
**Software engineering — Software product
Quality Requirements and Evaluation
(SQuaRE) — Data quality model**

*Ingénierie du logiciel — Exigences de qualité et évaluation du produit
logiciel (SQuaRE) — Modèle de la qualité des données*

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Published in Switzerland

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ISO/IEC 25012:2008

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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 25012 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*.

ISO/IEC 25012 is one of the SQuaRE series of International Standards, which 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),
- Quality Measurement Division (ISO/IEC 2502n),
- Quality Requirements Division (ISO/IEC 2503n),
- Quality Evaluation Division (ISO/IEC 2504n).

Introduction

The quantity of data and information handled by computer systems is increasing worldwide; data quality is a key component of the quality and usefulness of information derived from that data, and most business processes depend on the quality of data.

A common prerequisite to all information technology projects is the quality of the data which are exchanged, processed and used between the computer systems and users and among computer systems themselves.

Managing and enhancing the quality of data is important because of:

- the acquisition of data from organizations of which the quality of data production process is unknown or weak;
- the existence of defective data contributing to unsatisfactory information, unusable results and dissatisfied customers;
- the dispersion of such data among various owners and users. Data captured in accordance with the workflow needs of a single organization often lack a coherent and integrated vision which is necessary to ensure interoperability and co-operation;
- the need for processing data which are not immediately re-usable because of semantic ambiguity or lack of consistency between such data and other existing co-related data;
- the co-existence of legacy architecture and computer systems with distributed systems designed and realized at different times and with different standards;
- the existence of information systems (such as the world wide web) where data change frequently and integration is a special issue.

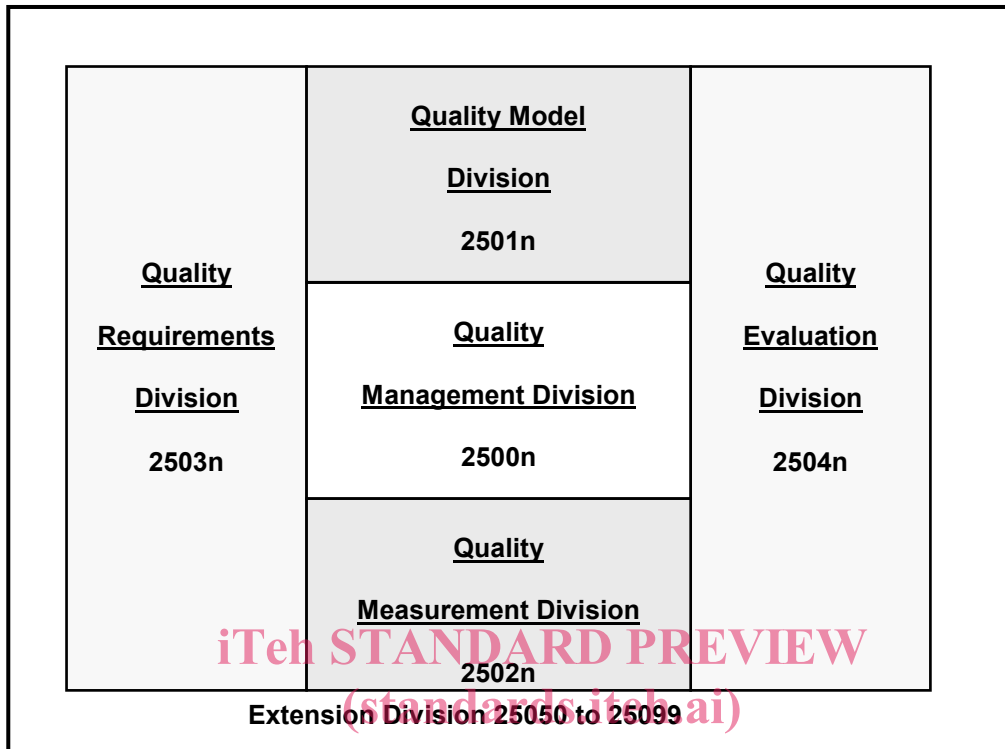
The data quality model defined in this International Standard aims to meet these needs, taking into account that the data life cycle is often longer than the software life cycle; it could be used, for example, to:

- define and evaluate data quality requirements in data production, acquisition and integration processes;
- identify data quality assurance criteria, also useful for re-engineering, assessment and improvement of data;
- evaluate the compliance of data with legislation and/or requirements.

