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Contents

Page

Foreword ..... **v**

Introduction ..... **vii**

1 Scope **1**

2 Normative references **1**

3 Terms, definitions and abbreviated terms **1**
3.1 Terms and definitions 1
3.2 Abbreviated terms 7

4 Conformance **8**

5 Concepts **8**
5.1 Requirements engineering 8
5.2 Requirement sources 9
5.2.1 Stakeholder needs and system constraints 9
5.2.2 Allocated requirements 9
5.2.3 Iteration and recursion 10
5.3 Requirement quality characteristics 11
5.3.1 Characteristics of individual requirements 11
5.3.2 Characteristics of a set of requirements 12
5.4 Requirement attributes 14
5.4.1 General considerations for requirements attributes 14
5.4.2 Examples of requirements attributes 14
5.4.3 Examples of the requirements type attribute 15
5.4.4 Requirements traceability 16
5.5 Forms of requirements and sources 16
5.5.1 Natural language statements 16
5.5.2 Agile backlog items 17
5.5.3 Modelling languages 18
5.5.4 Scenarios and use cases 18
5.5.5 Other forms 20
5.6 Enabling systems 20
5.6.1 General considerations 20
5.6.2 Requirements management tools 21
5.6.3 Prototypes 22
5.6.4 Static conceptual models 22
5.6.5 Digital engineering ecosystem 22
5.6.6 Artificial intelligence 23

6 Requirements of this document **23**
6.1 General considerations 23
6.2 Requirements for requirement quality characteristics 23
6.3 Requirements for processes 23
6.4 Requirements for information items 24

7 Processes **25**
7.1 Overview of processes 25
7.2 Primary requirements engineering processes 29
7.2.1 Business or mission analysis process 29
7.2.2 Stakeholder needs and requirements definition process 32
7.2.3 System requirements definition process 39
7.3 Requirements engineering in other processes 42
7.3.1 System architecture definition process 42
7.3.2 Verification process 43
7.3.3 Validation process 45
7.3.4 Configuration management process 46
7.3.5 Information management process 48

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7.3.6 Measurement process 49

8 Information items 51
8.1 Information items overview 51
8.2 Common elements for all information items 53
8.2.1 Common elements overview 53
8.2.2 Common elements content 53
8.2.3 General considerations for organizing information items 54
8.3 Concept of operations (ConOps) 54
8.3.1 ConOps overview 54
8.3.2 ConOps content 55
8.3.3 ConOps outline 57
8.4 Operational concept (OpsCon) 57
8.4.1 OpsCon overview 57
8.4.2 OpsCon content 58
8.4.3 OpsCon outline 69
8.5 Business requirements specification (BRS) 72
8.5.1 BRS overview 72
8.5.2 BRS content 72
8.5.3 BRS outline 76
8.6 Stakeholder requirements specification (StRS) 77
8.6.1 StRS overview 77
8.6.2 StRS content 78
8.6.3 StRS outline 82
8.7 System requirements specification (SyRS) 83
8.7.1 SyRS overview 83
8.7.2 SyRS content 84
8.7.3 SyRS outline 92

Annex A (informative) **Guidelines for constructing well-formed requirements 94**

Annex B (informative) **Information element catalogue 97**

Annex C (informative) **Conformance background and options 98**

Bibliography 100

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Foreword

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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Systems and software engineering*, in cooperation with the Systems and Software Engineering Standards Committee of the IEEE Computer Society, under the Partner Standards Development Organization cooperation agreement between ISO and IEEE.

This third edition cancels and replaces the second edition (ISO/IEC/IEEE 29148:2018), which has been technically revised.

The main changes are as follows:

— updated to conform to latest versions of ISO/IEC/IEEE 12207, ISO/IEC/IEEE 15288, and other referenced standards;

— updated information on Agile requirements, model-based requirements, and related topics;

— revised information item descriptions to improve consistency and better support production from requirements models;

— removed the software requirements specification information item and incorporated its content into the system requirements specification, for consistency with ISO/IEC/IEEE 15289.

