Appraisal Requirements for CMMI®, Version 1.2 (ARC, V1.2)

SCAMPI Upgrade Team

August 2006

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CMM Integration Project

This report was prepared for the

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In Memory of

Jim Heil,

our dedicated team member and friend

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Preface

The Capability Maturity Model® Integration (CMMI®) Project has involved a large number of people from different organizations throughout the world. These organizations were using a CMM® or multiple CMMs and were interested in the benefits of developing an integration framework to aid in enterprise-wide process improvement and integration activities.

The CMMI Project work is sponsored by the U.S. Department of Defense (DoD), specifically the Office of the Under Secretary of Defense (Acquisition, Technology, and Logistics) (OUSD [AT&L]). Industry sponsorship is provided by the Systems Engineering Committee of the National Defense Industrial Association (NDIA).

Organizations from industry, government, and the Software Engineering Institute (SEI) joined together to develop the CMMI Framework, a set of integrated CMMI models, a CMMI appraisal method, and supporting products. These organizations donated the time of one or more of their people to participate in the CMMI Project.

Acknowledgments

Many talented people were involved as part of this v1.2 upgrade to the CMMI appraisal method. Three primary groups were involved: the SCAMPI℠ Upgrade Team (SUT), Sponsors, and the Steering Group.

The SUT reviews and discusses change requests submitted by CMMI users to change the CMMI appraisal method. The SUT then writes, reviews, and revises proposed changes to the appraisal method.

The Sponsors of the v1.2 upgrade are the organizations listed above in the second paragraph of this Preface.

The Steering Group guides and approves plans for the appraisal method upgrade, provides consultation on significant appraisal issues, ensures involvement from a variety of interested stakeholders, and acts as the Configuration Control Board for the CMMI appraisal method.

Members of the three primary groups involved in upgrading the CMMI appraisal method upgrade are listed in Appendix D.

The contributions of these individuals are gratefully acknowledged. So, too, are those of others from the CMMI Product Team and the process improvement and capability evaluation

communities who provided change requests, ideas, and best practices leading to the improvements reflected in the current set of appraisal documentation and related assets.

Where to Look for Additional Information

You can find additional information, such as the intended audience, background, history of the CMMI models, and the benefits of using the CMMI models, in various other sources. Many of these sources are documented on the CMMI Web site, which is located at http://www.sei.cmu.edu/cmmi/.

Feedback Information

We are very interested in your ideas for improving these products. You can help these products continually improve.

See the CMMI Web site for information on how to provide feedback: http://www.sei.cmu.edu/cmmi/models/change-requests.html

If you have questions, send an email to cmmi-comments@sei.cmu.edu.

Abstract

The Appraisal Requirements for CMMI (ARC) V1.2 defines the requirements considered essential to appraisal methods intended for use with Capability Maturity Model® Integration (CMMI®) models. In addition, a set of appraisal classes is defined, based on typical applications of appraisal methods. These classes are intended primarily for developers of appraisal methods to use with CMMI capability models in the context of the CMMI Product Suite. Appraisal methods, as used in this document, may be applied for different purposes, including assessments for internal process improvement and capability evaluations for supplier selection and process monitoring. This document defines the requirements for such methods, but not necessarily the conditions or constraints under which they might be applied.

The approach employed to provide guidance to appraisal method developers is to define a class of typical applications of appraisal methods (which are based on years of experience in the process improvement community) called appraisal method classes. Requirements are then allocated to each class as appropriate based on the attributes associated with that class. Thus, a particular appraisal method may be declared to be an ARC Class A, B, or C appraisal method. This designation implies the sets of ARC requirements that the method developer has addressed when designing the method.

1 Introduction

The Appraisal Requirements for CMMI® (ARC) consists of a set of high-level design criteria for developing, defining, and using appraisal methods based on CMMI models. These requirements constitute an evolutionary progression from the CMM Appraisal Framework (CAF) V1.0 [Masters 95], which was produced originally to provide a common basis for appraisal methods employing the Capability Maturity Model® for Software. With the incorporation of multiple discipline models into the CMMI architecture, the ARC has been created to accommodate these new discipline models and their staged and continuous representations. The ARC has also been influenced by the EIA/IS 731.2 Appraisal Method [EIA 98b] and ISO/IEC 15504. Finally, the requirement to encompass both assessment (for internal process improvement) and capability evaluations (for source selection and/or process monitoring) [DoD 01] has influenced the ARC.

Appraisal teams use CMMI models as the basis for identifying the strengths and weaknesses of the processes examined during an appraisal. Appraisal results can be used in a number of ways:

- planning an improvement strategy for the organization
- generating maturity level or capability level ratings
- guidance for decision-making
- mitigation of risks for product acquisition, development, and monitoring

The appraisal principles for the CMMI Product Suite are similar to those for appraisals using the Capability Maturity Model for Software and Systems Engineering Capability Model [EIA 98a]:

- Start with an appraisal reference model.
- Use a formalized appraisal process.
- Involve senior management as the appraisal sponsor.
- Focus the appraisal on the sponsor’s business objectives.
- Observe strict confidentiality and non-attribution of data.
- Approach the appraisal collaboratively.
- Focus on follow-on activities and decision-making based upon the appraisal results.

2 Benefits and Features of CMMI Appraisal Methods

For organizations that wish to appraise against multiple disciplines (e.g., software engineering and systems engineering), the unified CMMI approach permits some economy of scale in model training and appraisal training. One appraisal method can provide separate or combined results for one or more disciplines. Appraisal methods can appraise a single discipline, as in the past.

