ARC, V1.0 Assessment Requirements for CMMI[SM], Version 1.0

CMMI Product Development Team

August 2000

TECHNICAL REPORT
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Carnegie Mellon
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CMM Integration Project

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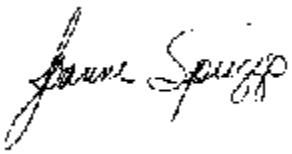

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Preface

The Capability Maturity Model Integration (CMMI[SM]) project has involved a large number of people from different organizations throughout the world. These organizations were using one or more 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, the CMMI model, 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 our development team for the CMMI Product Suite. Three primary groups involved in this development have been the steering group, product development team, and stakeholders/reviewers.

The steering group guides and approves the plans of the product development team, provides consultation on significant CMMI project issues, and ensures involvement from a variety of interested communities.

The product development team writes, reviews, revises, discusses, and agrees on the structure and technical content of the CMMI Product Suite,[1] including the model, assessment, and training

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CMM, Capability Maturity Model, and Capability Maturity Modeling are registered in the U.S. Patent and Trademark Office.

SM CMMI is a service mark of Carnegie Mellon University.

1 The CMMI Product Suite is the set of products produced from the CMMI Framework, which includes models, assessment materials, and training materials.

materials. Development activities were based on an A-Specification provided by the steering group, the three source models, and review comments from stakeholder and steering group members.

The stakeholder/reviewer group of organizations provided valuable insight in the early effort that was used to refine the approach to the assessment-related elements of the product suite.

The CMMI product development team has had the benefit of two distinguished leaders during the last 2-1/2 years. Project manager, Jack Ferguson, led the CMMI development team from the project's inception through to the release of CMMI-SE/SW V0.2. Project manager, Mike Phillips, led the team from the release of CMMI-SE/SW V0.2 to the present.

Members of the CMMI Assessment Methodology Team (AMT) played an important role in progressing this assessment requirements document, and their contribution is gratefully acknowledged. During the course of the development work, Dr. Donna Dunaway (SEI), Dr. Rick Hefner (TRW), and Mr. David H. Kitson (SEI) chaired the AMT; in addition, these three individuals served as editors for this document. Their efforts to lead the AMT and progress the document through peer reviews and the publication process are also recognized and gratefully acknowledged.

Both present and emeritus members of the three groups involved in developing CMMI products are listed in Appendix D.

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 additional sources. Many of these sources we have documented on the CMMI World Wide Web site, which is located at <URL: 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 World Wide Web site for information on how to provide feedback: <URL: http://www.sei.cmu.edu/cmmi/>.

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

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Abstract

The Assessment Requirements for CMMI (ARC) V1.0 defines the requirements considered essential to assessment methods intended for use with CMMI models. In addition, a set of assessment classes is defined based on assessment usage scenarios. These classes are intended primarily for developers of assessment methods to use with CMMI capability models in the context of the CMMI Product Suite. Additional audiences for the document include lead assessors, and other individuals who are involved in or may be interested in process assessment or improvement.

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

Assessment methods which satisfy all of the ARC requirements are called class A methods; in addition to being used to render ratings for benchmarking purposes, class A assessment methods can be used to conduct 15504-conformant assessments.

More information on the CMMI product suite is available on the World Wide Web at <URL: http://www.sei.cmu.edu/cmmi/>.

1 Introduction

The Assessment Requirements for CMMI (ARC) comprise a set of high level design criteria for developing, defining, and using assessment 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 assessment methods employing the Capability Maturity Model for Software. With the incorporation of multiple discipline models into the CMMI architecture, the ARC requirements have been created to accommodate these new models and their staged and continuous representations. The ARC requirements have also been influenced by the EIA/IS 731.2 Appraisal Method [EIA 98] and the CMMI Product Suite requirement that it be consistent and compatible with ISO/IEC 15504, an emerging international standard for process assessment [ISO 98a, ISO 98b].

