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Information technology — Guidelines for the management of software documentation

Technologies de l'information — Lignes directrices pour la gestion de la documentation technique du logiciel

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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. 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.

In exceptional circumstances, the joint technical committee may propose the publication of a Technical Report of one of the following types:

— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

— type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;

— type 3, when the joint technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

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 TR 9294, which is a Technical Report of type 3, was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and system engineering.*

This second edition cancels and replaces the first edition (ISO/IEC TR 9294:1990), which has been technically revised. Changes were made to update the document with current methodologies and to align it with ISO/IEC 12207:1995/Amd.1:2002.

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Introduction

Documentation is needed for all stages of the software life cycle. As a result, the preparation and maintenance of documentation constitute a necessary and continuous effort from the inception of the software through to its disposal. Documentation begins with and is consistent with a software life cycle process, such as the initiation of a software project, and continues with the design, development, testing, installation, use, modification and enhancement of the software. The documentation process can be regarded as having ended only when the information about the software is no longer needed and the use of the software is terminated.

Documentation is an essential component for the success of any software project, and the production of documentation implies the commitment of time, effort and money. It is the responsibility of management to ensure the effective deployment of these resources that recognizes the importance of documentation to the quality and success of the software product.

ISO/IEC TR 9294 is one of the guidelines of the Documentation Process in ISO/IEC 12207:1995/Amd1:2002 (from the viewpoint of managing the products of the documentation process). ISO/IEC 15910:1999 and ISO/IEC FDIS 18019, are guidelines for the user documentation process. These documents are useful in integrating the processes of documentation and software development. ISO/IEC 6592:2000 is useful in identifying the document contents.

The guidelines for the Documentation Process of ISO/IEC 12207:1995/Amd1:2002 and this Technical Report describe a management point of view of software documentation. The relationships between this document and other related International Standards are shown in Figure 1. This TR is one of the guidelines for the Documentation Process of ISO/IEC 12207:1995. Clause 6 includes a reference to the User Documentation Process of ISO/IEC 15910:1999 and ISO/IEC FDIS 18019; and 7.2 has a reference to ISO/IEC CD 15289 showing typical development and product documents.

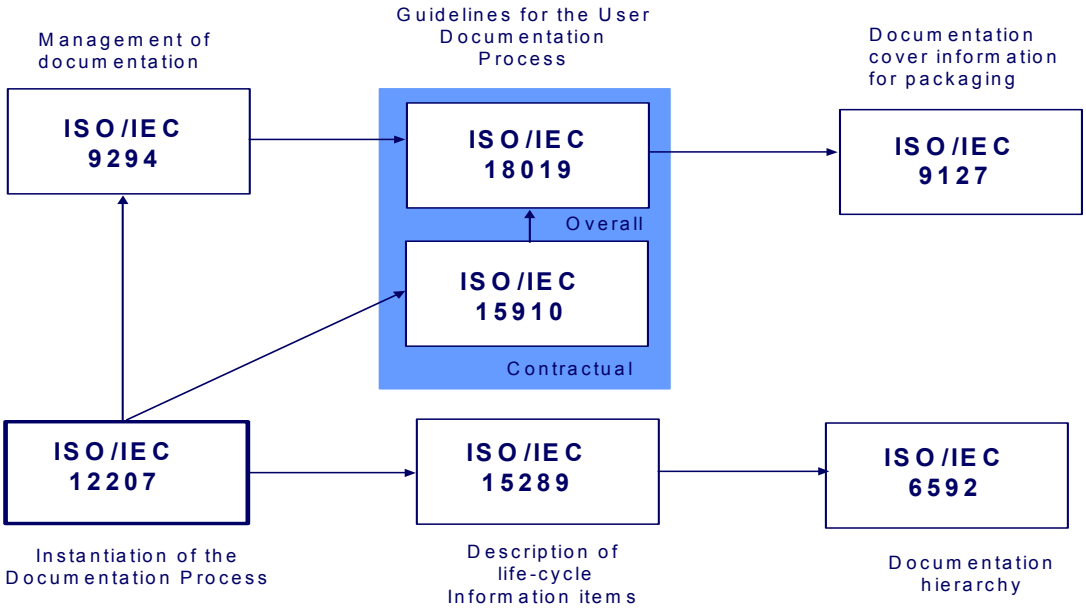

Figure 1 — Relationship of TR 9294 to documentation International Standards

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Information technology — Guidelines for the management of software documentation

1 Scope

This Technical Report (TR) offers guidance on the management of software documentation to managers responsible for the production of software or software-based products. This guidance is intended to assist managers in ensuring that effective documentation is produced in their organization.

