International Standard

ISO/IEC/IEEE 12207

Systems and software engineering — Software life cycle processes

Ingénierie des systèmes et du logiciel — Processus du cycle de vie du logiciel

Second edition
2026-04

Reference number
ISO/IEC/IEEE 12207:2026(en)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Institute of Electrical and Electronics Engineers, Inc
3 Park Avenue, New York
NY 10016-5997, USA

Email: stds.ipr@ieee.org
Website: www.ieee.org

Published in Switzerland

Contents

Page

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.

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 documents 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 or www.iec.ch/members_experts/refdocs).

IEEE Standards documents are developed within IEEE Societies and subcommittees of IEEE Standards Association (IEEE SA) Board of Governors. IEEE develops its standards through an accredited consensus development process, which brings together volunteers representing varied viewpoints and interests to achieve the final product. IEEE standards are documents developed by volunteers with scientific, academic, and industry-based expertise in technical working groups. Volunteers are not necessarily members of IEEE or IEEE SA and participate without compensation from IEEE. While IEEE administers the process and establishes rules to promote fairness in the consensus development process, IEEE does not independently evaluate, test, or verify the accuracy of any of the information or the soundness of any judgments contained in its standards.

ISO and IEC draw attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO and IEC take no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO and IEC had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents and https://patents.iec.ch. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

This document was prepared by Joint Technical Committee ISO/JTC 1, *Information technology,* Subcommittee SC 7, *Software and systems 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 second edition cancels and replaces the first edition (ISO/IEC/IEEE 12207:2017), which has been technically revised.

The main changes are as follows:

— clarifications and updates to reflect current practices in selected technical processes, including business or mission analysis, system architecture definition, implementation, integration, operations, and maintenance;

— improvements to selected technical management processes, including risk management and configuration management;

— updates to Clause 5, key concepts, including a more precise description of iteration, recursion, system-of-systems, and quality characteristics;

— new content in Clause 5 on concept and system definition, and expanded content on agile methods, process application, and system concepts.

— revised Annex D on model-based systems and software engineering (MBSSE)

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 and www.iec.ch/national-committees.

Introduction

The complexity of software systems continues to increase to unprecedented levels. Technology change has led to new opportunities, but also to increased challenges for the organizations that create and utilise systems. There is a continuum of human-made systems from those that use little or no software to those in which software is the primary interest. It is rare to encounter a complex system without software, and all software systems require physical system elements (hardware) to operate, either as part of the software system-of-interest (SoI) or as an enabling system or infrastructure. These challenges exist throughout the life cycle of a system and at all levels of architectural detail.

The purpose of this document is to provide a defined set of software life cycle processes. This document provides a common process framework for engineering the life cycle of systems created by humans, adopting a software engineering approach. Software engineering is an interdisciplinary approach and means to enable software. This document concerns software systems that are configured with software elements and with one or more of the following: hardware elements, data, humans, processes, services, procedures, and facilities.

This document provides processes for use by acquirers, suppliers, and other stakeholders in the life cycle of a software system, such as developers, integrators, operators, maintainers, managers, quality managers, and users of software services and products. It covers defining stakeholder needs, concerns, priorities, and constraints for the required functionality and non-functional characteristics early in the life cycle, establishing requirements, and concurrent design synthesis and system validation while considering the complete problem. It integrates disciplines and specialties into a team effort, forming a structured set of process that proceeds from concept through production operation and maintenance and sustainment to disposal. It considers both the business and the technical needs of stakeholders with the goal of providing a quality product that meets the needs of users and other applicable stakeholders. It provides the processes for acquiring and supplying systems. It helps to improve communication and cooperation among the parties that create, utilise, and manage modern software systems so they can work in an integrated, coherent fashion. Finally, this document provides the framework for assessment and improvement of the life cycle processes.

There is a wide variety of software systems in terms of their purpose, domain, complexity, size, novelty, adaptability, quantity, location, life span, and evolution. The processes in this document form a comprehensive set from which an organization can construct software life cycle models appropriate to its products and services. An organization can select and apply an appropriate subset of these processes to fulfil its specific objectives.