Assessment teams use CMMI models as the basis for deriving the strengths and weaknesses of the processes investigated during an assessment. These findings, along with guidance provided by the practices in the model, are used to plan an improvement strategy for the organization.

The assessment principles for the CMMI Product Suite are the same as those for assessments using the Capability Maturity Model for Software and Systems Engineering Capability Maturity Model:

- Start with an assessment reference model.
- Use a formalized assessment process.
- Involve senior management as the assessment sponsor.
- Focus the assessment on the sponsor's business goals.
- Observe strict confidentiality and non-attribution of data.
- Approach the assessment collaboratively.
- Focus on follow-on process improvement activities.

2 Benefits and Features of CMMI Assessment Methods

For organizations that wish to assess against multiple disciplines (e.g., software engineering and systems engineering, or integrated product and process development), the unified CMMI approach permits some economy of scale in model training and assessment training. One assessment method can provide separate or combined results for multiple disciplines. The assessment products will also allow the assessment of a single discipline, as in the past.

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

When a 15504-conformant assessment is desired, certain requirements are induced on the assessment method and assessment reference model.[2] The ARC requirements have been designed to address all of the assessment-method-induced 15504-3 requirements; these requirements are shown in italics in clause 4. Appendix B shows a summary of how the 15504-3 requirements are addressed by the ARC requirements.

[2] Assessment reference models satisfying the relevant 15504-2 requirements are said to be 15504-conformant.

3 Requirements for CMMI Assessment Class Structure

Not all CMMI assessment methods are expected to be fully ARC-compliant (by satisfying each of the ARC requirements). CMMI assessment 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 assessment methods to meet these needs.

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

Key differentiating attributes for assessment classes include

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

Table 1: Characteristics of CMMI Assessment Classes

Characteristics	Class A	Class B	Class C
Usage Mode	1. Rigorous and in-depth investigation of process(es) 2. Basis for improvement activities	1. Initial (first-time) 2. Incremental (partial) 3. Self-assessment	1. Quick-look 2. Incremental
Advantages	Thorough coverage; strengths and weaknesses for each PA investigated; robustness of method with consistent, repeatable results; provides objective view; option of 15504 conformance	Organization gains insight into own capability; provides a starting point or focuses on areas that need most attention; promotes buy-in	Inexpensive; short duration; rapid feedback
Disadvantages	Demands significant resources	Does not emphasize depth of coverage and rigor and cannot be used for level rating	Provides less buy-in and ownership of results; not enough depth to fine tune process improvement plans
Sponsor	Senior manager of organizational unit	Any manager sponsoring an SPI program	Any internal manager
Team Composition	External and internal	External or internal	External or internal
Team Size	4-10 persons + assessment team leader	1-6 + assessment team leader	1-2 + assessment team leader
Team Qualifications	Experienced	Moderately experienced	Moderately experienced
Assessment Team Leader Requirements	Lead assessor	Lead assessor or person experienced in method	Person trained in method

Class A methods must satisfy each of the ARC requirements and at the present time are the only methods considered suitable for providing ratings for benchmarking. The ARC requirements are based on widely used assessment methods that have yielded accurate, consistent, and useful results. As other assessment methods are identified, and shown to have similar quality characteristics, the requirements may be modified to reflect their features.

An example of a Class A method that complies with all of the ARC requirements is the Standard CMMI Assessment Method for Process Improvement (SCAMPI[SM]). The SCAMPI method has been created and used as a vehicle for pilot tests of various CMMI models.

[SM] SCAMPI is a service mark of Carnegie Mellon University.

4 Requirements for CMMI Assessment Methods

The sections below define the suite of requirements for CMMI assessment methods. The ARC requirements have been designed to address all of the assessment-method-induced 15504-3 requirements; these requirements are shown in italics below. Appendix B shows a summary of how the 15504-3 requirements are addressed by the ARC requirements.

4.1 Responsibilities

4.1.1 The sponsor of the assessment shall

a) Verify that the assessment team leader has the necessary competence and skills to take responsibility for and lead the assessment.