The detection of errors or inefficiencies due to data gives rise to enhancement and corrective interventions concerning data and other components of the system in which data reside, for example:

- data (e.g. redesigning, parsing, cleansing, enriching, transforming, matching);
- software (e.g. modifying source programs to implement consistency controls);
- hardware (e.g. upgrading a computer system to improve response time);
- human business processes (e.g. user training to avoid errors in the data entry process; improvement of accounting processes that manage data).

The data quality model defined in this International Standard is intended to be used in conjunction with the other SQuaRE series International Standards, which are represented in Figure 1 (adapted from ISO/IEC 25000).



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Figure 1 — Organization of the SQuaRE series of International Standards

The divisions within the SQuaRE series are:

- **ISO/IEC 2500n - Quality Management Division.** The International Standards that form this division define all common models, terms and definitions referred to further as all other International Standards from the SQuaRE series. Referring paths (guidance through SQuaRE documents) and high level practical suggestions in applying proper standards to specific application cases provide help to all types of users. The division also provides requirements and guidance for a supporting function which is responsible for the management of software product requirements specification and evaluation.
- **ISO/IEC 2501n - Quality Model Division.** The International Standards that form this division present detailed quality models for software and data. Furthermore, in the software quality model the internal and external quality characteristics are decomposed into subcharacteristics. Practical guidance on the use of the quality models is also provided.
- **ISO/IEC 2502n - Quality Measurement Division.** The International Standards that form this division include a software product quality measurement reference model, mathematical definitions of quality measures, and practical guidance for their application. Presented measures apply to internal software quality, external software quality and quality in use. 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 to specify quality requirements. These quality requirements can be used in the process of quality requirements elicitation for a software product to be developed or as input for an evaluation process. The requirements definition process is mapped to technical processes defined in ISO/IEC 15288.

- **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 support for documenting a measure as an Evaluation Module is also presented.
- **ISO/IEC 25050 to ISO/IEC 25099** are reserved for SQuaRE extension International Standards, Technical Specifications, Publicly Available Specifications (PAS) and/or Technical Reports.

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Software engineering — Software product Quality Requirements and Evaluation (SQuaRE) — Data quality model

1 Scope

This International Standard defines a general data quality model for data retained in a structured format within a computer system.

This International Standard focuses on the quality of the data as part of a computer system and defines quality characteristics for target data used by humans and systems.

Target data are those that the organization decides to analyse and validate through the model; the term non-target data covers two cases: the first refers to data that are not persistent such as data handled by an operating system; the second refers to data that could be within the scope of the standard, but an organization chooses to not apply the standard to them.

In Figure 2 the structure of a general system is displayed in a diagram; this can include information systems which in turn can include one or more computer systems.

