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Systems and software engineering — Software life cycle processes

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

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IEEE Std 12207™-2008
(Revision of
IEEE/EIA 12207.0-1996)

Systems and software engineering — Software life cycle processes

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Software & Systems Engineering Standards Committee
of the
IEEE Computer Society

Abstract: This International Standard establishes a common framework for software life cycle processes, with well-defined terminology, that can be referenced by the software industry. It applies to the acquisition of systems and software products and services, to the supply, development, operation, maintenance, and disposal of software products and the software portion of a system, whether performed internally or externally to an organization. Those aspects of system definition needed to provide the context for software products and services are included. Software includes the software portion of firmware. This revision integrates ISO/IEC 12207:1995 with its two amendments and was coordinated with the parallel revision of ISO/IEC 15288:2002 (System life cycle processes) to align structure, terms, and corresponding organizational and project processes. This standard may be used stand alone or jointly with ISO/IEC 15288, and supplies a process reference model that supports process capability assessment in accordance with ISO/IEC 15504-2 (Process assessment). An annex provides support for IEEE users and describes relationships of this International Standard to IEEE standards.

Keywords: acquisition, agreement, assessment, audit, configuration management, development, maintenance, disposal, operation, process reference model, process improvement, quality assurance, retirement, supply, validation, verification

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International Standard ISO/IEC 12207:2008(E)

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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.

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ISO/IEC 12207 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*.

This second edition cancels and replaces the first edition (ISO/IEC 12207:1995), which has been technically revised. It also incorporates the Amendments ISO/IEC 12207:1995/Amd.1:2002 and ISO/IEC 12207:1995/Amd.2:2004.

Changes in this revision of ISO/IEC 12207 were developed in conjunction with a corresponding revision of ISO/IEC 15288. The purpose of these revisions is to better align the two International Standards to facilitate their joint use. This alignment is the first step toward harmonization of the structures and contents of the two International Standards, while supporting the requirements of the assessment community. This alignment provides the foundation to facilitate evolution to an integrated and fully harmonized treatment of life cycle processes. This International Standard was developed with the following goals:

— incorporate and rationalize both Amendments;

— provide a common terminology between the revision of ISO/IEC 15288 and ISO/IEC 12207;

— where applicable, provide common process names and process structure between the revision of the ISO/IEC 15288 and this International Standard;

— enable the user community to evolve towards fully harmonized standards and to provide a stable standard, while maximizing backward compatibility; and

— leverage ten years of experience with the development and use of ISO/IEC 12207 and ISO/IEC 15288.

A subsequent revision is intended to achieve a fully harmonized view of the system and software life cycle processes. Identified areas to address in the future include: common process purposes and outcomes, architecture of the standards, level of prescription of activities and tasks, life cycle treatments, treatment of products and services, common verification and validation concepts, common configuration management concepts, deferred recommendations and alignment with other applicable standards.

The IEEE Computer Society collaborated with ISO/IEC JTC 1 in the development of this International Standard. *IEEE/EIA 12207.0-1996, Industry Implementation of International Standard ISO/IEC 12207:1995 Standard for Information Technology – Software Life Cycle Processes*, was one of the base documents used in the development of this International Standard.

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Introduction

ISO/IEC 12207 was published on 1 August 1995 and was the first International Standard to provide a comprehensive set of life cycle processes, activities and tasks for software that is part of a larger system, and for stand alone software products and services. That International Standard was followed in November 2002 by ISO/IEC 15288 which addressed system life cycle processes. The ubiquity of the software meant that the software and its design processes should not be considered separately from those systems, but be considered as an integral part of the system and system design processes. The ISO/IEC 12207 Amendments in 2002 and 2004 added process purpose and outcomes to the International Standard and established a Process Reference Model in accordance with the requirements of ISO/IEC 15504-2.

This International Standard, a revision of the amended ISO/IEC 12207, is an initial step in the SC7 harmonization strategy to achieve a fully integrated suite of system and software life cycle processes and guidance for their application.

This revision integrates ISO/IEC 12207:1995 with its two Amendments and applies SC7 guidelines for process definition to support consistency and improved usability. Project execution was carefully coordinated with the parallel revision of ISO/IEC 15288:2002 to align structure, terms, and corresponding organizational and project processes.

This International Standard can be used in one or more of the following modes:

— 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 may then employ this environment to perform and manage its projects and progress systems through their life cycle stages. In this mode this International Standard is used to assess conformance of a declared, established set of life cycle processes to its provisions.

— By a project — to help select, structure and employ the elements of an established set of life cycle processes to provide products and services. In this mode this International Standard 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 International Standard are selected, negotiated, agreed to and performed. In this mode this International Standard is used for guidance in developing the agreement.

— By organizations and assessors — to perform assessments that may be used to support organizational process improvement.

This International Standard contains requirements in four Clauses: Clause 6, which defines the requirements for the system life cycle processes, Clause 7, which defines the requirements for specific software life cycle processes, clauses of Annex A, which provides requirements for tailoring of this International Standard and clauses of Annex B, which provides a Process Reference Model (PRM) which may be used for assessment purposes.

Five informative annexes support the harmonization strategy initiated by this revision.

— Annex C expands on history and rationale for the changes, and provides high-level traceability among the International Standards which were used as the inputs to this revision.

— Annex D describes the alignment of the processes of ISO/IEC 15288 and ISO/IEC 12207 — a key focus of this revision.