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

c) Support assessment method provisions for ensuring non-attribution to assessment participants.

d) Ensure that resources are made available to conduct the assessment.

4.1.2 The assessment team leader shall

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

b) Confirm the sponsor's commitment to proceed with the assessment.

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

d) Ensure that he/she has adequate training and knowledge to interpret the assessment reference model.

e) Ensure that all of the assessment team members have the appropriate prerequisite knowledge and skills.

f) Ensure that all of the assessment team members have formal training or equivalent experience in the use of the assessment reference model.

g) *Provide assessment team training to ensure that assessment team members have the necessary knowledge and skills to perform the method, the necessary competence to use instruments or tools chosen to support the assessment, and access to documented guidance on how to perform the defined assessment activities.*

h) *Verify and document that the assessment method requirements have been met on completion of the assessment.*

4.2 Assessment Method Documentation

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

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

b) identification of the ARC version upon which the assessment method is based

c) identification of which CMMI assessment requirements are satisfied by the method along with the CMMI assessment class membership (if applicable)

d) activity descriptions, artifacts, and guidance that implement each of the assessment requirements

4.2.2 The method documentation shall provide guidance for

a) identifying an assessment's purpose, objectives, and constraints

b) determining the suitability of the assessment method relative to the assessment'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 assessment:

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

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

4.2.4 The method documentation shall provide guidance for identifying the scope of the organizational unit to be assessed:

a) the sponsor of the assessment and the sponsor's relationship to the organizational unit being assessed

b) projects within the organizational unit that have committed to participate

c) functional elements of the organizational unit that have committed to participate

d) names and affiliations (organizational unit or subunits) of participants who will be interviewed

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

a) discipline-specific experience
b) management experience
c) experience or formal training in the assessment reference model
d) formal training in the assessment method for each team member

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

a) training and experience using the assessment reference model
b) training and experience using the assessment method
c) experience in delivering training, managing teams, facilitating group discussions, and making presentations

4.2.7 The method documentation shall provide guidance for determining the appropriate size of the assessment team.

4.2.8 The method documentation shall provide guidance on the roles and responsibilities of assessment team members.

4.2.9 The method documentation shall provide guidance addressing the responsibilities of the assessment sponsor.

4.2.10 The method documentation shall provide guidance addressing the responsibilities of the assessment team leader.

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

4.2.12 The method documentation shall provide guidance for assessment logistics.

4.2.13 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 assessment reference model.

4.2.14 The method documentation shall provide guidance for creating final findings, including both strengths and weaknesses relative to the assessment reference model.

4.2.15 The method documentation shall provide guidance for protecting the confidentiality of assessment data and assuring non-attribution of data contributed by assessment participants.

4.2.16 The method documentation shall provide guidance: for compiling and maintaining an assessment record (with the minimum content identified below) that supports the assessment team's findings and/or ratings; for recording traceability between the data collected during the assessment and the findings and/or ratings; and for the retention and safekeeping of assessment records:

a) date of assessment

b) assessment plan

c) identification of objective evidence gathered

d) identification of assessment method (and version) used along with any tailoring options

e) findings

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

g) any issues associated with the accuracy and completeness of assessment outputs

h) identification of any additional data collected to support process improvement

i) *the set of 15504 process profiles resulting from the assessment - if any (i.e., one profile for each process assessed*