The ARC requirements are designed to help improve consistency across multiple disciplines and appraisal methods and to help appraisal method developers, sponsors, and users understand the tradeoffs associated with various methods.

When a 15504-conformant appraisal is desired, certain additional requirements must be addressed in the appraisal method and appraisal reference model. Appendix B shows a summary of how the 15504-2 clause 4 requirements are addressed by the ARC requirements.

3 Requirements for CMMI Appraisal Method Class Structure

Not all CMMI appraisal methods are expected to be fully ARC-compliant (by satisfying each of the ARC requirements). CMMI appraisal methods that are not fully ARC-compliant may be appropriate for a specific set of sponsor needs, and method developers are expected to develop a variety of appraisal methods to meet these needs.

The CMMI appraisal method class structure (specified in Appendix A) identifies the requirements appropriate to appraisal methods designed specifically for three typical applications (see Table 1). There is no requirement for a CMMI appraisal method to fall exactly into one class; however, this structure is intended to provide value and utility to users of the CMMI Product Suite, and its use is encouraged.

Table 1: Requirements of CMMI Appraisal Method Classes

Requirements	Class A	Class B	Class C
Types of Objective Evidence Gathered	Documents and interviews	Documents and interviews	Documents or interviews
Ratings Generated	Goal ratings required	Not allowed	Not allowed
Organizational Unit Coverage	Required	Not required	Not required
Minimum Team Size	4	2	1
Appraisal Team Leader Requirements	Lead appraiser	Person trained and experienced	Person trained and experienced

Key differentiating attributes for appraisal classes include

- the degree of confidence in the appraisal outcomes
- the generation of ratings
- appraisal cost and duration

Class A methods must satisfy all of the ARC requirements, and at the present time are the only methods considered suitable for providing ratings for benchmarking. Developers of Class A methods also have the option of supporting the conduct of 15504-conformant appraisals. An example of a Class A method is the Standard CMMI Appraisal Method for Process Improvement (SCAMPI[SM]).

Class B appraisal methods are required to comply with a subset of the ARC requirements. As indicated in Appendix A, several requirements of Class A methods are optional for Class B methods. Two types of objective evidence are required for both Class A and B methods. Class B methods do not produce ratings and are not intended to be ISO 15504 conformant. These types of appraisals are recommended for initial assessments in organizations that are just beginning to use CMMI models for process improvement activities. They also provide a cost-effective means for performing interim assessments and/or capability evaluations between Class A appraisals.

Class C appraisal methods are required to comply with a subset of the ARC requirements for Class B methods. Only one of the two types of objective evidence required for Class A methods is required for Class C methods. Validation and corroboration are also optional for Class C methods. These types of appraisals would most likely be used when the need for a "quick look" arises or for periodic self-assessments by projects and organizational support groups.

The ARC requirements are based on widely used appraisal methods that have yielded accurate, consistent, and useful results. As other appraisal methods are identified and shown to have similar quality characteristics, the requirements may be modified to reflect their features.

4 Requirements for CMMI Appraisal Methods

The sections below define the suite of requirements for CMMI appraisal methods. Each requirement statement is preceded by an indicator of applicability to one or more of the three CMMI appraisal method classes (e.g., ABC). If the indicator for an appraisal class is not listed for a requirement, then that requirement is either optional or not applicable for that appraisal class, as shown in Appendix A.

ARC requirements are derived from a variety of sources reflecting the best practices and standards applicable to process appraisal technology. Appendix B shows a summary of how the 15504-2 requirements are addressed by the ARC requirements. If 15504 conformance is not required for a given Class A method, a small portion of these ARC requirements that are 15504-unique, such as generation of 15504 process profiles, may be considered not applicable. Those requirements are shown in italics in this section. In any case, all Class A methods must contain a statement declaring whether or not 15504-conformant appraisals are supported.

4.1 Responsibilities

4.1.1 The method shall define the responsibilities of the appraisal sponsor, which, at a minimum, shall include the following activities:

a. (ABC) Verify that the appraisal team leader has the appropriate experience, knowledge, and skills to take responsibility for and lead the appraisal.

b. (ABC) Ensure that the appropriate organizational units or subunits (e.g., projects, functional units) participate in the appraisal.

c. (ABC) Support appraisal method provisions for ensuring non-attribution to appraisal participants.

d. (ABC) Ensure that resources are made available to conduct the appraisal.

e. (ABC) Review and approve the appraisal input prior to the beginning of data collection by the appraisal team.

4.1.2 The method shall define the responsibilities of the appraisal team leader, which, at a minimum, shall include the following activities:

a. (ABC) Ensure that the appraisal is conducted in accordance with the method's documented process.

b. (ABC) Confirm the sponsor's commitment to proceed with the appraisal.

c. (ABC) Ensure that appraisal participants are briefed on the purpose, scope, and approach of the appraisal.

d. (ABC) Ensure that all appraisal team members have the appropriate experience, knowledge, and skills in the appraisal reference model and appraisal method; the necessary competence to use instruments or tools chosen to support the appraisal; and access to documented guidance on how to perform the defined appraisal activities.

e. (ABC) Verify and document that the appraisal method requirements have been met.

f. (ABC) Confirm delivery of appraisal results to the sponsor.

