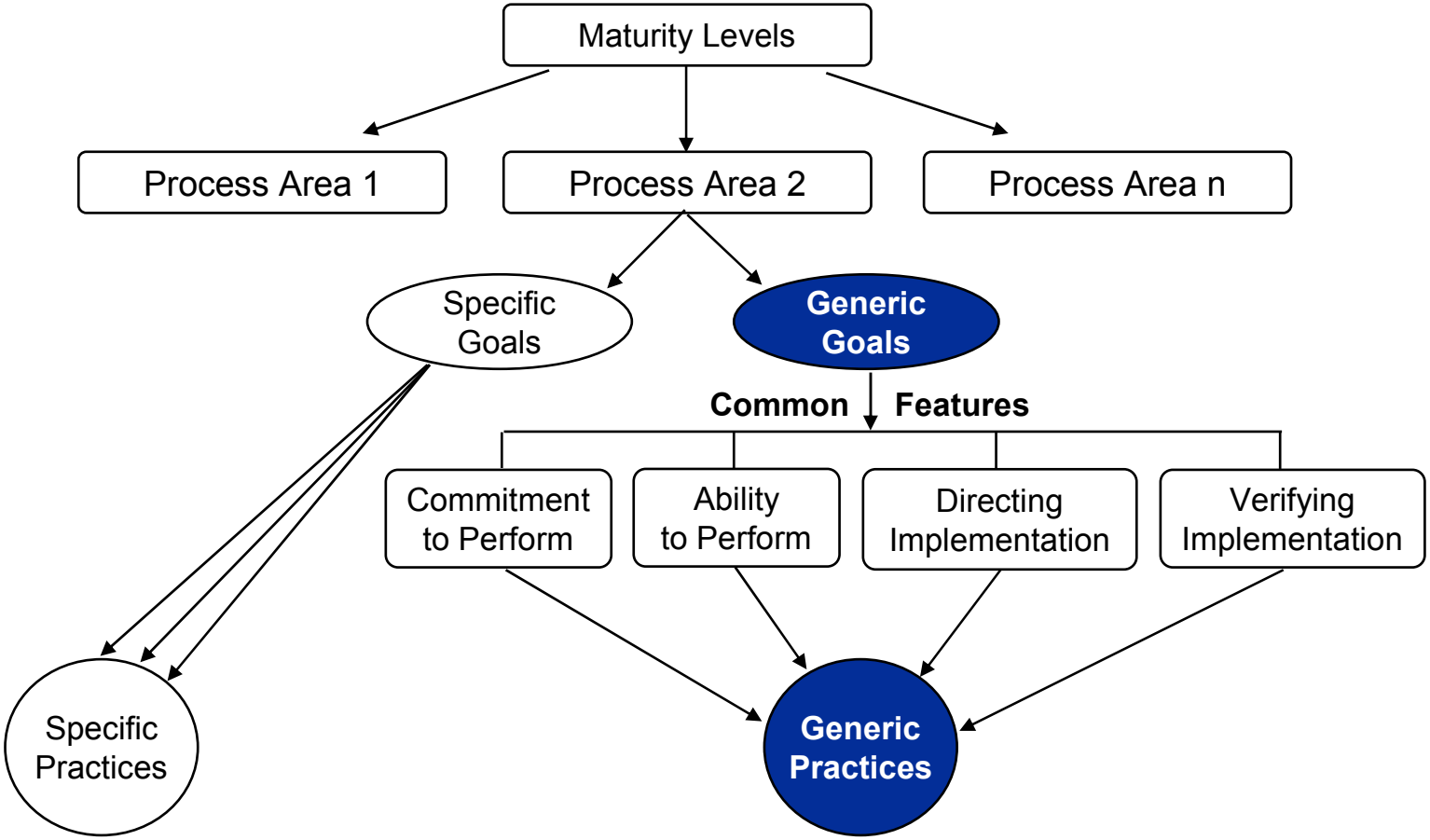
A SP is an activity that is considered important in achieving the associated SG.

Practices are the major building blocks in establishing the process maturity of an organization.

Example from Requirements Management

SP 1.3: Manage changes to the requirements as they evolve during the project.