4.3 Planning and Preparing for the Assessment

4.3.1 The method shall provide for the preparation of assessment participants which addresses, at a minimum

a) the purpose of the assessment

b) the scope of the assessment

c) the assessment approach

d) the role of each participant in the assessment

e) any required preparation on his or her part

f) the schedule of assessment activities, along with the specific dates, times and locations of his or her participation

g) any questions raised by participants

4.3.2 The method shall provide for the development of an assessment plan that, at a minimum, identifies

a) assessment scope

b) the CMMI models (version, discipline, and representation [e.g., staged or continuous]) used

c) assessment objectives and their alignment with the organizational unit's business objectives

d) schedule for the activities to be performed in conducting the assessment

e) people who will participate in the assessment, including the sponsor and the sponsor's relationship to the organizational unit being assessed, the assessment team leader and team members, assessment participants, and organizational unit support staff along with their defined responsibilities

f) resources and budget required to perform the assessment activities

g) assessment constraints

h) form and content of artifacts produced by the assessment team, the ownership thereof, their anticipated use, and any restrictions upon their use

i) mechanisms to be used to ensure the confidentiality of assessment data and associated sources

j) anticipated follow-on activities

k) planned tailoring of the assessment method and associated tradeoffs, including the sample size or coverage of the organizational unit

l) mitigation steps to address risks associated with assessment execution

m) provisions for approving and documenting any changes to the assessment plan which, at a minimum, require changes in the assessment plan to be approved by the sponsor

n) any additional information to be collected during the assessment to support process improvement, for example: specific data (or metrics) that is needed to quantify the organization's ability to meet a particular business goal

o) the criteria for competence of the assessment team leader

p) the assessment context which, at a minimum, includes

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*
5) *the quality characteristics of the products (see, for example, ISO/IEC 9126-1991, Software quality characteristics)*

4.3.3 *The method shall require the sponsor and the assessment team leader to approve the contents of the assessment plan prior to conducting the assessment*.

4.4 Assessment Data Collection

Assessment teams base their findings on observations that, in turn, are based on data gathered from one or more data sources. The requirements in this clause identify the sources of data recognized by CMMI assessment methods.

4.4.1 The method shall collect data by administering instruments (e.g., questionnaires, surveys).

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

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

4.5 Data Consolidation and Validation

4.5.1 The method shall require assessment team consensus in decisions when determining the validity of observations, creating findings, and establishing ratings.

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

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

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

c) The observation is relevant to the assessment reference model and can be associated with a specific model component.

4.5.3 The method shall require a mechanism for validating each accurate observation according to the following criteria:

a) The observation is corroborated.

b) The observation is consistent with other validated observations (e.g., validated observations cannot be both true and mutually inconsistent; in aggregate, they constitute a set of truths about the organization unit which must be consistent).

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

a) The observation is based on data from at least two different sources (e.g., the data should originate from at least two different individuals).

b) The observation is based on data from at least two different data-gathering sessions.

c) At least one of the two data points 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 assessment, according to the following minimum set of rules:

a) A specific or generic practice has sufficient data coverage if validated observations exist for the practice and

1) are adequate to understand the extent of implementation of the practice

2) are representative of the organizational unit

3) are representative of the life-cycle phases in use within the organizational unit

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

c) *In a continuous representation, a process area has sufficient data coverage if all of its specific practices and the generic practices within the assessment 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 *The method shall require a mechanism for consolidating observations into draft findings of strengths and weaknesses relative to the assessment reference model.*

4.5.7 *The method shall require that the assessment participants be presented with the draft findings in order to solicit their responses for verification of the findings' accuracy and clarity.*

4.6 Rating

4.6.1 *The method shall define a rating process which specifies, at a minimum, that*

a) *An assessment team can rate a specific or generic goal when valid observations for each practice related to the goal meet the method's defined data coverage criteria.*

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

c) *An assessment team can determine a maturity level rating once it has rated all of the process areas within that level and each level below.*

d) *An assessment 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.*

4.6.2 The method shall require that maturity level ratings and/or capability level ratings be based on the CMMI measurement frameworks for maturity and capability defined for CMMI models.

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

a) *Rate the goal "satisfied" if the associated findings indicate that, in the judgment of the assessment team, there are no significant weaknesses that negatively impact the achievement of the goal.*

b) Rate the goal "unsatisfied" if the associated findings indicate that, in the judgment of the assessment team, there are significant weaknesses in the appraised entity's satisfaction of this goal.

