International Standard

ISO/IEC 25040

Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Quality evaluation framework

Second edition
2024-09

Reference number
ISO/IEC 25040:2024(en)

© ISO/IEC 2024



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2024

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ... **iv**

Introduction ... **v**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

4 Concepts of quality evaluation ... **2**
4.1 Quality evaluation definition ... 2
4.2 Quality model and quality measures for quality evaluation ... 2
4.3 Measurement source ... 4
4.4 Tasks of quality evaluation ... 4
4.5 Quality rating module ... 4
4.6 Assessment using evaluation ... 5

5 Quality evaluation process reference model ... **5**
5.1 Overview ... 5
5.2 Define the evaluation ... 7
5.2.1 Purpose ... 7
5.2.2 Outcomes ... 7
5.2.3 Activities ... 7
5.3 Design the evaluation ... 10
5.3.1 Purpose ... 10
5.3.2 Outcomes ... 10
5.3.3 Activities ... 11
5.4 Plan the evaluation ... 12
5.4.1 Purpose ... 12
5.4.2 Outcomes ... 12
5.4.3 Activities ... 13
5.5 Execute the evaluation ... 14
5.5.1 Purpose ... 14
5.5.2 Outcomes ... 14
5.5.3 Activities ... 14
5.6 Conclude the evaluation ... 14
5.6.1 Purpose ... 14
5.6.2 Outcomes ... 14
5.6.3 Activities ... 15

Annex A (informative) **Measurement source** ... **17**

Annex B (informative) **Examples of four types of quality evaluations** ... **20**

Annex C (informative) **Quality evaluation process implementation through system/software life cycle processes** ... **24**

Bibliography ... **29**

© ISO/IEC 2024 – All rights reserved

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.

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 or www.iec.ch/members_experts/refdocs).

ISO and IEC draw attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO and IEC take no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO and IEC had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents and https://patents.iec.ch. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

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

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*.

This second edition cancels and replaces the first edition (ISO/IEC 25040:2011), which has been technically revised.

The main changes are as follows:

— alignment with the other SQuaRE divisions: quality management, model, measurement, and requirements;

— alignment with other standards for system/software life cycle processes and requirements engineering processes;

— expansion of its target entities from software to ICT products, data, and IT services;

— expansion of types of quality evaluation from only requirements conformity to four types: quality evaluation for suitability to a specific use, for qualification to quality standard, for conformity checking to requirements, and for suitability to the market;

— clarification of concepts relating to quality evaluation;

— provision of more practical guidelines for planning a quality evaluation.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

© ISO/IEC 2024 – All rights reserved

Introduction

Many systems and services are now deeply embedded into social infrastructures used in daily life. This requires them to achieve much higher quality; for example, connected systems need to be interoperable, secure, reliable, maintainable, and usable. Therefore, quality evaluation becomes ever more important.

The result of quality evaluation is used to objectively judge the value of the target entity in various business situations, including:

— outsourcers judging whether the target entity satisfies their quality requirements, in the case of outsourcing it;

— consumers or acquirers determining which product or service to be selected for their application, in the case of acquisition.

This document provides requirements and recommendations for quality evaluation, as well as guidance for its tasks.

Target entities for quality evaluation include ICT (information and communication technology) products (systems, software products, etc.), data, and IT services. The quality model defined by ISO/IEC 2501n provides comprehensive quality characteristics and subcharacteristics according to the types of target entities. ISO/IEC 2502n defines quality measures corresponding to those quality models.

This document is one of the standards on SQuaRE developed by ISO/IEC JTC 1/SC 7 (ISO/IEC 25000 to ISO/IEC 25099). Figure 1 (adapted from ISO/IEC 25000) illustrates the organization of the standards on SQuaRE developed by ISO/IEC JTC 1/SC 7. Similar standards are grouped into divisions. Each division provides guidance and resources for performing a different function in ensuring system and software product quality.

— ISO/IEC 2500n - quality management division. The International Standards that form this division define all common models, terms, and definitions referred to by all other International Standards on SQuaRE developed by ISO/IEC JTC 1/SC 7. This division also provides requirements and guidance for a supporting function that is responsible for the management of the requirements, specification, and evaluation of software product quality. Practical guidance on the use of the quality models is also provided.

— ISO/IEC 2501n - quality model division. The International Standards that form this division present detailed quality models for computer systems and software products, data, IT services and quality-in-use.

— ISO/IEC 2502n - quality measurement division. The International Standards that form this division include a quality measurement framework, mathematical definitions of quality measures, and practical guidance for their application. Examples are given of quality measures for internal and external property of product, data, IT services and quality-in-use. Quality measure elements (QME) forming foundations for quality measures for internal and external property of product are defined and presented.