4.2 Appraisal Method Documentation

4.2.1 The method shall be documented and, at a minimum, include

a. (ABC) identification of the CMMI models (version, discipline, and representation [staged or continuous]) with which the method can be used

b. (ABC) identification of the ARC version upon which the appraisal method is based

c. (ABC) identification of which CMMI appraisal requirements are satisfied by the method, along with the CMMI appraisal method class membership (if applicable)

d. (ABC) activity descriptions, artifacts, and guidance that implement each of the appraisal requirements

e. (A) declaration as to whether or not the method supports 15504-conformant appraisals

4.2.2 The method documentation shall provide guidance for

a. (ABC) identifying an appraisal's purpose, objectives, and constraints

b. (ABC) determining the suitability of the appraisal method relative to the appraisal's purpose, objectives, and constraints

4.2.3 The method documentation shall provide guidance for identifying the scope of the CMMI model(s) to be used for the appraisal:

a. (ABC) process areas to be investigated (continuous and staged representations)

b. (ABC) capability levels to be investigated for each process area (continuous representation)

4.2.4 The method documentation shall provide guidance for identifying the organizational unit to be appraised:

a. (ABC) the sponsor of the appraisal and the sponsor's relationship to the organizational unit being appraised

b. (ABC) projects within the organizational unit that will participate

c. (ABC) functional elements of the organizational unit that will participate

d. (ABC) names and affiliations (organizational units) of participants in the appraisal activities

4.2.5 The method documentation shall provide guidance for selecting appraisal team members and criteria for qualification, including

a. (ABC) technical experience (discipline-specific)

b. (ABC) management experience

c. (ABC) experience, knowledge, and skills in the appraisal reference model and appraisal method

4.2.6 The method documentation shall provide guidance for an appraisal team leader's qualification criteria, including

a. (ABC) training and experience using the appraisal reference model

b. (ABC) training and experience using the appraisal method

c. (ABC) experience in delivering training, managing teams, facilitating group discussions, and making presentations

4.2.7 (ABC) The method documentation shall provide guidance for determining the appropriate size of the appraisal team. For Class A appraisals, the minimum team size is four members; for Class B appraisals, two members; for Class C appraisals, one member.

4.2.8 (ABC) The method documentation shall provide guidance on the roles and responsibilities of appraisal team members.

4.2.9 (ABC) The method documentation shall provide guidance addressing the responsibilities of the appraisal sponsor.

4.2.10 (ABC) The method documentation shall provide guidance addressing the responsibilities of the appraisal team leader.

4.2.11 (ABC) The method documentation shall provide guidance for estimating the resources required to conduct the appraisal (including the amount of time required to conduct an appraisal).

4.2.12 (ABC) The method documentation shall provide guidance for appraisal logistics.

4.2.13 (ABC) The method documentation shall provide guidance for collecting relevant data on the organizational unit and associating the data to the specific and generic practices of the appraisal reference model.

4.2.14 (ABC) The method documentation shall provide guidance for creating findings, including both strengths and weaknesses relative to the appraisal reference model.

4.2.15 (ABC) The method documentation shall provide guidance for protecting the confidentiality of appraisal data and ensuring non-attribution of data contributed by appraisal participants.

4.2.16 The method documentation shall provide guidance for (1) recording traceability between the data collected during the appraisal and the findings and/or ratings, (2) the retention and safekeeping of appraisal records, and (3) compiling and maintaining an appraisal record that supports the appraisal team's findings and/or ratings and that contains the following minimum content:

a. (ABC) dates of appraisal

b. (ABC) appraisal input

c. (A) objective evidence, or identification thereof, sufficient to substantiate goal rating judgments

d. (ABC) identification of appraisal method (and version) used, along with any tailoring options

e. (ABC) findings

f. (A) any ratings rendered during the appraisal (goals, process areas, and maturity or capability levels)

4.3 Planning and Preparing for the Appraisal

4.3.1 The method shall provide for the preparation of appraisal participants by addressing, at a minimum,

a. (ABC) the purpose of the appraisal

b. (ABC) the scope of the appraisal

c. (ABC) the appraisal approach

d. (ABC) the roles and responsibilities of participants in the appraisal

e. (ABC) the schedule of appraisal activities

4.3.2 (ABC) The method shall provide for the development of the appraisal input prior to the beginning of data collection by the appraisal team.

4.3.3 At a minimum, the appraisal input shall specify

a. (ABC) the identity of the sponsor of the appraisal, and the sponsor's relationship to the organizational unit being appraised

b. (ABC) the appraisal purpose, including alignment with business objectives

c. (ABC) the appraisal reference model scope, including

   1. the process areas to be investigated within the organizational unit
   2. the highest maturity level and/or capability level to be investigated for each process area within the appraisal scope

d. (ABC) the organizational unit that is the subject of the appraisal

e. (ABC) the process context, which, at a minimum, shall include

   1. the size of the organizational unit
   2. the demographics of the organizational unit
   3. the application domain of the products or services of the organizational unit
   4. the size, criticality, and complexity of the products or services

f. (ABC) the appraisal constraints, which, at a minimum, shall include

   1. availability of key resources (e.g., staffing, funding, tools, facilities)
   2. schedule constraints
   3. the maximum amount of time to be used for the appraisal
   4. specific process areas or organizational entities to be excluded from the appraisal
   5. the minimum, maximum, or specific sample size or coverage that is desired for the appraisal
   6. the ownership of the appraisal outputs and any restrictions on their use

