

Software Process Improvement and CMM

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Information Systems
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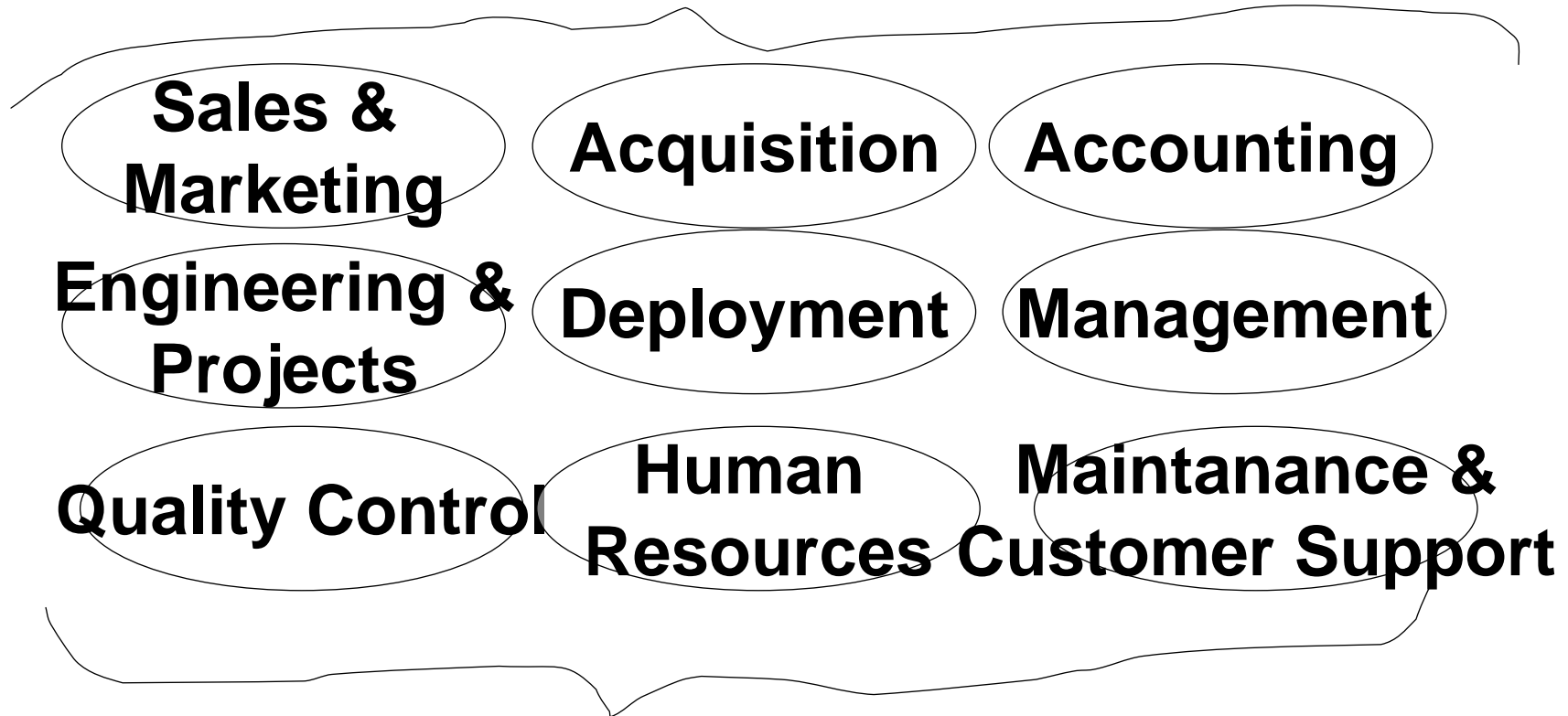
Goals

To understand CMMI concepts and implication for practice

To perform tutorial on software configuration management and software process modelling (D407a, D407b)

