

Module 10 - Measurement: Process Measures

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**Introduction**

Process Improvement is considered to be a "best practice" for development organizations.

Process improvement models support that practice by helping organizations implement existing processes, collecting data to measure and evaluate their effectiveness and using that evaluation to continuously improve their processes, making them more effective.

In addition to helping software developers, improvement models are also beneficial to acquirers. While developers can measure the maturity of their own processes and implement a continuous improvement effort, acquirers can obtain a clear picture of the developer's current maturity level, and in turn, assess the risk of awarding a contract to that supplier.

As an example of a process improvement model, this topic will describe the Capability Maturity Model Integration (CMMI)<sup>®</sup>.

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## Learning Objective

This lesson covers a maturity model that integrates Systems Engineering, Software Engineering and Collaboration processes. The model is the Capability Maturity Model Integration (CMMI).

After completing this lesson, you will be able to:

- Summarize the origins of the CMMI.
- Explain "staged" vs. "continuous" CMMI versions.
- Identify the CMMI's maturity levels.



# Objectives

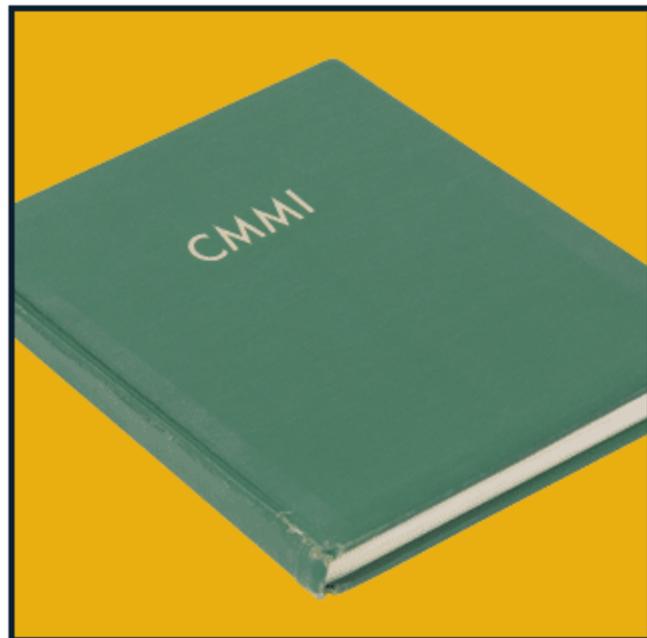
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**Background on CMMI®**

[CMMI](#) is a process improvement model with widespread name recognition.

The CMMI:

- Was developed by industry and government experts
- Divides process maturity into five levels, each one characterized by the performance of various practices



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**Background on CMMI®, Cont.**

DoD efforts at the [Software Engineering Institute \(SEI\)](#) were initially inspired by [Total Quality Management \(TQM\)](#) work done by Philip Crosby. Mr. Crosby's work is documented in his classic text called *Quality is Free*.

In the early 1980's, Watts Humphrey and his IBM colleagues adapted Crosby's framework and work by others in the TQM field to the arena of software development.

Humphrey's work directly led to linking effective software management to an organization's process maturity. The organizations that used software processes models discovered a profound impact.

CMMI grew from that early work and it encompasses software, systems engineering and integrated process and product development processes.

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## Uses of the CMMI®

Based on the principles of [Continuous Process Improvement](#), the CMMI is a framework that is used to:

- Measure the maturity of an organization's development processes as the basis for long-term internal process improvement efforts by the supplier
- Evaluate the supplier's development process capability for the purposes of contract award considerations or risk assessment by the acquirer



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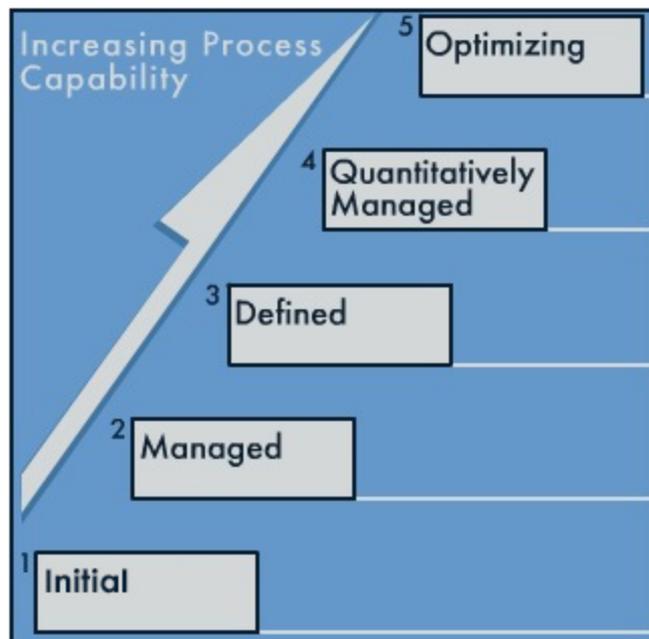
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**CMMI Application: Staged or Continuous**

Before proceeding, it is important to note that the CMMI can be applied as a staged model or a continuous model.

