
**Systems and software engineering —
Systems and software Quality
Requirements and Evaluation
(SQuaRE) — Planning and
management**

*Ingénierie des systèmes et du logiciel — Exigences de qualité et
évaluation des systèmes et du logiciel (SQuaRE) — Planification et
gestion*

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.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 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 25001 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Systems and software engineering*.

This second edition cancels and replaces the first edition (ISO/IEC 25001:2007), 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.

Introduction

This International Standard provides details about the planning and management requirements associated with systems and software product quality requirements and evaluation.

While this International Standard is mainly concerned with systems and software product quality requirements and evaluation, wherever it is relevant the corresponding process requirements and evaluation activities are also discussed.

This International Standard aims to clarify the requirements, which should be identified by the organisation in order to ensure the success of specifying systems and software quality requirements and executing the evaluation.

This International Standard is intended to be used in conjunction with the other documents of the ISO/IEC 25000 SQuaRE series of standards. The ISO/IEC 25000 SQuaRE series replaces the ISO/IEC 9126 series and the ISO/IEC 14598 series.

This International Standard complies with the technical processes identified in ISO/IEC 15288:2008 and ISO/IEC 12207:2008 related to quality requirements definition and analysis.

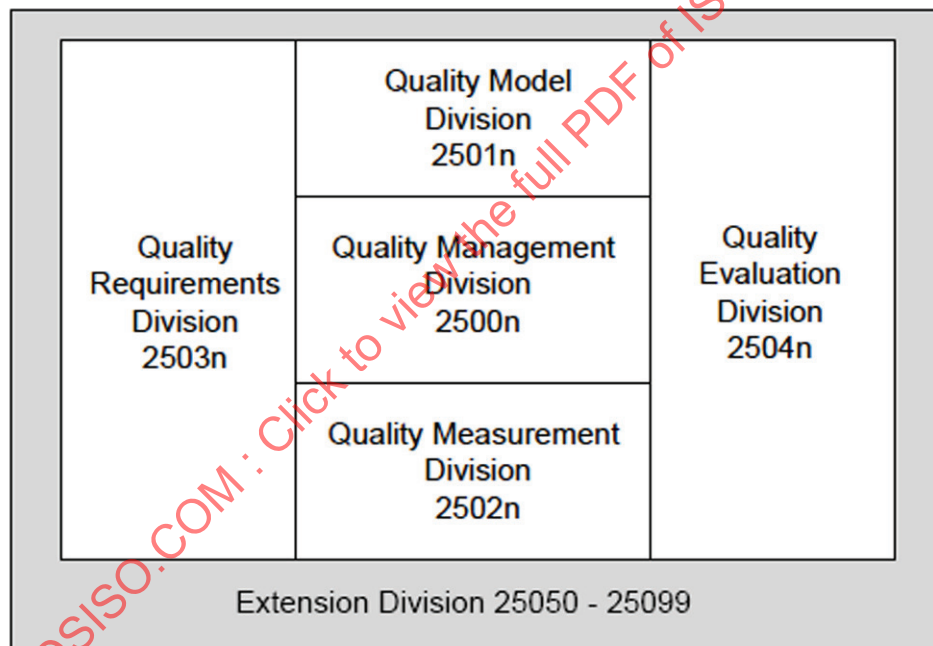


Figure 1 — Organization of SQuaRE series of standards

[Figure 1](#) (quoted after ISO/IEC 25000) illustrates the organisation of the SQuaRE series representing families of standards, further called Divisions.

The Divisions within SQuaRE model 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 standards from the SQuaRE series. Referring paths (guidance through SQuaRE documents) and high level practical suggestions in applying proper standards to specific application cases offer help to all types of users. The division also provides requirements and guidance for a supporting function, which is responsible for the management of product requirements specification and evaluation.