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Introduction

This document provides a unified treatment of the processes and products involved in engineering requirements throughout the life cycle of systems and software. It provides details for the construct of well-formed requirements, to include characteristics and attributes, in the context of system and software engineering. This document also provides guidance for the implementation of requirements related processes from ISO/IEC/IEEE 15288 and ISO/IEC/IEEE 12207. Finally, this document identifies information items related to requirements engineering and their content, consistent with ISO/IEC/IEEE 15289.

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Systems and software engineering — Life cycle processes — Requirements engineering

1 Scope

This document:

— specifies the required processes implemented in the engineering activities that result in requirements for systems and software products (including services) throughout the life cycle;

— provides guidelines for applying the requirements and requirements-related processes described in ISO/IEC/IEEE 15288 and ISO/IEC/IEEE 12207;

— specifies the required information items produced through the implementation of the requirements processes;

— specifies the required contents of the required information items;

— provides guidelines for the organization of the required and related information items.

This document is applicable to:

— those who use or plan to use ISO/IEC/IEEE 15288 and ISO/IEC/IEEE 12207 on projects dealing with human-made systems, software-intensive systems, software and hardware products, and services related to those systems and products, regardless of the project scope, product(s), methodology, size or complexity;

— those who use or plan to use ISO/IEC/IEEE 15289 on projects dealing with human-made systems, software-intensive systems, software and hardware products and services related to those systems and products, regardless of the project scope, product(s), methodology, size or complexity.

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/IEEE 12207:2026, *Systems and software engineering — Software life cycle processes*

ISO/IEC/IEEE 15288:2023, *Systems and software engineering — System life cycle processes*

ISO/IEC/IEEE 15289:2019, *Systems and software engineering — Content of life-cycle information items (documentation)*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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

ISO, IEC and IEEE maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

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— IEC Electropedia: available at https://www.electropedia.org/

— IEEE Standards Dictionary Online: available at http://dictionary.ieee.org

NOTE For additional terms and definitions in the field of systems and software engineering, see ISO/IEC/IEEE 24765, which is published periodically as a "snapshot" of the SEVOCAB (Systems and software Engineering Vocabulary) database and which is publicly accessible at https://www.computer.org/sevocab.

3.1.1
acquirer
stakeholder (3.1.28) that acquires or procures a system, product or service from a *supplier* (3.1.32)

Note 1 to entry: Other terms commonly used for an acquirer are buyer, *customer* (3.1.10), owner, purchaser or internal/organizational sponsor.

[SOURCE: ISO/IEC/IEEE 15288:2023, 3.1]

3.1.2
attribute
inherent property or characteristic of an entity that can be distinguished quantitatively or qualitatively by human or automated means

Note 1 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).

[SOURCE: ISO/IEC 25000:2014, 4.1, modified — The original Note 1 has been removed; Note 2 has become Note 1 to entry.]

3.1.3
baseline
formally approved version of a configuration item, regardless of media, formally designated and fixed at a specific time during the configuration item's life cycle

[SOURCE: ISO/IEC/IEEE 15288:2023, 3.8]

3.1.4
business requirement
requirement (3.1.20) that describes in business terms what needs to be delivered or accomplished

Note 1 to entry: The business requirement is a means to achieve business objectives and thereby provide value.

Note 2 to entry: Neither ISO/IEC/IEEE 12207 nor ISO/IEC/IEEE 15288 distinguish between business requirements and other classes of *stakeholder* (3.1.28) requirements.

Note 3 to entry: The term "business" here is used broadly and generically, without implying a commercial venture, and can pertain to both personal and work, for-profit and not-for-profit, and production and administrative situations.

[SOURCE: ISO/IEC/IEEE 41062:2024, 3.1.5, modified — The original Note 2 has been revised.]

3.1.5
business requirements specification
BRS
structured collection of the *requirements* (3.1.20) (business or mission problem or opportunity definition, concepts, and required conditions of solutions) of the business or mission and its relation to the external environment

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3.1.6
concept of operations
ConOps
verbal and graphic statement, in broad outline, of an organization's assumptions or intent in regard to an operation or series of operations of new, modified, or existing organizational systems

Note 1 to entry: The concept of operations frequently is embodied in long-range strategic plans and annual operational plans. In the latter case, the concept of operations in the plan covers a series of connected operations to be carried out simultaneously or in succession to achieve an organizational performance objective. See also *operational concept* (3.1.17).