Model Components: GG & GP



Generic Goals (GGs)

Achievement of a generic goal in a process area signifies improved control in planning and implementing the processes associated with that process area.

- Generic goals are called “generic” because the same goal statement appears in multiple process areas.
- Each process area has only one generic goal.

Maturity Level 2 Generic Goal

The generic goal for all maturity level 2 process areas is

GG 2: ***The process is institutionalized as a managed process.***

A managed process is a performed process that is planned and executed in accordance with

- policy;
- employs skilled people having adequate resources to produce controlled outputs;
- involves relevant stakeholders;
- is monitored, controlled, and reviewed;
- and is evaluated for adherence to its process description.

Generic Practices (GPs)

Generic practices are activities that ensure that the processes associated with the process area will be effective, repeatable, and lasting.

Generic practices contribute to the achievement of the generic goal when applied to a particular process area.

GG 2 Generic Practices (1)

10 GP's for all maturity level 2 PA's:

GP 2.1: Establish an Organizational Policy

GP 2.2: Plan the Process

GP 2.3: Provide Resources

GP 2.4: Assign Responsibility

GP 2.5: Train People

GP 2.6: Manage Configurations

GP 2.7: Identify and Involve Relevant Stakeholders

GP 2.8: Monitor and Control the Process

GP 2.9: Objectively Evaluate Adherence

GP 2.10: Review Status with Higher Level Management

GG 2 Generic Practices (2)

Generic practices for all maturity level 2 process areas

GP 2.1: Establish an Organizational Policy

Establish and maintain an organizational policy for planning and performing the <x> process.

GP 2.2: Plan the Process

Establish and maintain the plan for performing the <x> process.

KEY: <x> represents the name of a process area (e.g., Requirements Management)

GG 2 Generic Practices (3)

GP 2.3: Provide Resources

Provide adequate resources for performing the <x> process, developing the work products, and providing the services of the process.

GP 2.4: Assign Responsibility

Assign responsibility and authority for performing the process, developing the work products, and providing the services of the <x> process.

GP 2.5: Train People

Train the people performing or supporting the <x> process as needed.

GG 2 Generic Practices (4)

GP 2.6: Manage Configurations

Place designated work products of the <x> process under appropriate levels of configuration management.

GP 2.7: Identify and Involve Relevant Stakeholders

Identify and involve the relevant stakeholders of the <x> process as planned.

GP 2.8: Monitor and Control the Process

Monitor and control the <x> process against the plan for performing the process and take appropriate corrective action.

GG 2 Generic Practices (5)

GP 2.9: Objectively Evaluate Adherence

Objectively evaluate adherence of the <x> process against its process description, standards, and procedures, and address non-compliance.

GP 2.10: Review Status with Higher Level Management

Review the activities, status, and results of the <x> process with higher level management and resolve issues.

CMMI® Terminology

To subsume is to include or place within something larger or more comprehensive or to encompass as a subordinate or component element. For example, red, green, and yellow are subsumed under the term "color."

Merriam Webster Online Dictionary

Maturity Levels 3 to 5 GGs

The GG for all maturity level 3 to 5 PAs is

GG 3: ***The process is institutionalized as a defined process.*** *(GG 3 subsumes GG 2.)*

A defined process is a managed process that is tailored from the organization's set of standard processes according to the organization's tailoring guidelines; has a maintained process description; and contributes work products, measures, and other process-improvement information to the organizational process assets.

