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**Software engineering — Software product  
Quality Requirements and Evaluation  
(SQuaRE) — Measurement reference  
model and guide**

*Ingénierie du logiciel — Exigences de qualité du produit logiciel et  
évaluation (SQuaRE) — Modèle de référence de mesure et guide*

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Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
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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 national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO/IEC 25020 may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC FDIS 25020 is part of the SQuaRE series of standards and was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*.

SQuaRE series of standards consists of the following divisions under the general title *Software engineering, Software product Quality Requirements and Evaluation (SQuaRE)*:

- Quality Management Division (ISO/IEC 2500n),
- Quality Model Division (ISO/IEC 2501n), [ISO/IEC 25020:2007](https://standards.iteh.ai/catalog/standards/sist/30340633-c657-4ae2-b770-21cfb43/iso-iec-25020-2007)
- Quality Measurement Division (ISO/IEC 2502n), <https://standards.iteh.ai/catalog/standards/sist/30340633-c657-4ae2-b770-21cfb43/iso-iec-25020-2007>
- Quality Requirements Division (ISO/IEC 2503n), and
- Quality Evaluation Division (ISO/IEC 2504n).

## Introduction

The general goal of creating the SQuaRE series of International Standards is to move to a logically organized, enriched and unified series covering three complementary processes: requirements specification, measurement and evaluation. The purpose of the SQuaRE series of International Standards is to assist those developing and acquiring software products with the specification and evaluation of quality requirements. It establishes criteria for the specification of software product quality requirements and their evaluation. It includes a two-part quality model for aligning customer definitions of quality with characteristics of the software product. In addition, the series defines measures of software product quality characteristics that can be used by developers, acquirers and evaluators.

It has to be stressed that the SQuaRE series of International Standards is dedicated to software product quality only. The Quality Management Division of the SQuaRE series deals with software products, and is separate and distinct from the "Quality Management" of processes which is defined in the ISO 9000 family of International Standards.

The major benefits of the SQuaRE series over its predecessor standards include:

- the coordination of guidance on software product quality measurement and evaluation,
- guidance for the specification of software product quality requirements, and
- harmonization with ISO/IEC 15939 in the form of Quality Measurement Reference model presented in this International Standard.

The major differences between the SQuaRE series of International Standards and its predecessors, ISO/IEC 9126 and ISO/IEC 14598, are the:

- introduction of the new general reference model,
- introduction of dedicated and detailed guides for each division,
- introduction of Quality Measure Elements within the Quality Measurement Division,
- introduction of the Quality Requirements Division,
- incorporation and revision of the evaluation processes,
- introduction of guidance for practical use in the form of examples, and
- co-ordination and harmonization of content with ISO/IEC 15939.

SQuaRE consists of the following five divisions:

- Quality Management Division (ISO/IEC 2500n),
- Quality Model Division (ISO/IEC 2501n),
- Quality Measurement Division (ISO/IEC 2502n),
- Quality Requirements Division (ISO/IEC 2503n), and
- Quality Evaluation Division (ISO/IEC 2504n).

SQuaRE provides:

- terms and definitions,

## ISO/IEC 25020:2007(E)

- reference models,
- a general guide,
- individual division guides, and
- standards for requirements specification, measurement and evaluation purposes.

SQuaRE includes International Standards and technical reports for a quality model and measures, as well as on quality requirements and evaluation. SQuaRE replaces current ISO/IEC 9126 series and ISO/IEC 14598 series.