Note 2 to entry: The concept of operations provides the basis for bounding the operating space, system capabilities, interfaces, and operating environment.

[SOURCE: ANSI/AIAA G-043B-2018, 5.2, modified — The second definition has been used; the last two sentences of Note 1 to entry have been removed; Note 2 to entry has been added.]

3.1.7
condition
measurable qualitative or quantitative *attribute* (3.1.2) that is stipulated for a *requirement* (3.1.20) and that indicates a circumstance or event under which a requirement applies

3.1.8
constraint
externally imposed limitation on the system, its design, or implementation or on the process used to develop or modify a system

Note 1 to entry: A constraint is a factor that is imposed on the solution by force or compulsion and may limit or modify the design.

3.1.9
context of use
users (3.1.36), tasks, equipment (hardware, software and materials), and the physical and social environments in which a product is used

[SOURCE: ISO/IEC 25000:2014, 4.2]

3.1.10
customer
organization or person that receives a product or service

Note 1 to entry: Customers are a subset of *stakeholders* (3.1.28).

Note 2 to entry: A customer can be internal or external to the organization.

[SOURCE: ISO/IEC/IEEE 15288:2023, 3.12, modified — The original Note 1 to entry has become Note 2 to entry; a new Note 1 to entry has been introduced and the EXAMPLE has been removed.]

3.1.11
derived requirement
requirement (3.1.20) deduced or inferred from the collection and organization of requirements into a particular system configuration and solution

Note 1 to entry: The next higher-level requirement is referred to as a "parent" requirement while the derived requirement from this parent is called a "child" requirement.

Note 2 to entry: A derived requirement is typically identified during the elicitation of *stakeholder* (3.1.28) requirements, requirements analysis, trade studies or *validation* (3.1.37).

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3.1.12
document
uniquely identified unit of information for human use

EXAMPLE A report, specification, manual or book in printed or electronic form.

Note 1 to entry: A document can be a single *information item* (3.1.15), or part of a larger information item.

Note 2 to entry: Documents include both paper and electronic documents.

Note 3 to entry: The use of the term document is not intended to preclude interpretation in the broader sense of "documentation", especially as it applies to model-based engineering or conformance.

[SOURCE: ISO/IEC/IEEE 15289:2019, 3.1.10, modified – Notes 2 and 3 to entry have been added.]

3.1.13
human systems integration
HSI
an approach that integrates technology, organizations, and people effectively

[SOURCE: INCOSE-TP-2003-002-05:2023, 3.1.4]

3.1.14
include
<information> has either the information or a reference to the information

[SOURCE: ISO/IEC/IEEE 15289:2019, 3.1.11]

3.1.15
information item
separately identifiable body of information that is produced, stored, and delivered for human use

[SOURCE: ISO/IEC/IEEE 15289:2019, 3.1.12, modified – Notes 1 and 2 to entry have been removed.]

3.1.16
level of abstraction
view at a specific level of detail in a description of a system

3.1.17
operational concept
OpsCon
verbal and graphic statement of an organization's assumptions or intent in regard to an operation or series of operations of a specific system or a related set of specific new, existing or modified systems

Note 1 to entry: The operational concept is designed to give an overall picture of the operations using one or more specific systems, or set of related systems, in the organization's operational environment from the *users'* (3.1.36) and *operators'* (3.1.19) perspectives. See also *concept of operations* (3.1.6).

Note 2 to entry: The operational concept is about systems, while a concept of operations typically refers to organizations.

[SOURCE: ANSI/AIAA G-043B-2018, 5.2, modified — The third definition has been used; the first sentence in Note 1 to entry has been removed; Note 2 to entry has been added.]

3.1.18
operational scenario
description of an imagined sequence of events or activities that includes the interaction of the product or service with its environment and *users* (3.1.36), as well as interaction among its product or service components when there is end-use significance

Note 1 to entry: Operational scenarios are used to evaluate the *requirements* (3.1.20) and design of the system and to verify and validate the system.