4.6.4 The method shall rate each process area within the assessment scope in accordance with the following rules:

a) For a staged representation, the process area is "satisfied" if and only if all of its specific and generic goals are rated "satisfied."

b) For a continuous representation, the process area is given a capability level rating based upon the highest level and all levels below for which its specific goals and the generic goals within the assessment scope have been satisfied.

c) 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.

d) When a process area is outside of the assessment scope, or if the associated findings do not meet the method's defined criteria for data coverage, the process area is designated as "not rated" and is not rated.

4.6.5 The method shall rate maturity level, when desired by the assessment sponsor, in accordance with the following rules:

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

b) A maturity level for a continuous representation is achieved if the capability level profile is at or above the target profile for that maturity level in the equivalent staging.

4.7 Reporting Results

4.7.1 The method shall require documenting and reporting the assessment findings and/or ratings to the assessment sponsor.

4.7.2 The method shall define a mechanism for translating assessment observations into associated process attribute outcomes in accordance with the translation requirement of ISO/IEC TR 15504-2 (clause 7.6).

4.7.3 The method shall report assessment data to the CMMI Steward, or its designee, for the purpose of reporting aggregated assessment information to the constituent community.[3] At a minimum, the assessment data includes the assessment record.

4.7.4 The method shall require that the assessment record be provided to the assessment sponsor for retention.

[3] The type of information reported should be that used for reporting CMM-based assessments; non-attribution and confidentiality of data will be assured using similar measures as those currently employed by the Software Engineering Institute (SEI) for CMM-based assessment results.

References

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Appendix A: CMMI Assessment Class Specification

Requirements	Class A	Class B	Class C
Responsibilities			
4.1.1 – Assessment Sponsor	yes	yes	yes
4.1.2 – Assessment Team Leader	yes	yes	yes
Assessment Method Documentation			
4.2.1 – Documentation of method	yes	yes	yes
4.2.2 – Guidance for identifying assessment purpose and objectives	yes	yes	yes
4.2.3 – Guidance for CMMI model scope	yes	yes	yes
4.2.4 – Guidance for organizational scope	yes	yes	yes
4.2.5 – Guidance for team member selection	yes	yes	yes
4.2.6 – Guidance for team leader selection	yes	yes	yes
4.2.7 – Guidance for size of team	yes	yes	yes
4.2.8 – Guidance for team member roles and responsibilities	yes	yes	yes
4.2.9 – Guidance for assessment sponsor responsibilities	yes	yes	yes
4.2.10 – Guidance for team leader responsibilities	yes	yes	yes
4.2.11 – Guidance for estimating assessment resources	yes	yes	yes
4.2.12 – Guidance for logistics	yes	yes	yes
4.2.13 – Guidance for mapping data to assessment reference model	yes	yes	yes
4.2.14 – Guidance for final findings	yes	optional	optional
4.2.15 – Guidance for assuring confidentiality and non-attribution	yes	yes	yes
4.2.16 – Guidance for assessment record	yes	yes	yes
Planning and Preparing for the Assessment			
4.3.1 – Preparation of participants	yes	yes	yes

Requirements	Class A	Class B	Class C
4.3.2 – Development of assessment plan	yes	yes	yes
4.3.3 – Approval of assessment plan	yes	yes	yes
Assessment Data Collection			
4.4.1 – Data from instruments	yes	optional	optional
4.4.2 – Data from interviews	yes	At least one source of data - either documents or interviews (or both)	
4.4.3 – Data from documents	yes		
Data Consolidation and Validation			
4.5.1 – Consensus of team members	yes	yes	optional
4.5.2 – Accuracy of observations	yes	yes	yes
4.5.3 – Validation of observations	yes	yes	optional
4.5.4 – Corroboration of observations	yes	yes	optional
4.5.5 – Sufficiency of data	yes	optional	optional
4.5.6 – Draft findings preparation	yes	optional	optional
4.5.7 – Draft findings presentations	yes	optional	optional
Rating			
4.6.1 – Prerequisites for rating	yes	N/A	N/A
4.6.2 – Basis for goal rating	yes	N/A	N/A
4.6.3– Basis for process area and capability level rating	yes	N/A	N/A
4.6.4 – Basis for maturity level rating	yes	N/A	N/A
Reporting Results			
4.7.1 – Report results to sponsor	yes	yes	yes
4.7.2 – Translation for 15504	yes	no	no
4.7.3 – Assessment results to CMMI Steward	yes	yes	yes
4.7.4 - Retention of assessment record	yes	yes	yes

