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Information technology — Process assessment — Process measurement framework for assessment of process capability

Technologies de l'information — Évaluation du processus — Cadre de mesure du processus pour évaluer la capacité du processus

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Contents

Page

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 procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/IEC JTC 1, *Information technology*, SC 7, *Software and systems engineering*.

This second edition cancels and replaces Clause 5 of ISO/IEC 15504-2:2004, which has been technically revised.

Introduction

This International Standard defines a process measurement framework for the process quality characteristic of process capability. The process measurement framework in this International Standard conforms to the requirements of ISO/IEC 33003 and is applicable to any domain. The process measurement framework can be included in any process assessment model for the assessment of process capability, as specified in ISO/IEC 33004.

This International Standard is primarily addressed to developers of process assessment models for the process quality characteristic of process capability. It is also addressed to the lead assessor and other stakeholders, such as the sponsor of the assessment, who need to be assured that the requirements of this process measurement framework have been met.

This International Standard is part of a set of International Standards designed to provide a consistent and coherent framework for the assessment of process quality characteristics, based on objective evidence resulting from implementation of the processes. The framework for assessment covers processes employed in the development, maintenance and use of systems across the information technology domain and those employed in the design, transition, delivery and improvement of services. The set of International Standards, as a whole, addresses process quality characteristics of any type. Results of assessment can be applied for improving process performance, benchmarking, or for identifying and addressing risks associated with application of processes.

The set of International Standards ISO/IEC 33001 to ISO/IEC 33099, termed the ISO/IEC 330xx family, defines the requirements and resources needed for process assessment. The overall architecture and content of the series is described in ISO/IEC 33001. General issues relating to the application of conformity assessment to the assessment of process quality characteristics and organizational process maturity are addressed in ISO/IEC 29169.

Several Standards in the ISO/IEC 330xx family of standards for process assessment are intended to replace and extend parts of the ISO/IEC 15504 series of Standards. This International Standard is intended to replace Clause 5 of ISO/IEC 15504-2:2004. ISO/IEC 33001:2014, Annex A provides a detailed record of the relationship between the ISO/IEC 330xx family and the ISO/IEC 15504 series.

Information technology — Process assessment — Process measurement framework for assessment of process capability

1 Scope

This International Standard defines a process measurement framework that supports the assessment of process capability, in accordance with the requirements of ISO/IEC 33003. The process measurement framework provides a schema that can be used to construct a process assessment model conformant with ISO/IEC 33004[4] which can be used in the performance of assessment of process capability according to the requirements of ISO/IEC 33002[3]. In the context of this and related standards, process capability is a process quality characteristic related to the ability of a process to consistently meet current or projected business goals.

The process measurement frameworks defined in this International Standard form a structure which

a) facilitates self-assessment,

b) provides a basis for use in process improvement and process quality determination,

c) is applicable across all application domains and sizes of organization,

d) produces a set of process (capability) attribute ratings (process profile), and

e) derives a process capability level.

NOTE Copyright release: Users of this International Standard may reproduce subclauses 5.2, 5.3, 5.4 and 5.6 as part of any process assessment model or maturity model so that it can be used for its intended purpose.

2 Normative references

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

ISO/IEC 33001, *Information technology — Process assessment — Concepts and terminology*

ISO/IEC 33003, *Information technology — Process assessment — Requirements for process measurement frameworks*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 33001 and the following apply.

3.1
process capability
characterization of the ability of a process to meet current or projected business goals

3.2
process capability level
characterisation of a process on an ordinal measurement scale of process capability

4 Overview

The capability to perform a process to a specific level of performance depends on well established principles. This International Standard sets out those principles that are common to all domains. The process capability measurement framework described in this International Standard is expressed in terms of a set of process attributes. Each process attribute is defined in terms of a set of process attribute outcomes which can be evaluated to indicate the extent of achievement of the process attribute. The process attributes are organised into process capability levels, ranging from Incomplete (in which the process does not achieve its defined process outcomes) to Innovating (in which the process is continually improved to respond to organizational change).

The result of an assessment, using a process assessment model that incorporates this process measurement framework, will be a set of process profiles - ratings of the achievement of the set of process attributes for each process in the scope of the assessment. The result can also be expressed in terms of the capability level ratings achieved for each process in the assessment scope. A capability level rating does not guarantee that an organization will perform its processes at any given process capability level, simply that it is capable of performing its processes at that level.

5 A process measurement framework for process capability

5.1 Introduction

This clause defines a process measurement framework for the assessment of process capability, conformant with the requirements of ISO/IEC 33003. This process measurement framework provides a schema that can be used to construct a process assessment model for assessing process capability.

Within this process measurement framework, the measure of capability is based upon a set of process attributes. Each process attribute defines a measurable property of process capability. The extent of process attribute achievement is characterised on a defined rating scale. The process capability level for an assessed process is derived from the set of process attribute ratings represented in the process profile.

The achievement of one process attribute may be associated with the achievement of another process attribute within the process measurement framework.

5.2 Process capability levels and process attributes

Process capability is defined on a six point ordinal scale that enables capability to be assessed from the bottom of the scale, **Incomplete**, through to the top end of the scale, **Innovating**. The scale represents increasing capability of the implemented process, from failing to achieve the process purpose through to continually improving and able to respond to organizational change.

5.2.1 Process capability Level 0: Incomplete process

The process is not implemented, or fails to achieve its process purpose.

At this level there is little or no evidence of any systematic achievement of the process purpose.

5.2.2 Process capability Level 1: Performed process

The implemented process achieves its process purpose. The following process attribute demonstrates the achievement of this level.

