
**Information technology — Process
assessment —**

**Part 3:
Guidance on performing an assessment**

*Technologies de l'information — Évaluation des procédés du logiciel —
Partie 3: Réalisation d'une évaluation*

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to the national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 15504-3 was prepared by Joint Technical Committee ISO/IEC/TC JTC 1, *Information technology*, Subcommittee SC 7, *Software and system engineering*.

This first edition cancels and replaces ISO/IEC TR 15504-4:1998 and ISO/IEC TR 15504-6:1998, which have been technically revised.

ISO/IEC 15504 consists of the following parts, under the general title *Information technology — Process assessment*:

- *Part 2: Performing an assessment*
- *Part 3: Guidance on performing an assessment*
- *Part 4: Guidance on use for process improvement and process capability determination*

The following parts are in preparation:

- *Part 1: Concepts and vocabulary*
- *Part 5: An exemplar Process Assessment Model*

The complete series will replace ISO/IEC TR 15504-1 to ISO/IEC TR 15504-9.

Introduction

This part of ISO/IEC 15504 assumes familiarity with the normative part of the standard. It is primarily addressed to the competent assessor and other people, such as the sponsor of the assessment, who need guidance on ensuring that the requirements for performing an assessment have been met. It will also be of value to developers of assessment methods and of tools to support an assessment.

ISO/IEC 15504-1 will provide a general introduction to the concepts of process assessment and a glossary for assessment related terms.

ISO/IEC 15504-2 sets out the minimum requirements for performing an assessment that ensure consistency and repeatability of the ratings. The requirements help to ensure that the assessment output is self-consistent and provides evidence to substantiate the ratings and to verify compliance with the requirements.

ISO/IEC 15504-2 defines the Measurement Framework for process capability and the requirements for:

- a) performing an assessment;
- b) process reference models;
- c) process assessment models;
- d) verifying conformity of process assessment.

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This part of ISO/IEC 15504 provides guidance for interpreting the minimum requirements for performing an assessment. It also provides guidance on:

- the nature of the measurement framework;
- the role and function of process reference models;
- the requirements for and selection of a process assessment model;
- the selection and use of assessment tools;
- criteria for assessor competence; and
- verification of conformity of process assessment.

ISO/IEC 15504-3 incorporates, as Annex A, an exemplar documented assessment process.

Process assessment, as defined in this International Standard, is based on a two dimensional model containing a process dimension and a capability dimension. The process dimension is provided by an external process reference model, which defines a set of processes characterized by statements of process purpose and process outcomes. The capability dimension consists of a measurement framework comprising six process capability levels and their associated process attributes.

The assessment output consists of a set of process attribute ratings for each process assessed, termed the process profile, and may also include the capability level achieved by that process.

Process assessment is applicable in the following circumstances:

- a) by or on behalf of an organization with the objective of understanding the state of its own processes for process improvement;

- b) by or on behalf of an organization with the objective of determining the adequacy of its own processes for a particular requirement or class of requirements;
- c) by or on behalf of an organization with the objective of determining the adequacy of another organization's processes for a particular contract or class of contracts.

As described in ISO/IEC 15504-4, process assessment is an activity that can be performed either as part of a process improvement initiative or as part of a capability determination approach. The formal entry to the assessment process occurs with the compilation of the assessment input, which defines the purpose of the assessment (why it is being carried out), the scope of the assessment, what constraints apply to the assessment and any additional information that needs to be gathered. The assessment input also defines the responsibility of the various parties in the performance of an assessment. An assessor who has the necessary competence and skills oversees the assessment. Assessors may be from within the organization, external to the organization or a combination of both.

An assessment is carried out against a defined assessment input utilizing conformant process assessment model(s) related to one or more conformant or compliant process reference models. ISO/IEC 15504-5 contains an exemplar process assessment model that is based upon the process reference model defined in Annex F of ISO/IEC 12207:1995/Amd 1:2002.

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Information technology — Process assessment —

Part 3: Guidance on performing an assessment

1 Scope

This part of ISO/IEC 15504 provides guidance on meeting the minimum set of requirements for performing an assessment contained in ISO/IEC 15504-2.

It provides an overview of process assessment and interprets the requirements through the provision of guidance on:

- a) performing an assessment;
- b) the measurement framework for process capability;
- c) process reference models and process assessment models;
- d) selecting and using assessment tools;
- e) competency of assessors,
- f) verification of conformity.