Appendix B: ARC Coverage of 15504-3 Requirements

The table below shows how ARC requirements address the intent of assessment requirements levied by ISO/IEC TR 15504-3 [ISO 98b].

Note that ISO/IEC TR 15504-3 is copyright protected and cannot be freely reproduced; accordingly, only clause references are provided herein. Interested readers should obtain a copy of the document for additional information on the details of the 15504-3 requirements.

15504-3 Requirement	ARC Requirement	Remarks
4.2 Defining the assessment input	(see below)	
4.2.1	4.3.3	"Assessment input" as defined by 15504 is essentially equivalent to "assessment plan" as defined by ARC requirements (see clause 4.3.2). 15504 does not explicitly require the assessment team leader to approve the plan.
4.2.2	4.3.2	
4.2.2a	4.3.2e	
4.2.2b	4.3.2c	
4.2.2c	4.3.2a	The ARC glossary definition of assessment scope encompasses all of the lower level requirements mentioned in this 15504 requirement either explicitly or implicitly.
4.2.2c.1	4.2.3a	
4.2.2c.2	4.2.3b	In a staged assessment, the capability levels to be investigated are induced by the process areas selected.
4.2.2c.3	4.2.4	
4.2.2c.4	4.3.2p	

15504-3 Requirement	ARC Requirement	Remarks
4.2.2d	4.3.2g	The lower level 15504-3 requirements are of an exemplar nature and so are treated here as informative material.
4.2.2e	4.3.2b	The reference to the software discipline in this 15504-3 requirement is removed in the developmental baseline being progressed to international standard status and so is ignored. Note that satisfaction of this requirement is only possible if the CMMI models satisfy the relevant requirements in 15504-2.
4.2.2f	4.3.2e	
4.2.2g	4.3.2o	
4.2.2h	4.3.2e	
4.2.2i	4.3.2n	
4.2.3	4.3.2m	
4.3 Responsibilities:	4.1.1	
4.3.1	4.1.1a	
4.3.2	4.1.1d	
4.3.3	4.1.2b	
4.3.4	4.1.2a	
4.3.5	4.1.2c	
4.3.6	4.1.2g	
4.3.7	4.1.2g	
4.3.8	4.1.2h	The requirements refer to those defined for the assessment method; these will include, as a minimum, the ARC requirements that are implemented for the method.
4.4 The assessment process	(see below)	
4.4.1	4.1.2 4.2.1 4.2.2	
4.4.2a	4.3.2	

15504-3 Requirement	ARC Requirement	Remarks
4.4.2a.1	4.3.2	ARC requirement 4.3.2 was constructed to ensure that all 15504-required inputs were accounted for.
4.4.2a.2	4.3.2d	
4.4.2a.3	4.3.2d 4.3.2f	
4.4.2a.4	4.3.2e	
4.4.2a.5	TBD	This 15504 requirement may be revised or deleted.
4.4.2a.6	4.3.2h	
4.4.2b.1	4.4-4.6	Collectively, these ARC requirements address the intent of this 15504-3 requirement.
4.4.2b.2	N/A	Intent addressed through the Demonstration of Model Conformance document to be developed
4.4.2b.3	4.5.2a	
4.4.2b.4	4.3.2k	Note that (1) 15504 process attributes are not directly assessed and (2) minimum levels for corroboration and data sufficiency are stated in the ARC requirements. Any particular method can adjust them upwards according to the sponsor's needs.
4.4.2b.5	4.2.16	
4.4.2c	4.5.4 4.5.5	
4.4.2d.1	4.2.16f	This requirement may not be a concern as it relates to how 15504 translation results are recorded. If the assessment sponsor has not requested a 15504 profile, this is not relevant.
4.4.2d.2		Similarly, this activity would only take place if the translation mechanism were invoked.
4.4.2d.3	4.5.1	
4.4.2e	4.7.1 4.7.4	