Software Company

Input/subproducts



Software Product & Services

CMMI Overview

www.sei.cmu.edu/cmmi/adoption/pdf/cmmi-overview05.pdf



Capability Maturity Model® Integration (CMMI®) Overview

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Software Engineering Institute (SEISM)

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Awarded to Carnegie Mellon
University

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(OSD/AT&L)





Topics

This overview covers the following topics:

- **Common Process Problems**
- Process Improvement Basics
- Maturity Models
- The CMMI Concept
- The Benefits of Using CMMI
- More About CMMI
- CMMI Adoption
- The Bottom Line



Settling for Less

Do these statements sound familiar? If they do, your organization may be settling for less than it is capable of and may be a good candidate for process improvement.

“I'd rather have it wrong than have it late. We can always fix it later.”

- a senior software manager (industry)

“The bottom line is schedule. My promotions and raises are based on meeting schedule first and foremost.”

- a program manager (government)



Symptoms of Process Failure

Commitments consistently missed

- Late delivery
- Last minute crunches
- Spiraling costs

No management visibility into progress

- You're always being surprised.

Quality problems

- Too much rework
- Functions do not work correctly.
- Customer complaints after delivery

Poor morale

- People frustrated
- Is anyone in charge?



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The Process Management Premise

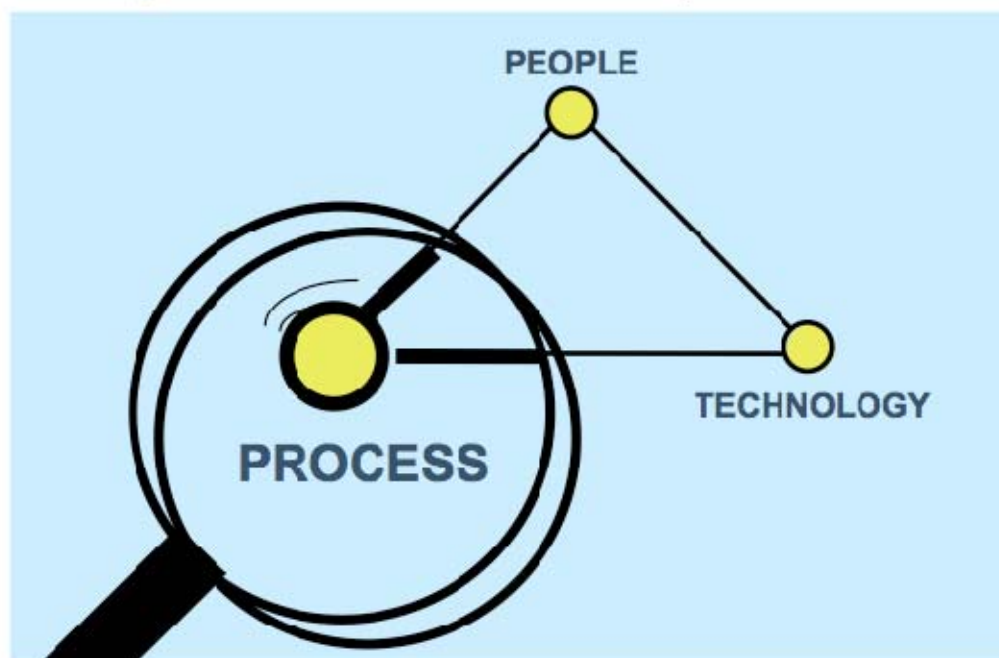
The quality of a system is highly influenced by the quality of the process used to acquire, develop, and maintain it.

This premise implies a focus on processes as well as on products.

- This is a long-established premise in manufacturing (and is based on TQM principles as taught by Shewhart, Juran, Deming, and Humphrey).
- Belief in this premise is visible worldwide in quality movements in manufacturing and service industries (e.g., ISO standards).

The Role of Process

Everyone realizes the importance of having a motivated,



quality work force and the latest technology, but even the finest people can't perform at their best when the process is not understood or operating at its best.