5.2.2.1 PA 1.1 Process performance process attribute

The process performance process attribute is a measure of the extent to which the process purpose is achieved. As a result of full achievement of this process attribute:

a) The process achieves its defined process outcomes.

5.2.3 Process capability Level 2: Managed process

The previously described *Performed process* is now implemented in a managed fashion (planned, monitored and adjusted) and its work products are appropriately established, controlled and maintained.

The following process attributes, together with the previously defined process attribute, demonstrate the achievement of this level:

5.2.3.1 PA 2.1 Performance management process attribute

The performance management process attribute is a measure of the extent to which the performance of the process is managed. As a result of full achievement of this process attribute:

a) Objectives for the performance of the process are identified;

b) Performance of the process is planned;

c) Performance of the process is monitored;

d) Performance of the process is adjusted to meet plans;

e) Responsibilities and authorities for performing the process are defined, assigned and communicated;

f) Personnel performing the process are prepared for executing their responsibilities;

g) Resources and information necessary for performing the process are identified, made available, allocated and used;

h) Interfaces between the involved parties are managed to ensure both effective communication and clear assignment of responsibility.

5.2.3.2 PA 2.2 Work product management process attribute

The work product management process attribute is a measure of the extent to which the work products produced by the process are appropriately managed. As a result of full achievement of this process attribute:

a) Requirements for the work products of the process are defined;

b) Requirements for documentation and control of the work products are defined;

c) Work products are appropriately identified, documented, and controlled;

d) Work products are reviewed in accordance with planned arrangements and adjusted as necessary to meet requirements.

NOTE 1 Requirements for documentation and control of work products may include requirements for the identification of changes and revision status, approval and re-approval of work products, distribution of work products, and for making relevant versions of applicable work products available at points of use.

NOTE 2 The work products referred to in this Clause are those that result from the achievement of the process purpose through the process outcomes.

5.2.4 Process capability Level 3: Established process

The previously described *Managed process* is now implemented using a defined process that is capable of achieving its process outcomes.

The following process attributes, together with the previously defined process attributes, demonstrate the achievement of this level:

5.2.4.1 PA 3.1 Process definition process attribute

The process definition process attribute is a measure of the extent to which a standard process is maintained to support the deployment of the defined process. As a result of full achievement of this process attribute:

a) A standard process, including appropriate tailoring guidelines, is defined and maintained that describes the fundamental elements that must be incorporated into a defined process;

b) The sequence and interaction of the standard process with other processes is determined.

c) Required competencies and roles for performing the process are identified as part of the standard process;

d) Required infrastructure and work environment for performing the process are identified as part of the standard process;

e) Suitable methods and measures for monitoring the effectiveness and suitability of the process are determined.

5.2.4.2 PA 3.2 Process deployment process attribute

The process deployment process attribute is a measure of the extent to which the standard process is deployed as a defined process to achieve its process outcomes. As a result of full achievement of this process attribute:

a) A defined process is deployed based upon an appropriately selected and/or tailored standard process;

b) Required roles, responsibilities and authorities for performing the defined process are assigned and communicated;

c) Personnel performing the defined process are competent on the basis of appropriate education, training, and experience;

d) Required resources and information necessary for performing the defined process are made available, allocated and used;

e) Required infrastructure and work environment for performing the defined process are made available, managed and maintained;

f) Appropriate data are collected and analysed as a basis for understanding the behaviour of the process, to demonstrate the suitability and effectiveness of the process, and to evaluate where continual improvement of the process can be made.

5.2.5 Process capability Level 4: Predictable process

The previously described *Established process* now operates predictively within defined limits to achieve its process outcomes. Quantitative management needs are identified, measurement data are collected and analysed to identify assignable causes of variation. Corrective action is taken to address assignable causes of variation.

The following process attributes, together with the previously defined process attributes, demonstrate the achievement of this level:

5.2.5.1 PA 4.1 Quantitative analysis process attribute

The quantitative analysis process attribute is a measure of the extent to which information needs are defined, relationships between process elements are identified and data are collected. As a result of full achievement of this process attribute:

a) The process is aligned with quantitative business goals;

b) Process information needs in support of relevant defined quantitative business goals are established;

c) Process measurement objectives are derived from process information needs;

d) Measurable relationships between process elements that contribute to the process performance are identified;

e) Quantitative objectives for process performance in support of relevant business goals are established;

f) Appropriate measures and frequency of measurement are identified and defined in line with process measurement objectives and quantitative objectives for process performance;

g) Results of measurement are collected, validated and reported in order to monitor the extent to which the quantitative objectives for process performance are met.

NOTE 1 Information needs typically reflect management, technical, project, process or product needs.

NOTE 2 Measures may be either process measures or product measures or both.

5.2.5.2 PA 4.2 Quantitative control process attribute

The quantitative control process attribute is a measure of the extent to which objective data are used to manage process performance that is predictable. As a result of full achievement of this process attribute:

a) Techniques for analysing the collected data are selected;

b) Assignable causes of process variation are determined through analysis of the collected data;

c) Distributions that characterize the performance of the process are established;

d) Corrective actions are taken to address assignable causes of variation;

e) Separate distributions are established (as necessary) for analysing the process under the influence of assignable causes of variation.

5.2.6 Process capability Level 5: Innovating process

The previously described *Predictable process* is now continually improved to respond to change aligned with organizational goals.

The following process attributes, together with the previously defined process attributes, demonstrate the achievement of this level:

5.2.6.1 PA 5.1 Process innovation process attribute

The process innovation process attribute is a measure of the extent to which changes to the process are identified from investigations of innovative approaches to the definition and deployment of the process. As a result of full achievement of this process attribute:

a) Process innovation objectives are defined that support the relevant business goals;