

IEEE Std 1028-1997

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IEEE Standard for Software Reviews

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IEEE Standard for Software Reviews

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Abstract: This standard defines five types of software reviews, together with procedures required for the execution of each review type. This standard is concerned only with the reviews; it does not define procedures for determining the necessity of a review, nor does it specify the disposition of the results of the review. Review types include management reviews, technical reviews, inspections, walk-throughs, and audits.

Keywords: audit, inspection, review, walk-through

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Introduction

(This introduction is not part of IEEE Std 1028-1997, IEEE Standard for Software Reviews.)

This Introduction provides the user with the rationale and background of the reviews outlined in this standard and their relationships to other IEEE standards.

Purpose

This standard defines five types of software reviews, together with procedures required for the execution of each review type. This standard is concerned only with the reviews; it does not define procedures for determining the necessity of a review, nor does it specify the disposition of the results of the review. Review types include management reviews, technical reviews, inspections, walk-throughs, and audits.

This standard is meant to be used either in conjunction with other IEEE software engineering standards or as a stand-alone definition of software review procedures. In the latter case, local management must determine the events that precede and follow the actual software reviews.

The need for reviews is described in several other IEEE standards, as well as standards prepared by other standards-writing organizations. IEEE Std 1028-1997 is meant to support these other standards. In particular, reviews required by the following standards can be executed using the procedures described herein:

- IEEE Std 730-1989 [B1]^a
- IEEE Std 828-1990 [B2]
- IEEE Std 1012-1986 [B5]
- IEEE Std 1058.1-1987 [B8]
- IEEE Std 1074-1995 [B10]
- IEEE Std 1219-1992 [B11]
- IEEE Std 1220-1994 [B12]
- IEEE Std 1228-1994 [B13]
- IEEE Std 1298-1992 (AS 3563.1-1991) [B14]
- ISO/IEC 12207:1995 [B15]

The use of IEEE Std 1044-1993 [B7] is encouraged as part of the reporting procedures for this standard.

General application intent

This standard applies throughout the scope of any selected software life-cycle model and provides a standard against which software review plans can be prepared and assessed. Maximum benefit can be derived from this standard by planning for its application early in the project life cycle.

This standard for software reviews was written in consideration of both the software and its system operating environment. It can be used where software is the total system entity or where it is part of a larger system. Care should be taken to integrate software review activities into any total system life-cycle planning; software reviews should exist in concert with hardware and computer system reviews to the benefit of the entire system.

Reviews carried out in conformance with this standard may include both personnel internal to the project and customers or acquirers of the product, according to local procedures. Subcontractors may also be included if appropriate.

^aThe numbers in brackets correspond to those of the bibliography in Annex C.

The information obtained during software reviews (particularly inspections) may be of benefit for improving the user's software acquisition, supply, development, operation, and maintenance processes. The use of review data for process improvement is not required by this standard, but their use is strongly encouraged.

Conformance

Conformance to this standard for a specific review type can be claimed when all mandatory actions (indicated by "shall") are carried out as defined in this standard for the review type used. Claims for conformance should be phrased to indicate the review types used; for example, "conforming to IEEE Std 1028-1997 for inspections."

Development procedure

This standard was developed by the Software Engineering Review Working Group. The entire standards writing procedure was carried out via electronic mail.

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IEEE Standard for Software Reviews

1. Overview

1.1 Purpose

The purpose of this standard is to define systematic reviews applicable to software acquisition, supply, development, operation, and maintenance. This standard describes how to carry out a review. Other standards or local management define the context within which a review is performed, and the use made of the results of the review. Software reviews can be used in support of the objectives of project management, system engineering (for example, functional allocation between hardware and software), verification and validation, configuration management, and quality assurance. Different types of reviews reflect differences in the goals of each review type. Systematic reviews are described by their defined procedures, scope, and objectives.

1.2 Scope

This standard provides minimum acceptable requirements for systematic software reviews, where “systematic” includes the following attributes:

- a) Team participation
- b) Documented results of the review
- c) Documented procedures for conducting the review

Reviews that do not meet the requirements of this standard are considered to be nonsystematic reviews. This standard is not intended to discourage or prohibit the use of nonsystematic reviews.

The definitions, requirements, and procedures for the following five types of reviews are included within this standard:

- a) Management reviews
- b) Technical reviews
- c) Inspections
- d) Walk-throughs
- e) Audits

This standard does not establish the need to conduct specific reviews; that need is defined by other software engineering standards or by local procedures. This standard provides definitions, requirements, and procedures that are applicable to the reviews of software development products throughout the software life cycle.

Users of this standard shall specify where and when this standard applies and any intended deviations from this standard.

