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Software engineering — Software product Quality Requirements and Evaluation (SQuaRE) — Requirements for quality of Commercial Off-The-Shelf (COTS) software product and instructions for testing

Ingénierie du logiciel — Exigences de qualité pour le logiciel et évaluation (SQuaRE) — Exigences de qualité pour les progiciels et instructions d'essai

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member 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 shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 25051 was prepared by Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and system engineering*. This first edition cancels and replaces the first edition of ISO/IEC 12119:1994.

The IEEE Computer Society participated as a liaison organization in the revision of this International Standard. Some suggestions from the IEEE adoption of the 1994 edition of this International Standard have been incorporated in this revision.

This corrected version of ISO/IEC 25051:2006 incorporates the following corrections:

— English and French titles corrected.

Introduction

Commercial Off-The-Shelf (COTS) software products are used in an increasingly wide variety of application areas and their correct operation is often vital for business, safety or personal applications.

COTS software products are ready-made packages sold off-the-shelf to the acquirer who had no influence on its features and other qualities. Typically the software is sold pre-wrapped with its user documentation. The information provided on the cover of the package is often the only means whereby the manufacturer or marketing organization can communicate with the acquirer and user. It is therefore important that essential information is given to enable acquirers to evaluate the quality of the COTS software products for their needs.

Selecting high quality COTS software products is of prime importance, because COTS software products may have to be operational in various environments and selected without the opportunity to compare performance among similar products. Suppliers need a way to ensure confidence in services given by the COTS software product to the users. Some suppliers may choose third-party evaluation or certification to assist them in providing this confidence.

In addition, when users require assurances that business or safety critical risks are involved, those assurances may need to be addressed by the user using techniques chosen by the user after the purchase. It is not the intent of this International Standard to specify minimum safety or business critical quality requirements for COTS, however, informative guidance is given. (See Annex B.)

ISO/IEC 12119:1994, was developed to support these needs. This International Standard took into account ISO/IEC 9126:1991, which defined quality characteristics.

The environment has changed. ISO/IEC 9126 has been revised, issued as ISO/IEC 9126-1 (including, for example, concept about quality in use), and in the new SQuaRE series it will become ISO/IEC 25010. ISO/IEC 12119:1994 has been used by certification bodies, which have identified some difficulties and ambiguities to correctly use the first edition.

These items are the major points for revising this International Standard, which provides a set of requirements for COTS software product and requirements for testing a COTS software product against its requirements.

This document is then a revision of ISO/IEC 12119:1994 to:

– be consistent with ISO/IEC 25010;

– take into account the experience resulting from usage of the standard, particularly by certification bodies;

– take into account the new normative context;

– add a clause about testing;

– delete Annex B for consistency with ISO 9127.

Software engineering — Software product Quality Requirements and Evaluation (SQuaRE) — Requirements for quality of Commercial Off-The-Shelf (COTS) software product and instructions for testing

1 Scope

This International Standard is applicable to COTS software products.

In this International Standard, the term “COTS” is used as an adjective and stands for “Commercial Off-The-Shelf”.

EXAMPLE Examples of COTS software products include but are not limited to text processors, spreadsheets, data base control software, graphics packages, software for technical, scientific or real-time embedded functions, such as real-time operating systems or local area networks for aviation/communication, automated teller machines, money conversion, human resources management software, sales management, and web software such as generators of web sites/pages.

This International Standard establishes:

a) Quality requirements for COTS software products;

b) Requirements for test documentation for the testing of COTS software products, including test requirements, test cases, and test reporting;

c) Instructions for conformity evaluation of COTS software products.

NOTE The collection of documents for test is called “test documentation”.

It includes also recommendations for safety or business critical COTS software products.

This International Standard deals only with providing the user confidence that the COTS software product will perform as offered and delivered. It does not deal with the production process (including activities and intermediate products, e.g. specifications). The quality system of a supplier is outside the scope of this International Standard.