This TR addresses the policies, standards, procedures, resources and plans with which managers must concern themselves in order to manage software documentation effectively.

The guidance given is intended to be applicable to all types of software, from the simplest program to the most complex software suite or software system. All types of software documentation are covered, relating to all stages of the software life cycle.

The principles of software documentation management are the same whatever the size of a project. For small projects, much of the detail given in this TR may not apply, but the principles remain the same. Managers may tailor the recommendations to their particular needs.

The guidance given is from the point of view of software documentation management. Detailed advice is not provided on, for example, the content and layout of software documents.

2 Normative references

The following referenced documents are indispensable for the application 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 12207:1995/Amd1:2002, *Information Technology — Software life cycle processes — Amendment 1*

ISO/IEC 18019:2004, *Software and system engineering — Guidelines for the design and preparation of user documentation for application software*

3 Terms and definitions

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

3.1
document
uniquely identified unit of information for human use, such as a report, specification, manual or book, in printed or electronic form

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3.2
documentation
collection of related documents that are designed, written, produced and maintained

3.3
software product
set of computer programs, procedures, and possibly associated documentation and data [ISO/IEC 12207:1995, 3.26]

4 The managerial role

4.1 Overview

Managers commit their organisations to a documentation effort and support that effort by implementing documentation policies, standards, procedures, resource allocations and plans. Effective performance of software documentation management can be seen as based on two elements as follows:

a) Management commitment to documentation: the recognition that software documentation is important and must be planned, designed, developed, tested, reviewed, approved, distributed and maintained.

b) Management support:

1) guidance and incentives for staff to produce the required documentation,

2) provision of resources to facilitate the work.

3) evidence of managerial commitment and support

4.2 Evidence of managerial commitment and support

Managerial commitment to documentation should include provision and maintenance of several elements:

a) documentation policy statements,

b) standards and guidelines which have been identified for all aspects of software documentation,

c) published documentation procedures,

d) allocation of adequate resources to documentation,

e) inclusion of documentation planning as an integral part of the software life cycle,

f) continuous review to ensure compliance with, and improvement of, documentation policies, standards, procedures and plans.

5 The functions of software documentation

5.1 Overview

To manage software documentation effectively, managers should be aware of the different functions performed by software documentation, including user, development, and management documentation.

Software documentation can be regarded as having six major functions described in the following sub-clauses: communication to management, communication among development task groups, quality assurance, instruction and reference for users, communication for software maintenance, and reference for other projects.

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5.2 Communication to management

During the development of software, management needs to be apprised of progress, problems and expectations. Periodic reports, tracking progress against schedules and laying out plans for the next period, provide control mechanisms and visibility for a project. Communication to management supports direction and decisions on project continuation and resource allocation.

5.3 Task-to-task communication

Software development methodologies may need to establish formal documents for task-to-task communication. Many software development projects are divided into tasks. These are often carried out by different groups, such as specialists, analysts, designers, programmers, who need a means of communicating with one another. For example, analysts may need to present formal requirements to designers, and designers may need to give formal design specifications to programmers.

5.4 Quality assurance

Those charged with the responsibility for software quality assurance may need to establish formal documents for both the software product and software quality assurance process required to carry out and document their responsibilities and to meet the required quality of documentation for the software product.

Documentation is needed to enable those performing quality assurance activities to carry out their tasks.

NOTE Quality assurance activities should address both the software life cycle processes and their documented products.

5.5 Instruction and reference

Documentation is needed to enable operators, users, acquirers, managers and other interested people to understand and use the software product.

5.6 Software support

Maintenance programmers use the documentation containing detailed descriptions of the software to locate and correct errors and modify the software as required.

Trainers and user support programmers may use the documentation for training and user support.

5.7 Historical reference

Documentation may be used as a historical reference for a other projects. This documentation can also be used in the transfer and conversion of software to new environments.

6 Establishing documentation policies

Documentation policies prepared and supported by management provide guidance to all decision-makers. Policies provide broad direction, and not detailed prescriptions on what to do or how to manage and prepare documentation.

Formal, well-publicised policies should be written to establish the discipline required for effective software documentation. Everyone affected by the policies should be informed of it and trained to effectively prepare the documentation.