This document can be used in one or more of the following situations:

— By an organization — to help establish an environment of desired processes. These processes can be supported by an infrastructure of methods, procedures, techniques, tools, and trained personnel. The organization can then employ this environment to perform and manage its projects and progress systems through their life cycle stages. In this mode, this document can be used to assess conformance of a declared, established environment to its provisions. It can be used by a single organization in a self-imposed mode or in a multi-party situation. Parties can be from the same organization or from different organizations, and the situation can range from an informal agreement to a formal contract.

— By a project: to help select, structure, and employ the elements of an established environment to provide products and services. In this mode this document is used in the assessment of conformance of the project to the declared and established environment.

— By an acquirer and a supplier: to help develop an agreement concerning processes and activities. Via the agreement, the processes and activities in this document are selected, negotiated, agreed to, and performed. In this mode this document is used for guidance in developing the agreement.

— By process assessors: to serve as a process reference model for use in the performance of process assessments that can be used to support organizational process improvement.

This document is related to ISO/IEC/IEEE 15288, which covers system engineering processes. The choice of whether to apply this document for the software life cycle processes, or ISO/IEC/IEEE 15288:2023, depends

on the system-of-interest (SoI). Processes in both documents have the same process purpose and process outcomes, but differ in activities and tasks to perform software engineering or systems engineering, respectively.

The requirements in this document are intended to be compatible with the requirements of the quality management system provided by ISO 9001, the service management system provided by ISO/IEC 20000-1, the IT asset management system provided by ISO/IEC 19770-1, and the information security management system provided by ISO/IEC 27001.

Systems and software engineering — Software life cycle processes

1 Scope

This document establishes a common framework for software life cycle processes. Its terminology can be referenced and applied across the software industry. It contains processes, activities and tasks that can be applied during the acquisition of a software system, product, or service and during the supply, development, operation, maintenance, and disposal of software products and services. This is accomplished through the involvement of stakeholders, with the goal of achieving customer satisfaction. This document includes those aspects of system definition needed to provide the context for software systems and services. This document also provides processes that can be employed for defining, controlling, and improving software life cycle processes within an organization or a project.

This document is applicable to one-of-a-kind software systems, software systems for wide commercial or public distribution, and customised, adaptable software systems. Software includes the software portion of firmware. It applies to a complete stand-alone software system and to software systems that are embedded and integrated into larger more complex and complete systems of systems (SoS). The processes, activities, and tasks of this document can also be applied during the acquisition of a system that contains software.

This document applies to the full life cycle of software systems, products, and services, including conception, development, operations, support, and retirement, and to their acquisition and supply, whether performed internally or externally to an organization. The life cycle processes of this document can be applied concurrently, iteratively, and recursively to a software system and incrementally to its elements.

This document can be applied in organizations and software projects using a variety of formal engineering approaches. It is applicable for agile approaches and methods, which are most widely used for software development, sustainment, and maintenance, and which are believed to be more affordable and to deliver usable products more quickly.

This document does not identify or require any specific software life cycle model, development methodology, method, modelling approach, or techniques for selecting a life cycle model for the organization or project and mapping the processes, activities, and tasks in this document into that model. Using engineering judgment to help achieve the desired level of quality is also outside the scope of this document.

This document does not detail information items in terms of name, format, explicit content, and recording media. ISO/IEC/IEEE 15289 identifies the content for life cycle process information items (documentation).

2 Normative references

There are no normative references in this document.