7. controls on information resulting from a confidentiality agreement
8. non-attribution of appraisal data to associated sources

g. (ABC) the identity of the CMMI models used, including the version, discipline, and representation (staged or continuous)

h. (ABC) the criteria for experience, knowledge, and skills of the appraisal team leader who is responsible for the appraisal

i. (ABC) the identity and affiliation of the appraisal team members, including the appraisal team leader, with their specific appraisal responsibilities

j. (ABC) the identity (name and organizational affiliation) of appraisal participants and support staff, with specific responsibilities for the appraisal

k. (ABC) any additional information to be collected during the appraisal to support achievement of the appraisal objectives

l. (ABC) a description of the planned appraisal outputs, including ratings to be generated (process areas, maturity level)

m. (ABC) anticipated follow-on activities (e.g., reports, appraisal action plans, re-appraisal)

n. (ABC) planned tailoring of the appraisal method and associated tradeoffs, including the sample size or coverage of the organizational unit

4.3.4 (ABC) The method shall require that the appraisal input, and any changes to the appraisal input, shall be agreed to by the sponsor (or the delegated authority) and documented in the appraisal record.

4.3.5 The method shall require the development of an appraisal plan that, at a minimum, specifies

a. (ABC) the appraisal input

b. (ABC) the activities to be performed in conducting the appraisal

c. (ABC) resources and schedule assigned to appraisal activities

d. (ABC) appraisal logistics

e. (ABC) mitigation steps to address risks associated with appraisal execution

4.4 Appraisal Data Collection

Appraisal teams base their findings on review of one or more types of objective evidence. The requirements in this section identify the types of objective evidence recognized by CMMI appraisal methods. As indicated in Appendix A, both of the two types of objective evidence identified below are required for Class A and Class B appraisal methods. At least one type of objective evidence is required for Class C methods.

4.4.1 The method shall collect data by conducting interviews (e.g., with project leaders, managers, practitioners).

4.4.2 The method shall collect data by reviewing documentation (e.g., organizational policies, instruments, project procedures, and implementation-level work products).

4.5 Data Consolidation and Validation

4.5.1 (ABC) The method shall require appraisal team consensus when teams are involved in decisions related to determining the validity of findings and establishing ratings.

4.5.2 The method shall require a mechanism for consolidating the data collected during an appraisal into accurate findings according to the following criteria:

a. (ABC) The finding was derived from objective evidence seen or heard during data collection sessions.

b. (ABC) The finding is clearly worded, phrased without attribution, and expressed in terminology used at the organizational unit.

c. (ABC) Objective evidence supporting the finding is traceable to the project or organizational unit.

d. (ABC) The finding is relevant to the appraisal reference model and can be associated with a specific model component.

4.5.3 The method shall require a mechanism for verifying findings according to the following criteria:

a. (AB) The finding is based on corroborated objective evidence.

b. (AB) The finding is consistent with other verified findings. (Verified findings cannot be both true and mutually inconsistent; in aggregate, they constitute a set of truths about the organizational unit that must be consistent.)

4.5.4 The method shall require the following minimum set of criteria to be satisfied in order for objective evidence to be considered "corroborated":

a. (AB) The objective evidence is obtained from at least two different sources.

b. (AB) At least one of the two sources must reflect work actually being done (e.g., process area implementation).

4.5.5 The method shall require a mechanism for determining that sufficient data has been collected to cover the scope of the appraisal, according to the following minimum set of rules:

a. (A) A specific or generic practice has sufficient data coverage if corroborated objective evidence exists for the practice and

   1. is adequate to understand the extent of implementation of the practice
   2. is representative of the organizational unit
   3. is representative of the life-cycle phases in use within the organizational unit

b. (A) In a staged representation, a process area has sufficient data coverage if all of its specific and generic practices have sufficient data coverage.

c. (A) In a continuous representation, a process area has sufficient data coverage if all of its specific practices and the generic practices within the appraisal scope have sufficient data coverage up through the capability level being investigated for the process area (e.g., the target capability level).

4.5.6 (A) The method shall require a mechanism for consolidating objective evidence into preliminary findings of strengths and weaknesses relative to the appraisal reference model.

4.5.7 (A) The method shall require that appraisal participants be presented with the preliminary findings in order to solicit their responses for validation of the findings' accuracy and clarity.

4.6 Rating

4.6.1 The method shall define a rating process that specifies, at a minimum, the following:

a. (A) An appraisal team can rate a specific or generic goal when corroborated objective evidence for each practice related to the goal meets the method's defined data coverage criteria.

b. (A) An appraisal team can rate a process area when it has rated each of the process area's specific goals and generic goals within the appraisal scope.

c. (A) An appraisal team can determine a maturity level rating once it has rated all of the process areas within that level and each level below.[1]

d. (A) An appraisal team can determine the capability level of a process area when it has rated each of the generic goals at or below the target capability level.

[1] See 4.6.5b for how a maturity level rating can be determined when using the continuous representation.

4.6.2 (A) The method shall require that maturity level ratings and/or capability level ratings be based on the definitions of capability levels and maturity levels in the CMMI models.

4.6.3 The method shall rate each specific and generic goal (provided the prerequisites of rating have been met) within the appraisal scope in accordance with the following rules:

a. (A) Rate the goal "satisfied" when the associated generic or specific practices (or acceptable alternative practices) are judged to be implemented and the aggregate of weaknesses does not have a significant negative impact on goal achievement.

b. (A) Rate the goal "not rated" if the goals cannot be rated in accordance with the method's defined criteria for data sufficiency,

c. (A) Rate the goal "unsatisfied" otherwise.