Common Misconceptions

I don't need process, I have

- really good people
- advanced technology
- an experienced manager

Process

- interferes with creativity
- equals bureaucracy + regimentation
- isn't needed when building prototypes
- is only useful on large projects
- hinders agility in fast-moving markets
- costs too much



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CMMI in a Nutshell

A CMMI model provides a structured view of process improvement across an organization.

CMMI can help

- integrate traditionally separate organizations
- set process improvement goals and priorities
- provide guidance for quality processes
- provide a yardstick for appraising current practices



The CMMI Products

Models

Four Disciplines

- Systems Engineering (SE)
- Software Engineering (SW)
- Integrated Product and Process Development (IPPD)
- Supplier Sourcing (SS)

Two Representations

- Staged
- Continuous

Modules

CMMI Acquisition Module

Appraisal Method

Appraisal Requirements for CMMI (ARC)

SCAMPI Method Definition Document (MDD)

Training

Four Courses

- Introduction to CMMI
- Intermediate Concepts of CMMI
- CMMI Instructor Training
- SCAMPI Lead Appraiser Training



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The CMMI Product Suite

The CMMI Product Suite integrates common elements and best features of multiple CMMs, providing

- common terminology
- common training
- an integrated appraisal method (SCAMPISM)
 - assessment for internal process improvement
 - evaluation for external (i.e., government) review

CMMI models help organizations improve their product and service development, acquisition, and maintenance processes.

The CMMI Product Suite includes a framework that will be extended to additional discipline areas (e.g., hardware, services).



Bodies of Knowledge Captured in CMMI Models

Organizations select the bodies of knowledge most relevant to achieving their business objectives. Bodies of knowledge available in CMMI models include

- systems engineering (SE)
- software engineering (SW)
- integrated product and process development (IPPD)
- supplier sourcing (SS)