Bibliography

[1] IEC 60300-1, *Dependability management - Part 1: Guidance for management and application*

[2] IEC 61508 (all parts), *Functional safety of electrical/electronic/programmable electronic safety-related systems*

[3] IEC 62741, *Demonstration of dependability requirements – The dependability case*

[4] IEEE Std 1012:2024, *IEEE Standard for System and Software Verification and Validation*

[5] IEEE Std 7005, *IEEE Standard for Transparent Employer Data Governance*

[6] IEEE Std 7007, *IEEE Ontological Standard for Ethically Driven Robotics and Automation Systems*

[7] IEEE Std 7009, *IEEE Standard for Fail-Safe Design of Autonomous and Semi-Autonomous Systems*

[8] IEEE Std 7014, *IEEE Standard for Ethical Considerations in Emulated Empathy in Autonomous and Intelligent Systems*

[9] IEEE Std 730:2014, *IEEE Standard for Software Quality Assurance Processes*

[10] IEEE Std 828:2012, *IEEE Standard for Configuration Management in Systems and Software Engineering*

[11] IEEE Std 982, *IEEE Standard for Measures of the Software Aspects of Dependability*

[12] ISO 10004:2018, *Quality management — Customer satisfaction — Guidelines for monitoring and measuring*

[13] ISO 10007, *Quality management — Guidelines for configuration management*

[14] ISO 13485, *Medical devices — Quality management systems — Requirements for regulatory purposes*

[15] ISO 14001, *Environmental management systems — Requirements with guidance for use*

[16] ISO 15704:2019, *Enterprise modelling and architecture — Requirements for enterprise-referencing architectures and methodologies*

[17] ISO 18435 (all parts), *Industrial automation systems and integration — Diagnostics, capability assessment and maintenance applications integration*

[18] ISO 19014-4:2020, *Earth-moving machinery — Functional safety — Part 4: Design and evaluation of software and data transmission for safety-related parts of the control system*

[19] ISO 21511, *Work breakdown structures for project and programme management*

[20] ISO 22400 (all parts), *Automation systems and integration — Key performance indicators (KPIs) for manufacturing operations management*

[21] ISO 26262-1:2018, *Road vehicles — Functional safety — Part 1: Vocabulary*

[22] ISO 26262-6, *Road vehicles — Functional safety — Part 6: Product development at the software level*

[23] ISO 31000, *Risk management — Guidelines*

[24] IEC 31010, *Risk management — Risk assessment techniques*

[25] ISO 31073:2022, *Risk management — Vocabulary*

[26] ISO 9000:—[1)], *Quality management systems — Fundamentals and vocabulary*

1) Under preparation.

[27] ISO 9001:2015, *Quality management systems — Requirements*

[28] ISO 9004, *Quality management — Quality of an organization — Guidance to achieve sustained success*

[29] ISO 9241-210, *Ergonomics of human-system interaction — Part 210: Human-centred design for interactive systems*

[30] ISO 9241-220, *Ergonomics of human-system interaction — Part 220: Processes for enabling, executing and assessing human-centred design within organizations*

[31] ISO/TS 18152, *Ergonomics of human-system interaction — Specification for the process assessment of human-system issues*

[32] ISO/IEC 5230, *Information technology — OpenChain Specification*

[33] ISO/IEC 10746-3, *Information technology — Open distributed processing — Reference model: Architecture — Part 3:*

[34] ISO/IEC 15408-3:2022, *Information security, cybersecurity and privacy protection — Evaluation criteria for IT security — Part 3: Security assurance components*

[35] ISO/IEC 16350, *Information technology — Systems and software engineering — Application management*

[36] ISO/IEC 19770 (all parts), *Information technology — IT asset management*

[37] ISO/IEC 20000 (all parts), *Information technology — Service management*

[38] ISO/IEC 23894, *Information technology — Artificial intelligence — Guidance on risk management*

[39] ISO/IEC 25000, *Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Guide to SQuaRE*

[40] ISO/IEC 25010, *Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Product quality model*

[41] ISO/IEC 25012, *Software engineering — Software product Quality Requirements and Evaluation (SQuaRE) — Data quality model*

[42] ISO/IEC 25023, *Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Measurement of system and software product quality*

[43] ISO/IEC 25030, *Systems and software engineering — Systems and software quality requirements and evaluation (SQuaRE) — Quality requirements framework*