4.6.4 The method shall rate each process area within the appraisal scope, if requested by the appraisal sponsor, in accordance with the following rules:

a. (A) When a process area is determined to be outside of the organizational unit's scope of work, the process area is designated as "not applicable" and is not rated.

b. (A) When an applicable process area is outside of the scope of the model used for the appraisal, the process area is designated as "out of scope" and is not rated.

c. (A) When one or more goals cannot be rated in accordance with the method's defined criteria for data sufficiency, the process area is designated as "not rated" and is not rated.

d. (A) Otherwise, when a process area is to be rated for a staged representation, the process area is "satisfied" if and only if all of its specific goals and all of its generic goals at the maturity level of interest and below are rated "satisfied." Else, it is "unsatisfied."

e. (A) Otherwise, when a process area is to be rated for a continuous representation, the process area is given a capability level rating based on the highest level for which all of its specific goals and generic goals have been satisfied.

4.6.5 The method shall rate the maturity level, if requested by the appraisal sponsor, in accordance with the following rules:

a. (A) A maturity level for a staged representation is achieved if all process areas within the level and within each lower level are either "satisfied" or "not applicable."

b. (A) A maturity level for a continuous representation is achieved if the capability level profile is at or above the target profile for all process areas for that

maturity level and all lower maturity levels in the equivalent staging, excepting those process areas that are designated as "not applicable."

4.7 Reporting Results

4.7.1 (ABC) The method shall require documenting and reporting the appraisal findings and/or ratings to the appraisal sponsor and to the appraised organization.

4.7.2 (A) The method shall require the submission of appraisal data required by the CMMI Steward for the purpose of reporting aggregated appraisal information to the constituent community.[2]

4.7.3 (ABC) The method shall require that the appraisal record be provided to the appraisal sponsor for retention.

[2] The CMMI Steward defines the specific data required for submission at the completion of an appraisal. This data is used for quality control and for the collection of appraisal measures that are reported to the appraisal community; however, non-attribution and confidentiality of data will be ensured. The content, format, and mechanisms for submission of this data are established by the CMMI Steward, and are required as part of Lead Appraiser authorization.

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Appendix A CMMI Appraisal Method Class Specification

The following table shows the applicability of the ARC requirements to the three classes of appraisal methods. In the cases where a requirement is applicable to a particular appraisal method class, "yes" is denoted. In some cases, a requirement has been specified as "not applicable" or "optional" for one or more appraisal methods. Requirements identified as not applicable are not relevant to the indicated method class; optional requirements, however, may still be performed. In the cases where "partial" is denoted, one or more subelements of the associated requirement are not applicable or are optional for the specified appraisal method class, while the rest of the subelements of that requirement are applicable to the class, as indicated.

Table 2: Applicability of ARC Requirements to Appraisal Method Classes

Requirements	Class A (15504 conformant)	Class A (not 15504 conformant)	Class B	Class C
Responsibilities				
4.1.1 – Appraisal Sponsor	yes	yes	yes	yes
4.1.2 – Appraisal Team Leader	yes	yes	yes	yes
Appraisal Method Documentation				
4.2.1 – Documentation of method	yes	yes	partial (a-d only)	partial (a-d only)
4.2.2 – Guidance for identifying appraisal purpose and objectives	yes	yes	yes	yes
4.2.3 – Guidance for CMMI model scope	yes	yes	yes	yes
4.2.4 – Guidance for identifying organizational unit	yes	yes	yes	yes
4.2.5 – Guidance for team member selection	yes	yes	yes	yes
4.2.6 – Guidance for team leader qualification criteria	yes	yes	yes	yes
4.2.7 – Guidance for size of team	yes	yes	yes	yes
4.2.8 – Guidance for team member roles and responsibilities	yes	yes	yes	yes
4.2.9 – Guidance for appraisal sponsor responsibilities	yes	yes	yes	yes
4.2.10 – Guidance for team leader responsibilities	yes	yes	yes	yes

Requirements	Class A (15504 conformant)	Class A (not 15504 conformant)	Class B	Class C
4.2.11 – Guidance for estimating appraisal resources	yes	yes	yes	yes
4.2.12 – Guidance for logistics	yes	yes	yes	yes
4.2.13 – Guidance for collecting and mapping data to appraisal reference model	yes	yes	yes	yes
4.2.14 – Guidance for creation of findings	yes	yes	yes	yes
4.2.15 – Guidance for assuring confidentiality and non-attribution	yes	yes	yes	yes
4.2.16 – Guidance for appraisal record	yes	partial (a-f only)	partial (a,b,d,e only)	partial (a,b,d,e only)
Planning and Preparing for the Appraisal				
4.3.1 – Preparation of participants	yes	yes	yes	yes
4.3.2 – Development of appraisal input	yes	yes	yes	yes
4.3.3 – Content of appraisal input	yes	partial (all except e.5)	partial (all except e.5)	partial (all except e.5)
4.3.4 – Sponsor approval of appraisal input	yes	yes	yes	yes
4.3.5 – Development of appraisal plan	yes	partial (a-e only)	partial a-e only)	partial (a-e only)
Appraisal Data Collection				
4.4.1 – Data from interviews	yes	yes	yes	At least one type of objective evidence
4.4.2 – Data from documents	yes	yes	yes	
Data Consolidation and Validation				
4.5.1 – Consensus of team members	yes	yes	yes	yes
4.5.2 – Accuracy of findings	yes	yes	yes	yes
4.5.3 – Validation of findings	yes	yes	yes	optional
4.5.4 – Corroboration of objective evidence	yes	yes	yes	optional
4.5.5 – Sufficiency of data	yes	yes	optional	optional
4.5.6 – Preliminary findings preparation	yes	yes	optional	optional
4.5.7 – Preliminary findings presentations	yes	yes	optional	optional
Rating				
4.6.1 – Define a rating process	yes	yes	N/A	N/A
4.6.2 – Basis for maturity level and capability level rating	yes	yes	N/A	N/A
4.6.3 – Rules for goal rating	yes	yes	N/A	N/A
4.6.4 – Rules for process area rating	yes	yes	N/A	N/A