Generic Practices Under GG 3

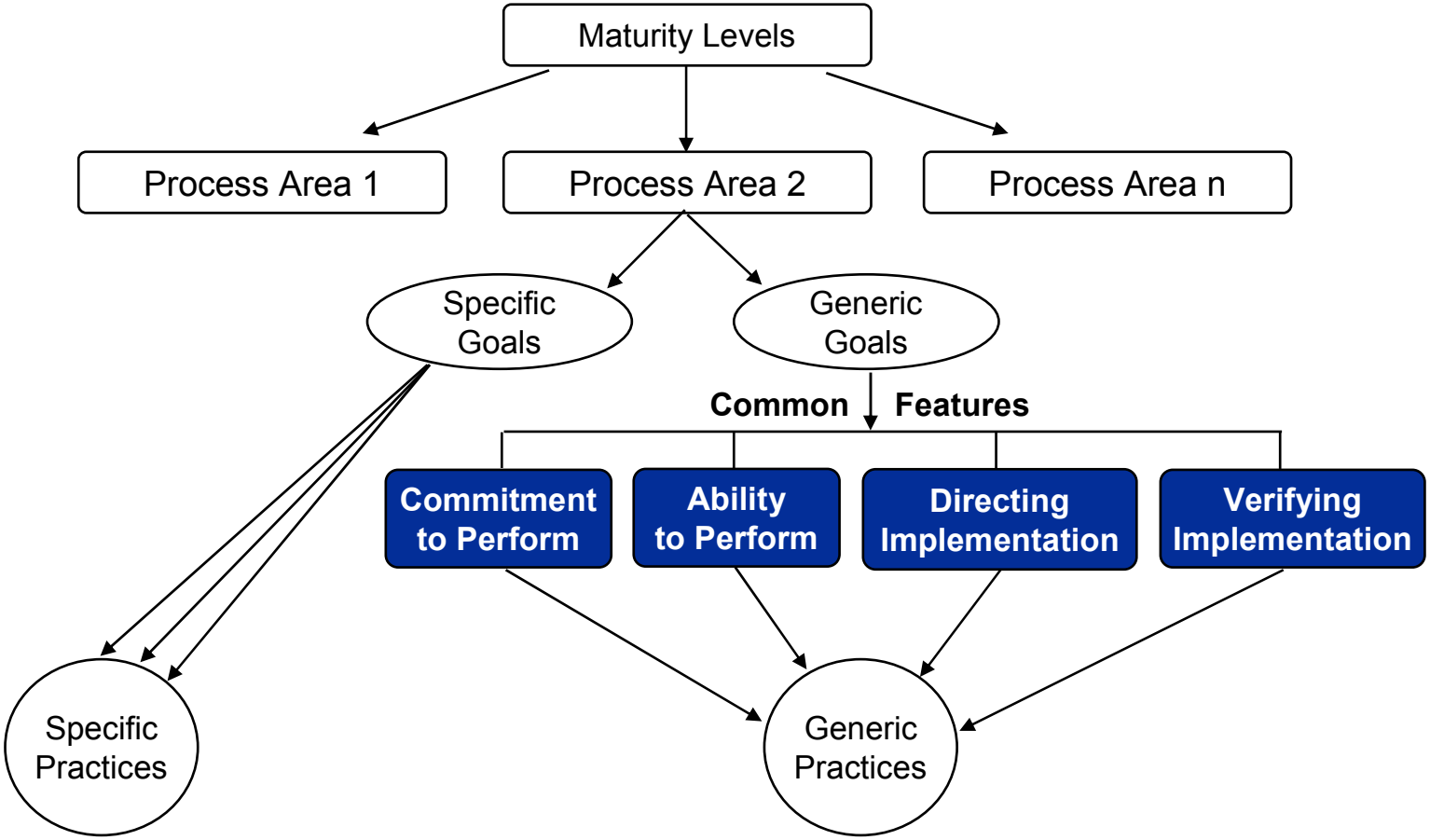
GP 3.1: Establish a Defined Process

Establish and maintain the description of a defined <x> process.

GP 3.2: Collect Improvement Information

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.

Model Components: Common Features



Process Area Contents (1)

Major contents of each PA in the CMMI® Staged Representation:

Purpose
Introductory Notes
Related Process Areas
Practice-to-Goal Relationship Table
Specific Goals and Specific Practices
Generic Goals and Generic Practices
Subpractices
Notes
Discipline Amplifications
Generic Practice Elaborations

Process Area Contents (2)

The Purpose is a brief statement of what is to be accomplished by the implementation of the practices of a particular PA.

Introductory Notes provide details that help you understand the core information of the model. Notes can be attached to any element of a PA.

Related Process Areas section of each PA identifies other PAs that could interact with the PA of interest.