Policies should support the basic elements of effective documentation:

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a) Documentation should be required for the entire software life cycle. Documentation is needed during the early stages of a project, and should be available and maintained throughout the software life cycle. After software development is completed, documentation may be needed for the use, maintenance, enhancement, conversion or transfer of the software.

b) Documentation should be managed. Direction and control are needed to obtain and maintain documentation. Managers and documentation specialists should prepare detailed plans outlining documentation products, schedules, responsibilities, resources and quality assurance and review procedures.

c) Documentation should be appropriate to each project and to its readership. Readers may be managers, analysts, office personnel, professionals with no computer expertise, maintenance programmers, etc. Depending on the tasks, they need various degrees of detail and different presentations of material. A documentation specialist should be charged with properly designing different types of documentation destined for different readers.

d) Documentation process should be planned and integrated into the overall software life cycle process. The software life cycle process and documentation requirements should be defined.

NOTE See ISO/IEC 12207:1995/Amd1:2002, ISO/IEC 15910, and ISO/IEC FDIS 18019 for more detailed guidance.

e) Documentation standards should be identified and used. Existing standards should be adopted wherever possible. Where no suitable standards exist, standards and guidelines should be developed as required.

f) Support tools should be specified and used. Tools to help develop, maintain and distribute software products, including documentation, should be used wherever economically feasible.

7 Establishing documentation standards and guidelines

7.1 Overview

Whenever appropriate existing guidelines should be adopted. However, if guidelines do not exit or are not appropriate, an organization should get guidance from national or international standards.

These standards and guidelines assist in establishing how documentation tasks are carried out, and in providing criteria both for planning the documentation resources and for judging completeness, usefulness and appropriateness of the organisation’s software documentation.

Whenever software development is outsourced, a software contract should specify the standard that the documentation has to meet for any given software life cycle. It should specify a plan for the management of the documentation development; the type of documents to be supplied; the level of quality for each document; and the documentation review, test and approval procedures.

Organizations should develop guidelines that provide advice regarding the use of standards and guidelines at a general level. Managerial judgment and contractual requirements will often lead to the adaptation of that general advice for each project. Application of documentation standards will enable project managers to determine:

a) What document types are required.

b) How much documentation is to be provided.

c) What the documents are to contain.

d) What level of quality is to be achieved.

e) When the documents are to be produced.

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f) How the documentation is to be stored, maintained, and communicated.

The sub-clauses 7.2 to 7.6 present the types of guidelines to be considered and give, for each, an overview of their applications.

7.2 Selecting a software life cycle model

A number of software life cycle models exist, with different terminology for the various stages, e.g., ISO/IEC TR 15271 – Guide for ISO/IEC 12207, for guidance on life cycle models based on ISO/IEC 12207 processes and terminology. From the point of view of software documentation, the selected software life cycle model should support defining, planning, and scheduling the life cycle activities and their associated documentation for any particular software project. Project Managers should therefore select an appropriate software life-cycle model for a project and ensure it is applied within the project.

Defined processes, stages, and associated tasks will help to monitor the progress of any software project. The production of the documentation associated with a particular stage may, e.g., be used as a checkpoint for the review, approval and completion of that stage prior to the beginning of the next stage.

7.3 Defining document type and content

7.3.1 Introduction

The following subclauses are neither exhaustive nor definitive, and may serve as a management checklist of the major types of software documentation that managers should provide for when defining their system life cycle document types.

7.3.2 Development documentation

Documentation should be created to provide an overview during software development activities, typically including software requirements, the design of the software, testing, and quality assurance. Development documentation includes detailed technical descriptions of software, typically including program, module, or object logic and inter-relationships, data formats and storage. Development documents serve the following purposes:

a) Record the history of the software development.

b) Allow managers to assess the development progress, track and control the software project.

c) Identify the responsibilities of the development team, recording the roles and responsibilities for software, subject matter, documentation, quality assurance and any one else.

d) Form the basis of the software support documentation required by maintenance programmers as part of the product documentation.

e) Serve as a vehicle of communication between those involved in the development life cycle process recording the details of the decisions made about software requirements, design, coding, testing, maintenance, support and operations.

Typical development documents include the following:

— Project initiation request including concept formulation and determination of need.

— Feasibility studies.

— Functional and performance specifications.

— Design specifications, including program and data specifications.

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— Development plans.

— Software integration and test plans.

— Quality assurance plans, standards and schedules.

— Security and test information.