Requirements	Class A (15504 conformant)	Class A (not 15504 conformant)	Class B	Class C
4.6.5 – Rules for maturity level rating	yes	yes	N/A	N/A
Reporting Results				
4.7.1 – Report results to sponsor and appraised organization	yes	yes	yes	yes
4.7.2 – Appraisal results to CMMI Steward	yes	yes	optional	optional
4.7.3 – Retention of appraisal record	yes	yes	yes	yes

Appendix B ARC Coverage of 15504-2 Requirements

The table below shows how ARC requirements address the intent of assessment requirements levied by ISO/IEC 15504-2 [ISO 03].

Note that ISO/IEC 15504-2 is copyright protected and cannot be freely reproduced; accordingly, only clause references are provided herein. Interested readers should obtain their own copy of the document for additional information on the details of the 15504-2 requirements.

Table 3: ARC Requirements that Address 15504-2 Requirements

15504-2 Requirement	ARC Requirement (s)	Remarks
4.2 The assessment process	(see below)	
4.2.1	4.2.1, 4.2.2	
4.2.2a	4.3.5	
4.2.2a.1	4.3.5a	
4.2.2a.2	4.3.5b	
4.2.2a.3	4.3.5c	
4.2.2a.4	4.3.5a, 4.3.3h-k	
4.2.2a.5	(see remarks)	If verification of the requirements of ISO/IEC 15504 are required, this will need to be included in the appraisal plan.
4.2.2a.6	4.3.3m	
4.2.2b.1	4.4 - 4.6	Collectively, these ARC requirements address the intent of this 15504-2 requirement.
4.2.2b.2	(see remarks)	Intent addressed through the satisfaction of the model compatibility requirements.
4.2.2b.3	4.5.2a	
4.2.2b.4	4.5.5	
4.2.2b.5	4.2.16c	
4.2.2c.1	4.5.3a	
4.2.2c.2	4.55	
4.2.2c.3	4.5.3, 4.5.4, 4.5.7	
4.2.2d.1	(see remarks)	If the appraisal sponsor has not requested a 15504 profile, this is not relevant.
4.2.2d.2	4.6.3	

15504-2 Requirement	ARC Requirement (s)	Remarks
4.2.2d.3	4.5.1	Note that the relationship to 15504 is indirect in that 15504 does not require that any particular form of decision-making (such as consensus) be used to derive rating judgments, only that the decision-making process be recorded.
4.2.2d.4	4.2.16 (1), 4.5.2c, 4.5.5, 4.6.1	
4.2.2d.5	4.7.3	
4.2.2e	4.7.1, 4.7.3	
4.3 Responsibilities:	(see below)	
4.3.1a	4.1.1a	
4.3.1b	4.1.1d	
4.3.1c	4.1.1b	
4.3.2a	4.1.2b	
4.3.2b	4.1.2a	This specific ARC requirement, coupled with the allocation of all ARC requirements to Class A appraisal methods, ensures that the appraisal is conducted in accordance with the requirements of ISO/IEC TR 15504-2.
4.3.2c	4.1.2c	
4.3.2d	4.1.2d	
4.3.2e	4.1.2d	
4.3.2f	4.1.2d	
4.3.2g	4.1.2f	
4.3.2h	4.1.2e	The requirements refer to those defined for the appraisal method; these will include, at a minimum, the ARC requirements that are implemented for the method.
4.4 Defining the assessment input		
4.4.1	4.1.1e, 4.3.2, 4.3.4	
4.4.2	4.3.3	
4.4.2a	4.3.3a	
4.4.2b	4.3.3b	
4.4.2c	4.3.3c, d, e	
4.4.2c.1	4.3.3c.1	
4.4.2c.2	4.3.3c.2	
4.4.2c.3	4.3.3d	
4.4.2c.4	4.3.3e	
4.4.2d	4.3.3n	
4.4.2e	4.3.3f	
4.4.2f	4.3.3g	Satisfaction of this 15504 requirement depends also on

15504-2 Requirement	ARC Requirement (s)	Remarks
		satisfaction of relevant requirements for model compatibility in 15504-2 (clause 6.3).
4.4.2g	4.3.3i	Only the identity of the appraisal team leader is required.
4.4.2h	4.3.3h	
4.4.2i	4.3.3i, j	The identity of the appraisal team members, appraisal participants, and support staff with specific responsibilities
4.4.2j	4.3.3k	
4.4.3	4.3.4	
4.5 Recording the assessment output	(see below)	
4.5.1	4.7.3	
4.5.2	4.2.16	Note that 4.5.2f is covered by 4.3.3l and that 4.2.16e does not relate to 4.5.2.