— ISO/IEC 2503n - quality requirements division. The International Standards that form this division help specify quality requirements based on quality models and quality measures. These quality requirements can be used in the process of eliciting quality requirements for information systems and IT services to be developed or as input for an evaluation process.

— ISO/IEC 2504n - quality evaluation division. The International Standards that form this division provide requirements, recommendations and guidelines for quality evaluation for information systems and IT services.

— ISO/IEC 25050 to ISO/IEC 25099 - SQuaRE extension division. These International Standards currently include requirements for quality of ready-to-use software product (RUSP), common industry formats for usability reports, and quality models and measures for new technologies such as cloud services and artificial intelligence.

© ISO/IEC 2024 – All rights reserved

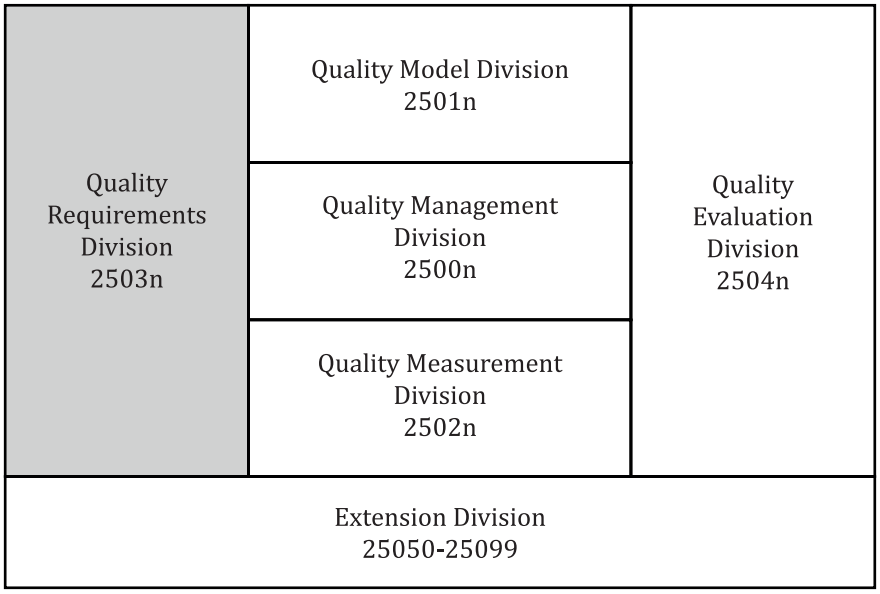


Figure 1 — Organization of standards on SQuaRE developed by ISO/IEC JTC 1/SC 7

The SQuaRE standards can be used in conjunction with ISO/IEC/IEEE 12207 and ISO/IEC/IEEE 15288, particularly the processes for the specification and evaluation of quality requirements. ISO/IEC 25030 describes how quality models and measures can be used for systems and software quality requirements, and ISO/IEC 25040 describes how the quality models and measures can be used for systems and software quality evaluation.

The SQuaRE standards can also be used in conjunction with standards on software process assessment developed by ISO/IEC JTC 1/SC 7, which provide:

— a framework for software product quality definition in the customer-supplier process;

— support for quality review, verification, and validation, as well as a framework for establishing quantitative quality characteristics;

— support for setting organizational quality goals in the management process.

The SQuaRE standards can be used in conjunction with ISO 9001 (which is concerned with quality management system) to provide:

— support for setting quality goals;

— support for design review, verification, and validation.

© ISO/IEC 2024 – All rights reserved

Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Quality evaluation framework

1 Scope

This document provides the framework for quality evaluation of ICT (information and communication technology) products (including software products), data, and IT services, which includes its concepts, and requirements, and recommendations for its processes to be implemented and enhanced.

This document is applicable for those who need to perform quality evaluations on target entities, including development organization (integrators, developers, and quality assurance group), acquirers, IT service providers, and independent evaluators.

This document does not provide specific test methods for quality evaluation or guidance on utilizing evaluation results.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 25000, *Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Guide to SQuaRE*

ISO/IEC 25030, *Systems and software engineering — Systems and software quality requirements and evaluation (SQuaRE) — Quality requirements framework*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 25000 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
assessment
action of comprehensively evaluating the target entity based on documented criteria for a specific purpose

Note 1 to entry: Such purposes can include determining acceptance or release of the target entity.

3.2
implementation rating module
quality rating module (3.8) that can be directly applied to target entity

© ISO/IEC 2024 – All rights reserved