TECHNICAL REPORT

ISO/IEC TR 15504-1

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Information technology — Software process assessment —

Part 1:
Concepts and introductory guide

Technologies de l'information — Évaluation des procédés du logiciel — Partie 1: Concepts et guide introductif

Reference numbe
ISO/IEC TR 15504-1:1998(E)

Contents

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.

The main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

— type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;

— type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/IEC TR 15504-1, which is a Technical Report of type 2, was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology,* Subcommittee SC 7, *Software engineering*.

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

— *Part 1: Concepts and introductory guide*

— *Part 2: A reference model for processes and process capability*

— *Part 3: Performing an assessment*

— *Part 4: Guide to performing assessments*

— *Part 5: An assessment model and indicator guidance*

— *Part 6: Guide to competency of assessors*

— *Part 7: Guide for use in process improvement*

— *Part 8: Guide for use in determining supplier process capability*

— *Part 9: Vocabulary*

Introduction

Overview

ISO/IEC TR 15504 provides a framework for the assessment of software processes. This framework can be used by organizations involved in planning, managing, monitoring, controlling, and improving the acquisition, supply, development, operation, evolution and support of software.

ISO/IEC TR 15504 provides a structured approach for the assessment of software processes for the following purposes:

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

— by or on behalf of an organization with the objective of determining the suitability of its own processes for a particular requirement or class of requirements;

— by or on behalf of one organization with the objective of determining the suitability of another organization's processes for a particular contract or class of contracts.

The framework for process assessment

— encourages self-assessment;

— addresses the adequacy of the management of the assessed processes;

— takes into account the context in which the assessed processes operate;

— produces a set of process ratings (a process profile) rather than a pass/fail result;

— is appropriate across all application domains and sizes of organization.

For an organization to improve product quality it must have a proven, consistent and reliable method for assessing the state of its processes and must have a means of using the results as part of a coherent improvement programme.

The use of process assessment within an organization should encourage

— the culture of constant improvement and the establishment of the proper mechanisms to support and maintain that culture;

— the engineering of processes to meet business requirements;

— the optimization of resources.

This will result in capable organizations that maximize their responsiveness to customer and market requirements, minimize the full life-cycle costs of their products and as a result maximize end-user satisfaction.

Purchasers will benefit from the use of process assessment. Its use in capability determination will

— reduce uncertainties in selecting suppliers of software intensive systems by enabling the risks associated with the contractor's capability to be identified before contract award;

— enable appropriate controls to be put in place for risk containment;

— provide a quantified basis for choice in balancing business needs, requirements and estimated project cost against the capability of competing suppliers.

The major benefits of a standardized approach to process assessment are that it will

— provide a public, shared approach for process assessment;

— lead to a common understanding of the use of process assessment for process improvement and capability evaluation;

— facilitate capability evaluation in procurement;

— be controlled and regularly reviewed in the light of experience of use;

— be changed only by international consensus;

— encourage harmonization of existing schemes.

The approach to process assessment defined in ISO/IEC TR 15504 is designed to provide a basis for a common approach to describing the results of process assessment, allowing for some degree of comparison of assessments based upon different but compatible models and methods. The sophistication and complexity required of a process is dependent upon its context. For instance the planning required for a five person project team is much less than for a fifty person team. This context influences how a competent assessor judges a practice when assessing its adequacy and influences the degree of comparability between process profiles.

Field of application

Process assessment has two principal contexts for its use, as shown diagrammatically in figure 1.

Within a process improvement context, process assessment provides the means of characterizing the current practice within an organizational unit in terms of the capability of the selected processes. Analysis of the results in the light of the organization's business needs identifies strengths, weaknesses and risks inherent in the processes. This, in turn, leads to the ability to determine whether the processes are effective in achieving their goals, and to identify significant causes of poor quality, or overruns in time or cost. These provide the drivers for prioritizing improvements to processes.

Process capability determination is concerned with analysing the proposed capability of selected processes against a target process capability profile in order to identify the risks involved in undertaking a project using the selected processes. The proposed capability may be based on the results of relevant previous process assessments, or may be based on an assessment carried out for the purpose of establishing the proposed capability.