- **ISO/IEC 2501n - Quality Model Division.** The International Standards that form this division present detailed quality models for systems and software product, quality in use and data. Practical guidance on the use of the quality model is also provided.
- **ISO/IEC 2502n - Quality Measurement Division.** The International Standards that form this division include a system and software product quality measurement reference model, mathematical definitions of quality measures, and practical guidance for their application. This division presents internal measures of software quality, external measures of system or software product quality and quality in use measures. Quality measure elements forming foundations for the latter measures are defined and presented.
- **ISO/IEC 2503n - Quality Requirements Division.** The International Standard that forms this division helps specifying quality requirements. These quality requirements can be used in the process of quality requirements elicitation for a product to be developed or as inputs for an evaluation process. The requirements definition process is mapped to Stakeholder Requirements Definition Process in Technical Processes defined in ISO/IEC 15288:2008 and ISO/IEC 12207:2008.
- **ISO/IEC 2504n - Quality Evaluation Division.** The International Standards that form this division provide requirements, recommendations and guidelines for product evaluation, whether performed by independent evaluators, acquirers or developers. The support for documenting a measure as an Evaluation Module is also presented.
- **ISO/IEC 25050-25099 - Extension Division.** SQuaRE extension (ISO/IEC 25050 to ISO/IEC 25099) is designated to contain system or software product quality International Standards and/or Technical Reports that address specific application domains or that can be used to complement one or more SQuaRE International Standards.

Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Planning and management

1 Scope

This International Standard provides requirements and recommendations for an organization responsible for implementing and managing the systems and software product quality requirements specification and evaluation activities through the provision of technology, tools, experiences, and management skills.

The role of the evaluation group includes motivating employees and training them for the requirements specification and the evaluation activities, preparing appropriate documents, identification or development of required methods, and responding to queries on relevant technologies.

Technology management is related to the planning and management of a systems and software quality requirements specification and evaluation process, measurements and tools. This includes the management of development, acquisition, standardisation, control, transfer and feedback of requirements specification and evaluation technology experiences within the organisation.

The intended users of this International Standard are those responsible for:

- managing technologies used for requirements specification and evaluation execution,
- specifying systems and software product quality requirements,
- supporting systems and software product quality evaluation,
- managing systems and software development organisations,

as well as those in a quality assurance function. However, it is also applicable to managers involved in other systems or software related activities.

2 Conformance

In order to conform to this International Standard, an organisation shall apply requirements from [clause 6](#) giving the reasons for any exclusion, or describe its own recommendations and provide a mapping to the original requirements.

3 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 25000:2014, *Software Engineering — Software product Quality Requirements and Evaluation (SQuaRE) — Guide to SQuaRE*

ISO/IEC 25010:2011, *Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — System and software quality models*

ISO/IEC 25020:2007, *Software engineering — Software product Quality Requirements and Evaluation (SQuaRE) — Measurement reference model and guide*

ISO/IEC 25021:2012, *Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Quality measure elements*

ISO/IEC 25022, *Systems and software engineering - Systems and software Quality Requirements and Evaluation (SQuaRE) – Measurement of quality in use*¹⁾

ISO/IEC 25023, *Systems and software engineering: Systems and software Quality Requirements and Evaluation (SQuaRE) – Measurement of system and software product quality*²⁾

ISO/IEC 25024, *Systems and software engineering: Systems and software Quality Requirements and Evaluation (SQuaRE) – Measurement of data quality*³⁾

ISO/IEC 25030:2007, *Software engineering — Software product Quality Requirements and Evaluation (SQuaRE) — Quality requirements*

ISO/IEC 25040:2011, *Systems and software engineering - Systems and software Quality Requirements and Evaluation (SQuaRE) – Evaluation process*

ISO/IEC 25041:2012, *Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Evaluation guide for developers, acquirers and independent evaluators*

ISO/IEC 25045:2010, *Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Evaluation module for recoverability*

ISO/IEC 25051, *Software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Requirements for quality of Ready to Use Software Product (RUSP) and instructions for testing*

ISO/IEC 15288:2008, *Systems and software engineering — System life cycle processes*

ISO/IEC 12207:2008, *Systems and software engineering — Software life cycle processes*

4 Terms and definitions

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

4.1 evaluation

systematic determination of the extent to which an entity meets its specified criteria (ISO/IEC 12207:2008)

4.2 evaluation activity

assessment of systems or software product against targeted values of identified and applicable quality characteristics performed using applicable techniques or methods

4.3 evaluation group

organization responsible for specifying the systems and software quality requirements as well as managing and implementing the quality evaluation activities through the provision of technology, tools, experiences, and management skills

Note 1 to entry: Software quality requirements could be specified previously by the requestor of the evaluation while the evaluation group would verify presence and value of the software quality requirements.

1) To be published.

2) To be published.

3) To be published.