15504-3 Requirement	ARC Requirement	Remarks
4.5 Recording the assessment output	(see below)	
4.5.1	4.7.4	
4.5.2	4.2.16	

Appendix C: Glossary

accurate observation	An observation extracted from data collected during an assessment that has been determined by the assessment team to be: a) worded appropriately, b) based on information seen or heard, c) relevant to the assessment reference model being used, d) significant such that it can be classified as a strength, weakness, or alternative practice, and e) not redundant with other observations.
alternative practice	A practice that is a substitute for one or more practices contained in the CMMI model that achieves an equivalent effect toward satisfying the goal associated with the practices.
assessment	An examination of one or more processes by a trained team of professionals using an assessment reference model as the basis for determining strengths and weaknesses. An assessment is typically conducted in the context of process improvement or capability evaluation.
assessment class	A family of assessment methods that satisfy a defined subset of requirements in the Assessment Requirements for CMMI (ARC). These classes are defined so as to align with typical usage modes of assessment.
assessment finding	The results of an assessment that identify the most important issues, problems, or opportunities for process improvement within the assessment scope. Assessment findings are inferences drawn from validated observations.
assessment input	The collection of information required before a process assessment can commence.
assessment objectives	The desired outcome (s) of an assessment process.

assessment participants	Members of the organizational unit who participate in providing information during the assessment.
assessment rating	The value assigned by an assessment 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 assessment method being employed.
assessment reference model	The CMMI model to which an assessment team correlates process activities.
assessment scope	The definition of the boundaries of the assessment encompassing the organizational limits, the CMMI model limits, and the context within which the processes to be investigated operate.
assessment sponsor	The individual who authorizes an assessment, defines its goals and constraints, and commits to the use of the final findings for process improvement.
assessment team leader	A person who leads the activities of an assessment.
capability evaluation	An assessment by a trained team of professionals used as a discriminator to select suppliers for contract monitoring and incentives. Evaluations are used to gain insight into the process capability of a supplier organization and are intended to help decision makers make better acquisition decisions, improve subcontractor performance, and provide insight to a purchasing organization (e.g., Software Capability Evaluation [SCE] V3.0).

CMMI appraisal questionnaire (CAQ)	A set of questions about practices and goals in each process area of the assessment reference model. Depending on the ARC-compliant appraisal method being used, the CMMI Appraisal Questionnaire response summaries may provide assessors with guidance for scripting questions for interviews, help in identifying documents for review, provide information for use in crafting observations and findings, serve as an independent source of data for the corroboration of observations, or be used to support model training.
CMMI measurement framework	Refers to the definition of process capability levels and maturity levels in the CMMI product suite.
consensus	A method of decision making that allows team members to develop a common basis of understanding and develop general agreement concerning a decision.
consolidation	The activity of collecting and summarizing the information provided into a manageable set of data, to determine the extent to which the data are corroborated and cover the areas being investigated, to determine the data's sufficiency for making judgments, and to revise the data-gathering plan as necessary to achieve this sufficiency.
corroboration	The extent to which enough data has been gathered to confirm that an observation is acceptable for use by an assessment team.
coverage	The extent to which data gathered addresses t he scope of an assessment.
coverage criteria	The specific criterion that must be satisfied in order for coverage to be claimed.

