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**Software engineering — Systems and  
software Quality Requirements and  
Evaluation (SQuaRE) — Quality model  
for AI systems**

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## ISO/IEC 25059:2023(E)

### Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives) or [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs)).

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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 42, *Artificial intelligence*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html) and [www.iec.ch/national-committees](http://www.iec.ch/national-committees).

## Introduction

High-quality software products and computer systems are crucial to stakeholders. Quality models, quality requirements, quality measurement, and quality evaluation are standardized within the International Standards on SQuaRE, see [Annex A](#) for further information.

AI systems require additional properties and characteristics of systems to be considered, and stakeholders have varied needs. AI systems have different properties and characteristics. For example, AI systems can:

- replace human decision-making;
- be based on noisy, or incomplete data;
- be probabilistic;
- adapt during operation.

According to ISO/IEC TR 24028,<sup>[2]</sup> trustworthiness has been understood and treated as both an ongoing organizational process as well as a non-functional requirement specifying emergent properties of a system — that is, a set of inherent characteristics with their attributes — within the context of quality of use as indicated in ISO/IEC 25010.

ISO/IEC TR 24028 discusses the applicability to AI systems of that have been developed for conventional software. According to ISO/IEC TR 24028, does not sufficiently address the data-driven unpredictable nature of AI systems. While considering the existing body of work, ISO/IEC TR 24028 identifies the need for developing new International Standards for AI systems that can go beyond the characteristics and requirements of conventional software development.

ISO/IEC TR 24028 contains a related discussion on different approaches to testing and evaluation of AI systems. It states that for testing of an AI system, modified versions of existing software and hardware verification and validation techniques are needed. It identifies several conceptual differences between many AI systems and conventional systems and concludes that “the ability of the [AI] system to achieve the planned and desired result ... may not always be measurable by conventional approaches to software testing”. Testing of AI systems is addressed in ISO/IEC TR 29119-11:2020.<sup>[3]</sup>

This document outlines an application-specific AI system extension to the SQuaRE quality model specified in ISO/IEC 25010.

AI systems perform tasks. One or more tasks can be defined for an AI system. Quality requirements can be specified for the evaluation of task fulfilment.

The quality model is considered from two perspectives, product quality as described in [Clause 5](#) and quality in use in [Clause 6](#). The relevance of these terms is explained, and links to other standardization deliverables (e.g. the ISO/IEC 24029 series<sup>[4][5]</sup>) are highlighted.

ISO/IEC 25012:2008<sup>[6]</sup> contains a model for data quality that is complementary to the model defined in this document. ISO/IEC 25012:2008 is being extended for AI systems by the ISO/IEC 5259 series.<sup>[7]</sup>





# Software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Quality model for AI systems

## 1 Scope

This document outlines a quality model for AI systems and is an application-specific extension to the standards on SQuaRE. The characteristics and sub-characteristics detailed in the model provide consistent terminology for specifying, measuring and evaluating AI system quality. The characteristics and sub-characteristics detailed in the model also provide a set of quality characteristics against which stated quality requirements can be compared for completeness.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 25010:2011, *Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — System and software quality models*

ISO/IEC 22989:2022, *Information technology — Artificial intelligence — Artificial intelligence concepts and terminology*

ISO/IEC 23053:2022, *Framework for Artificial Intelligence (AI) Systems Using Machine Learning (ML)*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 22989:2022, ISO/IEC 23053:2022 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

### 3.1 General

#### 3.1.1

**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.

[SOURCE: ISO/IEC/IEEE 15939:2017, 3.15]

#### 3.1.2

**measure**, verb

make a measurement

[SOURCE: ISO/IEC 25010:2011, 4.4.6]

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### 3.1.3

#### **software quality measure**

measure of internal software quality, external software quality or software quality in use

Note 1 to entry: Internal measure of software quality, external measure of software quality or software quality in use measure are described in the quality model in ISO/IEC 25010.

[SOURCE: ISO/IEC 25040:2011, 4.61]

### 3.1.4

#### **risk treatment measure**

protective measure

action or means to eliminate hazards or reduce risks

[SOURCE: ISO/IEC Guide 51:2014, 3.13, modified — change reduction to treatment.]

### 3.1.5

#### **transparency**

degree to which appropriate information about the AI system is communicated to relevant stakeholders

Note 1 to entry: Appropriate information for AI system transparency can include aspects such as features, components, procedures, measures, design goals, design choices and assumptions.

## 3.2 Product quality

### 3.2.1

#### **user controllability**

degree to which a user can appropriately intervene in an AI system's functioning in a timely manner

### 3.2.2

#### **functional adaptability**

degree to which an AI system can accurately acquire information from data, or the result of previous actions, and use that information in future predictions

### 3.2.3

#### **functional correctness**

degree to which a product or system provides the correct results with the needed degree of precision

Note 1 to entry: AI systems, and particularly those using machine learning models, do not usually provide functional correctness in all observed circumstances.

[SOURCE: ISO/IEC 25010:2011, 4.2.1.2, modified — Note to entry added.]

### 3.2.4

#### **intervenability**

degree to which an operator can intervene in an AI system's functioning in a timely manner to prevent harm or hazard

### 3.2.5

#### **robustness**

degree to which an AI system can maintain its level of functional correctness under any circumstances