Two of the parts of ISO/IEC TR 15504 (parts 7 and 8) address the use of process assessment for process improvement and for process capability determination. Other parts of ISO/IEC TR 15504 address various issues relating to process assessment.

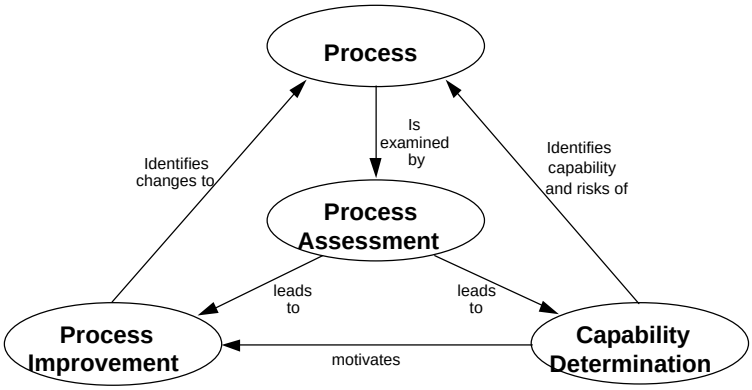

Figure 1 — Software Process Assessment

ISO/IEC TR 15504 has been designed to satisfy the needs of acquirers, suppliers and assessors, and their individual requirements from within a single source.

The benefits arising from the use of this suite of documents include

For **acquirers:**

— an ability to determine the current and potential capability of a supplier's software processes.

For **suppliers:**

— an ability to determine the current and potential capability of their own software processes;

— an ability to define areas and priorities for software process improvement;

— a framework that defines a road map for software process improvement.

For **assessors:**

— a framework for conducting assessments.

ISO/IEC TR 15504 is not intended to be used in any scheme for the certification/registration of the process capability of an organization.

Components of ISO/IEC TR 15504

ISO/IEC TR 15504 is composed of nine parts. This clause describes each of the parts and its role within ISO/IEC TR 15504.