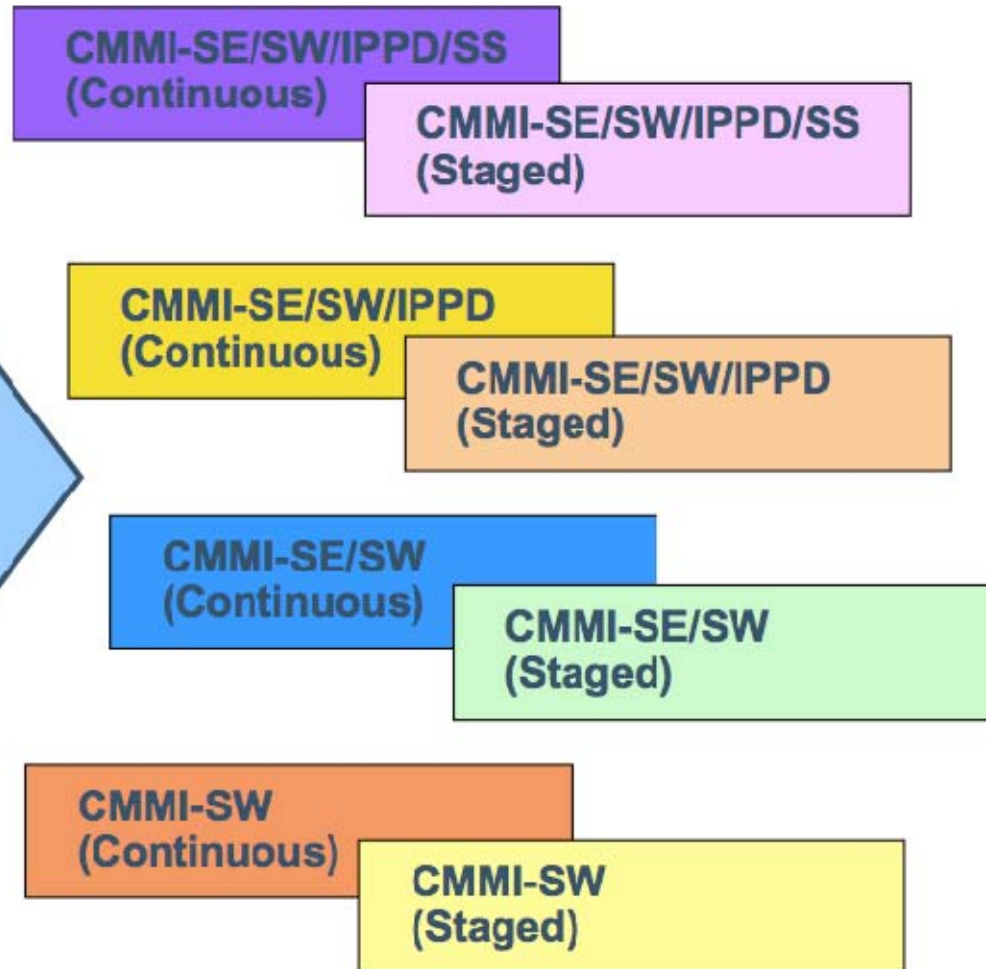


CMMI Models

Model Framework

Bodies of Knowledge

- Systems Engineering
- Software Engineering
- Integrated Product and Process Development
- Supplier Sourcing





Understanding CMMI Representations

There are two types of representations in the CMMI models:

- staged
- continuous

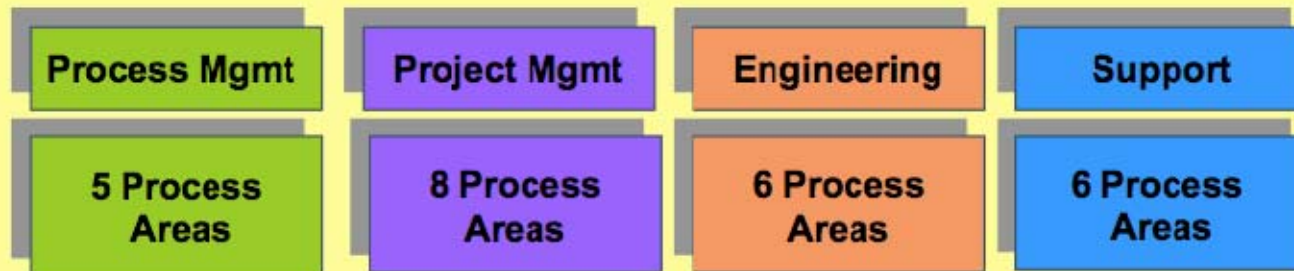
A **representation** allows an organization to pursue different improvement paths.

The organization and presentation of the data are different in each representation. However, the content is the same.



Continuous View of CMMI

Continuous



- Organizational Process Focus
- Organizational Process Definition
- Organizational Training
- Organizational Process Performance
- Organizational Innovation and Deployment

- Requirements Management
- Requirements Development
- Technical Solution
- Product Integration
- Verification
- Validation

- Project Planning
- Project Monitoring and Control
- Supplier Agreement Management
- Integrated Project Management
- Risk Management
- Integrated Teaming
- Integrated Supplier Management
- Quantitative Project Management

- Configuration Management
- Process and Product Quality Assurance
- Measurement and Analysis
- Decision Analysis and Resolution
- Organizational Environment for Integration
- Causal Analysis and Resolution



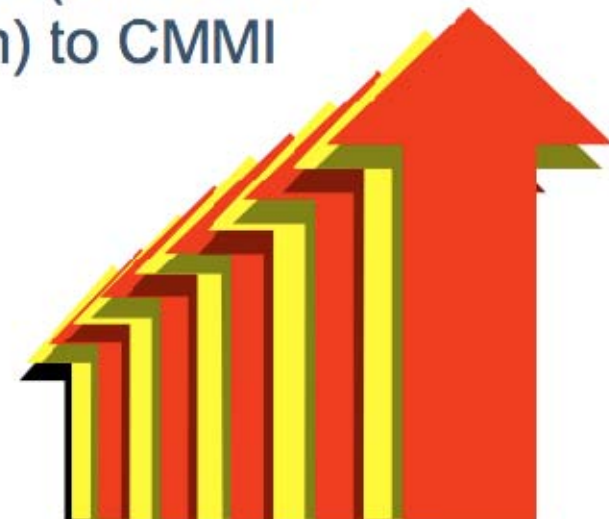
Continuous Representation

Allows you to select the order of improvement that best meets your organization's business objectives and mitigates your organization's areas of risk

