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Systems and software engineering — Capabilities of review tools

Ingénierie des systèmes et du logiciel — Capacités des outils d'analyse

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Foreword

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

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

It is widely recognized that almost all software development organizations need to improve the quality of software at an appropriate cost and review is one important means. Applying reviews early in the lifecycle is known to reduce the amount of unnecessary rework in regular projects. This is because problem detection in upstream requires less cost than detection of problems by performing tests in downstream processes. By conducting the review in this way, it is possible to detect problems early, evaluate alternatives, improve organizational and personal processes, and improve work outcomes. ISO/IEC 20246 specifies a standard process for work product reviews.

Review support tools provide capabilities to improve review work and improve review quality, for example support for collaboration and communication between reviewers, logging and highlighting comments made on a work product, and support for review report generation.

Support tools are indispensable in the large-scale development project where the number of items pointed out in the review exceeds one thousand. Support tools are also actively used in small and medium-sized projects to improve review quality and efficiency. Indeed, various kinds of "review tools" are provided. For example, there is a relatively simple capability that allows you to add comments as a tag using the macro function of document creation. On the other hand, there are tools to support the progress management of the entire project in the large-scale development in which dozens of reviewers point out issues and the project manager monitors the status of the review implementation status.

In large organizations, it is very important to select appropriate tools from among various kinds of review tools. It is essential that the selected tool has a high degree of fairness and is evaluated according to public standards. For this purpose, ISO/IEC 20741 on the process of evaluation and selection of software engineering tools was published in 2017. However, ISO/IEC 20741 does not prescribe standard capabilities specific to reviews because it is generalized without depending on a specific tool field.

This document aims to define the capabilities of review support tools and to select the appropriate tool in combination with ISO/IEC 20741 for tool evaluation and selection (see Annex E). The review support tool assumed in this document supports the entire process specified in ISO/IEC 20246. For example, capabilities which support personal activities such as viewing and pointing out deliverables are necessary, and capabilities which support group activities such as reporting of situations are necessary (see Annex D). It is assumed that the check work itself such as the source code check defined in the ISO/IEC 30130 test tool is not included, and it is assumed that humans are checking.

Systems and software engineering — Capabilities of review tools

1 Scope

This document specifies the capabilities of a tool to support review work.

The evaluation and selection of the review tools are performed in accordance with ISO/IEC 20741 which defines the general evaluation selection process and evaluation characteristics. This document defines capabilities specific to review tools in the process. By using these two standards together, it is possible to derive objective and reasonable results of the evaluation and selection of review tools.

The review work is based on the process, activities, and tasks defined in ISO/IEC 20246. It is also assumed that the review targets are defined in ISO/IEC 20246. The review work in this document is assumed not to be performed by a 3rd party, but within a project.

The review tool capabilities specified in this document harmonize with the review process defined in ISO/IEC 20246. This document does not include automated process, activities, or tasks for conducting reviews such as automated source code checkers defined in ISO/IEC 30130.

Issues which are identified in the review are recorded and managed by the tool; but defects found in tests and issues found in general except for reviews are out of the scope of this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 20246, *Software and systems engineering — Work product reviews*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 20246 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
entity
data concept that may have attributes and relationships to other entities

[SOURCE: ISO/TR 25100:2012, 2.1.3, modified — NOTE has been removed.]

3.2
review folder
entity (3.1) for binding one or more related reviews, including a list of the reviews and information common to the reviews

Note 1 to entry: The information common to the reviews can include information on members who can participate in or organize the reviews, and information on the classification given to the issues identified during the reviews.

4 Object model for review tools

4.1 Overview of the object model

The overall structure of the object model of review consists of the following elements:

a) Review Process: a set of processes defined by ISO/IEC 20246,

b) Review Entity: a set of elements that represents identifiable information which appears in Review Process and is described as a class in the object model, and

c) Review Tool: a tool which supports to create, refer to, update, and delete Review Entity.

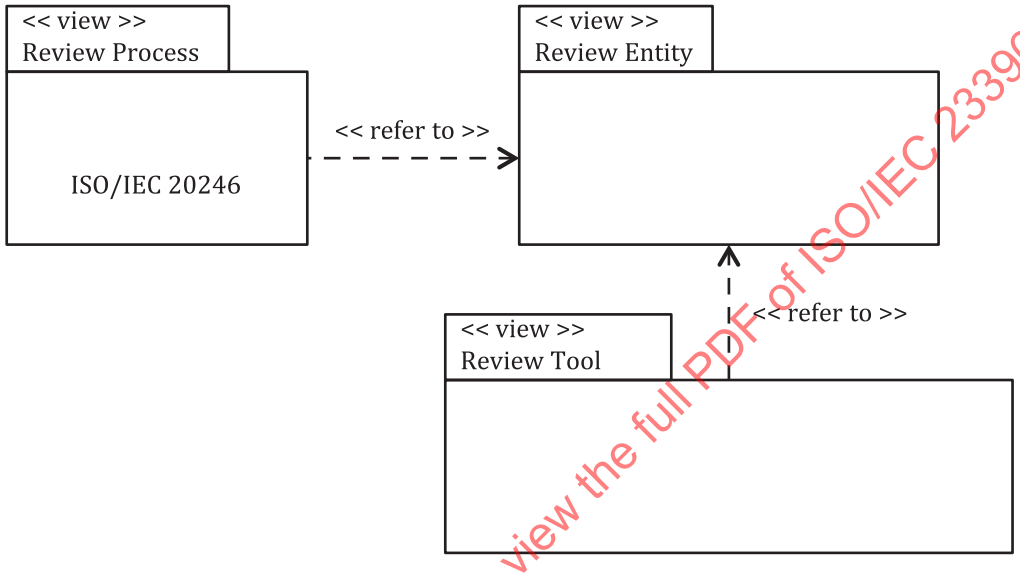


Figure 1 — Overall structure of object model of review

The object model diagrams, Figure 1 to Figure 3, are described using UML 2 (Unified Modelling Language 2) (see ISO/IEC 19505-2).