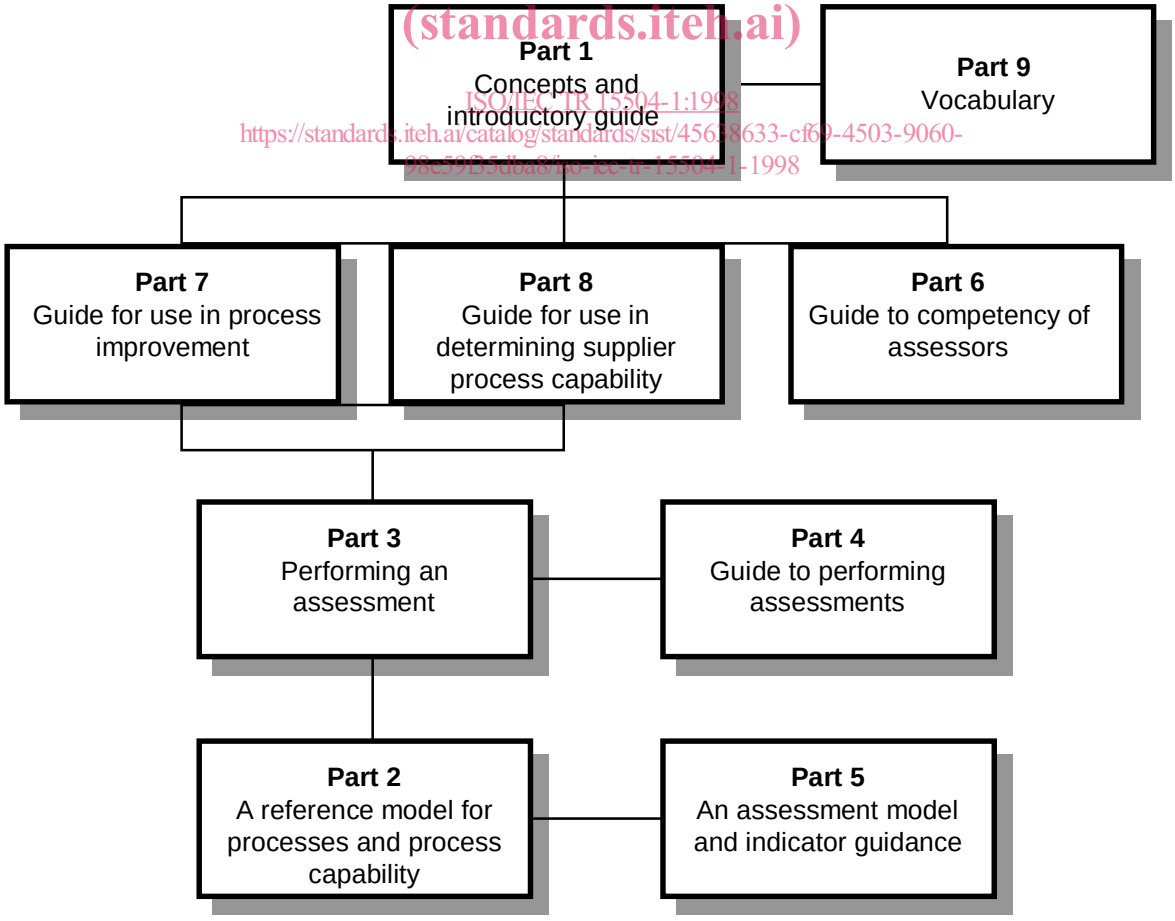

Figure 2 — Components of ISO/IEC TR 15504

Figure 2 shows a potential road map for users of ISO/IEC TR 15504. Part 1 (this document) provides a general entry point to ISO/IEC TR 15504. Readers with specific interest in either process improvement or supplier capability determination should then read parts 7 or 8 as appropriate for detailed guidance on these contexts of use. These parts will enable the user to identify the appropriate usage of the normative components of ISO/IEC TR 15504 (parts 2 and 3). Part 4 provides guidance on the application of part 2 and part 3 while part 5 is an exemplar assessment model compatible with the reference model (part 2). Users with a primary interest in the role of the assessor are directed to part 6 where guidance on the skills and competencies of assessors can be found.

Table 1 identifies the principal classes of reader for ISO/IEC TR 15504 and shows where their primary areas of interest are addressed within the document set.

Table 1 — Readership of ISO/IEC TR 15504

Class of Reader	Interests	Suggested parts to be read
Assessment Sponsor	How an assessment is conducted, what tools and other support are required, how to initiate an assessment.	1, 2, 3, 4, 6
Process Improvement Sponsor	Initiating an improvement programme, defining assessment inputs for an assessment for improvement purposes, using assessment results for improvement.	7
Process Capability Determination Sponsor	Initiating a programme for the determination of supplier capability, defining a target capability profile, verifying and using assessment results in a capability determination exercise.	8
Assessors	Conducting a conformant assessment, developing the skills and competencies needed to perform an assessment.	2, 3, 4, 5, 6
Developers of Assessment Models	Developing a model for performing assessments that is compatible with the reference model.	2, 3, 4, 5
Developers of Assessment Methods	Developing a method that will support the performance of conformant assessments.	2, 3, 4
Tool Developers	Developing tools that will support assessors by collecting, recording and classifying evidence in the performance of assessments.	2, 3, 4, 5

Part 1 (informative) is an entry point into ISO/IEC TR 15504. It describes how the parts of the suite fit together, and provides guidance for their selection and use. It explains the requirements contained within ISO/IEC TR 15504 and their applicability to the performance of an assessment.

Part 2 (normative) of ISO/IEC TR 15504 defines a two dimensional reference model for describing processes and process capability used in a process assessment. The reference model defines a set of processes, defined in terms of their purpose and outcomes, and a framework for evaluating the capability of the processes through assessment of process attributes structured into capability levels. Requirements for establishing the compatibility of different assessment models with the reference model are defined.

Part 3 (normative) of ISO/IEC TR 15504 defines the requirements for performing an assessment in such a way that the outcomes will be repeatable, reliable and consistent.

Part 4 (informative) of ISO/IEC TR 15504 provides guidance on performing software process assessments, interpreting the requirements of ISO/IEC TR 15504-2 and ISO/IEC TR 15504-3 for different assessment contexts. The guidance covers the selection and use of a documented process for assessment; of a compatible assessment model(s); and of a supporting assessment instrument or tool. This guidance is generic enough to be applicable across all organizations, and also for performing assessments using a variety of different methods and techniques, and supported by a range of tools.