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3.1.19
operator
individual or organization that performs the operations of a system

Note 1 to entry: The role of operator and the role of *user* (3.1.36) can be vested, simultaneously or sequentially, in the same individual or organization.

Note 2 to entry: An individual operator combined with knowledge, skills and procedures can be considered as an element of the system.

Note 3 to entry: An operator may perform operations on a system that is operated, or of a system that is operated, depending on whether or not operating instructions are placed within the system boundary.

[SOURCE: ISO/IEC/IEEE 15288:2023, 3.24]

3.1.20
requirement
statement which translates or expresses a need and its associated *constraints* (3.1.8) and *conditions* (3.1.7)

Note 1 to entry: Requirements exist at different levels in the system structure.

Note 2 to entry: A requirement is an expression of one or more particular needs in a very specific, precise and unambiguous manner.

Note 3 to entry: A requirement relates to a system, product, service, or other item of interest.

3.1.21
requirements elicitation
use of systematic techniques, such as prototyping and structured surveys, to proactively identify and document potential *requirements* (3.1.20)

3.1.22
requirements engineering
interdisciplinary function that mediates between the domains of the *acquirer* (3.1.1) and *supplier* (3.1.32) to establish and maintain the *requirements* (3.1.20) to be met by the system, software or service of interest

Note 1 to entry: Requirements engineering is concerned with discovering, eliciting, developing, analysing, verifying, validating, communicating, documenting and managing requirements.

3.1.23
requirements management
activities that identify, document, maintain, communicate, trace and track *requirements* (3.1.20) throughout the life cycle of a system, product or service

3.1.24
requirements traceability
identification and documentation of the derivation path (upward) and allocation/flow-down path (downward) of *requirements* (3.1.20) in the requirements set

Note 1 to entry: One or more requirements upward from which a requirement is derived are called parent requirements. A requirement downward that is derived from one or more parent requirements is called a child requirement.

3.1.25
requirements traceability matrix
structured information artefact that relates *requirements* (3.1.20) to their source and other information.

3.1.26
requirements validation
confirmation that *requirements* (3.1.20) (individually and as a set) define the right system as intended by the *stakeholders* (3.1.28)

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3.1.27
requirements verification
confirmation by examination that *requirements* (3.1.20) (individually and as a set) are well-formed

Note 1 to entry: This means that a requirement or a set of requirements has been reviewed to help confirm the characteristics of good requirements are achieved and the requirements set is well organized.

3.1.28
stakeholder
individual or organization having a right, share, claim or interest in a system or in its possession of characteristics that meet their needs and expectations

EXAMPLE End *users* (3.1.36), end user organizations, supporters, developers, *customers* (3.1.10), producers, trainers, maintainers, disposers, *acquirers* (3.1.1), *suppliers* (3.1.32), regulatory bodies, and people influenced positively or negatively by a system.

Note 1 to entry: Some stakeholders can have interests that oppose each other or oppose the system.

[SOURCE: ISO/IEC/IEEE 15288:2023, 3.44]

3.1.29
stakeholder need
prerequisite identified as necessary for a *stakeholder* (3.1.28), or a set of stakeholders, to achieve an intended outcome, implied or stated within a specific context of use

[SOURCE: ISO/IEC 25019:2023, 3.1.27]

3.1.30
stakeholder requirements specification
StRS
structured collection of the *requirements* (3.1.20) [characteristics, context, concepts, *constraints* (3.1.8) and priorities] of the *stakeholder* (3.1.28) and the relationship to the external environment

3.1.31
state
condition (3.1.7) that characterizes the behaviour of a function, subfunction or element at a point in time

Note 1 to entry: A state may be used to define sets of functions or system characteristics that can vary with time.

[SOURCE: ISO/IEC/IEEE 24765:2017, 3.3958, modified — Definition 4 has been kept; all other definitions have been removed: new Note 1 to entry has replaced the original Note 1 to entry.]

3.1.32
supplier
organization or an individual that enters into an agreement with the *acquirer* (3.1.1) for the supply of a product or service

Note 1 to entry: Suppliers are a subset of *stakeholders* (3.1.28).

Note 2 to entry: Other terms commonly used for supplier are contractor, producer, seller or vendor.

