INTERNATIONAL STANDARD

ISO/IEC 25019

First edition
2023-11

Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Quality-in-use model

Ingénierie des systèmes et du logiciel — Exigences de qualité et évaluation des systèmes et du logiciel (SQuaRE) — Modèle de qualité de fonctionnement

Reference number
ISO/IEC 25019:2023(E)

© ISO/IEC 2023



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2023

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

© ISO/IEC 2023 – All rights reserved

Contents

Page

Foreword ... **iv**

Introduction ... **v**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**
3.1 Quality-in-use ... 2
3.2 Quality-in-use characteristics and sub-characteristics ... 7
3.3 Related SQuaRE concepts ... 8

4 Quality-in-use model ... **11**
4.1 General ... 11
4.2 Stakeholder ... 11
4.3 Quality-in-use in context ... 12
4.4 Quality-in-use model structure ... 12
4.5 Target of the quality-in-use model ... 13
4.6 Using the quality-in-use model ... 15

Annex A (informative) **Comparison with the quality-in-use model in ISO/IEC 25010:2011** ... **16**

Annex B (informative) **The relationship between quality characteristics, quality sub-characteristics, and their stakeholder's needs** ... **19**

Annex C (informative) **Example of quality-in-use characteristics and their effect and influence** ... **21**

Annex D (informative) **Example of applying the quality-in-use model to an application** ... **26**

Bibliography ... **30**

© ISO/IEC 2023 – 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 first edition of ISO/IEC 25019, together with the first edition of ISO/IEC 25002 and the second edition of ISO/IEC 25010, cancels and replaces ISO/IEC 25010:2011, which has been technically revised.

The main changes are as follows:

— stakeholders influenced by use of system or product are classified and explicated;

— aspects of interest for each stakeholder are integrated and shown as quality characteristics;

— context coverage which was shown as quality characteristics in the quality-in-use model of the previous version is removed.

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 2023 – All rights reserved

Introduction

As information system (ICT products, software, data) and IT services are widely used, the target of their effect and influence of using them can extend from their direct users to organizations and the society. To control the effect and influence as much as possible is a social responsibility of enterprises and public/society administrations.

A wide variety of organizational functions and personal activities are increasingly performed by information systems and IT services. Therefore, high-quality information systems and IT services are essential to providing value and avoiding potential negative consequences for th stakeholders. Unfortunately, quality assurance has traditionally focused primarily on functional requirements, giving far less attention to the non-functional attributes of a system/product. Comprehensive specification, design, and evaluation of all quality attributes of information systems and IT services are critical to optimizing the value of information systems to their stakeholders.

The purpose of the "quality-in-use" model is to represent the effects and influences that can be experienced by using information system and IT service system; that is, to define, measure, evaluate and improve the quality of systems and software products and IT services when using them. Quality-in-use can be influenced by many factors including the quality of software, data and IT services.

If context of use changes, effect and influence on a stakeholder also changes.

Such context of use changes are monitored through quality evaluations of quality-in-use characteristics/ sub-characteristics so that changes/gaps from initially specified context of use are identified and fed back to the next quality improvement cycle.

Full details of the changes to the quality-in-use model are in Annex A. The comprehensive specification of quality characteristics associated with a specific type of information system is represented in a quality model. A quality model can be used as an objective reference supporting requirements definition, evaluation, and validation/verification. By establishing agreed quality characteristics and their measurement, the SQuaRE family of standards provides a framework for reliable development and delivery of information systems and IT services.

This document introduces the structure of SQuaRE quality models and provides requirements for developing them. ISO/IEC 25002 describes how SQuaRE quality models in the quality model division (2501n) can be used in conjunction with other SQuaRE standards to guide quality-related activities across the information system lifecycle regardless of the development methodology. These quality models can guide the development of measures for evaluating the quality of information systems and IT services to meet the requirements of their stakeholders. These models provide a common language for describing quality characteristics that can be understood by all stakeholders. They also provide a basis for defining standard quantitative measures of quality characteristics for evaluating the quality properties of a target entity.

The complexity of information systems has grown exponentially with the advent of modern digital technologies. This complexity elevates the importance of non-functional requirements and qualities. SQuaRE quality models can help guide the development of modern digital technologies that are trustworthy and that delight their users.