Enables comparisons across and among organizations on a process-area-by-process-area basis

Provides an easy migration from EIA 731 (and other models with a continuous representation) to CMMI

Uses predefined sets of process areas to define an improvement path for an organization





Capability Levels

A **capability level** is a well-defined evolutionary plateau describing the organization's capability relative to a particular process area.

There are six capability levels.

Each level is a layer in the foundation for continuous process improvement.

Thus, capability levels are cumulative (i.e., a higher capability level includes the attributes of the lower levels).



The Capability Levels

5 Optimizing

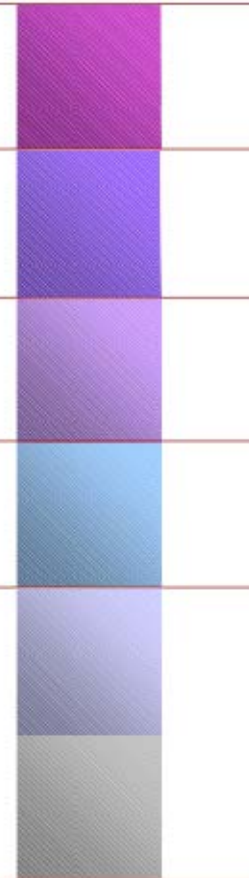
4 Quantitatively Managed

3 Defined

2 Managed

1 Performed

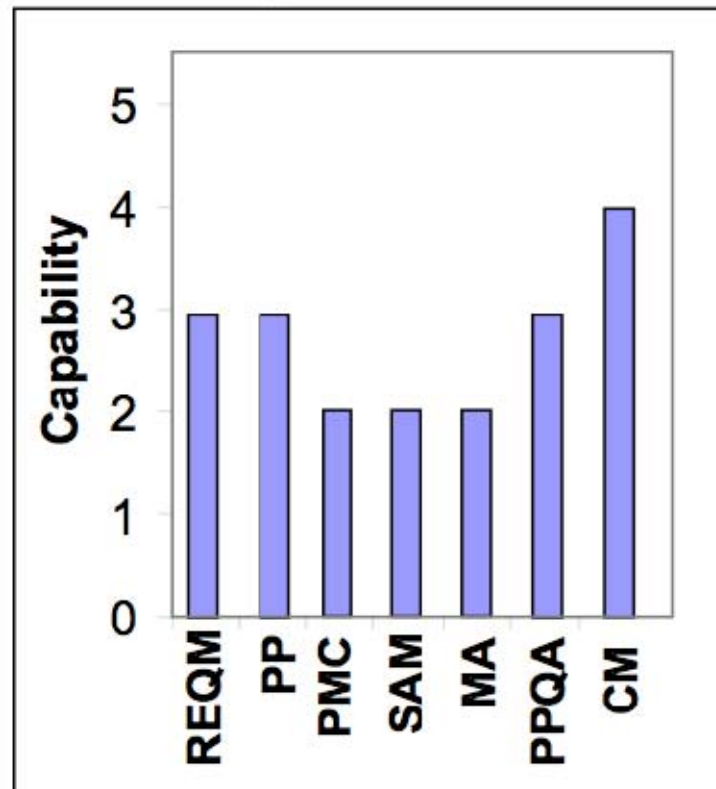
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Representing Capability Levels for Individual Process Areas