[44] ISO/IEC 25063, *Systems and software engineering — Systems and software product Quality Requirements and Evaluation (SQuaRE) — Common Industry Format (CIF) for usability: Context of use description*

[45] ISO/IEC 26550, *Software and systems engineering — Reference model for product line engineering and management*

[46] ISO/IEC 26580, *Software and systems engineering — Methods and tools for the feature-based approach to software and systems product line engineering*

[47] ISO/IEC 27000, *Information technology — Security techniques — Information security management systems — Overview and vocabulary*

[48] ISO/IEC 27002, *Information security, cybersecurity and privacy protection — Information security controls*

[49] ISO/IEC 27034-3, *Information technology — Application security — Part 3: Application security management process*

[50] ISO/IEC 27036 (all parts), *Cybersecurity — Supplier relationships*

[51] ISO/IEC 33001:2015, *Information technology — Process assessment — Concepts and terminology*

[52] ISO/IEC 33002, *Information technology — Process assessment — Requirements for performing process assessment*

[53] ISO/IEC 33004:2015, *Information technology — Process assessment — Requirements for process reference, process assessment and maturity models*

[54] ISO/IEC 33020:2019, *Information technology — Process assessment — Process measurement framework for assessment of process capability*

[55] ISO/IEC 33202, *Software and systems engineering — Core agile practices*

[56] ISO/IEC 5338, *Information technology — Artificial intelligence — AI system life cycle processes*

[57] ISO/TR 25060, *Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — General framework for Common Industry Format (CIF) for usability-related information*

[58] ISO/IEC 29110-1-1, *Systems and software engineering — Lifecycle profiles for very small entities (VSEs) — Part 1-1: Overview*

[59] ISO/IEC 29110-1-2, *Systems and software engineering — Lifecycle profiles for Very Small Entities (VSEs) — Part 1-2: Vocabulary*

[60] ISO/IEC/IEEE 14764, *Software engineering — Software life cycle processes — Maintenance*

[61] ISO/IEC/IEEE 15026 (all parts), *Systems and software engineering — Systems and software assurance*

[62] ISO/IEC/IEEE 15288, *Systems and software engineering — System life cycle processes*

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

[64] ISO/IEC/IEEE 15939, *Systems and software engineering — Measurement process*

[65] ISO/IEC/IEEE 16085, *Systems and software engineering — Life cycle processes — Risk management*

[66] ISO/IEC/IEEE 16326, *Systems and software engineering — Life cycle processes — Project management*

[67] ISO/IEC/IEEE 21839:2019, *Systems and software engineering — System of systems (SoS) considerations in life cycle stages of a system*

[68] ISO/IEC/IEEE 21840, *Systems and software engineering — Guidelines for the utilization of ISO/IEC/IEEE 15288 in the context of system of systems (SoS)*

[69] ISO/IEC/IEEE 21841, *Systems and software engineering — Taxonomy of systems of systems*

[70] ISO/IEC/IEEE 24641:2023, *Systems and Software engineering — Methods and tools for model-based systems and software engineering*

[71] ISO/IEC/IEEE 24748-1:2024, *Systems and software engineering — Life cycle management — Part 1: Guidelines for life cycle management*

[72] ISO/IEC/IEEE 24748-2, *Systems and software engineering — Life cycle management — Part 2: Guidelines for the application of ISO/IEC/IEEE 15288 (system life cycle processes)*

[73] ISO/IEC/IEEE 24748-3, *Systems and software engineering — Life cycle management — Part 3: Guidelines for the application of ISO/IEC/IEEE 12207 (software life cycle processes)*

[74] ISO/IEC/IEEE 24748-4, *Systems and software engineering — Life cycle management — Part 4: Systems engineering planning*

[75] ISO/IEC/IEEE 24748-5, *Systems and software engineering — Life cycle management — Part 5: Software development planning*

[76] ISO/IEC/IEEE 24748-6, *Systems and software engineering — Life cycle management — Part 6: System and software integration*

[77] ISO/IEC/IEEE 24748-8, *Systems and software engineering — Life cycle management — Part 8: Technical reviews and audits on defense programs*