It is intended that this standard be used with other software engineering standards that determine the products to be reviewed, the timing of reviews, and the necessity for reviews. This standard is closely aligned with IEEE Std 1012-1986 [B5],¹ but can also be used with IEEE Std 1074-1995 [B10], IEEE Std 730-1989 [B1], ISO/IEC 12207:1995 [B15], and other standards. Use with other standards is described in Annex A. A useful model is to consider IEEE Std 1028-1997 as a subroutine to the other standards. Thus, if IEEE Std 1012-1986 were used to carry out the verification and validation process, the procedure in IEEE Std 1012-1986 could be followed until such time as instructions to carry out a specific review are encountered. At that point, IEEE Std 1028-1997 would be “called” to carry out the review, using the specific review type described herein. Once the review has been completed, IEEE Std 1012-1986 would be returned to for disposition of the results of the review and any additional action required by IEEE Std 1012-1986.

In this model, requirements and quality attributes for the software product are “parameter inputs” to the review and are imposed by the “caller.” When the review is finished, the review outputs are “returned” to the “caller” for action. Review outputs typically include anomaly lists and action item lists; the resolution of the anomalies and action items are the responsibility of the “caller.”

1.3 Conformance

Conformance to this standard for a specific review type can be claimed when all mandatory actions (indicated by “shall”) are carried out as defined in this standard for the review type used. Claims for conformance should be phrased to indicate the review types used; for example, “conforming to IEEE Std 1028-1997 for inspections.” The word “shall” is used to express a requirement, “should,” to express a recommendation, and “may,” to express alternative or optional methods of satisfying a requirement.

1.4 Organization of standard

Clauses 4–8 of this standard provide guidance and descriptions for the five types of systematic reviews addressed by this standard. Each of these clauses contains the following information:

- a) *Introduction*. Describes the objectives of the systematic review and provides an overview of the systematic review procedures.
- b) *Responsibilities*. Defines the roles and responsibilities needed for the systematic review.
- c) *Input*. Describes the requirements for input needed by the systematic review.
- d) *Entry criteria*. Describes the criteria to be met before the systematic review can begin, including
 - 1) Authorization
 - 2) Initiating event
- e) *Procedures*. Details the procedures for the systematic review, including
 - 1) Planning the review
 - 2) Overview of procedures
 - 3) Preparation
 - 4) Examination/evaluation/recording of results
 - 5) Rework/follow-up
- f) *Exit criteria*. Describes the criteria to be met before the systematic review can be considered complete.
- g) *Output*. Describes the minimum set of deliverables to be produced by the systematic review.

¹The numbers in brackets correspond to those of the bibliography in Annex C.

1.5 Application of standard

The procedures and terminology defined in this standard apply to software acquisition, supply, development, operation, and maintenance processes requiring systematic reviews. Systematic reviews are performed on a software product as required by other standards or local procedures.

The term “software product” is used in this standard in a very broad sense. Examples of software products include, but are not limited to, the following:

- a) Anomaly reports
- b) Audit reports
- c) Back up and recovery plans
- d) Build procedures
- e) Contingency plans
- f) Contracts
- g) Customer or user representative complaints
- h) Disaster plans
- i) Hardware performance plans
- j) Inspection reports
- k) Installation plans
- l) Installation procedures
- m) Maintenance manuals
- n) Maintenance plans
- o) Management review reports
- p) Operations and user manuals
- q) Procurement and contracting methods
- r) Progress reports
- s) Release notes
- t) Reports and data (for example, review, audit, project status, anomaly reports, test data)
- u) Request for proposal
- v) Risk management plans
- w) Software configuration management plans (see IEEE Std 828-1990 [B2])
- x) Software design descriptions (see IEEE Std 1016-1987 [B6])
- y) Software project management plans (see IEEE Std 1058-1987 [B8])
- z) Software quality assurance plans (see IEEE Std 730-1989 [B1])
- aa) Software requirements specifications (see IEEE Std 830-1993 [B4])
- ab) Software safety plans (see IEEE 1228-1994 [B13])
- ac) Software test documentation (see IEEE Std 829-1983 [B3])
- ad) Software user documentation (see IEEE Std 1063-1987 [B9])
- ae) Software verification and validation plans (see IEEE Std 1012-1986 [B5])
- af) Source code
- ag) Standards, regulations, guidelines, and procedures
- ah) System build procedures
- ai) Technical review reports
- aj) Vendor documents
- ak) Walk-through reports

This standard permits reviews that are held by means other than physically meeting in a single location. Examples include telephone conferences, video conferences, and other means of group electronic communication. In such cases the communication means should be defined in addition to the meeting places, and all other review requirements remain applicable.

