

INTERNATIONAL  
STANDARD

ISO/IEC  
12207

IEEE  
Std 12207-2008

Second edition  
2008-02-01

---

---

**Systems and software engineering —  
Software life cycle processes**

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



Reference number  
ISO/IEC 12207:2008(E)  
IEEE  
Std 12207-2008

**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

# **Systems and software engineering — Software life cycle processes**

Sponsor

**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

---

This document is an International Standard and is copyright-protected by ISO and the IEEE. Except as permitted under the applicable laws of the user's country, neither this ISO/IEC-IEEE standard nor any extract from it may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, photocopying, recording or otherwise, without prior written permission being secured. Requests for permission to reproduce should be addressed to either ISO or the IEEE at the addresses below.

ISO Copyright Office  
Case postale 56 · CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Institute of Electrical and Electronics Engineers  
IEEE Standards Activities Department  
445 Hoes Lane  
Piscataway, NJ 08854  
E-mail [stds.ipr@ieee.org](mailto:stds.ipr@ieee.org)  
Web [www.ieee.org](http://www.ieee.org)

Copyright © 2008 ISO/IEC-IEEE. All rights reserved.

Published 31 January 2008. Printed in the United States of America.

IEEE is a registered trademark in the U.S. Patent & Trademark Office, owned by the Institute of Electrical and Electronics Engineers, Incorporated.

Print: ISBN 0-7381-5663-9      SH95713  
PDF: ISBN 0-7381-5664-7      SS95713

*No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.*

## **International Standard ISO/IEC 12207:2008(E)**

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 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.



International Organization for Standardization/International Electrotechnical Commission  
Case postale 56 • CH-1211 Genève 20 • Switzerland

**IEEE Standards** documents are developed within the IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Association (IEEE-SA) Standards Board. The IEEE develops its standards through a consensus development process, approved by the American National Standards Institute, which brings together volunteers representing varied viewpoints and interests to achieve the final product. Volunteers are not necessarily members of the Institute and serve without compensation. While the IEEE administers the process and establishes rules to promote fairness in the consensus development process, the IEEE does not independently evaluate, test, or verify the accuracy of any of the information contained in its standards.

Use of an IEEE Standard is wholly voluntary. The IEEE disclaims liability for any personal injury, property or other damage, of any nature whatsoever, whether special, indirect, consequential, or compensatory, directly or indirectly resulting from the publication, use of, or reliance upon this, or any other IEEE Standard document.

The IEEE does not warrant or represent the accuracy or content of the material contained herein, and expressly disclaims any express or implied warranty, including any implied warranty of merchantability or fitness for a specific purpose, or that the use of the material contained herein is free from patent infringement. IEEE Standards documents are supplied **“AS IS.”**

The existence of an IEEE Standard does not imply that there are no other ways to produce, test, measure, purchase, market, or provide other goods and services related to the scope of the IEEE Standard. Furthermore, the viewpoint expressed at the time a standard is approved and issued is subject to change brought about through developments in the state of the art and comments received from users of the standard. Every IEEE Standard is subjected to review at least every five years for revision or reaffirmation. When a document is more than five years old and has not been reaffirmed, it is reasonable to conclude that its contents, although still of some value, do not wholly reflect the present state of the art. Users are cautioned to check to determine that they have the latest edition of any IEEE Standard.

In publishing and making this document available, the IEEE is not suggesting or rendering professional or other services for, or on behalf of, any person or entity. Nor is the IEEE undertaking to perform any duty owed by any other person or entity to another. Any person utilizing this, and any other IEEE Standards document, should rely upon the advice of a competent professional in determining the exercise of reasonable care in any given circumstances.

Interpretations: Occasionally questions may arise regarding the meaning of portions of standards as they relate to specific applications. When the need for interpretations is brought to the attention of IEEE, the Institute will initiate action to prepare appropriate responses. Since IEEE Standards represent a consensus of concerned interests, it is important to ensure that any interpretation has also received the concurrence of a balance of interests. For this reason, IEEE and the members of its societies and Standards Coordinating Committees are not able to provide an instant response to interpretation requests except in those cases where the matter has previously received formal consideration. At lectures, symposia, seminars, or educational courses, an individual presenting information on IEEE standards shall make it clear that his or her views should be considered the personal views of that individual rather than the formal position, explanation, or interpretation of the IEEE.