Appendix C Glossary

The ARC glossary defines many, but not all, terms used in this document. The model glossary and terminology should be considered supplementary to the ARC glossary. Terms that are particularly significant to this document are duplicated from the model document for convenience.

alternative practice A practice that is a substitute for one or more generic or specific practices contained in the CMMI model that achieves an equivalent effect toward satisfying the goal associated with the model practices. Alternative practices are not necessarily one-for-one replacements for the generic or specific practices. [ARC v1.0 and CMMI model glossary]

appraisal An examination of one or more processes by a trained team of professionals using an appraisal reference model as the basis for determining, at a minimum, strengths and weaknesses. [ARC v1.0]

appraisal action plan A detailed plan to address an appraisal finding.

appraisal findings (See "findings.")

appraisal input The collection of appraisal information required before data collection can commence. [ISO 98b]

appraisal method class Designation assigned to an appraisal method that satisfies a defined subset of requirements in the ARC. The three classes defined in the ARC align with typical applications of appraisal methods. [derived from ARC v1.0]

appraisal objectives The desired outcome(s) established for an appraisal as derived from the business objectives of the appraisal sponsor. [ARC v1.0]

appraisal output All of the tangible results from an appraisal. (See "appraisal record.") [ISO 98b]

appraisal participants Members of the organizational unit who participate in providing information during the appraisal. [CMMI model glossary]

appraisal rating	The value assigned by an appraisal team to (1) a CMMI goal or process area, (2) the capability level of a process area, or (3) the maturity level of an organizational unit. The rating is determined by enacting the defined rating process for the appraisal method being employed. [CMMI model glossary]
appraisal record	An orderly, documented collection of information that is pertinent to the appraisal and adds to the understanding and verification of the appraisal findings and ratings generated. [derived from ISO 98b]
appraisal reference model	The CMMI model to which an appraisal team correlates implemented process activities. [CMMI model glossary]
appraisal scope	The definition of the boundaries of the appraisal encompassing the organizational limits and the CMMI model limits. [derived from CMMI model glossary, ISO 98b]
appraisal sponsor	The individual, internal or external to the organization being appraised, who requires the appraisal to be performed, and provides financial or other resources to carry it out. [derived from ISO 98b]
appraisal tailoring	Selection of options within the appraisal method for use in a specific instance. The intent of tailoring is to assist an organization in aligning application of the method with its business needs and objectives. [CMMI model glossary]
appraisal team leader	The person who leads the activities of an appraisal and has satisfied the qualification criteria for experience, knowledge, and skills defined by the appraisal method.
assessment	An appraisal that an organization does to and for itself for the purpose of process improvement.
capability evaluation	An appraisal by a trained team of professionals used as a discriminator to select suppliers, for contract monitoring, or for incentives. Evaluations are used to help decision makers make better acquisition decisions, improve subcontractor performance, and provide insight to a purchasing organization. [CMMI model glossary]
consensus	A method of decision making that allows team members to develop a common basis of understanding and develop general agreement concerning a decision that all team members are willing to support. [ARC v1.0]

consolidation

The activity of collecting and summarizing the information provided during an appraisal into a manageable set of data to (a) determine the extent to which the data are corroborated and cover the areas being investigated, (b) determine the data's sufficiency for making judgments, and (c) revise the data-gathering plan as necessary to achieve this sufficiency. [ARC v1.0]

corroboration

The activity of considering multiple pieces of objective evidence in support of a judgment regarding an individual CMMI model practice. [ARC v1.2]

data collection session

An activity during which objective evidence is gathered. Data collection sessions (or activities) include document reviews and interviews. [ARC v1.2]

equivalent staging

Equivalent staging is a target staging, created using the continuous representation that is defined so that the results of using the target staging can be compared to the maturity levels of the staged representation. (See "target staging," "maturity level," "capability level profile," and "target profile.")

Such staging permits benchmarking of progress among organizations, enterprises, and projects, regardless of the CMMI representation used. The organization may implement components of CMMI models beyond those reported as part of equivalent staging. Equivalent staging is only a measure to relate how the organization is compared to other organizations in terms of maturity levels. [CMMI model glossary]

evaluation

(See "capability evaluation.")

findings

The conclusions of an appraisal that identify the most important issues, problems, or opportunities within the appraisal scope. Findings include, at a minimum, strengths and weaknesses based on corroborated objective evidence. [ARC v1.2]

instruments

Artifacts used in an appraisal for the collection and presentation of data (e.g., questionnaires, organizational unit information packets). [ARC v1.0]

interviews

A meeting of appraisal team members with appraisal participants for the purpose of gathering information relative to work processes in place. [ARC v1.0]

lead appraiser A person who has achieved recognition from an authorizing body to perform as an appraisal team leader for a particular appraisal method.

objective evidence Qualitative or quantitative information, records, or statements of fact pertaining to the characteristics of an item or service or to the existence and implementation of a process element, which are based on observation, measurement, or test and are verifiable. [CMMI model glossary, ISO 98b]

organizational scope The collection of projects and support functions that provides instantiations of practices used within, and representative of, an organizational unit. [CMMI model glossary]

organizational unit The part of an organization that is the subject of an appraisal. An organizational unit deploys one or more processes that have a coherent process context and operates within a coherent set of business objectives. An organizational unit is typically part of a larger organization, although in a small organization, the organizational unit may be the whole organization. [Derived from CMMI model glossary, ISO 98b]

preliminary findings Findings created after synthesizing corroborated objective evidence. Preliminary findings are provided to appraisal participants for validation. (See also "findings.") [ARC v1.2]

process attribute A measurable characteristic of process performance applicable to any process. [CMMI model glossary, ISO 98b]

process attribute outcomes The results of achievement of a process attribute.