An object model for review tools can be identified to define tool capabilities by its input, process, and output.

4.2 Object model of review entities

ReviewFolder in this object model (hereinafter referred as ReviewFolder) stands for a review folder.

Review in this object model (hereinafter referred as Review) is an entity representing a single review in which all information, such as a list of work products to be reviewed, a list of participants, and a list of issues identified during the review, is recorded.

WorkProduct in this object model (hereinafter referred as WorkProduct) is an entity representing a work product which is defined in ISO/IEC 20246.

Member in this object model (hereinafter referred as Member) is an entity representing a member who participates in or organizes the review. It represents all roles defined in ISO/IEC 20246 such as author, review leader, and reviewer.

A single review is usually carried out on one or more WorkProduct by participants selected from Member.

IssueByReview in this object model (hereinafter referred as IssueByReview) is an entity representing an issue which is identified in the review.

NOTE 1 Issue is defined in ISO/IEC 20246.

PlaceOfIssueByReview in this object model (hereinafter referred as PlaceOfIssueByReview) is an entity representing a place where the issue is identified.

NOTE 2 There are two reasons why detection places of issues are set as independent entities on the model. The first reason is that the multiplicity of the relationship between WorkProduct and IssueByReview is many to many. That is, the same IssueByReview may be given to more than one PlaceOfIssueByReview, and multiple IssueByReview may be given to the same PlaceOfIssueByReview. The second reason is that the capability to support the discovery of the issue detection place is decisively important on the tool.

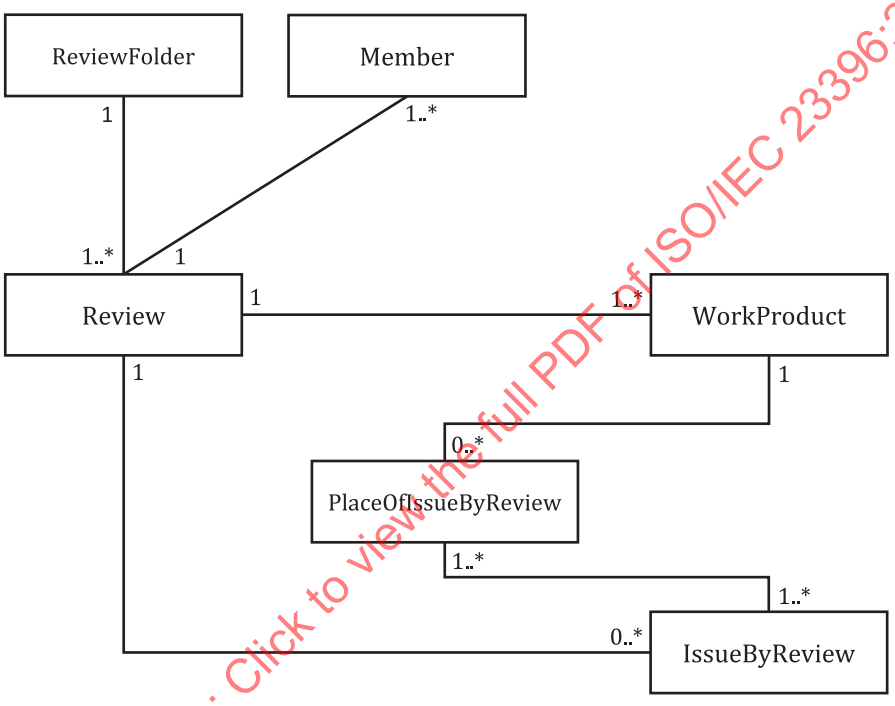
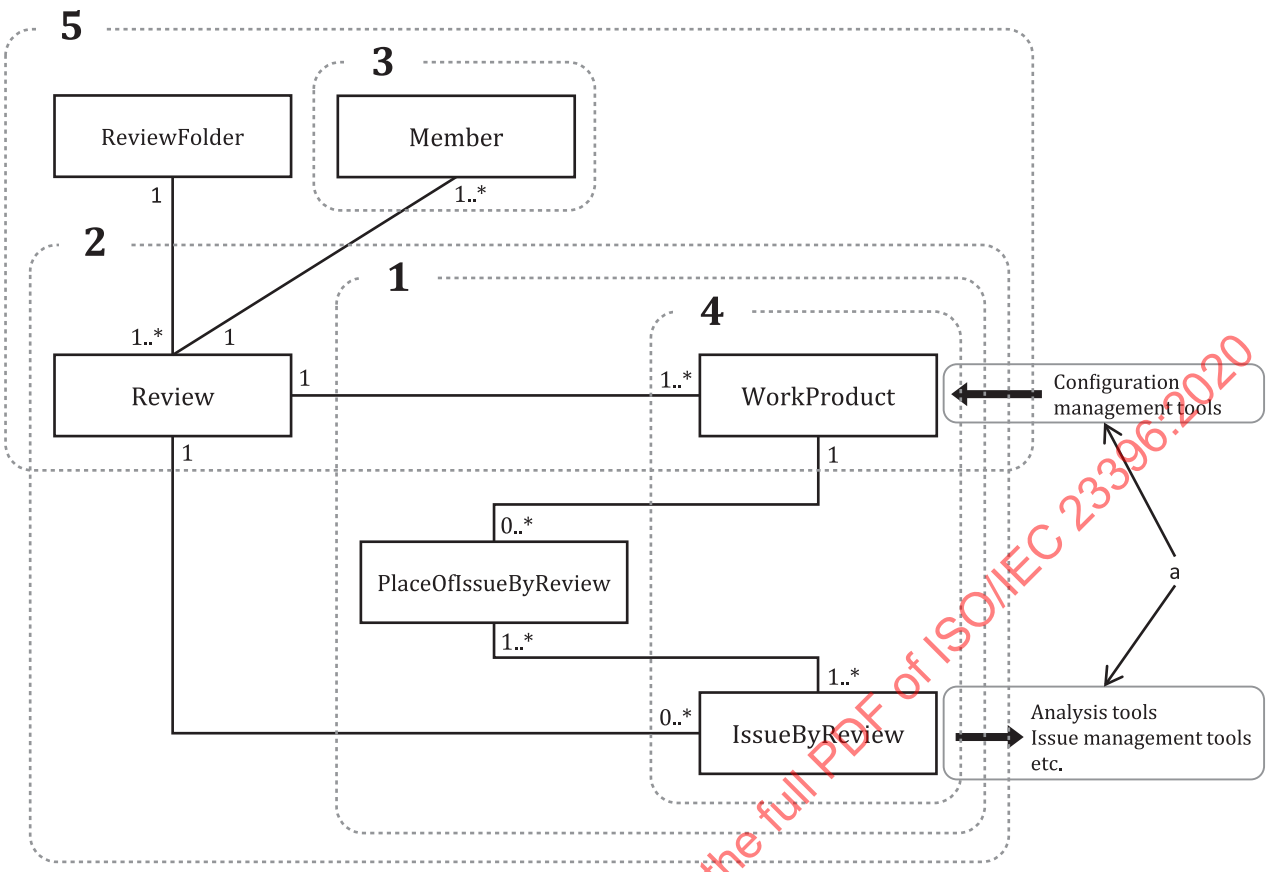