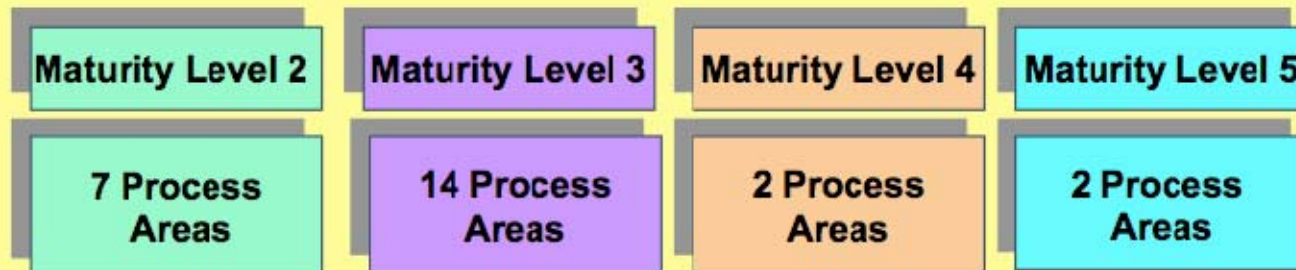
The process area capability of an implemented process can be represented by a bar.





Staged View of CMMI

Staged



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

- Requirements Development
- Technical Solution
- Product Integration
- Verification
- Validation
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- Organizational Process Definition

- Organizational Training
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- Quantitative Project Management

- Organizational Innovation and Deployment
- Causal Analysis and Resolution



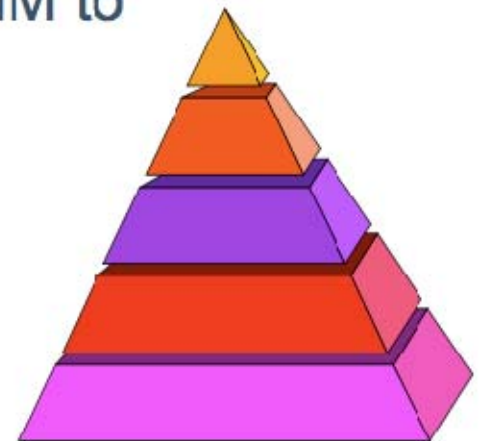
Staged Representation

Provides a proven sequence of improvements, each serving as a foundation for the next

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

Provides an easy migration from the SW-CMM to CMMI

Allows an organization to select a specific process area and improve relative to it