Subpractices are suggested courses of action that correspond to specific practices.

Notes provide details that help you understand the core information of the model. Notes can be attached to any element of a PA.

Discipline Amplifications contain information relevant to a particular discipline.

GP Elaborations explain how to apply a GP in the context of a PA.

QUIZ

SW-CMM® Equivalent Terminology:

Level = _____ or _____

KPA = ___

Goal = _____ and _____

Key Practice = _____ and _____

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Exercise: CMMI® Terminology & Representations

1. Break into groups of 2.

2. Each person answer the following questions (30 min):
   - Person 1 Explain Staged and (Organizational Maturity)
   - Person 2 Explain Continuous and (Process Capability)

   - Read definitions page:
     - Establish & Maintain
     - Stakeholder
     - Manager

3. Group Discussion

Exercise: Mapping SW-CMM® to CMMI®

1. **Break into groups.**
2. **Each group select one of the following:**
   - **Map SW-CMM® KPA's to CMMI® PA's for Maturity Level 2.**
   - **Map SW-CMM® common features *(Co, Ab, Me, Ve, Ac)* to CMMI®**
   - **Map SW-CMM® KPA's to CMMI® PA's for Maturity Level 3. This includes the following:**
     - **Map SW-CMM® SPE Activities to CMMI® *(i.e, which PAs)***
     - **Map SW-CMM® ISM Activities to CMMI® *(i.e, which PAs)***
     - **Map SW-CMM® PR Activities to CMMI® *(i.e, which PAs)***
3. **Group Discussion**

Answers

If you would like a copy of the answers to the mapping exercise:

E-Mail: rwilliams@Cooliemon.com

"Answers for SW-CMM to CMMI Mapping Exercise - NDIA"

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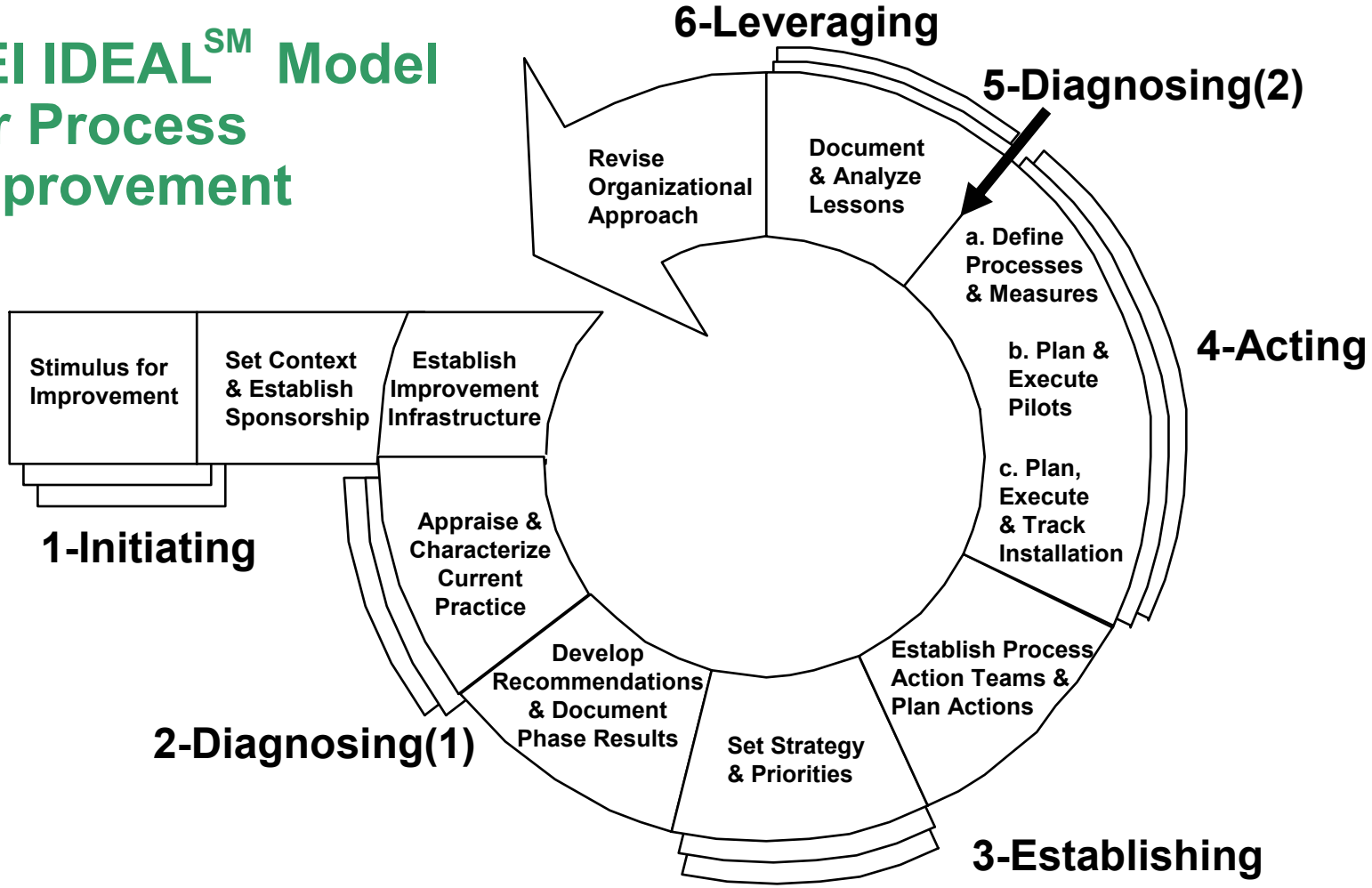
A CMMI® Roadmap