4.4

evaluation technology (technology used for evaluation)

techniques, processes, tools, measures and relevant technical information used for evaluation

EXAMPLE internal, external or quality in use measures or specific evaluation processes designed for developers, acquirers or independent evaluators

4.5

techniques

methods and skills required to carry out a specific activity

5 Evaluation management concepts

The ISO/IEC 25001 is applicable to the evaluation group, which provides the organisation-wide support to all projects in systems or software development, systems or software acquisition and third party evaluation organisations (see [Table 1](#)).

Table 1 — System or software quality evaluation activities

DEVELOPED SYSTEMS or SOFTWARE		ACQUIRED SYSTEMS or SOFTWARE	
Development Activities	Evaluation Activities	Acquisition Activities	Evaluation Activities
The “deliverables” are dependent upon the chosen life cycle (see ISO/IEC 15288 and ISO/IEC 12207) e.g. System Requirements Specification, Systems Design Specification	Evaluation of specific “deliverables” (output of the project) e.g. System Design Review	Purchase of the existing system or ready-to-use software products (RUSP)	Evaluate the product to be acquired applying appropriate International Standards and Technical Reports from ISO/IEC 25000 SQuaRE series

The main responsibilities of the evaluation group are:

- leading and management of systems or software quality evaluation related activities,
- leading the identification and definition of quality requirements,
- execution of quality requirements specification and quality evaluation projects,
- development of criteria for setting benchmarks for the evaluation,
- collection and analysis of evaluation group activities results,
- dissemination of results of evaluation group activities within the organisation,
- acquisition of relevant technical information,
- acquisition of evaluation technology,
- development of the proprietary (company-specific) standards and tools,
- evaluation of effectiveness and quality of systems or software acquisition and development,
- facilitation of technology transfer.

NOTE The evaluation group can be external or internal with respect to the organisation which is evaluating the systems or software.

6 Requirements and recommendations for systems and software quality requirements specification and quality evaluation

6.1 General

The organisation shall develop policies and plans for quality requirements specification and quality evaluation activities, which also includes the roles of the evaluation group.

For the requirements specification purposes ISO/IEC 25010 and ISO/IEC 25030 shall be applied. For the evaluation execution purposes ISO/IEC 25040, ISO/IEC 25041 and ISO/IEC 25045 (when applicable) shall be applied. For the requirements specification, quality measurement and evaluation execution purposes ISO/IEC 25010 and ISO/IEC 25020 to ISO/IEC 25024 shall be applied.

The Quality Evaluation Project Plan (template example: [Annex A](#)) for an evaluation project shall identify and describe activities applicable in the steps below:

- specifying systems and software quality requirements,
- defining the objectives of the systems and software quality evaluation,
- establishing evaluation requirements
- specifying the evaluation,
- designing the evaluation,
- executing the evaluation,
- analysing results.

The systems or software quality evaluation shall satisfy pre-defined criteria, including the following:

- conformance to international, national or internal standards (if applicable),
- ability to quantify and clearly present traceable results,
- use of suitable and effective technology and best practices.

6.2 Organisation level activities

Any organisation that develops, acquires or evaluates systems and/or software shall identify the associated systems and/or software quality evaluation responsibilities and incorporate them into an organisation policy.

6.2.1 Organisation environment management

The organization shall implement the following in accordance with applicable organization policies and procedures:

- prepare systems and/or software quality evaluation plan and procedures that are consistent with organisation strategic and organization quality policies,
- define the roles, responsibilities and authorities to facilitate strategic management of systems and/or software quality,
- define target values for quality evaluation,
- conduct periodic reviews of the systems and software quality model applied in quality requirements and evaluation projects.

NOTE The above requirements are based on the Quality Management Process in Organizational Project-Enabling Processes clause of ISO/IEC 15288:2008 and ISO/IEC 12207:2008.

6.2.2 Resources management

The organization shall implement the following in accordance with applicable organization policies and procedures:

- determine and provide the resource infrastructure support needed to execute systems and/or software quality requirements specification and evaluation project,
- maintain and manage the pool of personnel necessary to staff ongoing projects,
- manage schedule conflicts that may result from executing multiple project in parallel.

6.2.3 Planning the use and improvement of the quality requirements specification and quality evaluation technology

An overall plan for improving the systems and/or software quality evaluation, quality of quality requirements and supporting technologies shall be made and implemented.