Figure 2 — Entities of review

The relationship between the entities described here and the activities defined in ISO/IEC 20246 is shown in Annex B.

4.3 Category of capabilities for review tools

On the object model of the review entity, capabilities are categorized into groups according to the group of entities to be handled (see Figure 3).



Key

(1) A group of entities for capabilities of category "IssueByReview management"

(2) A group of entities for capabilities of category" Review metrics collection and report output

(3) A group of entities for capabilities of category "Human communication report"

(4) A group of entities for capabilities of category "Linkage with other schools"

(5) A group of entities for capabilities of category "Administration"

[a] Linking destination tools.

Figure 3 — Category of capabilities

1) IssueByReview management

It is a set of capabilities of managing individual IssueByReview identified during the review of a WorkProduct. It generates and updates IssueByReview. At the same time, accompanying pointing PlaceOfIssueByReview is also generated and updated.

This category is required for individual review and issue communication and analysis, such as supporting the easy detection of issues, recording of issues, recording of the status of issues, communication of issues, and recording of solutions. Furthermore, it is important that the records can be used for monitoring the status of each issue and analysing the progress of review as a whole.

2) Review metrics collection and report output

It is a set of capabilities to collect and compile information related to review metrics for a single review. It creates a review report. Review rate, reviewer progress rate, and reviewer completion criteria are managed by this group of entities.

3) Human communication support

It is a set of capabilities to support communication among the review organizer and review participants, such as messaging, chat, and mail distribution of review holding information.

It is important to support communication between each reviewer who usually performs an individual review at different places. These capabilities can avoid duplication of issues and promote new discoveries.

4) Linkage with other tools

It is a set of capabilities to import/export the information of each entity.

In the review, cooperation with multiple external tools is required, such as checking out the target work product from the configuration management tool, registering a problem that cannot be solved in the review process to the issue management tool.

5) Administration

It is a set of capabilities used by the administrator of the review, such as defining review folders and reviews and controlling the implementation of reviews. It generates and updates ReviewFolder and Review as well as related Member and WorkProduct.

5 Entities of review tools

5.1 Overview

The following six entities to be handled by a review tool presented in 4.2 are defined in this clause:

— ReviewFolder;

— Review;

— Member;

— WorkProduct;

— IssueByReview; and

— PlaceOfIssueByReview.

Detailed examples of each entity and the attributes contained therein are shown in Annex A.

5.2 ReviewFolder

The following attributes are normally recorded:

— a name for identifying the review folder;

— a list of members who may participate in or organize reviews bound by this entity;

— names and values of classifications which are standard vocabularies to be uniformly used for each issue identified during reviews bound by this entity; and

— a list of reviews.

EXAMPLE The names of the classifications can include “severity” and “priority”. The values of the classifications can include “high”, “medium”, and “low”.

5.3 Review

This is information of each review bound by the review folder.

The following attributes are normally recorded:

— a review ID;

— a review name;

— a review type;

— a list of work products to be reviewed;

— a list of members planned to participate in the review;

— an organizer of the review;

— a list of participants in the review;

— a list of issues identified during the review;

— date and time when review started;

— date and time when review ended;

— time spent in the review;

— work product appraisal; and

— review decision.

In addition, the following attributes may be recorded:

— purpose of the review;

— scheduled start date and time of the review;

— scheduled end date and time of the review;

— checklists used in the review;

— scenarios used in the review;

— support information such as standards;

— the review man-hours; and

— viewpoints of the review.