The intended users of this International Standard include:

a) suppliers when:

   1) specifying requirements for a COTS software product;

   2) advertising performance claims for their product (ISO 9127);

   3) assessing their own software products against the claimed performance;

   4) issuing declarations of conformity (ISO/IEC 17050);

   5) applying for certificates or marks of conformity (ISO/IEC Guide 23);

b) certification bodies that may wish to establish a third-party certification scheme (international, regional or national) (ISO/IEC Guide 28);

c) testing laboratories which will have to follow the instructions for testing when testing for a certificate or a mark of conformity (ISO/IEC 17025);

d) accreditation bodies for accrediting registration or certification bodies and testing laboratories;

e) potential acquirers who may:

   1) compare the requirements for the intended work task with the information in product descriptions of existing software products;

   2) look for certified COTS software product;

   3) check if the requirements are otherwise met;

f) end users who may profit from better software products;

g) organizations:

   1) establishing management and engineering environments based on the quality requirements and methods of this international standard; and

   2) managing and improving their quality processes and personnel;

h) regulatory authorities who may require or recommend the requirements of this International Standard for COTS software products used in safety or business-critical applications.

Annex C provides guidance on the use of this International Standard.

2 Conformance

A COTS software product conforms to this International Standard if:

a) it has the properties specified in Clause 5;

b) it has been tested by producing test documentation that meets the requirements of Clause 6;

c) anomalies found during testing are documented and resolved prior to product release. Anomalies against advertised performance claims must be fixed or the performance claim must be removed. Known anomalies may be considered acceptable if:

   1) the anomaly is not a violation of a performance claim; and

   2) the supplier has duly considered the nature and the impact of the anomaly on the potential acquirer and deemed it negligible, and has preserved the documentation of the anomalies for future improvement.

Subclause recommendations are optional.

NOTE To facilitate the conformity evaluation, requirements of the present standard are drafted in a way that they are level 3 subclauses (numbered X.X.X.X). Informative notes complete these clauses and can serve as a guide.

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 9126-1:2001, *Software engineering — Product quality — Part 1: Quality model*

Note The reference to ISO/IEC 9126-1 will be replaced by a reference to ISO/IEC 25010*, Software product Quality Requirements and Evaluation (SQuaRE) — Quality Model*

Refer to Bibliography for additional informative documents.

4 Terms and definitions

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

4.1
application administration function
functions performed by users which include installation, configuration, application backup, maintenance (patching and upgrading) and de-installation

4.2
conformity evaluation report
document that describes the conduct and results of the evaluation carried out for a COTS software product

NOTE This was adapted from IEEE Std 610.12-1990.

4.3
COTS software product
Commercial-Off-The-Shelf software defined by a market driven need, commercially available, and whose fitness for use has been demonstrated by a broad spectrum of commercial users

NOTE 1 COTS software product includes:

– the product description (including all cover information, data sheet, web site information, etc.),

– the user documentation (necessary to install and use the software),

– the software contained on a computer sensible media (disk, CD-ROM, internet downloadable, etc.).

NOTE 2 This was adapted from ISO/IEC 14598-4:1999.

NOTE 3 Software is mainly composed of programs and data.

NOTE 4 This definition apply also to product description, user documentation and software which are produced and supported as separate manufactured goods, but for which typical commercial fees and licensing considerations may not apply.

4.4
function
implementation of an algorithm in the software with which the end user or the software can perform part or all of a work task

NOTE A function does not need to be callable by the end user (e.g. automatic backupor saving of data).

4.5
product description
document stating properties of software, with the main purpose of helping potential acquirers in the evaluation of the suitability for themselves of the software before purchasing it

4.6
requirements document
document containing any combination of requirements or regulations to be met by a COTS software product

EXAMPLE These documents may be technical reports, standards, requirements list (or model requirements specification) for a kind of users, or a statute or regulation imposed by a governing or regulatory body.

4.7
test documentation
collection of the documentation inherent to the testing activities

4.8
test environment
hardware and software configuration necessary to conduct the test case

4.9
test objective
identified set of software features to be measured under specified conditions by comparing actual behavior with the required behavior

NOTE This was adapted from IEEE Std 610.12-1990.

4.10
test plan
document describing the scope, approach, resources, and schedule of intended testing activities

NOTE This was adapted from IEEE Std 610.12-1990.

4.11
testing description
description of the test execution conditions (i.e. test procedure)

Refer to Annex A for additional definitions from other standards.