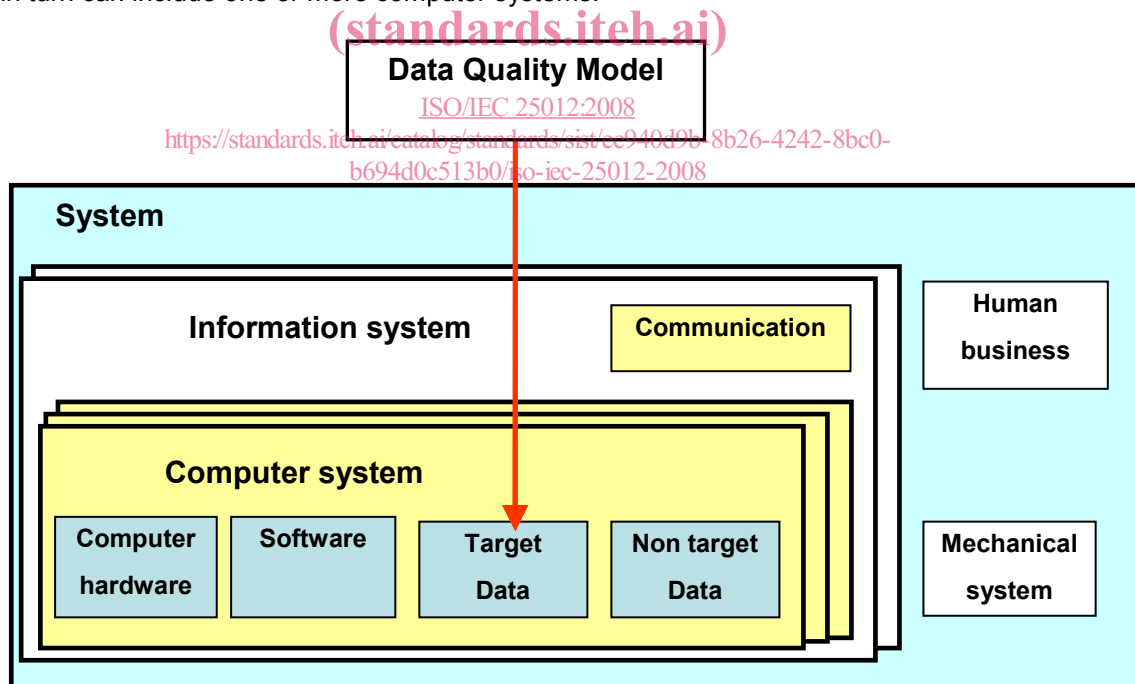


Figure 2 — Target domain of the data quality model

This International Standard can be used with other standards in the SQuaRE series to establish data quality requirements, define data quality measures, or plan and perform data quality evaluations.

Data quality requirements and data quality measures can be categorized with the data quality characteristics in 5.2 and used by an evaluation process to analyse data independently from other computer system's components.

ISO/IEC 25012:2008(E)

This International Standard aims to support the implementation of system's life cycle processes, such as those defined in ISO/IEC 15288.

This International Standard takes into account all data types (e.g. character strings, texts, dates, numbers, images, sounds, etc.), assigned data values and relationships between data (e.g. consistency between data in the same or in different entities); the scope does not include data produced by embedded devices or real time sensors that are not retained for further processing or historical purposes.

This International Standard does not dictate physical organization of data (i.e. data base management systems); moreover the activities of conceptual, logical and physical schema design are outside the scope of this International Standard; all processes and deliverables related to such data benefit from the application of this International Standard.

Conformance of data to the data design is included within the scope of this International Standard.

The definition of metadata is addressed by ISO/IEC 11179 and is outside the scope of this International Standard, even if it refers to metadata to evaluate data quality.

The relationship of this International Standard to industry- and domain-specific data quality standards and its precedence over these standards are determined by the user in a specific context of use.

2 Conformance

When this International Standard is used for conformance, the user shall provide evidence that each data quality characteristic in 5.2 has been addressed, give reasons in the event of exclusion, or describe its own categorization of data quality attributes and provide a mapping to the characteristics in 5.2.

3 Normative references

ISO/IEC 25012:2008

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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*

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

computer system

system containing one or more components

NOTE 1 Components include computers (hardware), associated software and data.

NOTE 2 Adapted from ISO/IEC 24765.

4.2

data

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

NOTE 1 Data can be processed by humans or by automatic means.

[ISO/IEC 2382-1:1993]

NOTE 2 The definition in ISO/IEC 25000 is different because it refers to data which relate to the result of the measurement.

4.3

data quality

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

4.4

data quality characteristic

category of data quality attributes that bears on data quality

4.5

data quality measure

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

NOTE Adapted from ISO/IEC 15939:2007.

4.6

data quality model

defined set of characteristics which provides a framework for specifying data quality requirements and evaluating data quality

4.7

data type

categorization of an abstract set of possible values, characteristics, and set of operations for an attribute

NOTE Adapted from ISO/IEC 2382-17.

4.8

entity

representation of a set of real or abstract things that are recognized as the same type because they share the same characteristics and can participate in the same relationships

NOTE Adapted from ISO/IEC 2382-17.

4.9

entity instance

one of a set of real or abstract things represented by an entity

[IEEE 1320.2-1998]

4.10

information

(information processing) knowledge concerning objects, such as facts, events, things, processes, or ideas, including concepts, that within a certain context have a particular meaning

[ISO/IEC 2382-1:1993]

NOTE Although information will necessarily have a representation form to make it communicable, it is the interpretation of this representation (the meaning) that is relevant in the first place.

4.11

information system

one or more computer systems and communication systems, together with associated organizational resources such as human, technical, and financial resources, that provide and distribute information

NOTE Adapted from ISO/IEC 2382-1:1993.