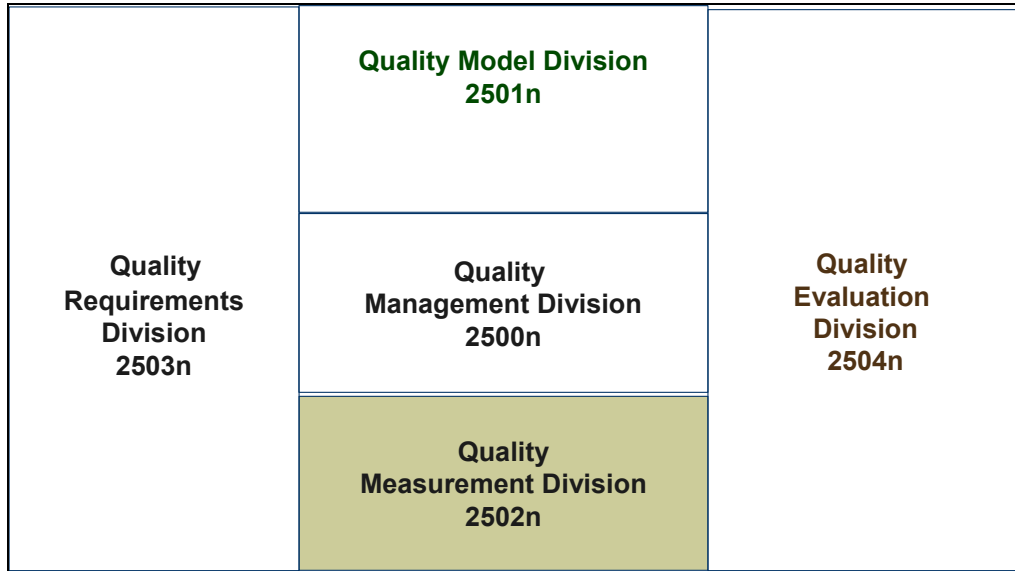
This International Standard is intended to be used together with ISO/IEC 25010. It is strongly recommended that users refer to ISO/IEC 2500n, ISO/IEC 2501n, ISO/IEC 2503n, and ISO/IEC 2504n division of International Standards prior to using this International Standard and the associated measurement technical reports, particularly if the user is not familiar with the use of software measures for requirements specification and product evaluation. These International Standards discuss the planning and use of the software quality measures defined in the ISO/IEC 2502n series on software product quality measurement.

ISO/IEC 25010 will provide a model and defines terms for software product quality characteristics and how these characteristics are decomposed into subcharacteristics. It does not describe how any of these subcharacteristics could be measured. The Quality Measurement Division provides information and guidance about how to measure the characteristics and subcharacteristics of a quality model. This International Standard provides a reference model and guide for measuring the quality characteristics defined in ISO/IEC 2501n Quality Model Division (Figure 1). The associated standards and technical reports within the Quality Measurement Division describe measures of quality throughout the product life cycle.

ISO/IEC 25021 offers quality measure elements that can be used to construct software quality measures. Quality measure elements are the base and derived measures used to create measures of software product quality characteristics. Quality measure elements may measure a static representation of the software, the behaviour of the software, or the effects of the software when it is used.

ISO/IEC 25022, ISO/IEC 25023 and ISO/IEC 25024 will describe measures for the characteristics in the quality model. Internal measures characterize software product quality based upon static representations of the software, external measures characterize software product quality based upon the behaviour of the computer-based system including the software, and quality in use measures characterize software product quality based upon the effects of using the software in a specific context of use.

The measures in these technical reports should not be construed as an exhaustive or required set. Figure 2 depicts the relationship between this International Standard and the technical reports in the Quality Measurement Division. Developers, evaluators, quality managers, acquirers, suppliers, maintainers and other users of software may select measures from these technical reports for the measurement of quality characteristics of interest. In practice this may be with respect to defining requirements, evaluating software products, quality management and other purposes. Users may also modify the measures or use measures which are not included in those technical reports.



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Figure 1 — Organization of the SQuaRE series of International Standards

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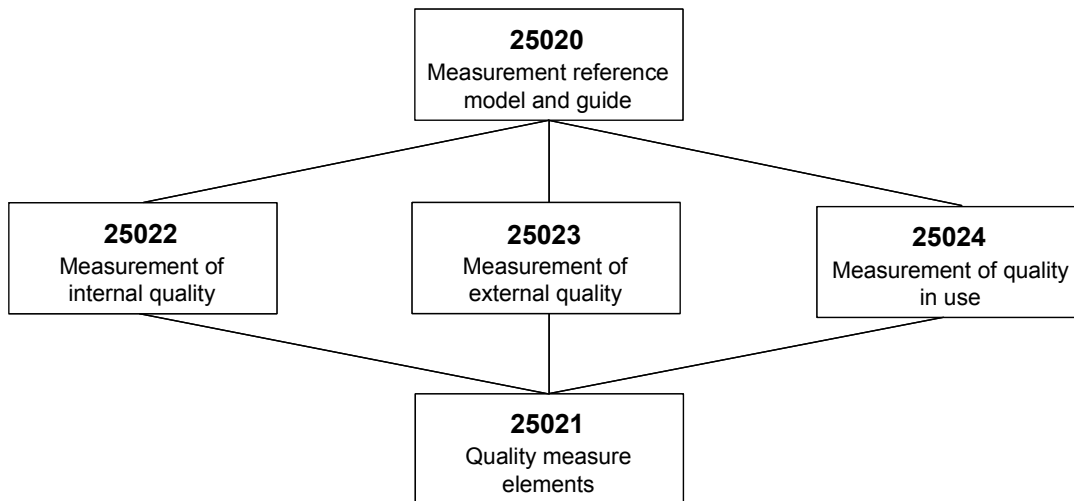


Figure 2 — Structure of the Quality Measurement division

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# Software engineering — Software product Quality Requirements and Evaluation (SQuaRE) — Measurement reference model and guide

## 1 Scope

The scope of this International Standard is the selection and construction of software product quality measures, with respect to their use in conjunction with the other SQuaRE series documents.