Comments for revision of IEEE Standards are welcome from any interested party, regardless of membership affiliation with IEEE. Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments. Comments on standards and requests for interpretations should be addressed to:

Secretary, IEEE-SA Standards Board  
445 Hoes Lane  
Piscataway, NJ 08854  
USA

Authorization to photocopy portions of any individual standard for internal or personal use is granted by the Institute of Electrical and Electronics Engineers, Inc., provided that the appropriate fee is paid to Copyright Clearance Center. To arrange for payment of licensing fee, please contact Copyright Clearance Center, Customer Service, 222 Rosewood Drive, Danvers, MA 01923 USA; +1 978 750 8400. Permission to photocopy portions of any individual standard for educational classroom use can also be obtained through the Copyright Clearance Center.

## **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.

## **Notice to users**

### **Errata**

Errata, if any, for this and all other standards can be accessed at the following URL: <http://standards.ieee.org/reading/ieee/updates/errata/index.html>. Users are encouraged to check this URL for errata periodically.

## Interpretations

Current interpretations can be accessed at the following URL: <http://standards.ieee.org/reading/ieee/interp/index.html>.

## Patents

Attention is called to the possibility that implementation of this standard may require use of subject matter covered by patent rights. By publication of this standard, no position is taken with respect to the existence or validity of any patent rights in connection therewith. The IEEE shall not be responsible for identifying patents or patent applications for which a license may be required to implement an IEEE standard or for conducting inquiries into the legal validity or scope of those patents that are brought to its attention.

# Contents

Page

Introduction .....	vi
<b>1 Overview .....</b>	<b>1</b>
1.1 Scope .....	1
1.2 Purpose .....	1
1.3 Limitations .....	1
<b>2 Conformance .....</b>	<b>2</b>
2.1 Intended usage .....	2
2.2 Full conformance .....	2
2.3 Tailored conformance .....	2
<b>3 Normative references .....</b>	<b>2</b>
<b>4 Terms and definitions .....</b>	<b>3</b>
<b>5 Application of this International Standard .....</b>	<b>9</b>
5.1 Key concepts of this International Standard .....	9
5.1.1 Relationship of software products and software services .....	9
5.1.2 Relationship between systems and software .....	9
5.1.3 Organizations and parties .....	10
5.1.4 Organization-level and project-level adoption .....	10
5.1.5 Tailoring .....	11
5.1.6 Temporal relationships among the processes .....	11
5.1.7 Evaluation versus verification, and validation .....	11
5.1.8 Criteria for processes .....	11
5.1.9 Description of processes .....	11
5.1.10 General Characteristics of processes .....	12
5.1.11 Decomposition of processes .....	12
5.1.12 Life cycle models and stages .....	12
5.2 Organization of this International Standard .....	13
5.2.1 Categories of Life Cycle Processes .....	13
5.2.2 Summary of Life Cycle Processes .....	14
5.2.3 Process Reference Model .....	18
<b>6 System Life Cycle Processes .....</b>	<b>18</b>
6.1 Agreement Processes .....	18
6.1.1 Acquisition Process .....	18
6.1.2 Supply Process .....	22
6.2 Organizational Project-Enabling Processes .....	25
6.2.1 Life Cycle Model Management Process .....	25
6.2.2 Infrastructure Management Process .....	26
6.2.3 Project Portfolio Management Process .....	27
6.2.4 Human Resource Management Process .....	29
6.2.5 Quality Management Process .....	31
6.3 Project Processes .....	32
6.3.1 Project Planning Process .....	32
6.3.2 Project Assessment and Control Process .....	33
6.3.3 Decision Management Process .....	34
6.3.4 Risk Management Process .....	36
6.3.5 Configuration Management Process .....	38
6.3.6 Information Management Process .....	39
6.3.7 Measurement Process .....	41
6.4 Technical Processes .....	42
6.4.1 Stakeholder Requirements Definition Process .....	42
6.4.2 System Requirements Analysis Process .....	45
6.4.3 System Architectural Design Process .....	46