As a staged model, the CMMI identifies key development processes and divides them into a framework of five progressive stages or levels. Each level, consisting of multiple Process Areas (PAs), builds on a previous level's capabilities. This approach is typically used to rate and characterize an entire organization, as a "Level 5" developer, etc.

As a continuous model, each Process Area is rated individually. An overall maturity level can then be calculated for each individual process. This approach highlights issues for process improvement efforts and is the recommended way many authorities believe the CMMI is best used.



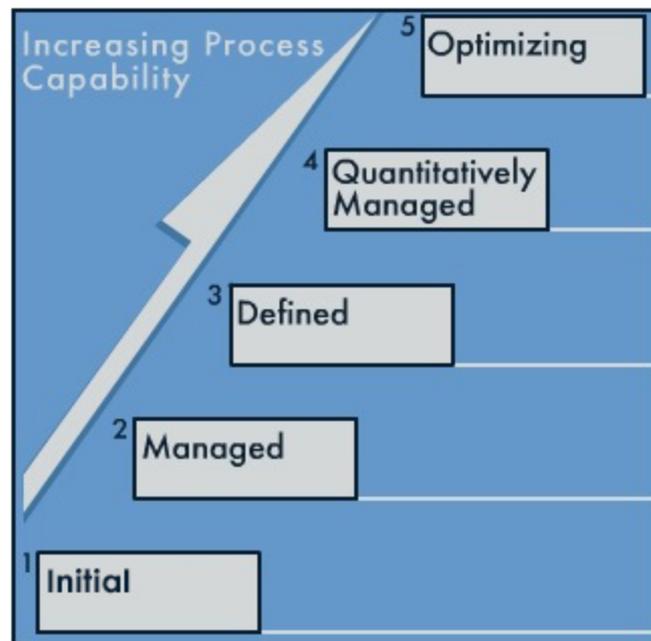
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## Maturity Levels Defined

As a staged model, CMMI is divided into five maturity levels. These discrete maturity levels allow:

- An organization's process maturity to be reliably measured
- An organization to prioritize its software process improvement actions in a reasonable, coherent way



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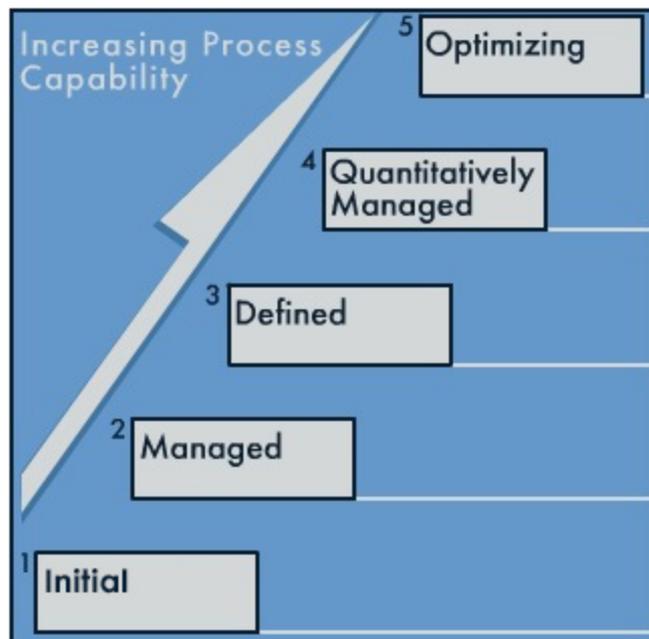
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## Maturity Levels: A Closer Look

Now let's take a closer look at each of the five maturity levels of the Capability Maturity Model Integration (CMMI).

Select each level for its summary description.  
The levels are:

1. [Initial](#)
2. [Managed](#)
3. [Defined](#)
4. [Quantitatively Managed](#)
5. [Optimizing](#)



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## Knowledge Review

What process activities are documented, standardized, and integrated?

L5 Optimizing

L3 Defined

L1 Initial

Check Answer



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## Summary

This lesson covered:

### The CMMI

The Capability Maturity Model Integration (CMMI) is a process improvement model that is based on the principle of achieving continuous improvement through measurement.

The CMMI provides a framework that is used to:

- Measure the maturity of an organization's software processes as the basis for long-term internal process improvement efforts by the supplier
- Evaluate the supplier's software process capability for the purposes of contract award or risk assessment by the acquirer

"Staged" and "continuous" representations of the CMMI exist. As a staged model, the CMMI divides key development activities consisting of multiple Process Areas into a framework of five maturity levels.

As a continuous model, each Process Area can be rated individually.



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## Summary, Cont.

**Maturity Levels**

The CMMI is divided into five maturity levels that allow an organization's process maturity to be reliably measured and also allow an organization to prioritize its software process improvement actions in a reasonable, coherent way.

The maturity levels of the CMMI are:

- Level 1: Initial
- Level 2: Managed
- Level 3: Defined
- Level 4: Quantitatively Managed
- Level 5: Optimizing



## Lesson Completion

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