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Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Guide to SQuaRE

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National foreword

This British Standard is the UK implementation of ISO/IEC 25000:2014. It supersedes BS ISO/IEC 25000:2005 which is withdrawn.

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INTERNATIONAL STANDARD

ISO/IEC 25000

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Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Guide to SQuaRE

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

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Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
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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 document 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 25000 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 25000:2005), of which it constitutes a minor revision.

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

— ISO/IEC 2500n, *Quality Management Division*,

— ISO/IEC 2501n, *Quality Model Division*,

— ISO/IEC 2502n, *Quality Measurement Division*,

— ISO/IEC 2503n, *Quality Requirements Division*, and

— ISO/IEC 2504n, *Quality Evaluation Division*.

ISO/IEC 25050 to ISO/IEC 25099 are reserved to be used for SQuaRE extension International Standards and/or Technical Reports.

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Introduction

Computers are being used in an increasingly wide variety of application areas, and their intended and correct operation is often critical for business success and/or human safety. Developing or selecting high quality systems and products is therefore of prime importance. Comprehensive specification and evaluation of systems and software product quality is a key factor in ensuring adequate quality. This can be achieved by defining appropriate quality characteristics, while taking account of the intended use of the systems and software product. It is important that every relevant system and software product quality characteristic is specified and evaluated, whenever possible using validated or widely accepted measures.

As quality characteristics and associated measures can be useful not only for evaluating a systems and software product but also for defining quality requirements, the predecessor of SQuaRE, ISO/IEC 9126:1991 has been replaced by two related multipart International Standards: ISO/IEC 9126 (Software product quality) and ISO/IEC 14598 (Software product evaluation). The following points derived from practical use of both series gave the logical impulse for creating the new SQuaRE series of International Standards:

— Both ISO/IEC 9126 and ISO/IEC 14598 have common normative, referential and functional roots.

— ISO/IEC 9126 and ISO/IEC 14598 form a complementary set of standards.

— The independent life cycles of both series have created inconsistencies between them.

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

It has to be stressed that the SQuaRE series of International Standards is dedicated to systems and software product quality only. SQuaRE ISO/IEC 2500n — Quality Management Division addresses systems and software product quality requirements specification, measurement and evaluation, and is separate and distinct from the “Quality Management” of processes, which is defined in the ISO 9000 family of standards.

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

— the coordination of guidance on systems and software product quality measurement and evaluation,

— guidance for the specification of systems and software product quality requirements, and

— harmonization with ISO/IEC 15939 in the form of Software product Quality Measurement Reference Model presented in ISO/IEC 25020, *Software engineering — Software product Quality Requirements and Evaluation (SQuaRE) — Measurement reference model and guide*.

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

— the introduction of the new general reference model,

— the introduction of dedicated, detailed guides for each division,

— the introduction of systems product quality,

— the introduction of a data quality model,

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— the introduction of Quality Measure Elements within Quality Measurement Division,

— the introduction of the Quality Requirements Division,

— incorporation and revision of the evaluation processes,

— the introduction of guidance of practical use in form of examples,

— coordination and harmonization of the content with ISO/IEC 15939.

SQuaRE consists of the following five divisions:

— ISO/IEC 2500n - Quality Management Division,

— ISO/IEC 2501n - Quality Model Division,

— ISO/IEC 2502n - Quality Measurement Division,

— ISO/IEC 2503n - Quality Requirements Division,

— ISO/IEC 2504n - Quality Evaluation Division, and

— ISO/IEC 25050 to ISO/IEC 25099 - Extension division

SQuaRE provides:

— Terms and definitions,

— Reference models,

— General guide,

— Individual division guides, and

— International Standards for requirements specification, planning and management, measurement and evaluation purposes.

SQuaRE includes International Standards on quality model and measures, as well as on quality requirements and evaluation.

SQuaRE replaces the ISO/IEC 9126 series and the ISO/IEC 14598 series.

This part of SQuaRE series of standards is an International Standard with the goal of providing a common set of reference models, terminology, definitions and guidance for practical use of the associated standards and technical reports.

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INTERNATIONAL STANDARD ISO/IEC 25000:2014(E)

Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Guide to SQuaRE

1 Scope

This International Standard provides guidance for the use of the new series of International Standards named Systems and software Quality Requirements and Evaluation (SQuaRE). The purpose of this Guide is to provide a general overview of SQuaRE contents, common reference models and definitions, as well as the relationship among the documents, allowing users of the Guide a good understanding of those series of standards, according to their purpose of use. This International Standard also contains an explanation of the transition process between the old ISO/IEC 9126 and the ISO/IEC 14598 series and SQuaRE.

The SQuaRE series of International Standards is intended for, but not limited to, developers, acquirers and independent evaluators of systems and software products, particularly those responsible for defining systems and software quality requirements and for systems and software product evaluation. It is recommended that users of SQuaRE as well as ISO/IEC 14598 and ISO/IEC 9126 series of standards also use this International Standard as a guide to execute their tasks.

2 Conformance

There is no particular conformance clause for this document. Users, for their intended use of SQuaRE series of Standards should follow individual conformance clauses stated in each document of the series.

3 Normative references

This International Standard does not require any normative references. All informative references are presented in the Bibliography.

4 Terms and definitions

For the purposes of this document, the following definitions apply.

NOTE The definitions are common to all parts of SQuaRE series of International Standards.

