

5 Using CMMI Models

The complexity of today's [products/services](#) demands an integrated view of how organizations do business. CMMI can reduce the cost of process improvement across enterprises that depend on multiple functions or groups to produce products and services.

To achieve this integrated view, the CMMI Framework includes common terminology, common model components, common appraisal methods, and common training materials. This chapter describes how organizations can use the CMMI Product Suite not only to improve their quality, reduce their costs, and optimize their schedules, but also to gauge how well their process improvement program is working.

Adopting CMMI

Research has shown that the most powerful initial step to process improvement is to build [strong](#) organizational support through strong senior management sponsorship. To gain senior management sponsorship, it is often beneficial to expose senior management to the performance results experienced by others who have used CMMI to improve their processes [\[Gibson 2006\]](#).

For more information about CMMI performance results, see the SEI [Web website at www.sei.cmu.edu/cmmi/results.html](#) [\[SEI 3\]](#) [www.sei.cmu.edu/cmmi/results.html](#).

The senior manager, once committed as the process improvement sponsor, must be actively involved in the CMMI-based process improvement effort. Activities performed by the senior management sponsor include (but are not limited to) the following:

- Influence the organization to adopt CMMI.
- Choose the best people to manage the process improvement effort.
- Monitor the process improvement effort personally.
- Be a visible advocate and spokesperson for the process improvement effort.
- Ensure that adequate resources are available to enable the process improvement effort to be successful.

Given sufficient senior management sponsorship, the next step is establishing a strong, technically competent process group that represents relevant stakeholders to guide process improvement efforts.

For an organization with a mission to ~~develop software-intensive systems~~ deliver quality services, the process group might include ~~engineers~~ those representing the different ~~technical~~ disciplines across the organization and other selected members based on the business needs driving improvement. For example, a systems administrator may focus on information-technology support, whereas a marketing representative may focus on integrating customers' needs. Both members could make powerful contributions to the process group.

Once your organization ~~has decided~~ decides to adopt CMMI, planning can begin with an improvement approach such as the IDEALSM (Initiating, Diagnosing, Establishing, Acting, & Learning) model [McFeeley 1996]. For more information about the IDEAL model, see the SEI ~~Web website~~ at www.sei.cmu.edu/ideal/ideal.html [SEI ~~1~~]. www.sei.cmu.edu/ideal/.

Your Process Improvement Program

Use the CMMI Product Suite to help establish your organization's process improvement program. Using the product suite for this purpose can be a relatively informal process that involves understanding and applying CMMI best practices to your organization. Or, it can be a formal process that involves extensive training, creation of a process improvement infrastructure, appraisals, and more.

Selections ~~That~~ Influence Your Program

You must make three selections to apply CMMI to your organization for process improvement:

1. Select a part of the organization.
2. Select a model.
3. Select a representation.

Selecting the projects to be involved in your process improvement program is critical. If you select a group that is too large, it may be too much for the initial improvement effort. The selection should also consider how homogeneous the group is (i.e., whether ~~they~~ the group's members all are ~~software-engineer~~ experts in the same discipline, whether they all work on the same product or business line, and so on).

~~Selecting the model to be used depends on the areas your organization is interested in improving. Not only must you select a constellation (e.g., Development, Acquisition, or Services), but you must also decide whether to include any additions (e.g., IPPD).~~

The process of selecting the representation to be used has some guidelines because of how CMMI models are built. If your organization

likes the idea of maturity levels and the staged representation, your improvement roadmap is already defined. If your organization likes the continuous representation, you can select nearly any process area or group of process areas to guide improvement, although dependencies among process areas should be considered when making such a selection.

As the process improvement plans and activities progress, other important selections must be made, including which appraisal method should be used, which projects should be appraised, how training for personnel should be secured, and which personnel should be trained.

CMMI Models

CMMI models describe ~~what have been determined to be~~ best practices that organizations have found to be productive and useful to achieving their business objectives.

Regardless of your ~~type of~~ organization, ~~to apply CMMI best practices,~~ you must use professional judgment when interpreting ~~them~~ CMMI best practices for your situation, needs, and business objectives. Although process areas depict the characteristics of an organization committed to process improvement, you must interpret the process areas using an in-depth knowledge of CMMI, your organization, the business environment, and the specific circumstances involved.

As you begin using a CMMI model to improve your organization's processes, map your real-world processes to CMMI process areas. This mapping enables you to initially judge and later track your organization's level of conformance to the CMMI model you are using and to identify opportunities for improvement.

To interpret practices, it is important to consider the overall context in which these practices are used and to determine how well the practices satisfy the goals of a process area in that context. CMMI models do not ~~explicitly~~ prescribe nor imply ~~particular~~ processes that are right for any organization or project. Instead, CMMI describes minimal criteria necessary to plan and implement processes selected by the organization for improvement based on business objectives.

CMMI practices purposely use nonspecific phrases such as "relevant stakeholders," "as appropriate," and "as necessary" to accommodate the needs of different organizations and projects. The specific needs of a project may also differ at various points ~~during~~ its life.

Using CMMI Appraisals

Many organizations find value in measuring their progress by conducting an appraisal and ~~thus~~ earning a maturity level rating or a capability level achievement profile. These ~~types of~~ appraisals are typically conducted for one or more of the following reasons:

- To determine how well the organization's processes compare to CMMI best practices and identify areas where improvement can be made
- To inform external customers and suppliers about how well the organization's processes compare to CMMI best practices
- To meet the ~~contract~~contractual requirements of one or more customers

Appraisals of organizations using a CMMI model must conform to the requirements defined in the *Appraisal Requirements for CMMI* (ARC) document. ~~These appraisals~~Appraisals focus on identifying improvement opportunities and comparing the organization's processes to CMMI best practices. Appraisal teams use a CMMI model and ARC-conformant appraisal method to guide their evaluation of the organization as well as how they report and their reporting of conclusions. The appraisal results are ~~then~~-used (e.g., by a process group, ~~for example~~) to plan improvements for the organization.