6.4.4	Implementation Process .....	47
6.4.5	System Integration Process .....	47
6.4.6	System Qualification Testing Process .....	48
6.4.7	Software Installation Process .....	50
6.4.8	Software Acceptance Support Process .....	51
6.4.9	Software Operation Process .....	51
6.4.10	Software Maintenance Process.....	53
6.4.11	Software Disposal Process .....	56
7	Software Specific Processes.....	57
7.1	Software Implementation Processes.....	57
7.1.1	Software Implementation Process.....	57
7.1.2	Software Requirements Analysis Process .....	59
7.1.3	Software Architectural Design Process .....	60
7.1.4	Software Detailed Design Process .....	61
7.1.5	Software Construction Process.....	63
7.1.6	Software Integration Process.....	64
7.1.7	Software Qualification Testing Process.....	65
7.2	Software Support Processes.....	66
7.2.1	Software Documentation Management Process.....	66
7.2.2	Software Configuration Management Process.....	68
7.2.3	Software Quality Assurance Process.....	69
7.2.4	Software Verification Process.....	71
7.2.5	Software Validation Process .....	73
7.2.6	Software Review Process .....	74
7.2.7	Software Audit Process .....	76
7.2.8	Software Problem Resolution Process .....	77
7.3	Software Reuse Processes.....	78
7.3.1	Domain Engineering Process.....	78
7.3.2	Reuse Asset Management Process.....	80
7.3.3	Reuse Program Management Process.....	82
Annex A	(normative) Tailoring Process .....	85
A.1	Introduction.....	85
A.2	Tailoring Process .....	85
A.2.1	Purpose of the Tailoring Process .....	85
A.2.2	Tailoring Process outcomes .....	85
A.2.3	Tailoring Process activities .....	85
Annex B	(normative) Process Reference Model (PRM) for Assessment Purposes.....	87
B.1	Introduction.....	87
B.2	Conformance with ISO/IEC 15504-2.....	87
B.2.1	General .....	87
B.2.2	Requirements for Process Reference Models.....	87
B.2.3	Process descriptions .....	88
B.3	Process Reference Model.....	90
B.3.1	Acquisition Process Lower-Level Processes.....	91
B.3.2	Supply Process Lower-Level Processes .....	93
B.3.3	Life Cycle Model Management Process Lower-Level Processes.....	94
B.3.4	Human Resource Management Process Lower-Level Processes.....	96
B.3.5	Software Operation Process Lower-Level Processes .....	97
Annex C	(informative) History and rationale .....	99
C.1	Introduction.....	99
C.2	History .....	99
C.3	Goals.....	99
C.4	Process constructs and their usage .....	100
C.5	Relations among version of standards .....	101
Annex D	(informative) ISO/IEC 12207 and ISO/IEC 15288 process alignment.....	105
Annex E	(informative) Process views .....	107
E.1	Introduction.....	107
E.2	Definition .....	107

E.3	The process view concept .....	107
E.3.1	Process viewpoint .....	107
E.4	Process view for usability .....	108
Annex F	(informative) Some example process descriptions .....	110
F.1	Organizational Alignment Process .....	110
F.1.1	Purpose .....	110
F.1.2	Outcomes .....	110
F.2	Organization Management Process .....	110
F.2.1	Purpose .....	110
F.2.2	Outcomes .....	110
F.3	Contract Change Management Process .....	111
F.3.1	Purpose .....	111
F.3.2	Outcomes .....	111
F.3.3	Activities and tasks .....	111
Annex G	(informative) Relationship to other IEEE standards .....	113
Annex H	(informative) Bibliography .....	120
Annex I	(informative) List of participants .....	122

# Systems and software engineering — Software life cycle processes

## 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