5.4 Member

This is information of members who are involved in the review. These members can be the organizer or participant of the review.

The following attributes are normally recorded:

— a member ID;

— a member name;

— an affiliation; and

— contact information.

5.5 WorkProduct

This is information of work products to be reviewed.

The following attributes are normally recorded:

— an identifier of a work product;

— a file path;

— an author;

— number of pages or lines of code; and

— a scope to be reviewed.

NOTE If the changed parts are specified by "a scope to be reviewed", reviewers can concentrate on only the changed parts.

In addition, the following attributes may be recorded:

— the formats of files of work products such as documents, spreadsheets, presentations, or source codes; and

— status of review implementation for each page or for each line of code.

5.6 IssueByReview

This is information of issues identified during the review.

The following attributes are normally recorded:

— an issue ID;

— the date and time when the issue was identified;

— originator who identified the issue;

— place on the work product where the issue was found (see 5.7);

— description of the issue;

— classifications of the issue;

— member assigned responsibility for addressing the issue; and

— status of the issue (e.g. “corrected” or “confirmed”).

The following attribute may be also recorded:

— a resolution of the issue.

5.7 PlaceOfIssueByReview

This is information of places on work product where the issues were identified.

The following attributes are normally recorded:

— an identifier of the work product; and

— a physical position in the page in the case of a document or the column position and the row in the case of source code.

The following attribute may also be recorded:

— a logical place such as chapter and clause.

6 Capabilities of review tools

6.1 Overview

This clause defines capabilities of review tools which are divided into five categories in 4.3. Figure 4 shows overall categories of capabilities of review tools. These capabilities are used as tool specific capabilities in ISO/IEC 20741 evaluation and selection process (see Annex E). The following capabilities are used in the activities of the review process defined in ISO/IEC 20246 (see Annex C). Furthermore, how each capability is applied in the use case is shown in Annex F.

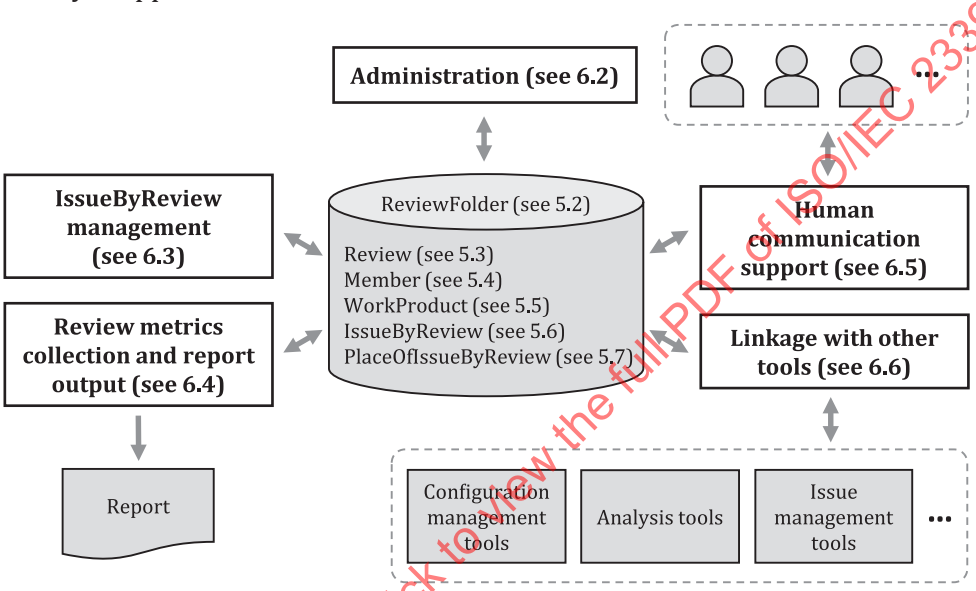


Figure 4 — Overall categories of capabilities of review tools

NOTE See Annex A for attributes included in the entities shown in the description of each capability below.

6.2 Administration

6.2.1 Overview

This capability consists of capabilities to manage the review folder, capabilities to manage each review-bound by the review folder, and capabilities to control the implementation of the review.

6.2.2 Administration of review folder

6.2.2.1 Review folder definition

A capability to create ReviewFolder shall be provided in order to manage the definitions of the review folder. Also, a capability to refer to and update the attributes of ReviewFolder shall be provided.

6.2.2.2 Member definition

A capability to create and delete Member shall be provided in order to manage the definition of members who can participate in or organize each review bound by the review folder. Also, a capability to refer to and update the attributes of Member shall be provided.

NOTE Members not defined here are not able to organize reviews or participate in reviews.

6.2.2.3 Classification definition

A capability of giving any classification of arbitrary names to issues which are identified during the review shall be provided in order to classify the issues. In addition, a capability to create, to delete, to refer to, and to update classification names and classification values shall be provided in order to manage the definition of the classification given to the issues.

6.2.3 Review definition

A capability to create and delete Review shall be provided in order to manage the definition of one review bound by the review folder. Also, a capability to refer to and update the attributes of Review shall be provided.

6.2.4 Control of review implementation

6.2.4.1 Overview

The following capabilities control the implementation of the individual review and review meeting.

6.2.4.2 Start of review

A capability to start a review bound by the review folder so that members are able to participate shall be provided. At the beginning of the review, the attributes of Review such as the start date and time are recorded.

There should also be a capability to automatically start the review when the scheduled start date and time comes.