This document uses the following schema: the text inside a box is quoted from the normative ISO/IEC 15504-2 and the text following a box is guidance about the normative text. If the quoted text includes a clause reference, it is understood that ISO/IEC 15504-2 should be referred to.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 15504-2:2003, *Information technology — Process assessment — Part 2: Performing an assessment*

ISO/IEC TR 15504-9, *Information technology — Software process assessment — Part 9: Vocabulary*¹⁾

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC TR 15504-9 apply.

1) A revision of this document is in preparation under the following reference: ISO/IEC 15504-1.

4 Overview of Process Assessment

4.1 Introduction

Process assessment is undertaken to understand the capability of an Organizational Unit's current processes. Process assessment may encompass all or a subset of the processes (e.g. project management, development, maintenance, configuration management) used by an organization.

Process assessment is performed by one or more assessor(s), one of them (the competent assessor) being responsible for assuring conformity of the assessment to the requirements in ISO/IEC 15504-2.

The assessment of the Organizational Unit's processes is made utilizing a Process Assessment Model based upon a Process Reference Model (e.g. ISO/IEC 12207:1995/Amd 1:2002). A Process Reference Model describes the processes in terms of purpose and outcomes. A Process Assessment Model provides detailed indicators necessary to assess the achievement of the process attributes.

There is a set of 9 process attributes applicable to any process and characterizing the capability of an implemented process. They are defined in ISO/IEC 15504-2.

Process attributes are grouped into capability levels that define an ordinal scale of process capability and provide a rational route for improvement of each individual process. Each process attribute represents measurable characteristics which support achievement of the process purpose and contribute to meeting the business goals of the organization.

The fundamental assessment output consists of up to nine process attribute ratings (referred to as a process profile) for each process assessed.

4.2 Assessment process

An assessment must be conducted according to a documented process that is capable of meeting the assessment purpose. The key elements of a documented assessment process are closely tied to the requirements for performing an assessment, defined in Clause 4 of ISO/IEC 15504-2. A brief overview of these elements is given in the next section while more details on interpreting the activities for performing an assessment are given in Clause 5 of this part of the standard. Note, however, that the guidance provided does not constitute a complete, documented assessment process. Its purpose is to provide help in interpreting the requirements in ISO/IEC 15504-2 and to provide a starting point for selecting or creating a documented assessment process.

The documented assessment process is the set of instructions for conducting the assessment. A documented assessment process addresses the following aspects of the conduct of an assessment:

- defining the inputs to an assessment such as purpose, scope, constraints and the identity of the conformant Process Assessment Model to be used;
- defining key roles and responsibilities;
- providing guidance for planning, data collection, data validation, process attributes rating and reporting of assessment results;
- recording of assessment outputs.

Clause 5 provides guidance on requirements for the assessment process and 11.3 provides guidance on verifying conformity of process assessments. In addition, Annex A provides an exemplar documented assessment process.

4.3 Measurement Framework for Process Capability

The Measurement Framework defines a six point ordinal scale of increasing process capability ranging from a process which is not capable of achieving its purpose (process capability level zero) to a process which optimizes its performance (process capability level 5). Each process has a set of process attribute ratings that constitute the process profile. Process attribute ratings are expressed using the process attribute scale as defined in ISO/IEC 15504-2. The process capability level model is described in terms of the process attribute ratings that must be achieved in order to achieve a particular level. Clause 6 provides guidance on the Measurement Framework for process capability.

4.4 Process Reference Model

A Process Reference Model describes a set of one or more processes in terms of purpose and expected outcomes.

The purpose describes the high-level objectives that the process should achieve while the associated outcomes are the expected results of a successful enactment of the process. The purpose statements in conjunction with the outcomes describe what to achieve, but do not prescribe how the process should achieve its objectives. Clause 7 provides guidance on Process Reference Models and 11.1 provides guidance on verifying conformity or compliance of Process Reference Models.

Annex F of ISO/IEC 12207:1995/Amd 1:2002, as well as ISO/IEC 15288, provide Process Reference Models.

4.5 Process Assessment Model

A Process Assessment Model as defined in this International Standard is one that meets the requirements specified in ISO/IEC 15504-2. In summary, a conformant Process Assessment Model is one:

- that is suitable for the purpose of process assessment;
- whose relevant elements are mapped to the processes described in a selected conformant Process Reference Model(s), and to the relevant process attributes defined in ISO/IEC 15504-2;
- that is based upon a set of indicators for use during an assessment to gather the information about processes and process attributes;
- that has a formal and verifiable mechanism for expressing the information gathered using the Process Assessment Model into process attribute ratings as defined in ISO/IEC 15504-2.