This International Standard also contains the following informative annexes (A through C) and Bibliography:

- Criteria for selecting software quality measures and quality measure elements
- Demonstrating predictive validity and assessing measurement reliability
- Example format for documenting software quality measures
- Bibliography

The SQuaRE series of International Standards is intended for, but not limited to, developers, acquirers and independent evaluators of software, particularly those responsible for defining software product quality requirements and for software product evaluation. It is recommended that users of SQuaRE use this International Standard as a guide to execute their software product quality measurement tasks.

## 2 Conformance

Any software product quality measurement that conforms to this International Standard shall fulfil the requirements of Clause 6.

## 3 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 25000, *Software Engineering — Software product Quality Requirements and Evaluation (SQuaRE) — Guide to SQuaRE*

ISO/IEC 15939:2002, *Software engineering — Software measurement process*

## 4 Terms and definitions

For the purposes of this standard, the terms and definitions given in ISO/IEC 25000 and ISO/IEC 15939 apply. The following definitions are replicated here for the convenience of the user of this International Standard. Unattributed references are from ISO/IEC 25000.

### 4.1 attribute

inherent property or characteristic of an entity that can be distinguished quantitatively or qualitatively by human or automated means

[ISO/IEC 15939:2002]

NOTE ISO 9000 distinguishes two types of attributes: a permanent characteristic existing inherently in something; and an assigned characteristic of a product, process or system (e.g. the price of a product, the owner of a product). The assigned characteristic is not an inherent quality characteristic of that product, process or system.

### 4.2 base measure

measure defined in terms of an attribute and the method for quantifying it

NOTE A base measure is functionally independent of other measures.

[ISO/IEC 15939: 2002, based on the definition in International Vocabulary of Basic and General Terms in Metrology, 1993]

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### 4.3 derived measure

measure that is defined as a function of two or more values of base measures

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[ISO/IEC 15939:2002, based on the definition in International Vocabulary of Basic and General Terms in Metrology, 1993]

NOTE A transformation of a base measure using a mathematical function can also be considered as a derived measure.

### 4.4 external software quality

capability of a software product to enable the behaviour of a system to satisfy stated and implied needs when the system is used under specified conditions

NOTE Attributes of the behaviour can be verified and/or validated by executing the software product during testing and operation.

EXAMPLE The number of failures found during testing is an external software quality measure related to the number of faults present in the program. The two measures are not necessarily identical since testing may not find all faults, and a fault may give rise to apparently different failures in different circumstances.

### 4.5 indicator

measure that provides an estimate or evaluation of specified attributes derived from a model with respect to defined information needs

[ISO/IEC 15939:2002]

NOTE In ISO/IEC 14598 this definition was, "a measure that can be used to estimate or predict another measure."

#### 4.6 information need

insight necessary to manage objectives, goals, risks and problems

[ISO/IEC 15939:2002]

#### 4.7 internal software quality

capability of a set of static attributes of a software product to satisfy stated and implied needs when the software product is used under specified conditions

NOTE 1 Static attributes include those that relate to the software architecture, structure and its components.

NOTE 2 Static attributes can be verified by review, inspection and/or automated tools.

EXAMPLE The number of lines of code, complexity measures and the number of faults found in a walk through are all internal software quality measures made on the product itself.

#### 4.8 measure, noun

variable to which a value is assigned as the result of measurement

NOTE The term “measures” is used to refer collectively to base measures, derived measures and indicators.

[ISO/IEC 15939:2002]

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#### 4.9 measure, verb

make a measurement

[ISO/IEC 14598-1:1999]

#### 4.10 measurement

set of operations having the object of determining a value of a measure

[ISO/IEC 15939:2002, based on the definition in International Vocabulary of Basic and General Terms in Metrology, 1993]

NOTE Measurement can include assigning a qualitative category such as the language of a source program (ADA, C, COBOL, etc.).

#### 4.11 measurement function

algorithm or calculation performed to combine two or more base measures

[ISO/IEC 15939:2002]