— Annex E provides an example of a process view for Usability, intended to illustrate how a project might assemble processes, activities and tasks of ISO/IEC 12207 to provide focused attention to the achievement of product characteristics that have been selected as being of special interest.

— Annex F contains some example process descriptions that are considered useful to some readers of this International Standard.

— Annex G provides support for IEEE users and describes relationships of this International Standard to IEEE standards.

Readers of this International Standard are advised to consult Clause 5 to gain understanding of the key concepts used.

NOTE A future Technical Report (ISO/IEC TR 24748) will describe the relations between this International Standard and ISO/IEC 15288:2008.

IEEE Introduction

This introduction is not part of IEEE Std 12207™-2008, Systems and Software Engineering—Software Life Cycle Processes.

IEEE Std 12207™-2008 and IEEE Std 15288™-2008 are identical to ISO/IEC 12207:2008 and ISO/IEC 15288:2008. Therefore, all references to ISO/IEC 12207 or ISO/IEC 15288 apply equally well to their IEEE counterparts. Further details regarding relationships to IEEE standards can be found in Annex G.

This standard replaces IEEE/EIA 12207.0-1996, *Industry Implementation of International Standard ISO/IEC 12207: 1995 Standard for Information Technology – Software Life Cycle Processes*, which was an adoption with changes of ISO/IEC 12207:1995. Users of the earlier standard may be interested to know what will happen to its companions, IEEE/EIA 12207.1-1996 and IEEE/EIA 12207.2-1997. There is currently a project underway to replace IEEE/EIA 12207.1 with an adoption of ISO/IEC 15289. Completion of the current project will render IEEE/EIA 12207.2 obsolete; it will probably be withdrawn unless there is a demonstration of interest to revise it.

The original ISO/IEC 12207 was published on 1 August 1995 and was the first international standard to provide a comprehensive set of life cycle processes, activities and tasks for software that is part of a larger system, and for stand alone software products and services. That international standard was followed in November 2002 by ISO/IEC 15288 which addressed system life cycle processes.

IEEE cooperated with the Electronic Industries Alliance (EIA) in adopting ISO/IEC with changes to become IEEE/EIA 12207-1996. In 2004, IEEE performed an identical adoption of ISO/IEC 15288:2002.

The ISO/IEC 12207 amendments in 2002 and 2004 added process purpose and outcomes to the International Standard and established a Process Reference Model in accordance with the requirements of ISO/IEC 15504-2. IEEE did not pick up these amendments, preferring a stable base for the users of its standard.

This new revision of ISO/IEC 12207 is the product of a coordinated effort by IEEE and ISO/IEC JTC 1/SC 7. The base documents for the revision included the ISO/IEC standard and its amendments, and the IEEE/EIA standard and its unique material.

This revision integrates ISO/IEC 12207:1995 with its two Amendments and applies SC7 guidelines for process definition to support consistency and improved usability. Project execution was carefully coordinated with the parallel revision of ISO/IEC 15288:2002 to align structure, terms, and corresponding organizational and project processes.

This revised standard is a step in the SC7 harmonization strategy to achieve a fully integrated suite of system and software life cycle processes and guidance for their application. It is also an important step in the shared strategy of ISO/IEC JTC 1/SC 7 and the IEEE to harmonize their respective collections of standards. The new editions of ISO/IEC 12207 and ISO/IEC 15288, and their identical IEEE editions, will provide a single, shared baseline of systems and software life cycle processes applicable to both ISO/IEC and the IEEE standards collections.

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Errata

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1 Overview

1.1 Scope

This International Standard establishes a common framework for software life cycle processes, with well-defined terminology, that can be referenced by the software industry. It contains processes, activities, and tasks that are to be applied during the acquisition of a software product or service and during the supply, development, operation, maintenance and disposal of software products. Software includes the software portion of firmware.

This International Standard applies to the acquisition of systems and software products and services, to the supply, development, operation, maintenance, and disposal of software products and the software portion of a system, whether performed internally or externally to an organization. Those aspects of system definition needed to provide the context for software products and services are included.

This International Standard also provides a process that can be employed for defining, controlling, and improving software life cycle processes.

The processes, activities and tasks of this International Standard—either alone or in conjunction with ISO/IEC 15288—may also be applied during the acquisition of a system that contains software.

1.2 Purpose

The purpose of this International Standard is to provide a defined set of processes to facilitate communication among acquirers, suppliers and other stakeholders in the life cycle of a software product.

This International Standard is written for acquirers of systems and software products and services and for suppliers, developers, operators, maintainers, managers, quality assurance managers, and users of software products.

This International Standard is intended for use in a two-party situation and may be equally applied where the two parties are from the same organization. The situation may range from an informal agreement up to a legally binding contract. The International Standard may be used by a single party through a self-imposed set of processes. This clause does not prevent the use of ISO/IEC 12207 by suppliers or developers of off-the-shelf software.

1.3 Limitations

This International Standard does not detail the life cycle processes in terms of methods or procedures required to meet the requirements and outcomes of a process.

This International Standard does not detail documentation in terms of name, format, explicit content and recording media. The International Standard may require development of documents of similar class or type; various plans are an example. The International Standard, however, does not imply that such documents be developed or packaged separately or combined in some fashion. These decisions are left to the user of the International Standard.

NOTE ISO/IEC 15289 addresses the content for life cycle process information items (documentation).

This International Standard does not prescribe a specific system or software life cycle model, development methodology, method, model or technique. The parties of the International Standard are responsible for