6.2.4.3 Suspension of review

A capability to suspend the ongoing review by shutting out the participating members and by terminating the review in a resumable state shall be provided. When the review is suspended, the participation of the members is rejected. At the time of the review suspension, the attributes of Review such as the end date and time, review status (e.g. set to “Not completed”), review time, and review man-hours are recorded.

6.2.4.4 Resuming of review

A capability to resume the suspended review shall be provided. Once the review is resumed, the members may participate in the review again. At the time of resuming the review, the attributes of Review such as the start date and time are recorded.

6.2.4.5 End of review

A capability to end the ongoing review by shutting out the participating members and by ending the review in a completed state shall be provided. When the review is over, the participation of the member is rejected. At the end of the review, the attributes of Review such as the end date and time, review status (e.g. set to “Completed”), review time, and review man-hours are recorded.

In addition, a capability should be provided to show a warning message when the actual number of identified issues has not reached the target number.

There should also be a capability to automatically end the review when the scheduled end date and time comes.

6.2.4.6 Participation in the review

A capability to participate in an ongoing review for members who are allowed to join shall be provided. At the time of participation authentication is required and the attributes of Review such as a list of participated members and participation records for each member are updated.

NOTE A form of participating in the review can include participation of neighbouring members via the LAN (local area network) and participation of the remote members via the Internet.

EXAMPLE Authentication methods for participation are password matching, fingerprint collation, or others.

6.2.4.7 Making participants browse work products

A capability to allow review participants to browse the work products shall be provided. Moreover, the work products shall be protected from tampering. In addition, displaying the work products in several ways, such as zoom in, zoom out, and multi views should be supported. Also, when reviewing work products over multiple generations, the differences between generations may be displayed to be easily distinguishable.

6.2.4.8 Leaving the review

A capability for participants to leave from participating reviews shall be provided. At the time of leaving the member, the attributes of Review such as participation records for each member are updated.

6.2.4.9 Logging of review

A capability to log events that occur during the review such as start, end, suspension, resuming, participation, and leaving shall be provided. The information of logged events is used for review metrics collection.

6.2.4.10 Seeing checklists and scenarios

A capability to see checklists and scenarios at any time as needed during the review should be provided. These checklists and scenarios are registered in Review as part of the review information in advance.

6.2.5 Dashboard of review progress

A capability to indicate progress of a review by review metrics shall be provided.

EXAMPLE Progress is represented by “number of reviewed pages / number of review target pages” (in the case of source code, “number of reviewed lines / number of review target lines”) for each work product.

A capability to indicate the progress of each participating member should be provided as well as the progress of the review as a whole.

6.3 IssueByReview management

6.3.1 Creation, deletion, reference, and update of issues

A capability to create and delete IssueByReview and PlaceOfIssueByReview shall be provided in order to manage the issues identified during the review. Also, a capability to refer to and update the attributes of IssueByReview and PlaceOfIssueByReview shall be provided.

A capability to specify the place of issue by simple operation such as using pointing device should be provided. Specifying the place of issue by a logical position such as chapter, clause, section, and line number by manual, is a heavy burden and error prone, and it is not recommended.

6.3.2 Highlighting place of issue

A capability to highlight places of issues on a work product being displayed shall be provided in order to facilitate confirmation of where issues were raised.

This highlighting may be able to easily identify the difference of issue classification, issue status, or others by changing colours or others.

6.3.3 Transition of issue status

A capability to refer to and update attributes indicating a status of an issue shall be provided.

EXAMPLE Typical examples of issue status are “analysing”, “rejected”, “issue to be addressed”, “correcting”, and “corrected”.

6.3.4 Issue confirmation support

6.3.4.1 Overview

The following capabilities facilitate confirmation of the contents of registered issues.

6.3.4.2 Listing issues

A capability to list registered issues shall be provided. In the list, some or all of the attributes of IssueByReview are displayed. The attributes to be displayed in the list should be selectable.

6.3.4.3 Tag jump extension by issues

A capability to open from the issue list the target work product quickly and to indicate the place where the issues were identified shall be provided.

EXAMPLE Operation of this capability can be implemented by clicking, double clicking, or other actions to one item in the list of the identified issues.

6.3.5 Similar issue detection support

6.3.5.1 Overview

The following capabilities support detection of issues similar to existing issues.

6.3.5.2 String search

A capability to search for the specified character string from work products and to list the places where the character string was found shall be provided.

The scope of the search (e.g. “Entire review folder”, “Selected review”, “Work product being displayed“) should be able to be specified. Also, wildcard characters should be available to specify the search character string ambiguously.

6.3.5.3 Tag jump extension by search result

A capability to open from the search result the target work product quickly and to indicate the place where the character string was found shall be provided.

EXAMPLE Operation of this capability can be implemented by clicking, double clicking, or other actions to one item in the list of found character strings.

6.3.6 Issue entry support

6.3.6.1 Overview

The following capabilities facilitate entry of issues.

6.3.6.2 Application of previously identified issues to other places

A capability to apply the existing issue to other places easily shall be provided. It is common to have many issues for the same reason. This capability makes it easier to enter the same reasons for the issues.

6.3.6.3 Duplicate of previously identified issue

A capability to copy some attributes from a previous issue in order to facilitate the entry of issues with content similar to the previous issue shall be provided.

EXAMPLE Attributes to be copied can include description, resolution, and classification.

6.4 Review metrics collection and report output

6.4.1 Review metrics collection

A capability to collect review metrics shall be provided.

EXAMPLE 1 Attributes required for calculating review metrics can include the number of issues identified, the number of issues by classification value for each classification, the time spent reviewing, review man-hours, and the review implementation rate.