In order to make use of this standard to carry out a software review, first decide the objective of the review. Next, select an appropriate review type using the guidance in Annex B or a local procedure. Then follow the procedure described in the appropriate clause (4–8) of this standard.

2. References

This standard shall be used in conjunction with the following publications. If the following publications are superseded by an approved revision, the revision shall apply. (Additional standards that may be used to prepare software products that are the subject of reviews are cited in a bibliography in Annex C.)

IEEE Std 100-1996, The IEEE Standard Dictionary of Electrical and Electronics Terms, Sixth Edition.

IEEE Std 610.12-1990, IEEE Standard Glossary of Software Engineering Terminology.

3. Definitions

For purposes of this standard, the following terms and definitions apply. IEEE Std 610.12-1990² and IEEE Std 100-1996 should be consulted for terms not defined in this clause.

Six of the terms given here are defined in other IEEE software engineering standards. The definition of the term “anomaly” is identical to that given in IEEE Std 1044-1993 [B7]. The terms “audit,” “inspection,” “review,” “software product,” and “walk-through” are all defined in IEEE Std 610.12-1990; however, some minor modifications have been made to those definitions to more closely match the content of this standard, as explained in the succeeding paragraph.

IEEE Std 610.12-1990 uses different terms for the object of a review: audits and reviews are defined therein in terms of “work products,” inspections are defined in terms of “development products,” and walk-throughs are defined in terms of “segment of documentation or code.” “Work products” are not defined in IEEE Std 610.12-1990. Since “software product” is defined therein, and it is desirable to use a single term in this standard, a change in terminology was made. Since software products being reviewed are not limited to those “designated for delivery to a user,” that phrase was dropped from the definition of “software product.” The definition of “inspection” has been changed considerably. No other changes to the definitions from IEEE Std 610.12-1990 were made.

3.1 anomaly: Any condition that deviates from expectations based on requirements specifications, design documents, user documents, standards, etc., or from someone’s perceptions or experiences. Anomalies may be found during, but not limited to, the review, test, analysis, compilation, or use of software products or applicable documentation.

3.2 audit: An independent examination of a software product, software process, or set of software processes to assess compliance with specifications, standards, contractual agreements, or other criteria.

3.3 inspection: A visual examination of a software product to detect and identify software anomalies, including errors and deviations from standards and specifications. Inspections are peer examinations led by impartial facilitators who are trained in inspection techniques. Determination of remedial or investigative action for an anomaly is a mandatory element of a software inspection, although the solution should not be determined in the inspection meeting.

²Information on references can be found in Clause 2.

3.4 management review: A systematic evaluation of a software acquisition, supply, development, operation, or maintenance process performed by or on behalf of management that monitors progress, determines the status of plans and schedules, confirms requirements and their system allocation, or evaluates the effectiveness of management approaches used to achieve fitness for purpose.

3.5 review: A process or meeting during which a software product is presented to project personnel, managers, users, customers, user representatives, or other interested parties for comment or approval.

3.6 software product: (A) A complete set of computer programs, procedures, and associated documentation and data. (B) One or more of the individual items in (A).

3.7 technical review: A systematic evaluation of a software product by a team of qualified personnel that examines the suitability of the software product for its intended use and identifies discrepancies from specifications and standards. Technical reviews may also provide recommendations of alternatives and examination of various alternatives.

3.8 walk-through: A static analysis technique in which a designer or programmer leads members of the development team and other interested parties through a software product, and the participants ask questions and make comments about possible errors, violation of development standards, and other problems.

4. Management reviews

4.1 Introduction

The purpose of a management review is to monitor progress, determine the status of plans and schedules, confirm requirements and their system allocation, or evaluate the effectiveness of management approaches used to achieve fitness for purpose. Management reviews support decisions about corrective actions, changes in the allocation of resources, or changes to the scope of the project.

Management reviews are carried out by, or on behalf of, the management personnel having direct responsibility for the system. Management reviews identify consistency with and deviations from plans, or adequacies and inadequacies of management procedures. This examination may require more than one meeting. The examination need not address all aspects of the product.

Examples of software products subject to management review include, but are not limited to

- a) Anomaly reports
- b) Audit reports
- c) Back-up and recovery plans
- d) Contingency plans
- e) Customer or user representative complaints
- f) Disaster plans
- g) Hardware performance plans
- h) Installation plans
- i) Maintenance plans
- j) Procurement and contracting methods
- k) Progress reports
- l) Risk management plans
- m) Software configuration management plans
- n) Software project management plans
- o) Software quality assurance plans
- p) Software safety plans