data collection session	A team activity during which information that will later be used as the basis for observation formulation or corroboration is gathered. Data collection sessions (or activities) include the administration and/or analysis of questionnaires, document review, interviews, and presentations.
document	A collection of data, regardless of the medium on which it is recorded, that generally has permanence and can be read by humans or machines.
draft findings	Findings created by an assessment team after consolidating and synthesizing valid observations in order to present the findings to the assessment participants for a validation of accuracy.
final findings	The findings derived during assessment activities and presented to the sponsor.
findings	The conclusions of an assessment, evaluation, audit, or review that identify the most important issues, problems, or opportunities within the assessment scope. Examples of findings are strengths, weaknesses, and validated observations.
instruments	Artifacts used in an assessment for the collection and presentation of data (e.g., questionnaires, organizational unit information packets).
interviews	A meeting of the assessment team members with assessment participants for the purpose of gathering information relative to work processes in place.
lead assessor	A person who has demonstrated the necessary skills, competencies, and experience for leading a process assessment.
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 is based on observation, measurement, or test and which can be verified [ISO 94].

observation	A written record that represents the assessment team members' understanding of information either seen or heard during the assessment-data-collection activities. The written record may take the form of a statement or may take alternative forms as long as the information content is preserved.
organizational scope	See "organizational unit."
organizational unit	That part of an organization that is the subject of an assessment. An organizational unit deploys one or more processes that have a coherent process context and operates within a coherent set of business goals. An organizational unit is typically part of a larger organization, although in a small organization, the organizational unit may be the whole organization. An organizational unit may be, for example: (a) a specific project or set of (related) projects; (b) a unit within an organization focused on a specific life-cycle phase (or phases) such as acquisition, development, maintenance, or support; (c) a part of an organization responsible for all aspects of a particular product or product set.
process	A sequence of steps performed for a given purpose: for example, the software development process. A set of activities, methods, and practices that guide people (with their tools) in the production of a product.
process context	The set of factors, documented in the assessment plan, that influence the judgment and comparability of assessment ratings; these include, but are not limited to: the size of the organizational unit to be assessed; the demographics of the organizational unit; the application discipline of the products or services; the size, criticality, and complexity of the products or services; and the quality characteristics of the products or services.
rating	The characterization of a designated CMMI model component (goal, process area, capability level, maturity level) by the assignment of a rating value to that component. Rating values are defined on a model component-specific basis.

satisfied	Rating given to a goal when the associated findings indicate that, in the judgment of the assessment team, there are no significant weaknesses that negatively impact the achievement of the goal. Rating given to a process area when all of its goals are rated "satisfied."
strength	As used in CMMI assessment materials, implementation of practices which, in the judgment of the assessment team, contribute to the satisfaction of a goal. Strengths related to CMMI models are effective implementations of one or more of the CMMI model practices or alternative practices.
sufficient data coverage	The coverage requirements have been met. See "coverage" and "coverage criteria."
tailoring	Selection of options within the assessment method for use in a specific instance, making the method suitable for a specific application. The intent of tailoring is to assist an organization in aligning the application of the method and model with its business objectives.
valid observation	An observation that the assessment team members agree is a) accurate, b) corroborated, and c) consistent with other validated observations.
weakness	The ineffective implementation of, or lack of, practices which, in the judgment of the assessment team, detract from or interfere with achievement of a goal. [SE/SW model glossary]

Appendix D: CMMI Project Participants

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ABSTRACT (MAXIMUM 200 WORDS)

The Assessment Requirements for CMMI (ARC) V1.0 defines the requirements considered essential to assessment methods intended for use with CMMI models. In addition, a set of assessment classes is defined based on assessment usage scenarios. These classes are intended primarily for developers of assessment methods to use with CMMI capability models in the context of the CMMI Product Suite. Additional audiences for the document include lead assessors, and other individuals who are involved in or may be interested in process assessment or improvement.

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

Assessment methods which satisfy all of the ARC requirements are called class A methods; in addition to being used to render ratings for benchmarking purposes, class A assessment methods can be used to conduct 15504-conformant assessments.

More information on the CMMI product suite is available on the World Wide Web at <URL: http://www.sei.cmu.edu/cmmi/>.

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