SEI IDEAL℠ Model for Process Improvement



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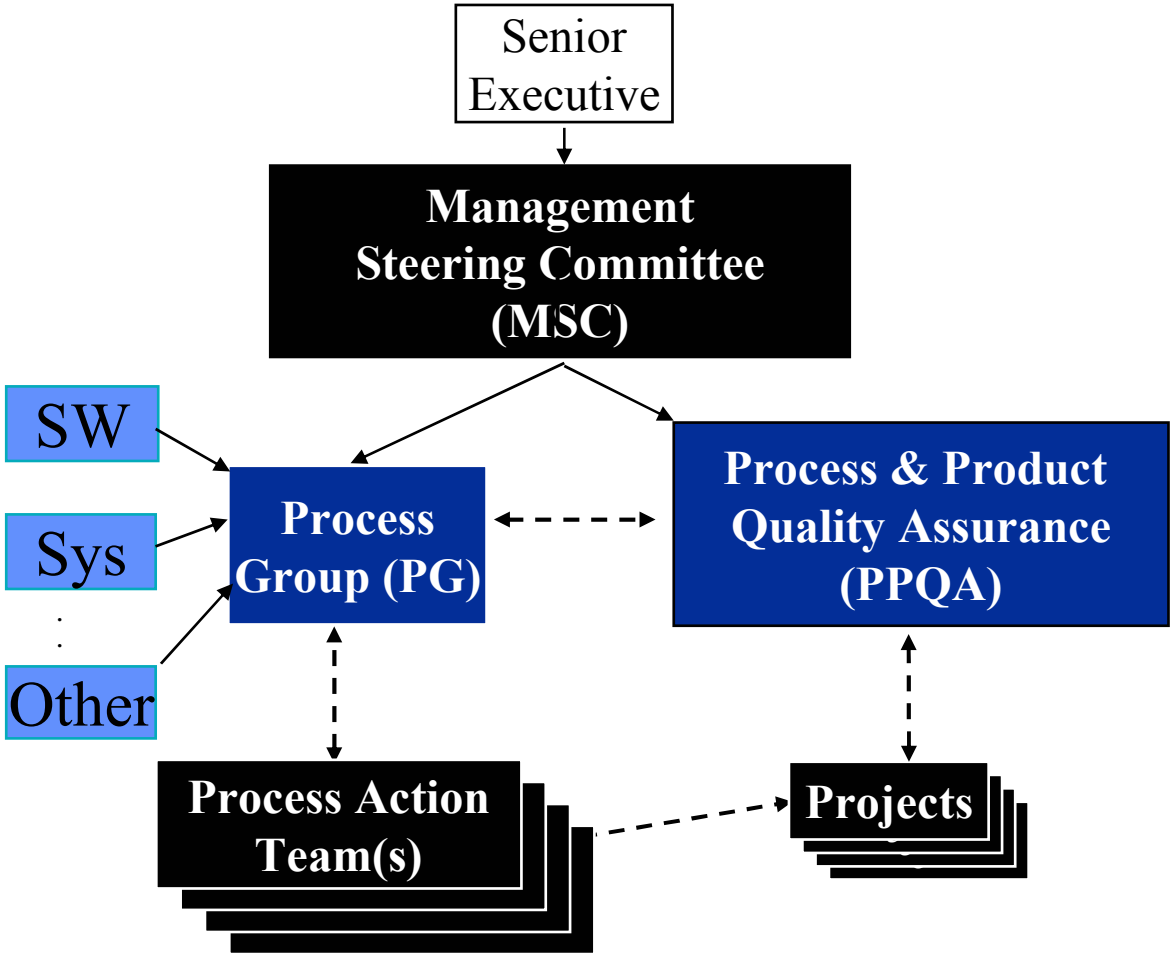
Initiating Phase – *Establish Infrastructure*