EXAMPLE 2 Review metrics which are most commonly used include “defect density”, “defect introduction”, “defect detection”, and “review rate”.

6.4.2 Report output

A capability to create a review report shall be provided.

The review report includes, for example, the following items:

— review folder name;

— review name;

— review implementation period;

— time spent reviewing;

— review organizer;

— review participant list;

— list of the work products reviewed;

— number of pages or lines in scope of review;

— number of issues identified;

— number of issues identified by classification value for each classification;

— list of issues identified; and

— work product appraisal.

6.5 Human communication support

6.5.1 Overview

The following capabilities support communication among review participants.

6.5.2 Notification of events and schedule information of the review

A capability to notify review participants of review events and schedule information should be provided.

EXAMPLE 1 Review events can include review start, review end, advance notice of review start, and advance notice of review end.

EXAMPLE 2 Typical examples of notification means are e-mail and instant messaging.

6.5.3 Online chat between review participants

A capability of online chat that members participating in the review are able to use for communication at review meetings should be provided.

6.5.4 Messaging with specific review participants

A capability to send a message to the specified member participating in the review at a review meeting should be provided.

6.5.5 Sharing issues among review participants

A capability to allow all participants to see the contents of issue in real time when the issue is identified should be provided. This capability helps to prevent duplication of issues raised and also leads to the detection of new issues.

EXAMPLE Issues that someone identifies are displayed in the view of the tool for all registered participants simultaneously.

6.5.6 Sharing work product view on a screen among review participants

A capability that participants such as reviewers share a view of the screen displaying the work products that a participant such as an author is seeing should be provided.

EXAMPLE With this capability, in the walkthrough, the reviewers can easily follow the place where the author who leads the review is seeing.

6.6 Linkage with other tools

6.6.1 Overview

The following capabilities exchange information with other tools. Architecture of interface to other tools should be disclosed.

EXAMPLE In the case of files to be used for information exchange, a general-purpose format such as CSV can be used.

6.6.2 Importing and exporting member definition

A capability to import/export the attributes of Member from/to other tools should be provided.

6.6.3 Importing and exporting classification definition

A capability to import/export the attributes of classification list of ReviewFolder from/to other tools should be provided.

6.6.4 Importing and exporting viewpoints of review

A capability to import/export viewpoints of Review from/to other tools should be provided.

6.6.5 Importing work products to be reviewed

A capability to retrieve the work products such as source codes or documents stored in a repository and import them as review targets should be provided.

6.6.6 Exporting identified issues

A capability to export the issues identified to other tools should be provided.

6.6.7 Exporting review findings

A capability to export the review findings to other tools should be provided.

Annex A
(informative)

Review tool entities and attributes

Table A.1 lists the entities and attributes handled by the review tool. This table is provided as an example to assist with the understanding and improve the readability of this document. For entity names, the use of these names is not mandatory and may be replaced with other synonymous terms.

Table A.1 — Example of review tool entities and attributes

Entity name	Explanation of entity	Major attributes included
ReviewFolder	entity for binding one or more related reviews	name of the review folder
		list of members involved in reviews bound by this entity NOTE 1 Members registered here can be the organizer or participant of the reviews. NOTE 2 Each element of the list references entity “Member”.
		list of classifications[a] given to issues identified during reviews bound by this entity NOTE Each element of the list has the following attributes. identifier of the classification NOTE This ID is unique within the review folder. name of classification EXAMPLE “severity”, “priority”, “influence range”. possible values of classification NOTE The value is chosen from multiple choices. All of the choices are defined here. EXAMPLE 1 When the name is “influence range”, as the value choices, “large”, “medium”, and “small” are defined. EXAMPLE 2 When the name is “priority”, as the value choices, “high”, “medium”, and “low” are defined.
		list of reviews bound by this entity NOTE Each element of the list references entity “Review”.
Review	information of each review	identifier of the review NOTE This ID is unique within the review folder.
		name of the review
		password used for authentication when participating in the review
		purpose of the review EXAMPLE Detect issues, evaluate quality, educate reviewers.
		viewpoints of the review
		checklists used in the review
		scenarios used in the review

[a] An arbitrary number of attributes with an arbitrary name can be attached to an issue, and the attributes are called ‘classification’ because its main use to classify issues.

Table A.1 *(continued)*

Entity name	Explanation of entity	Major attributes included
		support information EXAMPLE Standards, organizational design standards.
		identifier of the member who is the organizer of the review NOTE It is selected from members registered in the list of members of ReviewFolder.
		list of identifiers of members who are going to participate in the review NOTE 1 Only members included in this list can participate in the review. NOTE 2 These members are selected from members registered in list of members of ReviewFolder.
		target value of number of issues identified during the review
		list of work products to be reviewed NOTE Each element of the list references WorkProduct. EXAMPLE The target work product can include document, spreadsheet, presentation, portable document format, or source code.
		review type EXAMPLE Inspection, milestone review, peer desk check, technical review, walkthrough.
		date and time scheduled to start the review NOTE At this date and time, the review starts automatically.
		date and time scheduled to end the review NOTE At this date and time, the review ends automatically.
		status of the review EXAMPLE "Not implemented", "Not completed", "Completed".
		review decision EXAMPLE "used as is", "updated based on the identified issues and used", "reworked and re-reviewed", or "discarded".
		list of identifiers of members who actually participated in the review
		list of issues identified during the review NOTE Each element of the list references IssueByReview.
		appraisal of reviewed work products
		date and time the review started NOTE When one review is performed a plurality of times (suspended and resumed repeated), this attribute has plural values.
		date and time the review ended NOTE When one review is performed a plurality of times (suspended and resumed repeated), this attribute has plural values.
		time spent reviewing
		man-hours of review participation

[a] An arbitrary number of attributes with an arbitrary name can be attached to an issue, and the attributes are called 'classification' because its main use to classify issues.