Figure 1 (adapted from ISO/IEC 25000) illustrates the organization of the SQuaRE family of International Standards. 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 2023 – All rights reserved

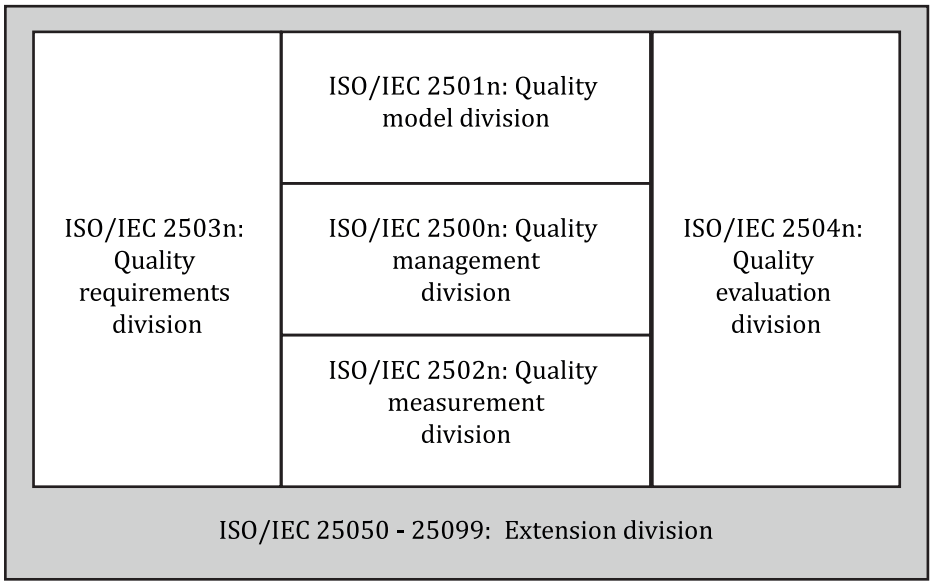


Figure 1 — Organization of SQuaRE family of International Standards

The divisions within the SQuaRE family are:

— 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 from the SQuaRE family. The 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 25000: Guide to SQuaRE

  — ISO/IEC 25001: Planning and management

  — ISO/IEC 25002: Quality models overview and usage

— 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. This document belongs to the quality model division. This document is aligned with ISO/IEC 25002 on quality models overview and usage.

  — ISO/IEC 25010: Product quality model

  — ISO/IEC 25011: IT service quality models

  — ISO/IEC 25012: Data quality model

  — ISO/IEC 25019: Quality-in-use model

— 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 2023 – All rights reserved

— ISO/IEC 2504n - quality evaluation division. The International Standards that form this division provide requirements, recommendations, and guidelines for software product evaluation, whether performed by evaluators, acquirers, or developers. The guideline for documenting a measure as an evaluation module is also provided.

— 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), commercial off-the-shelf software and common industry formats for usability reports, and quality models and measures for new technologies such as cloud services and artificial intelligence.

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 can be used for systems and software quality requirements; and ISO/IEC 25040 describes how the quality models can be used for system and software quality evaluation.

The SQuaRE standards can also be used in conjunction with the ISO/IEC 33000 family of International (which are concerned with software process assessment) to provide. Standards which are concerned with software process assessment to provide:

— a framework for quality requirements 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 and ISO/IEC/IEEE 90003 (which are concerned with quality assurance processes) to provide:

— support for setting quality goals (and certification where applicable);

— support for design review, verification, and validation.

© ISO/IEC 2023 – All rights reserved

Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Quality-in-use model

1 Scope

This document defines a quality-in-use model composed of three characteristics (which are further subdivided into sub-characteristics) that can influence stakeholders when products or systems are used in a specified context of use. This model is applicable to the entire spectrum of information system and IT service system, including both computer systems in use and software products in use.

This document provides a set of quality characteristics for specifying, measuring, evaluating and improving quality-in-use.

In this document, because context of use is specified as prerequisite of quality-in-use, context of use is necessary to be re-specified to change prerequisite when a product or service intend to fulfil to context of use changes.

The model can be applied, in particular, by those responsible for specifying and evaluating software product quality, such as developers, acquirers, quality assurance and control staff, and independent evaluators. Activities during product development that can benefit from the use of the quality model can include, but are not limited to:

— identifying requirements for information system and IT service system in use;

— validating the comprehensiveness of a quality-in-use requirements specification;

— identifying information system and IT service system design objectives for quality-in-use;

— identifying quality-in-use control criteria as part of overall quality assurance;

— identifying acceptance criteria for information system and IT service system or information systems;

— establishing measures to address the consequences of using products in specified context-of -use;

— presenting evaluation items for ethics considerations when using information system and IT service system;

— supporting governance of digitalization activities.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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/

© ISO/IEC 2023 – All rights reserved