The plan should include the following:

a) Preparation of a policy

There should be a policy stating the organisation's approach to the introduction, maintenance and improvement of systems and software quality requirements specification and quality evaluation.

b) Definition of the organisation's objectives

The organisation's objectives, which are to be achieved by the introduction, maintenance and improvement of systems and software quality requirements specification and evaluation technology, shall be defined.

c) Identification of the evaluation technology to be used

The quality evaluation techniques and tools used in the organisation shall be assessed and identified in the policy. Any deviation from the stated objectives shall be either justified or corrected.

d) Assignment of responsibilities for the management of the quality requirements specification and evaluation process

Clearly stated responsibility shall be assigned for the introduction, maintenance and ongoing improvement of the quality requirements specification and quality evaluation process.

e) Identification of further improvements

Improvement of the quality requirements specification and quality evaluation processes and the use of new technology shall be planned and executed.

6.2.4 Implementation of the evaluation technology

The organisation shall:

- define the requirements for acquiring or developing the evaluation technology,
- assess the availability of quality evaluation technology,
- define the process for adopting and operating the acquired evaluation technology.

Any validated evaluation module should be maintained under configuration control, and documented as an Evaluation Module. Otherwise it should be put into trial use for assessment.

6.2.5 Transfer of the technology used for evaluation

In order to transfer the developed or acquired technology the organisation shall prepare training programs, tools and the appropriate environment for the introduction and adoption of new technology. These programs, tools and environment shall correspond to the technology applied in the evaluation group activities.

a) Preparation for technology transfer

The organisation shall consider the following for the purpose of technology transfer:

- prepare supporting training programs,
- prepare tools and environment,
- define how to collect data and assess the technology transfer,
- define how to collect experiences about technology transfer.

NOTE Quality Evaluation Project Plan targets, activities, schedules, project objectives and responsibilities should make a part of dedicated training program.

b) Implementation of technology transfer

The organisation shall implement the technology transfer and collect the data according to the defined plan.

c) Assessment of technology transfer

The organisation shall assess the technology transfer as follows:

- assess the effects of the introduced technology for all projects,
- evaluate the extent to which the technology is used within the organisation.

The organisation shall, if necessary, modify or prepare a new plan subject to the results of the assessment.

6.2.6 Assessment of technology for quality requirements specification and evaluation

In order to improve quality requirements specification and evaluation, the technology used shall be assessed. The data captured during the evaluation should be analysed applying the appropriate tools and methods (like for example economical or statistical analysis tools). This includes the following:

- effort spent on quality requirements specification
- effort spent on measurements and evaluation. This information shall be verified and maintained for future use by other projects and for the purpose of verifying the usefulness of the new technology,
- suitability and validity of measurements, evaluation criteria and the techniques used,
- effectiveness of quality requirements specification
- effectiveness of the overall systems and/or software quality evaluation,
- standardisation. If the above proves satisfactory the proprietary standardisation (company-specific) of the evaluation technology shall be considered
- Suitability of rating levels.

6.2.7 Management of experiences

The responsibility for the effective use of the evaluation technology within the organisation shall be defined. This responsibility includes the maintenance of assessment results and experiences. These shall be used to improve the quality and the use of the evaluation technology.

The improvements can be achieved through modifications of the proprietary (company-specific) standards, such as:

- definition of quality requirements,
- measures selection,
- definition of rating level, and
- assessment criteria.

In order to achieve the above improvements the following approach shall be taken into consideration:

- carry out periodic technology-related reviews,
- integrate new and existing relevant standards,
- integrate new and existing measures,
- provide feedback that should be used in revisions of these standards,
- provide feedback that should be used in revisions of the organisation's Quality Plan and/or Quality Manual,
- maintain records of the improvements and ensure the utilisation of "best practices" within the organisation.

6.3 Project Management level activities

The evaluation group assures the effective management of its activities. This includes systems and software requirements specification and evaluation planning, the promotion of this plan and any necessary technology transfer.

For the management of an evaluation project there shall be an agreed Quality Evaluation Project Plan.

The evaluation shall be managed by an experienced project manager, and have:

- an approved budget,
- suitable resources,
- supporting tools, standards and procedures,
- clearly defined, documented and agreed Quality Evaluation Project Plan ([Annex A](#)).

6.3.1 Support for Evaluation Planning

In order to carry out systems and software product evaluation successfully a Quality Evaluation Project Plan shall be developed at the start of a project. The aim of the plan is to assist the project manager in defining and monitoring quantitative quality objectives. It shall also assist all project staff in identifying their own quality objectives and in monitoring their progress continuously against those objectives.