[78] ISO/IEC/IEEE 24748-7000, *Systems and software engineering — Life cycle management — Part 7000: Standard model process for addressing ethical concerns during system design*

[79] ISO/IEC/IEEE 24765, *Systems and software engineering — Vocabulary*

[80] ISO/IEC/IEEE 24774:2021, *Systems and software engineering — Life cycle management — Specification for process description*

[81] ISO/IEC/IEEE 26515, *Systems and software engineering — Developing information for users in an agile environment*

[82] ISO/IEC/IEEE 26531, *Systems and software engineering — Content management for product life cycle, user and service management information for users*

[83] ISO/IEC/IEEE 23612, *Software and systems engineering -- Incident management*

[84] ISO/IEC/IEEE 29119 (all parts), *Software and systems engineering — Software testing*

[85] ISO/IEC/IEEE 29148:2018, *Systems and software engineering — Life cycle processes — Requirements engineering*

[86] ISO/IEC/IEEE 32675:2022, *Information technology — DevOps — Building reliable and secure systems including application build, package and deployment*

[87] ISO/IEC/IEEE 41062, *Software engineering — Life cycle processes — Software acquisition*

[88] ISO/IEC/IEEE 42010:2022, *Software, systems and enterprise — Architecture description*

[89] ISO/IEC/IEEE 42020:2019, *Software, systems and enterprise — Architecture processes*

[90] ISO/IEC/IEEE 42030, *Software, systems and enterprise — Architecture evaluation framework*

[91] ISO/IEC/IEEE 90003, *Software engineering — Guidelines for the application of ISO 9001:2015 to computer software*

[92] ANSI/AAMI/IEC 62304:2006/A1: 2016, *Medical device software — Software life cycle processes*

[93] ANSI/AIAA G-043B-2018, *ANSI/AIAA Guide to the Preparation of Operational Concept Documents*

[94] Cybersecurity in Medical Devices. Quality System Considerations and Content of Premarket Submissions, Sept. 27, 2023, https://www.fda.gov/media/119933/download?attachment

[95] Framing Software Component Transparency: Establishing a Common Software Bill of Material (SBOM), NTIA Multistakeholder Process on Software Component Transparency, 2019-11-12, https://www.fda.gov/regulatory-information/search-fda-guidance-documents/cybersecurity-medical-devices-quality-system-considerations-and-content-premarket-submissions

[96] IEEE. Computer Society, *Guide to the Software Engineering Body of Knowledge* (SWEBOK) V4, 2024, <ieeecs-media.computer.org/media/education/swebok/swebok-v4.pdf>

[97] INCOSE *Systems Engineering Handbook*: A Guide for System Life Cycle Processes and Activities, version 5.0. Hoboken, NJ, USA: John Wiley and Sons, Inc.

[98] INCOSE TP-2003-020-01, *Technical Measurement*

[99] INCOSE-TP-2020-002-06, *Systems Engineering and System Definitions*, Version 1.0, 08 January 2019

[100] NATO AEP-67, *Engineering for System Assurance in NATO Programs*

[101] NIST AI 100-1, *Artificial Intelligence Risk Management Framework*

[102] NIST SP 800-218, *Secure Software Development Framework*

[103] PMI (Project Management Institute), *Practice Standard for Work Breakdown Structures*

[104] Royce, Winston. "Managing the Development of Large Software Systems", https://www.praxisframework.org/files/royce1970.pdf

[105] SAE ARP4754A, *Guidelines for Development of Civil Aircraft and Systems*

[106] 10SAE EIA-649-C-2019, *Configuration Management Standard*

[107] 101SAE JA1011, *Evaluation Criteria for Reliability-Centered Maintenance (RCM) Processes*

[108] STANAG 4427, *Configuration Management in System Life Cycle Management*

[109] Tukker A.2004, Eight Types of Product Service Systems: Eight Ways to Sustainability? Business Strategy and the Environment 13, p. 246