5 Requirements for COTS software product

5.1 Requirements for product description

NOTE The paragraph concerning the Cover information of ISO/IEC 9127 *Software engineering — User documentation and cover information for consumer software package* can be used as input for creating a product description.

5.1.1 Availability

5.1.1.1 The product description shall be available for potential acquirers and users of the product.

5.1.2 Contents

5.1.2.1 The product description shall contain information needed by potential acquirers to evaluate the suitability of the software for their needs.

5.1.2.2 The product description shall be free from internal inconsistences.

5.1.2.3 The statements included in the product description shall be testable or verifiable.

5.1.3 Identification and indications

5.1.3.1 The product description shall display a unique identification.

5.1.3.2 The COTS software product shall be designated by its name, a version, and a date.

5.1.3.3 The product description shall contain the name and address (postal or web) of the supplier and at least one seller, e-commerce seller or distributor (if applicable).

5.1.3.4 The product description shall identify the intended work tasks and services that can be performed with the software.

5.1.3.5 When requirements defined by law or by a regulatory body apply to the COTS Software product and the supplier want to claim conformity to the corresponding requirements documents, the product description shall identify those requirements documents.

5.1.3.6 The product description shall indicate whether the COTS software product is intended for multiple concurrent end users or for a single end user on a single system, and shall state the maximum number of concurrent end users feasible at a stated level of performance on the required system.

5.1.3.7 If the product description makes reference to known user callable interfaces to other software, these interfaces or software shall be identified.

5.1.3.8 The product description shall indicate where the COTS software product relies on specific software and/or hardware with appropriate references.

EXAMPLES The reference may include:
– name of software and/or hardware;
– version;
– specific operating system.

5.1.3.9 The product description shall state whether support for operating the COTS software product is offered or not.

5.1.3.10 The product description shall state whether maintenance is offered or not. If offered, the product description shall describe the maintenance services offered.

5.1.4 Statements on functionality

5.1.4.1 The product description shall contain, as applicable, statements on functionality, taking into account suitability, accuracy, interoperability, security, and functionality compliance, written such that verifiable evidence of compliance can be demonstrated, based on ISO/IEC 9126-1:2001.

5.1.4.2 The product description shall provide an overview of end user callable functions of the product.

5.1.4.3 The product description shall describe all critical functions.

NOTE Refer to Annex B and to ISO/IEC 15026 for more information.

5.1.4.4 If there are options and versions for software components, they shall be indicated.

5.1.4.5 All known limitations to user functionality shall be described.

EXAMPLES These limitations may be:
– minimum or maximum values;
– lengths of keys;
– maximum number of records in a file;
– maximum number of search criteria;
– minimum sample size.

5.1.4.6 If prevention of unauthorized access, whether accidental or deliberate, to the software is provided, the product description shall include this information.

5.1.5 Statements on reliability

5.1.5.1 The product description shall contain, as applicable, statements on reliability, taking into account maturity, fault tolerance, recoverability, and reliability compliance, written such that verifiable evidence of compliance can be demonstrated, based on ISO/IEC 9126-1:2001.

NOTE No statement claiming reliability should be made unless the developer can substantiate the claim with in-service data or other verifiable data.

5.1.5.2 The product description shall address the ability of the software to continue operating (i.e. to be available) in the case of user interface errors, errors in the application's own logic, or errors due to availability of system or network resources.

5.1.5.3 The product description shall include information on data saving and restoring procedures.

NOTE An indication affirming that data backup may be executed by functions of the operating system is acceptable.

5.1.6 Statements on usability

5.1.6.1 The product description shall contain, as applicable, statements on usability, taking into account understandability, learnability, operability, attractiveness, and usability compliance, written such that verifiable evidence of compliance can be demonstrated, based on ISO/IEC 9126-1:2001.

5.1.6.2 The product description shall specify the type of user interface.

EXAMPLES These interfaces may be:
– command line;
– menu;
– windows;
– web browser;
– function key;
– help function.

5.1.6.3 The product description shall specify the specific knowledge required for the use and operation of the software.

EXAMPLES They can be:
– knowledge of the database calls and protocol used;
– knowledge of a technical area;
– knowledge of an operating system;
– knowledge obtainable by special training;
– knowledge of a language other than that in which the product description is written.