The following shall be considered when such a plan is being prepared:

- a) The purpose and use of the plan

All project members shall understand the importance of the proposed plan, its implementation details and its relevance to each individual project member. All this shall be clarified prior to any evaluation activity.

This plan shall be acknowledged and supported by all project personnel and management.

b) Validation of the plan

The plan shall be validated by the person responsible within an organisation. It shall be reviewed in order to ensure that it adequately covers the various evaluation requirements, which include the specification of the following:

- how the stated objectives will be achieved,
- how these objectives will be quantified and measured,
- how these measurements will support the evaluation process,
- how the quantitative management is to be carried out during systems or software product evaluation,

NOTE Quantitative management uses data from statistical management in order to predict whether the project will be able to achieve its quality and process-performance objectives and identify what corrective action should be taken

- respective quality objectives,

NOTE These may be product, process or even size related

- clarification of the tasks, and assignment of corresponding responsibilities, (e.g. who is responsible for data collection, analysis and feedback to the project staff and to the management)
- definition of how data is to be collected, controlled and used.

c) Content of the plan

The content of this plan shall cover all measures applicable to the quality characteristics of the systems and/or software product specified by quality requirements.

The objectives stated in the plan shall be complemented by:

- the corresponding product quality characteristics,
- the adopted standards,
- methods,
- staff skills,
- tool and project management support.

A Quality Evaluation Project Plan template is shown in [Annex A](#).

6.4 Analysis and use of evaluation results

The evaluation group shall collect the evaluation results at the end of each evaluation project. These results shall be then analysed and put in effective use. In order to achieve these objectives the following shall be considered:

- verification of the quality of collected data (e.g. meaningful, representative, correct and statistically valid)
- identification of appropriate methods of data aggregation and analysis,

- identification of appropriate methods of data interpretation,
- revision of targeted values for quality factors for each evaluation project,
- relevant training, if required.

In order to improve evaluation technology, the following shall be analysed and the findings recorded:

- evaluation results,
- evaluation methods,
- evaluation targeted values of quality factors for each evaluation project.

After the analysis process the obtained data shall be interpreted and presented to all involved parties. The collected data shall also be stored for reference purposes for future projects.

Annex A **(informative)**

Quality Evaluation Project Plan Template

The following Quality Evaluation Project Plan template makes an example of a document that should be used by the evaluation group when preparing and executing an evaluation project. If the preparation of an evaluation project requires more specific approach like for example applying the specific evaluation process, the users of this standard may refer to the following parts of SQaRE series:

ISO/IEC 25040:2011, Systems and software engineering – Systems and software Quality Requirements and Evaluation (SQaRE) – Evaluation process

ISO/IEC 25041:2012, Systems and software engineering – Systems and software Quality Requirements and Evaluation (SQaRE) – Evaluation guide for developers, acquirers and independent evaluators

ISO/IEC 25045:2010, Systems and software engineering – Systems and software Quality Requirements and Evaluation (SQaRE) – Evaluation module for recoverability

If the preparation of an evaluation project requires more specific approach to requirements definition process the users of this standard may refer to the following parts of SQaRE series:

ISO/IEC 25030:2007, Software engineering: Software product Quality Requirements and Evaluation (SQaRE) – Quality requirements

If the preparation of an evaluation project requires more specific approach to measurement process the users of this standard may refer to the following parts of SQaRE series, when published:

ISO/IEC 25020:2007, Software engineering – Software product Quality Requirements and Evaluation (SQaRE) - Measurement reference model and guide

ISO/IEC 25021:2012, Systems and software engineering – Systems and software Quality Requirements and Evaluation (SQaRE) – Quality measure elements

ISO/IEC 25022, Systems and software engineering – Systems and software product Quality Requirements and Evaluation (SQaRE) – Measurement of quality in use (when published)

ISO/IEC 25023, Systems and software engineering – Systems and software product Quality Requirements and Evaluation (SQaRE) – Measurement of system and software product quality (when published)

ISO/IEC 25024, Systems and software engineering – Systems and software product Quality Requirements and Evaluation (SQaRE) – Measurement of data quality (when published)

A.1 Chapter 1 Introduction

The following should be described:

- the purpose of the plan
- the audience of the plan
- the intended use of the plan