7.3.3 Product documentation

Product documentation provides the information necessary for the use, maintenance, enhancement, conversion and transfer of a software product. Product documentation serves the following purposes:

a) Provides training and reference information for anyone using, demonstrating and operating a software product.

b) Describes the software product to enable designers and programmers, other than those who developed the software, to maintain and enhance the software.

c) Promotes the marketing and acquisition of software products.

Product documentation should be directed to readers, such as:

— Users, who enter data, retrieve information and solve problems with the software.

— Operators, who run the software on a computer system.

— Maintenance programmers, who maintain, enhance or change the software.

— Buyers of software packages for selecting, installing, operating and obtaining assistance in the use of the functions.

Typical product documents include:

— Promotional material announcing the availability of a software product and detailing its functions, operational environment, etc.

— Product brochures and information leaflets.

— Tutorials.

— Reference manuals and user guides.

— Software support manuals.

— Guides and material for managers who supervise the use of the software.

— General information describing a software product for anyone interested in it.

7.3.4 Project management documentation

Project management documentation provides the information related to the life of a product from the management point of view. Documentation should be created to manage software projects, including:

a) Schedules for each stage of the development, maintenance, operations processes and records of the schedule changes.

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b) Records of the agreed software or documentation changes.

c) Records of the decisions related to the development, maintenance or operations.

d) Definitions of the responsibilities.

e) Records of the reviews and approvals.

7.4 Defining document quality

Managers should determine how quality is to be achieved and maintained, consistent with quality and project management requirements. Managers should set standards for the level of quality appropriate to the different types of documentation, operations and functions described, and types of projects.

Considerations of document quality apply to the content, structure and presentation of documentation:

a) Quality of content can be measured in terms of accuracy, completeness, relevance and clarity.

b) Quality of structure can be measured by the ease a reader is able to locate information through the use of different styles, logical organisation, indexing, and use of diagrams, tables, and illustrations.

c) Quality of presentation should be appropriate to the type of readers. For example, a user guide might take the form of a set of printed pages stapled together or an electronic version, it might have extensive illustrations designed by a graphics expert, or presented in a visual format on an electronic user device.

NOTE See ISO/IEC 15910:1999 for guidance on the documentation process.

7.5 Defining document formats

Standardised document formats assist in:

a) Maintaining quality control of documents.

b) Preparing documents.

c) Ensuring the readability of documents.

d) Maintaining and reusing information among documents.

Information can be presented in a variety of formats. Design specifications, for example, can be shown on pre-defined forms. User training can be accomplished by means of on-line training programs, in classrooms or through workbooks and tutorials.

Document format may vary from project to project. Standardised document formats should be tailored applying factors such as project size, the audiences and content to be addressed, the number of stages identified, and the degree to which the documentation is accessible on-line in an interactive mode and the documentation budget.

When designing formats, thought should be given to whether documents will be translated for international distribution and for translation. National colloquialisms and cultural bias should be avoided.

An organisation’s standards and guidelines for document formats should be defined in such a way as to permit flexibility in selecting the formats appropriate for a project.

NOTE ISO/IEC FDIS 18019 provides guidance on formats for user documentation

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7.6 Defining a document identification system

A standard means of identifying documents is essential for effective control of documentation. Identifying information may include:

a) Document title.

b) Document reference-numbering scheme.

c) Document version-numbering scheme.

d) Date of issue and revisions.

e) Author name(s) and organisation identification.

f) Review and approval authority.

g) Protection and copyright identification.

h) Issuing organisation identification.

When documents are issued in loose-leaf form, every page should be uniquely identified, e.g., with the document reference number, page number, date, and issue and revision number.

8 Establishing documentation procedures

Procedures should implement the documentation policies and define documentation sequences consistent with the software life cycle process and software documentation management, such as:

a) Setting objectives.

b) Planning.

c) Analysing and designing.

d) Developing and reviewing.

e) Producing.

f) Evaluating and updating, with underlying processes of control, storing, maintaining backup, distributing, disposing and archiving.

Procedures should also identify document configuration management and quality assurance checkpoints, measures, and methods.

NOTE ISO/IEC 18019 provides guidance on the activities in the life cycle of user documentation.

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9 Allocating resources to documentation

9.1 People

9.1.1 Managers

Managers should ensure that qualified people are assigned responsibilities for documentation. The process of software development and documentation has roles for people with knowledge of:

a) Software, to develop the software.

b) Subject matter, including the audience or customer characteristics, to provide information about the application the software is addressing.

c) Documentation, to develop product documentation.