4.1
attribute
inherent property or characteristic of an entity that can be distinguished quantitatively or qualitatively by human or automated means

Note 1 to entry: Based on ISO/IEC 15939:2007.

Note 2 to entry: 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.

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4.2
context of use
users, tasks, equipment (hardware, software and materials), and the physical and social environments in which a product is used

[SOURCE: ISO 9241-11:1998]

4.3
custom software
software product developed for a specific application from a user requirements specification

4.4
data
reinterpretable representation of information in a formalized manner suitable for communication, interpretation or processing

[SOURCE: ISO/IEC 25012:2008]

4.5
data quality
degree to which the characteristics of data satisfy stated and implied needs when used under specified conditions

4.6
developer
individual or organisation that performs development activities (including requirements analysis, design, testing through acceptance) during the system or software life cycle process

[SOURCE: ISO/IEC 12207:2008, modified]

4.7
end user
individual person who ultimately benefits from the outcomes of the system or software

Note 1 to entry: The end user may be a regular operator of the system or software product or a casual user such as a member of the public.

4.8
evaluation method
procedure describing actions to be performed by the evaluator in order to obtain results for the specified measurement applied to the specified product components or on the product as a whole

4.9
evaluation module
package of evaluation technology for measuring systems and software quality characteristics, subcharacteristics or attributes

Note 1 to entry: The package includes evaluation methods and techniques, inputs to be evaluated, data to be measured and collected and supporting procedures and tools.

4.10
evaluator
individual or organisation that performs an evaluation

4.11
external measure of system or software quality
measure of the degree to which a system or software product enables its behaviour to satisfy stated and implied needs for the system including the software to be used under specified conditions

Note 1 to entry: Attributes of the behaviour can be verified and/or validated by executing the system or software product during testing and operation.

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EXAMPLE The number of failures found during testing is an external measure of software quality related to the number of faults present in the computer system. 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.

4.12
implied needs
needs that may not have been stated but are actual needs

Note 1 to entry: Some implied needs only become evident when the system or software product is used in particular conditions.

EXAMPLE Implied needs include: needs not stated but implied by other stated needs and needs not stated because they are considered to be evident or obvious.

4.13
indicator
measure that provides an estimate or evaluation of specified attributes derived from a model with respect to defined information needs

[SOURCE: ISO/IEC 15939:2007]

Note 1 to entry: In ISO/IEC 14598 this definition was: "a measure that can be used to estimate or predict another measure".

4.14
information need
insight necessary to manage objectives, goals, risks, and problems

[SOURCE: ISO/IEC 15939:2007]

4.15
intermediate system or software product
product of the system or software development process that is used as input to another stage of its development process

EXAMPLE Intermediate software products can include static and dynamic models, other documents and source code.

4.16
internal measure of software quality
measure of the degree to which a set of static attributes of a software product satisfies stated and implied needs for the software product to be used under specified conditions

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

Note 2 to entry: Static attributes can be verified by review, inspection, simulation and/or automated tools.

EXAMPLE Complexity measures and the number, severity, and failure frequency of faults found in a walk through are internal software quality measures made on the product itself.

4.17
maintainer
individual or organisation that performs maintenance activities

Note 1 to entry: Based on the definition in ISO/IEC 12207:2008.

4.18
measure (noun)
variable to which a value is assigned as the result of measurement

Note 1 to entry: The term "measures" is used to refer collectively to base measures, derived measures, and indicators.

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[SOURCE: ISO/IEC 15939:2007]

4.19
measure (verb)
make a measurement

[SOURCE: ISO/IEC 14598-1:1999]

4.20
measurement
set of operations having the object of determining a value of a measure

[SOURCE: ISO/IEC 15939:2007]

Note 1 to entry: Measurement can include assigning a qualitative category such as the language of a source program (ADA, C, Java, etc.).

4.21
measurement process
process for establishing, planning, performing and evaluating systems and software measurement within an overall project or organisational measurement structure

[SOURCE: ISO/IEC 15939:2007]

4.22
process
system of activities, which use resources to transform inputs into outputs

[SOURCE: ISO 9000:2005]

4.23
product
artifact that is produced, is quantifiable, and can be either an end item in itself or a component item

[SOURCE: Guide to the Project Management Body of Knowledge (PMBOK) Fourth Edition: 2008]

Note 1 to entry: ISO 9000:2005 defines four agreed generic product categories: hardware (e.g. engine mechanical part); software (e.g. computer program); services (e.g. transport); and processed materials (e.g. lubricant). Hardware and processed materials are generally tangible products, while software or services are generally intangible. Most products comprise elements belonging to different generic product categories. Whether the product is then called hardware, processed material, software, or service depends on the dominant element. Results could be components, systems, software, services, rules, documents, or many other items. The result could in some cases be many related individual results.

4.24
quality in use
degree to which a product or system can be used by specific users to meet their needs to achieve specific goals with effectiveness, efficiency, freedom from risk and satisfaction in specific contexts of use

Note 1 to entry: Before the product is released, quality in use can be specified and measured in a test environment designed and used exclusively by the intended users for their goals and contexts of use, e.g. User Acceptance Testing Environment.

4.25
quality in use measure
measure of the degree to which a product or system can be used by specific users to meet their needs to achieve specific goals with effectiveness, efficiency, freedom from risk, satisfaction and context coverage in specific contexts of use

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