process context The set of factors documented in the appraisal input that influences the judgment and comparability of appraisal ratings. These include, but are not limited to, (a) the size of the organizational unit to be appraised, (b) the demographics of the organizational unit, (c) the application domain of the products or services, (d) the size, criticality, and complexity of the products or services, and (e) the quality characteristics of the products or services. [CMMI model glossary]

process profile The set of goal ratings assigned to the process areas in the scope of the appraisal. In CMMI, also known as the process area profile. [derived from ISO98b]

rating	(See “appraisal rating.”) [CMMI model glossary]
satisfied	Rating given to a goal when the associated generic or specific practices (or acceptable alternative practices) are judged to be implemented and the aggregate of weaknesses does not have a significant negative impact on goal achievement. Rating given to a process area when all of its goals are rated “satisfied.” [ARC v1.0]
strength	Exemplary or noteworthy implementation of a CMMI model practice. [CMMI model glossary]
tailoring	(See “appraisal tailoring.”)
weakness	The ineffective, or lack of, implementation of one or more CMMI model practices. [CMMI model glossary]

Appendix D CMMI Appraisal Upgrade Participants

Many talented people have been part of the effort to upgrade the CMMI appraisal method to version 1.2. This appendix recognizes the people involved in this upgrade. The three primary groups involved were the SCAMPI Upgrade Team, Sponsors, and the Steering Group. Current members of these groups are listed. If you wish to see a more complete listing of participants involved in the larger version 1.2 effort, see Appendix C of the CMMI for Development version 1.2.

SCAMPI Upgrade Team

The SCAMPI Upgrade Team (SUT) reviewed change requests submitted by CMMI users to change the CMMI appraisal method. Upgrade activities were then based on change requests, version 1.2 guidelines provided by the Steering Group, and additional input from the Steering Group acting as the Configuration Control Board.

SCAMPI Upgrade Team Members

- Busby, Mary (Lockheed Martin)[1]
- Cepeda, Sandra (RD&E Command, Software Engineering Directorate)
- Ferguson, Jack (Software Engineering Institute)[2]
- Hayes, Will (Software Engineering Institute)
- Heil, James (U.S. Army) in memoriam
- Kirkham, Denise (Boeing)
- Masters, Steve (Software Engineering Institute)
- Ming, Lisa (BAE Systems)

[1] Co-Team Leader
[2] Co-Team Leader

- Ryan, Charlie (Software Engineering Institute)
- Sumpter, Beth (National Security Agency)
- Ulrich, Ron (Northrop Grumman)
- Wickless, Joe (Software Engineering Institute)

Sponsors

The CMMI version 1.2 project was sponsored by both government and industry. Government sponsorship was provided by the U.S. Department of Defense (DoD), specifically the Office of the Under Secretary of Defense (Acquisition, Technology, and Logistics) (OUSD [AT&L]). Industry sponsorship was provided by the Systems Engineering Committee of the National Defense Industrial Association (NDIA).

- Rassa, Bob (NDIA Systems Engineering Division)
- Schaeffer, Mark (OUSD [AT&L])

Steering Group

The Steering Group guided and approved plans for version 1.2, provided consultation on significant appraisal issues, ensured involvement from a variety of interested stakeholders, and acted as the Configuration Control Board for the CMMI appraisal method.

Steering Group Members

- Baldwin, Kristen (OUSD [AT&L] DS/SE)
- Chittister, Clyde (Software Engineering Institute)
- D'Agosto, Tony (U.S. Army RDECOM-ARDEC)
- Gill, Jim (Boeing Integrated Defense Systems)
- Kelly, John (NASA HQ)
- Lundeen, Kathy (Defense Contract Management Agency)
- McCarthy, Larry (Motorola, Inc.)
- Nicol, Mike (U.S. Air Force ASC/EN)[3]
- Peterson, Bill (Software Engineering Institute)

[3] Government Co-Chair

- Rassa, Bob (Raytheon Space & Airborne Systems)[4]
- Weszka, Joan (Lockheed Martin)
- Wilson, Hal (Northrop Grumman Mission Systems)
- Zettervall, Brenda (U.S. Navy, ASN/RDA CHENG)

Ex-Officio Steering Group Members

- Anderson, Lloyd (Department of Homeland Security)
- Bate, Roger; chief architect (Software Engineering Institute)
- Drake, Thomas (National Security Agency)
- Phillips, Mike; CMMI program manager (Software Engineering Institute)
- Sumpter, Beth (National Security Agency)
- Yedlin, Debbie (General Motors)

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- Gallagher, Brian (Software Engineering Institute)

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The Appraisal Requirements for CMMI (ARC) V1.2 defines the requirements considered essential to appraisal methods intended for use with Capability Maturity Model® Integration (CMMI®) models. In addition, a set of appraisal classes is defined, based on typical applications of appraisal methods. These classes are intended primarily for developers of appraisal methods to use with CMMI capability models in the context of the CMMI Product Suite. Appraisal methods, as used in this document, may be applied for different purposes, including assessments for internal process improvement and capability evaluations for supplier selection and process monitoring. This document defines the requirements for such methods, but not necessarily the conditions or constraints under which they might be applied.

The approach employed to provide guidance to appraisal method developers is to define a class of typical applications of appraisal methods (which are based on years of experience in the process improvement community) called appraisal method classes. Requirements are then allocated to each class as appropriate based on the attributes associated with that class. Thus, a particular appraisal method may be declared to be an ARC Class A, B, or C appraisal method. This designation implies the sets of ARC requirements that the method developer has addressed when designing the method.

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