Table A.1 *(continued)*

Entity name	Explanation of entity	Major attributes included
		The following information is recorded for each participating member. date and time when the member participated in the review date and time when the member left the review the amount of time spent on participating
Member	information of members being involved in the reviews	identifier of the member NOTE This ID is unique within the review folder.
		name of the member
		name of the organization to which the member belongs
		contact information such as e-mail address, telephone number
WorkProduct	information of each work product to be reviewed	identifier of the work product NOTE This ID is unique within the review.
		file path of the work product
		author of the work product
		scope to be reviewed within the work product EXAMPLE The scope is specified by page or by line.
		formats of files of the work product EXAMPLE Document, spreadsheet, presentation, portable document format, source code.
		number of pages or lines of the work product
		review implementation status for each page (in the case of source code, for each line) of the work product EXAMPLE "Not reviewed", "Reviewed", "Excluded from review".
IssueByReview	information on each issue identified during review	identifier of the issue NOTE This ID is unique within the review.
		date and time when an issue was identified
		identifier of the member who originated the issue
		place on the work product of the issue NOTE This attribute references PlaceOfIssueByReview.
		description of the issue
		resolution of the issue
		pairs of name and value of classifications attached to the issue NOTE The classification names and the classification values defined in list of classifications of ReviewFolder are used.
		member assigned responsibility for addressing the issue
		status of the issue EXAMPLE "analysing", "rejected", " issue to be addressed", "addressed".

[a] An arbitrary number of attributes with an arbitrary name can be attached to an issue, and the attributes are called 'classification' because its main use to classify issues.

Table A.1 *(continued)*

Entity name	Explanation of entity	Major attributes included
PlaceOfIssueByReview	information of the places of the issues	identifier of the work product in which the issue was identified
		physical place information indicating the area of the issue EXAMPLE Page number and rectangle (the graphic coordinates on the page image of the page where the issue exists), or start column, start row, end column and end row.
		logical place information indicating the area of the issue EXAMPLE Chapter number, clause number, section number or package name, class name, method name.
[a] An arbitrary number of attributes with an arbitrary name can be attached to an issue, and the attributes are called 'classification' because its main use to classify issues.		

Annex B
(informative)

Review tool entities CRUD matrix

Table B.1 shows which entities are operated in each review activity defined in ISO/IEC 20246.

Table B.1 — Mapping of review activities to entities of review tool

Review activities	Review tool entities					
	ReviewFolder	Member	Review	WorkProduct	IssueByReview	PlaceOfIssueByReview
Planning	RU	RUD	CRUD	CRUD		
Initiate review		R	R			
Individual review	R	R	RU	R	CRUD	CRUD
Issue communication and analysis	R	R	RU	R	CRUD	CRUD
Fixing and reporting	R	R	R	R	RU	R
Key C Creation R Reference U Update D Deleting						

Annex C
(informative)

Review tool capabilities and review activities

Table C.1 shows which review activities defined in ISO/IEC 20246 are supported by each capability of review tool.

Table C.1 — Mapping of review activities to capabilities of review tool

Review tool capabilities		Review activities				
Category	Capability	Planning	Initiate review	Individual review	Issue communication and analysis	Fixing and reporting
6.2 Administration	6.2.2 Administration of review folder					
	6.2.2.1 Review folder definition					
	6.2.2.2 Member definition					
	6.2.2.3 Classification definition					
	6.2.3 Review definition	X			X	X
	6.2.4 Control of review implementation					
	6.2.4.2 Start of review			X	X	
	6.2.4.3 Suspension of review			X	X	
	6.2.4.4 Resuming of review			X	X	
	6.2.4.5 End of review			X	X	
	6.2.4.6 Participation in the review			X	X	
	6.2.4.7 Making participants browse work products			X	X	
	6.2.4.8 Leaving the review			X	X	
	6.2.4.9 Logging of review			X	X	
	6.2.4.10 Seeing checklists and scenarios			X	X	
	6.2.5 Dashboard of review progress			X	X	
6.3 IssueByReview management	6.3.1 Creation, deletion, reference, and update of issues			X	X	
	6.3.2 Highlighting place of issue			X	X	
	6.3.3 Transition of issue status				X	X
	6.3.4 Issue confirmation support					
	6.3.4.2 Listing issues			X	X	X
Key X Supported						

Table C.1 *(continued)*

Review tool capabilities		Review activities				
Category	Capability	Planning	Initiate review	Individual review	Issue communication and analysis	Fixing and reporting
	6.3.4.3 Tag jump extension by issues			X	X	X
	6.3.5 Similar issue detection support					
	6.3.5.2 String search			X	X	
	6.3.5.3 Tag jump extension by search result			X	X	
	6.3.6 Issue entry support					
	6.3.6.2 Application of previously identified issues to other places			X	X	
	6.3.6.3 Duplicate of previously identified issue			X	X	
6.4 Review metrics collection and report output	6.4.1 Review metrics collection				X	X
	6.4.2 Report output					X
6.5 Human communication support	6.5.2 Notification of events and schedule information of the review		X	X	X	
	6.5.3 Online chat between review participants				X	
	6.5.4 Messaging with specific review participants				X	
	6.5.5 Sharing issues among review participants			X	X	
	6.5.6 Sharing work product view on a screen among review participants				X	
6.6 Linkage with other tools	6.6.2 Importing and exporting member definition	X				
	6.6.3 Importing and exporting classification definition	X				
	6.6.4 Importing and exporting viewpoints of review	X				
	6.6.5 Importing work products to be reviewed	X				
	6.6.6 Exporting identified issues					X
	6.6.7 Exporting review findings					X

Key

X Supported

Annex D
(informative)

Scope of review tools

The scope of a review tool assumed by this document covers five activities from “Planning” to “Fixing & reporting” defined in ISO/IEC 20246 (see Figure D.1). These activities have personal tasks and collective tasks, both of which shall be supported.