Maturity Levels

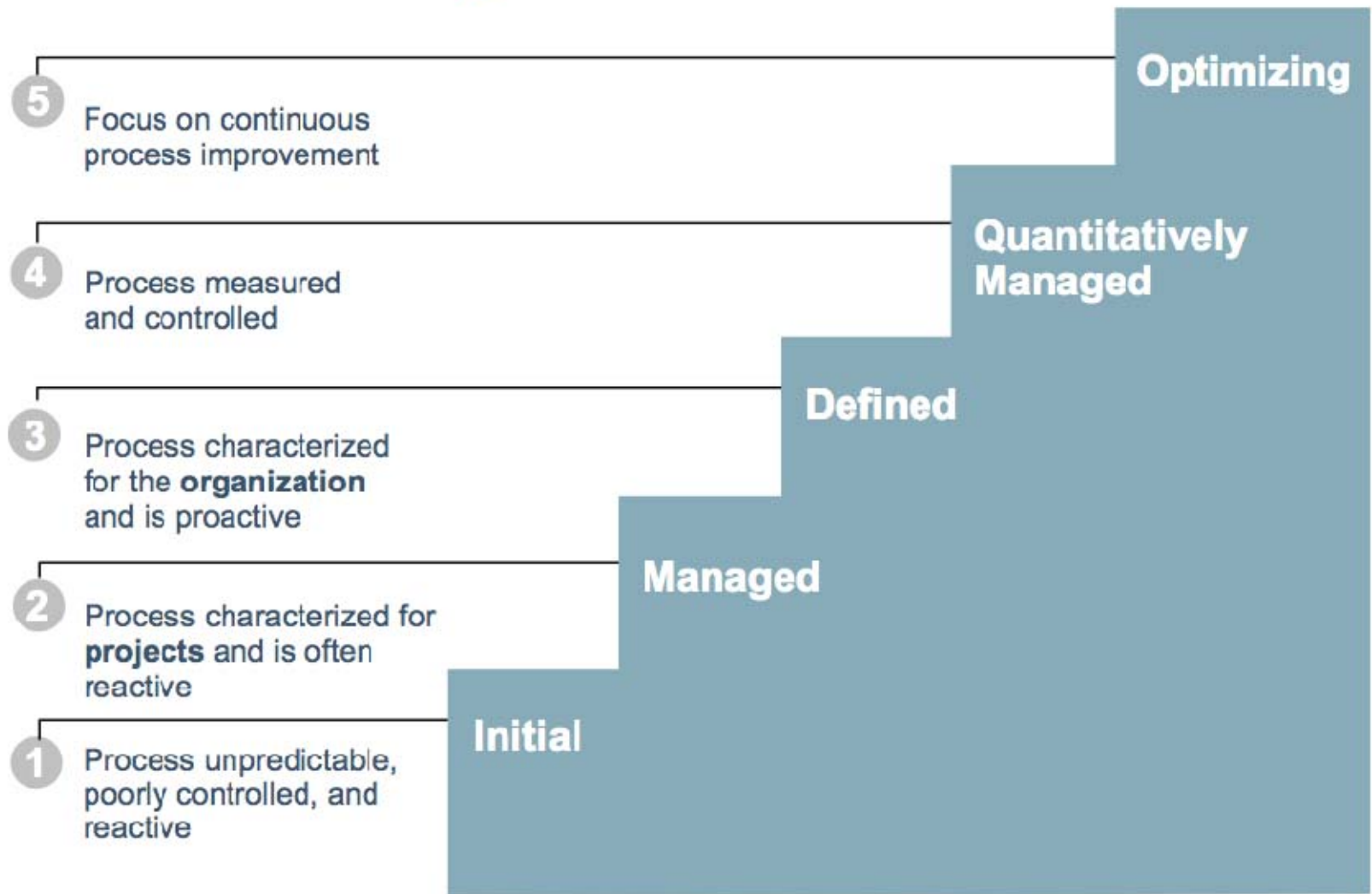
A **maturity level** is a well-defined evolutionary plateau of process improvement.

There are five maturity levels.

Each level is a layer in the foundation for continuous process improvement using a proven sequence of improvements, beginning with basic management practices and progressing through a predefined and proven path of successive levels.



The Maturity Levels





Maturity Levels Should Not Be Skipped

Each maturity level provides a necessary foundation for effective implementation of processes at the next level.

- Higher level processes have less chance of success without the discipline provided by lower levels.
- The effect of innovation can be obscured in a noisy process.

Higher maturity level processes may be performed by organizations at lower maturity levels, with the risk of not being consistently applied in a crisis.



Comparing the Representations

Both representations provide ways of implementing process improvement to achieve business goals.

Both representations provide the same essential content but organized in different ways.

Continuous Representation	Staged Representation
Maximum flexibility for order of process improvement	Predefined and proven path with case study and ROI data
Focuses on improvement within process areas	Focuses on organizational improvement
Improvement of process areas can occur at different rates	Overall results summarized in a maturity level
Source selection investigation can target risky areas at any level	Maturity levels are common discriminators



One Model; Two Representations

CMMI-SE/SW Staged

Overview

Learn about the model

Maturity Level 2

REQM, PP, PMC,
SAM, MA, PPQA, CM

Maturity Level 3

REQD, TS, PI, VER,
VAL, OPF, OPD, OT,
IPM, RSKM, DAR

Maturity Level 4

OPP, QPM

Maturity Level 5

OID, CAR

Appendixes

CMMI-SE/SW Continuous

Overview

Learn about the model

Process Management

OPF, OPD, OT,
OPP, OID

Project Management

PP, PMC, SAM
IPM, RSKM, QPM

Engineering

REQM, REQD, TS,
PI, VER, VAL

Support

CM, PPQA, MA,
CAR, DAR

Appendixes