Example CMMI® Process Improvement Infrastructure



Diagnosing Phase – *Appraise Current Practice*

Conduct "Mini" Appraisal *(Class B, C Appraisal)*

- **Plan "Mini" Appraisal,** *e.g.,*
  - *Identify Scope (Organizational Unit, CMMI)*
  - *Identify Appraisal Outputs*
  - *Identify Gap Analysis Team*

- **Train "Mini" Appraisal Team**
  - *Introduction to CMMI®*
  - *Appraisal Method*

Tip: Consider Use a "Trace Matrix" to identify CMMI Gaps

Establishing Phase –
Set Priorities and "Plan the Work"

Define a Strategic Plan *(e.g., 3 - 5 year outlook)*

Define a Tactical Plan *(e.g., 1 - 2 year outlook)*

Treat your process improvement initiative like a "project"

- *Schedule*
- *Resource*
- *Functionality*

Note: Align Process Improvement initiative to Business Objectives and the culture of the organization.

Examples of PI Entry Points

Example PI Entry Points:

- **Executive Training/Overview on CMMI®** *(½ – 1 Day)*
- **Training Introduction to CMMI®** *(2 – 3 Days)*
- **Gap Analysis: Goal Satisfaction Reviews**
- **Gap Analysis: Translation Tables** *(Work Products; Roles)*
- **Gap Analysis: Maturity Questionnaire**
- **Conduct CMMI® Assessment** *(SCAMPI℠ - Class A)*
- **Conduct Mini Assessment** *(either: Class B, Class C)*
- **Continuous: Implement specific PA(s)** *(e.g., Verification/Peer Reviews in the form of Inspections)*
- **Purchase Off-The-Shelf** *(OTS)* **CMMI® Processes & Tailor**
- **Implement PSP/TSP**