Clause 8 provides guidance on Process Assessment Models and 11.2 provides guidance on verifying conformity of Process Assessment Models. The model in ISO/IEC 15504-5 is an exemplar Process Assessment Model based on the Process Reference Model defined in ISO/IEC 12207:1995/Amd 1:2002.

4.6 Assessment Tools

In any assessment, data will need to be collected, recorded, stored, collated, processed, analysed, retrieved and presented. This may be supported by various tools. For some assessments, the support tools may be paper-based (forms, questionnaires, checklists, etc.). In some cases the volume and complexity of the assessment information may result in the need for computer-based support tools.

Regardless of the form of the supporting tools, their objectives are:

- to help an assessor perform an assessment in a consistent and reliable manner, reducing subjectivity and contributing to the achievement of valid, useful and comparable assessment results;
- to perform the assessment more efficiently.

In order to achieve these objectives, the tools need to make a Process Assessment Model and its indicators accessible to the assessors.

Clause 9 provides guidance on selecting and using assessment tools.

4.7 Competency of assessment team

Assessments are performed by individuals:

- with an adequate mix of education, training and experience on relevant processes,
- who have access to appropriate documented guidance on how to perform the defined assessment activities,
- who have the competencies to use the tools chosen to support the assessment.

The competency of team members should be verified by the competent assessor before assigning roles and responsibilities for performing the assessment.

The competency of the competent assessor will be verified by the sponsor.

Clause 10 provides guidance on competency of assessors.

4.8 Assessment approaches

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4.8.1 Self-assessment

A self-assessment is carried out by an organization to assess the capability of its own process. The sponsor of a self-assessment is normally internal to the Organizational Unit as are the member(s) of the assessment team.

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4.8.2 Independent assessment

An independent assessment is an assessment conducted by an assessment team whose member(s) are independent of the Organizational Unit being assessed. An independent assessment may be conducted, for example, by an organization on its own behalf as independent verification that its assessment program is functioning properly; the assessment sponsor will belong to the same organization but not necessarily to the Organizational Unit being assessed.

The sponsor of an assessment may be external to the Organizational Unit being assessed, such as an acquirer who wishes to have an independent determination of process capability. The degree of independence, however, may vary according to the purpose, scope and context of the assessment.

In the case of an external assessment sponsor, mutual agreement between the assessment sponsor and the assessed organisation is assumed.

4.9 Success factors for process assessment

The following factors are essential to a successful process assessment.

4.9.1 Commitment

The commitment of the sponsor is essential to ensuring that the assessment objectives are met. This commitment requires that the necessary resources, time and personnel are available to perform the assessment. The competent assessor will confirm the sponsor's commitment to proceed with the assessment.

4.9.2 Motivation

The attitude of the organization's management has a significant influence on the outcome of an assessment. The organization's management, therefore, needs to motivate participants to be open and constructive. Process assessments focus on the process, not on the performance of Organizational Unit members implementing the process. The intent is to make the processes more effective in support of the defined business goals, not to allocate blame to individuals.

Providing feedback and maintaining an atmosphere that encourages open discussion about preliminary findings during the assessment helps to ensure that the assessment output is meaningful to the Organizational Unit. The organization needs to recognize that the participants are a principal source of knowledge and experience about the process and that they are in a good position to identify potential weaknesses.

4.9.3 Confidentiality

Respect for the confidentiality of the sources of information and documentation gathered during assessment is essential in order to secure that information. Where interviews or discussions are employed, consideration should be given to ensuring that participants do not feel threatened or have any concerns regarding confidentiality. Some of the information provided might be proprietary to the Organizational Unit. It is therefore important that adequate controls are in place to handle such information.

4.9.4 Relevance

The Organizational Unit members should believe that the assessment will result in some benefits that will accrue to them directly or indirectly.

4.9.5 Credibility

The sponsor, the management and the staff of the Organizational Unit should all believe that the assessment will deliver a result which is objective and is representative of the assessment scope. It is important that all parties can be confident that the assessors have adequate assessment experience, are sufficiently impartial and have an adequate understanding of the Organizational Unit and its business to conduct the assessment.