Appraisal Requirements for CMMI

The *Appraisal Requirements for CMMI* (ARC) document describes the requirements for several types of appraisals [SEI 2006c]. A full benchmarking class of appraisal is defined as a *Class A* appraisal method. Less formal methods are defined as *Class B* or *Class C* methods. The ARC document was designed to help improve consistency across appraisal methods, and to help appraisal method developers, sponsors, and users understand the tradeoffs associated with various methods [SEI 2006a].

Depending on the purpose of the appraisal and the nature of the circumstances, one class may be preferred over the others. Sometimes self-assessments, initial appraisals, quick-look, or mini-appraisals, incremental appraisals, or external appraisals are appropriate, ~~and~~; at other times a formal benchmarking appraisal is appropriate.

A particular appraisal method is declared an ARC Class A, B, or C appraisal method based on the sets of ARC requirements that the method developer addressed when designing the method.

More information about the ARC is available on the SEI ~~Web~~-website at www.sei.cmu.edu/cmmi/appraisals/appraisals.html ~~www.sei.cmu.edu/cm~~ni/appraisals/index.html.

SCAMPI Appraisal Methods

The *SCAMPI A* appraisal ~~methods are~~method is the generally accepted ~~methods-method~~ used for conducting ARC Class A appraisals using CMMI models. The *SCAMPI A Method Definition Document* (MDD) defines rules for ensuring the consistency of SCAMPI A appraisal ratings [SEI 2006b]. For benchmarking against other organizations,

appraisals must ensure consistent ratings. The achievement of a specific maturity level or the satisfaction of a process area must mean the same thing for different appraised organizations.

The SCAMPI family of appraisals includes Class A, B, and C appraisal methods. The SCAMPI A appraisal method is the officially recognized and most rigorous method and. It is the only method that can result in a rating. SCAMPI B provides options in model scope, but the characterization of practices is fixed to one scale and is performed on implemented practices. SCAMPI C provides a wide range of options, including characterization of planned approaches to process implementation according to a scale defined by the user benchmark quality ratings. SCAMPI B and C appraisal methods provide organizations with improvement information that is less formal than the results of a SCAMPI A appraisal, but nonetheless helps the organization to identify improvement opportunities.

More information about SCAMPI methods is available on the SEI [Web website](http://www.sei.cmu.edu/cmmi/appraisals/appraisals.html) at www.sei.cmu.edu/cmmi/appraisals/appraisals.html [SEI 2006b]-www.sei.cmu.edu/cmmi/appraisals/index.html.

Appraisal Considerations

Choices that affect a CMMI-based appraisal include the following:

- WhichThe CMMI model to use for the appraisal (for this constellation, the choice would be between the CMMI for Development model and the CMMI for Development + IPPD model)models
- Establishing theThe appraisal scope, including the organizational unit to be appraised, the CMMI process areas to be investigated, and the maturity level or capability level(s) to be appraised
- Selecting theThe appraisal method
- Selecting theThe appraisal team members
- SelectingThe appraisal participants selected from the appraisal entities to be interviewed
- EstablishingThe appraisal outputs (e.g., ratings-or, instantiation-specific findings)
- EstablishingThe appraisal constraints (e.g., time spent on site)

The SCAMPI MDD allows the selection of predefined options for use in an appraisal. These appraisal options are designed to help organizations align CMMI with their business needs and objectives.

Documentation of CMMI appraisal plans and results must always include a description of the appraisal options, model scope, and organizational scope selected. This documentation confirms whether an appraisal meets the requirements for benchmarking.

For organizations that wish to appraise multiple functions or groups, CMMI's ~~the~~ integrated approach ~~of CMMI~~ enables some economy of scale in model and appraisal training. One appraisal method can provide separate or combined results for multiple functions.

The appraisal principles for ~~the~~ CMMI Product Suite¹ ~~remain are~~ the same as those used in appraisals for other process improvement models. Those principles are as follows:

- Senior management sponsorship²
- A focus on the organization's business objectives
- Confidentiality for interviewees
- Use of a documented appraisal method
- Use of a process reference model (e.g., a CMMI model) as a base
- A collaborative team approach
- A focus on actions for process improvement

CMMI-Related Training

Whether your organization is new to process improvement or is already familiar with process improvement models, training is a key element in the ability of organizations to adopt CMMI. An initial set of courses is provided by the SEI and its ~~Partners~~ Partner Network, but your organization may wish to supplement these courses with ~~internal~~ its own instruction. This approach allows your organization to focus on ~~the~~ areas that provide the greatest business value.

The SEI and its ~~Partners~~ Partner Network offer ~~the~~ *Introduction to CMMI* a course, ~~which that~~ provides a basic overview of ~~the~~ CMMI ~~models~~ *SVC*. The SEI also offers the *Intermediate Concepts of CMMI* course to those who plan to become more deeply involved in CMMI adoption or appraisal—for example, those who will guide improvement as part of a process group, those who will lead SCAMPI appraisals, and those who will teach the *Introduction to CMMI* course.

Current information about CMMI-related training is available on the SEI ~~Web~~ website at www.sei.cmu.edu/cmmi/training/trainingindex.html.

Field Code Changed

¹ See the glossary for the definition of CMMI Product Suite.

² Experience has shown that the most critical factor influencing successful process improvement and appraisals is senior management sponsorship.

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