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Assessment Methods

For CMM®

CBA IPI **= CMM® - Based Appraisal for Internal Process Improvement**

OR

SCE **= Software Capability Evaluation**

For CMMI®

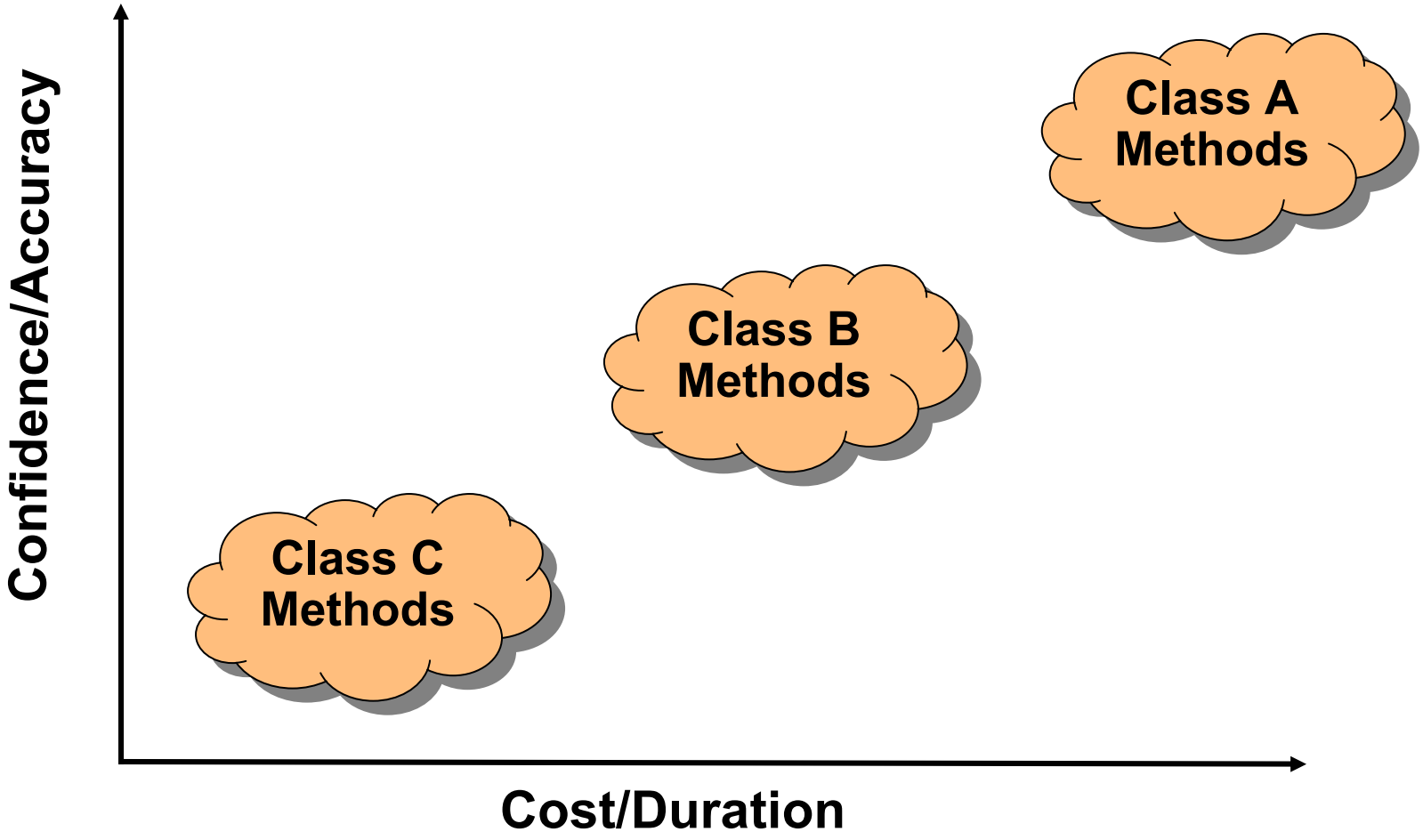
SCAMPI℠ **= Standard CMMI® Appraisal Method for Process Improvement** ***(Class A*)***

**Class A = 15504 conformant or not-conformant (x2)*

OR

Class B or Class C Appraisal

Class Performance Attributes



Appraisal Class Attributes

Attributes	*Class A*	*Class B*	*Class C*
Usage Mode	- Benchmark - Baseline establishment	- Initial - Incremental - Self-assessment	- Quick Look - Incremental - Gap analysis
Relative: - Cost/Duration - Confidence - Accuracy	High	Medium	Low
Rating?	Yes	No	No

Reference: Appraisal Requirements for CMMI (ARC)

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The CMMI® is used to synergize process improvement across different disciplines.

The continuous and staged representations of the CMMI® models contain essentially the same information.

- **The different representations organize the information differently**
- **The different representations have their own particular strengths relative to one another**

The IDEAL℠ Model is a roadmap that can be used to successfully implement the CMMI®

Questions?

Contact Information

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For More Information About CMMI®

Go to CMMI Web site

http://www.sei.cmu.edu/cmmi

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