5 Guidance on Requirements for Performing an Assessment

5.1 General

The requirements for performing an assessment defined in ISO/IEC 15504-2 aim at achieving a greater degree of uniformity in the approach to process assessment, so as to maximize the reliability of different approaches and provide a degree of comparability between the results of different assessments. It may make sense to verify the requirements prior to and during the course of the assessment so that corrective actions can occur.

5.2 The assessment process activities

The assessment shall be conducted according to a documented assessment process that is capable of meeting the assessment purpose.

[ISO/IEC 15504-2, 4.2.1]

This clause addresses two different aspects of process assessment:

- The documented assessment process shall be capable of meeting the assessment purpose;
- The assessment shall be conducted in accordance with the documented assessment process.

The assessment purpose is defined as one of the assessment inputs [ISO/IEC 15504-2, 4.4.2 b)]; this International Standard defines assessment purpose as “a statement, provided as part of the assessment input, which defines the reason for performing the assessment.”

A documented assessment process supports repeatability of an assessment approach. Subclause 5.6 provides guidance on the selection of a documented assessment process.

5.2.1 Planning

The documented assessment process shall contain at minimum the following activities:

a) **Planning** *A plan for the assessment shall be developed and documented, including at minimum:*

- 1) *the required inputs defined in this part of ISO/IEC 15504;*
- 2) *the activities to be performed in conducting the assessment;*
- 3) *the resources and schedule assigned to these activities;*
- 4) *the identity and defined responsibilities of the participants in the assessment;*
- 5) *the criteria to verify that the requirements of this International Standard have been met;*
- 6) *a description of the planned assessment outputs.*

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[ISO/IEC 15504-2, 4.2.2 a)]

The activities to be performed will be determined by the chosen documented assessment process tailored as necessary.

The resource and schedule depend strongly on information contained in the assessment input such as scope and purpose of the assessment. This information should be reviewed thoroughly before planning. Timing and resource needs may change during the process assessment activities. Monitoring and corrective actions to maintain schedule and resources should be one of the planned activities.

In the first version of the plan some information may be missing or not available (e.g. identity of all participants). As process assessment activities progress, the plan will be updated with the necessary information.

Clause 11 provides guidance on the criteria to verify that the requirements of this International Standard have been met.

The assessment output that will be delivered to the assessment Sponsor will be identified and briefly described. The minimum output required is the assessment record. Any additional information [as indicated by ISO/IEC 15504-2, 4.5.2 f)] will need to be defined in the plan.

5.2.2 Data collection

b) **Data Collection** Data required for evaluating the processes within the scope of the assessment [see 4.4.2 c)] and additional information [see 4.4.2 j)] shall be collected in a systematic manner, applying at minimum the following:

- 1) the strategy and techniques for the selection, collection, analysis of data and justification of the ratings shall be explicitly identified and shall be demonstrable;
- 2) correspondence shall be established between the organizational unit's processes, specified in the assessment scope, and the elements in the Process Assessment Model;
- 3) each process identified in the assessment scope shall be assessed on the basis of objective evidence;
- 4) the objective evidence gathered for each attribute for each process assessed shall be sufficient to meet the assessment purpose and scope;
- 5) the identification of the objective evidence gathered shall be recorded and maintained to provide the basis for verification of the ratings.

[ISO/IEC 15504-2, 4.2.2 b)]

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Data collection may be performed in various ways such as interviews, questionnaires, discussions and artefact review. Before starting data collection, the Organizational Unit's processes should be mapped to the processes defined within the Process Assessment Model.

The sampling mechanism should ensure that the set of processes selected is appropriate to the assessment purpose. The sampling information and rationale should be retained.

The information gathering may be organized as part of a monitoring or reporting mechanism used by one or more projects. Alternatively, information collection may be automated or semi-automated through the support of a tool. A tool could be used continuously throughout the life cycle, for example, at defined milestones to measure adherence to the process, to measure process improvement progress, or to gather information to facilitate a future assessment.

5.2.3 Data validation

c) **Data Validation** The data collected shall be validated to:

- 1) confirm that the evidence collected is objective;
- 2) ensure that the objective evidence is sufficient and representative to cover the scope and purpose of the assessment;
- 3) ensure that the data as a whole is consistent.

[ISO/IEC 15504-2, 4.2.2 c)]

The data collected should accurately represent the processes assessed. Validation of this data should include assessing whether the sample size chosen is representative of the processes assessed.