Note 3 to entry: The acquirer and the supplier sometimes are part of the same organization.

[SOURCE: ISO/IEC/IEEE 15288:2023, 3.45, modified — New Note 1 to entry has been added; other Notes to entry renumbered.]

3.1.33
system of interest
system whose life cycle is under consideration

[SOURCE: ISO/IEC/IEEE 15288:2023, 3.48, modified — “system-of-interest” changed to “system of interest”]

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3.1.34
system requirements specification
SyRS
structured collection of the *requirements* (3.1.20) [functions, performance, design *constraints* (3.1.8), and other *attributes* (3.1.2)] for a system and its operational environments and external interfaces

Note 1 to entry: The scope of an SyRS can be a system or a system element. A system or system element can be partially or completely composed of software.

3.1.35
trade-off
decision-making actions that select from various *requirements* (3.1.20) and alternative solutions on the basis of net benefit to the *stakeholders* (3.1.28)

3.1.36
user
individual or group that interacts with a system or benefits from a system during its utilization

Note 1 to entry: The role of user and *operator* (3.1.19) may be vested, simultaneously or sequentially, in the same individual or organization.

Note 2 to entry: Users are a subset of *stakeholders* (3.1.28).

[SOURCE: ISO/IEC/IEEE 15288:2023, 3.53, modified — Note 2 to entry has been added.]

3.1.37
validation
confirmation, through the provision of objective evidence, that the *requirements* (3.1.20) for a specific intended use or application have been fulfilled

Note 1 to entry: In a life cycle context, validation involves the set of activities for gaining confidence that a system is able to accomplish its intended use, goals, and objectives in an environment like the operational environment. The right system was built.

[SOURCE: ISO/IEC/IEEE 15288:2023, 3.54]

3.1.38
verification
confirmation, through the provision of objective evidence, that specified *requirements* (3.1.20) have been fulfilled

Note 1 to entry: Verification is a set of activities that compares a system or system element against the required characteristics. This includes, but is not limited to, specified requirements, design description, and the system itself. The system was built right.

[SOURCE: ISO/IEC/IEEE 15288:2023, 3.55]

3.2 Abbreviated terms

AI	artificial intelligence
BABOK®	Business Analysis Body of Knowledge®[1)]
FSM	functional size measurement
OMG®	Object Management Group®
SQuaRE	Systems and software Quality Requirements and Evaluation

1) BABOK is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO, IEC or IEEE of this product.

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SysML® Systems Modeling Language[2)]

TBD to be determined

TPM technical performance measures

4 Conformance

Users of this document can make claims of conformance (conformance statements) to some or all requirements in this document. Users can structure the form of such claims to meet their needs, therefore this document does not prescribe the form of these claims.

Also, per ISO/IEC 17007 this document does not address specific methods or procedures for individual conformity assessment activities, nor does it address general rules or methodology for conformity assessment.

For more information about conformance, see Annex C and www.iso.org/iso/foreword.html.

5 Concepts

5.1 Requirements engineering

Requirements engineering mediates among stakeholders using the applicable processes from ISO/IEC/IEEE 12207 and ISO/IEC/IEEE 15288 (Clause 7) and associated enabling systems (5.6) to produce sets of requirements and related information. Each requirement and set of requirements meet their expected purpose(s) by:

— appropriately incorporating stakeholder needs and system constraints (5.2.1);

— exhibiting quality characteristics of requirements (5.3);

— including necessary attributes (5.4).

These results can serve several purposes, such as:

— establishing a common understanding among stakeholders as to the technical expectations for new or revised systems, software, or services;

— providing a realistic basis for estimating product costs, risks and schedules;

— supporting the definition of an agreement between parties for the development or procurement of a new or revised system;

— providing a reference for implementing, verifying and validating new or revised designs and solutions;

— providing an informed basis for deploying a product to new users or new operational environments;

— defining the complete behaviour and other aspects of an existing system as a baseline for change analysis, product enhancement or other activities.

Requirements can be represented in a variety of forms (5.5) and are documented in one or more requirements specifications (Clause 8).

NOTE For a more detailed discussion of these concepts, see INCOSE-TP-2021-002-01 and INCOSE-TP-2010-006-04.

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