9.1.2 Project Team Members

Project team members should have experience in documentation skills and techniques (to the level needed). All members should be informed of their documentation roles and should understand how to fulfil their respective roles.

a) Software designers and programmers should have requisite skills to produce the development and test documentation describing the product and its functions.

b) Subject matter specialists should have requisite skills to provide information for and may produce parts of feasibility studies, requirements specifications, testing and quality assurance plans, plans for integrating the software into its operational environment, and provide appropriate controls and protection for sensitive document content.

c) Documentation specialists should have requisite skills to design and produce product development, test, user training, reference, product information and promotional documentation that may be required to support the project.

9.2 Facilities

Managers should ensure that adequate and appropriate facilities are available for documentation process activities and tasks.

Software tools should be available for preparing and controlling documentation. These tools should be familiar to the documentation writers and can be used effectively to improve the efficiency of the documentation process activities and tasks.

9.3 Funding

Management should provide sufficient funding for documentation activities. Documentation resources and associated costs may be identified as separate budget line items throughout the development life cycle, since they can form a significant part of the cost of software development.

NOTE The cost of documentation may be offset by reduced costs for user support and software maintenance.

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10 Documentation plan

10.1 Overview

A documentation plan states:

— What is to be done.

— Where it is to be done.

— When it is to be done.

— How it is to be done.

— Who is to do it.

A documentation plan may be part of an overall project plan or a stand-alone document. For small, informal projects, a plan may be brief. For larger projects, a comprehensive documentation plan following established standards and a formal review and approval procedure may be required.

The documentation plan should be distributed to all project team members and to anyone else concerned with it. The users of the software being developed for testing, training and operations should also be involved.

10.2 Information in the documentation plan

The documentation plan should include statements of:

a) Overall documentation structure.

b) Document types and content.

c) Document quality and formats.

d) Document identification.

e) Document collection and storage.

f) Document distribution.

g) Documentation schedule.

10.3 Documentation schedule

The documentation schedule should allocate time to:

a) Plan the documents, giving consideration to electronic and printed copies.

b) Review the documentation plan and documentation outlines.

c) Prepare drafts and review them for technical accuracy, completeness, comprehensiveness, consistency and appropriateness.

d) Edit drafts to conform to documentation standards and practices, in addition to incorporating comments arising from the reviews and tests.

e) Obtain approvals.

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f) Translate, e.g., Japanese to French, and convert from draft to final products.

g) Produce finished documents for distribution, including reproducing in electronic or printed format.

h) Distribute documents.

Planning should start early and should be consistent with the software life cycle model used. Managers should review documentation plans throughout a project life cycle. Like any plan, a documentation plan indicates future activities and is subject to change. Regular reviews resulting in appropriate changes to a documentation plan should be built into a project.

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Annex A
(informative)

Checklist for software documentation management

A.1 Policies checklist

Have decisions been made to:

a) Produce software documentation consistent with the software life cycle model?

b) Apply documentation standards and guidelines, including consideration for protecting intellectual properties, applying proprietary and protection provisions?

c) Establish procedures for documentation development and control?

d) Make resources available for documentation?

e) Use automated documentation tools?

f) Appoint or allocate staff with requisite skills to be responsibilities for:

   1) Establishing and applying documentation standards and procedures?

   2) Documentation quality control, including user training and testing?

g) Has a documentation policy and documentation guidance manual been created and distributed to the project team?

A.2 Standards checklist

Have standards been adopted or defined for:

a) Documentation of the software life cycle model?

b) Document types and content for applicable audience categories ?

c) Document quality levels and characteristics ?

d) Document format ?

e) Document identification?

A.3 Procedure checklist

Have procedures been established for:

a) Documentation planning?

b) Documentation control?

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c) Documentation production?

d) Documentation review and approval?

e) Documentation distribution?

f) Document storage of master and backup copies?

g) Documentation updates?

h) Documentation archiving and disposition?

A.4 Project planning checklist

a) Has a documentation plan been produced to include:

   1) Types, content, quality, and formats, consistent with the life cycle process in use?

   2) Schedules that coincide with the project life cycle?

   3) Budget?

b) Have responsibilities been assigned for:

   1) Document preparation?

   2) Document review and approval?

   3) Document translations, conversions, production, and distribution?

c) Has staff been provided with adequate facilities and resources for documentation tasks?

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