Part 5 (informative) of ISO/IEC TR 15504 provides an exemplar model for performing process assessments that is based upon and directly compatible with the reference model in ISO/IEC TR 15504-2. The assessment model(s) extend the reference model through the inclusion of a comprehensive set of indicators of process performance and capability.

Part 6 (informative) of ISO/IEC TR 15504 describes the competence, education, training and experience of assessors that are relevant to conducting process assessments. It describes mechanisms that may be used to demonstrate competence and to validate education, training and experience.

Part 7 (informative) of ISO/IEC TR 15504 describes how to define the inputs to and use the results of an assessment for the purposes of process improvement. The guide includes examples of the application of process improvement in a variety of situations.

Part 8 (informative) of ISO/IEC TR 15504 describes how to define the inputs to and use the results of an assessment for the purpose of process capability determination. It addresses process capability determination in both straightforward situations and in more complex situations involving, for example, future capability. The guidance on conducting process capability determination is applicable either for use within an organization to determine its own capability, or by an acquirer to determine the capability of a (potential) supplier.

Part 9 (normative) is a consolidated vocabulary of all terms specifically defined for the purposes of ISO/IEC TR 15504.

Relationship to other International Standards

ISO/IEC TR 15504 is complementary to several other International Standards and other models for evaluating the capability and effectiveness of organizations and processes. This section describes the relationship between ISO/IEC TR 15504 and the major related International Standards.

ISO/IEC TR 15504 incorporates the intent of the ISO 9000 series to provide confidence in a supplier's quality management whilst providing acquirers with a framework for assessing whether potential suppliers have the capability to meet their needs. Process assessment provides users with the ability to evaluate process capability on a continuous scale in a comparable and repeatable way, rather than using the pass/fail characteristic of quality audits based on ISO 9001. In addition, the framework described in ISO/IEC TR 15504 provides the opportunity to adjust the scope of assessment to cover specific processes of interest, rather than all of the processes used by an organizational unit.

ISO/IEC TR 15504 is related in particular to the following components of the ISO 9000 series:

— ISO 9001:1994, *Model for quality assurance in design, development, production, installation and servicing;*

— ISO 9000-3:1997, *Quality management and quality assurance standards — Part 3: Guidelines for the application of ISO 9001:1994 to the development, supply, installation and maintenance of computer software;*

— ISO 9004-4:1993, *Quality management and quality system elements — Part 4: Guidelines for quality improvement.*

ISO/IEC TR 15504, and particularly part 2, is directly aligned to

— ISO/IEC 12207:1995, *Information technology — Software life cycle processes.*

ISO/IEC TR 15504 provides an overall contextual framework for software life cycle processes, and the process dimension of the reference model is closely mapped to this framework.

Information technology — Software process assessment —

Part 1:
Concepts and introductory guide

1 Scope

This part of ISO/IEC TR 15504 provides overall information on the concepts of software process assessment and its use in the two contexts of process improvement and process capability determination. It describes how the parts of the suite fit together, and provides guidance for their selection and use. It explains the requirements contained within ISO/IEC TR 15504, and their applicability to performing assessments.

Readers of this guide should familiarize themselves with the terminology and structure of the document suite, and then reference the appropriate parts of the suite for the context in which they propose to conduct an assessment. If the assessment is to be conducted for the purposes of internal process improvement within an organization, the relevant context is described in ISO/IEC TR 15504-7. If the results of the assessment are to be used for the purposes of determining the process capability of the organizational unit in the context of a specified requirement, the guidance is in ISO/IEC TR 15504-8.

More detailed description of the use of ISO/IEC TR 15504 is given in clause 4.

2 Normative reference

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC TR 15504. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO/IEC TR 15504 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC TR 15504-9:1998, *Information technology — Software process assessment — Part 9: Vocabulary.*

3 Terms and definitions

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

4 Overview

4.1 General

ISO/IEC TR 15504 provides a framework for the assessment of software processes. This framework can be used by organizations involved in planning, managing, monitoring, controlling and improving the acquisition, supply, development, operation, evolution and support of software.

Process assessment examines the processes used by an organization to determine whether they are effective in achieving their goals. The assessharacterizes the current practice within an organizational unit in terms of the capability of the selected processes. The results may be used to drive process improvement activities or