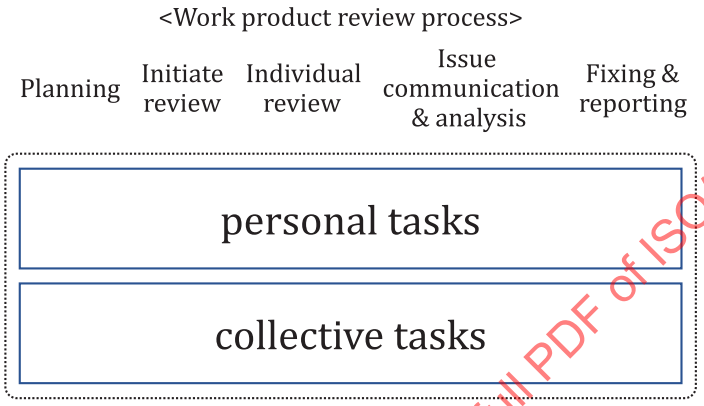


Figure D.1 — Scope of the review tools

Annex E
(informative)

How to use this document with ISO/IEC 20741

This document is supposed to be used together with ISO/IEC 20741, and this annex explains how to use it concretely. ISO/IEC 20741 provides detailed process for evaluation and selection (see Figure E.1). In the sub-process of structuring, the user needs to have well-defined requirements of the review tools. Capabilities of review tools defined in this document are a good starting point for the requirements definition in ISO/IEC 20741.

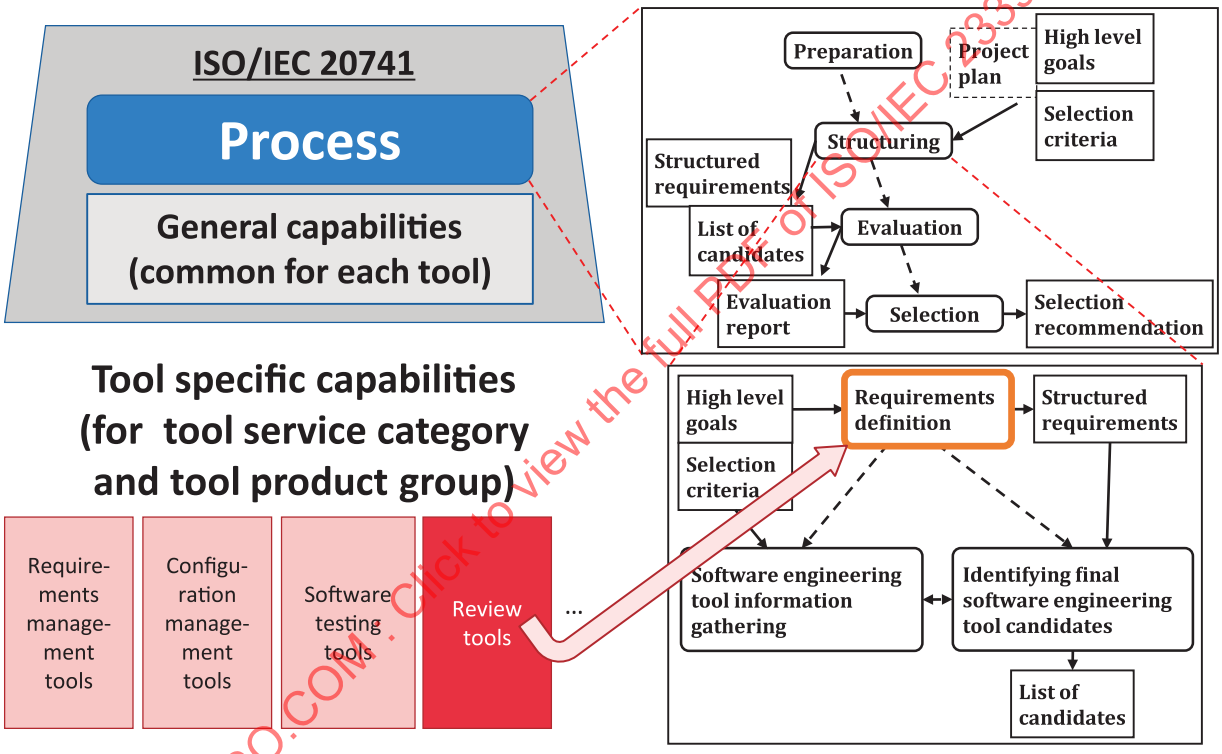


Figure E.1 — How to use this document with ISO/IEC 20741

Annex F
(informative)

Use case of a review tool

F.1 Overview

This annex clarifies which capabilities of a review tool are used in each activity in the review process defined in ISO/IEC 20246 by introducing the use case.

Figure F.1 shows the use cases of a review tool. The activities in ISO/IEC 20246 are described as a use case in this diagram.

Two types of actors are identified, organizer of the review and participants of the review. ISO/IEC 20246 describes the various roles of those involved in the review, but from the viewpoint of using review tools, these two types are sufficient.

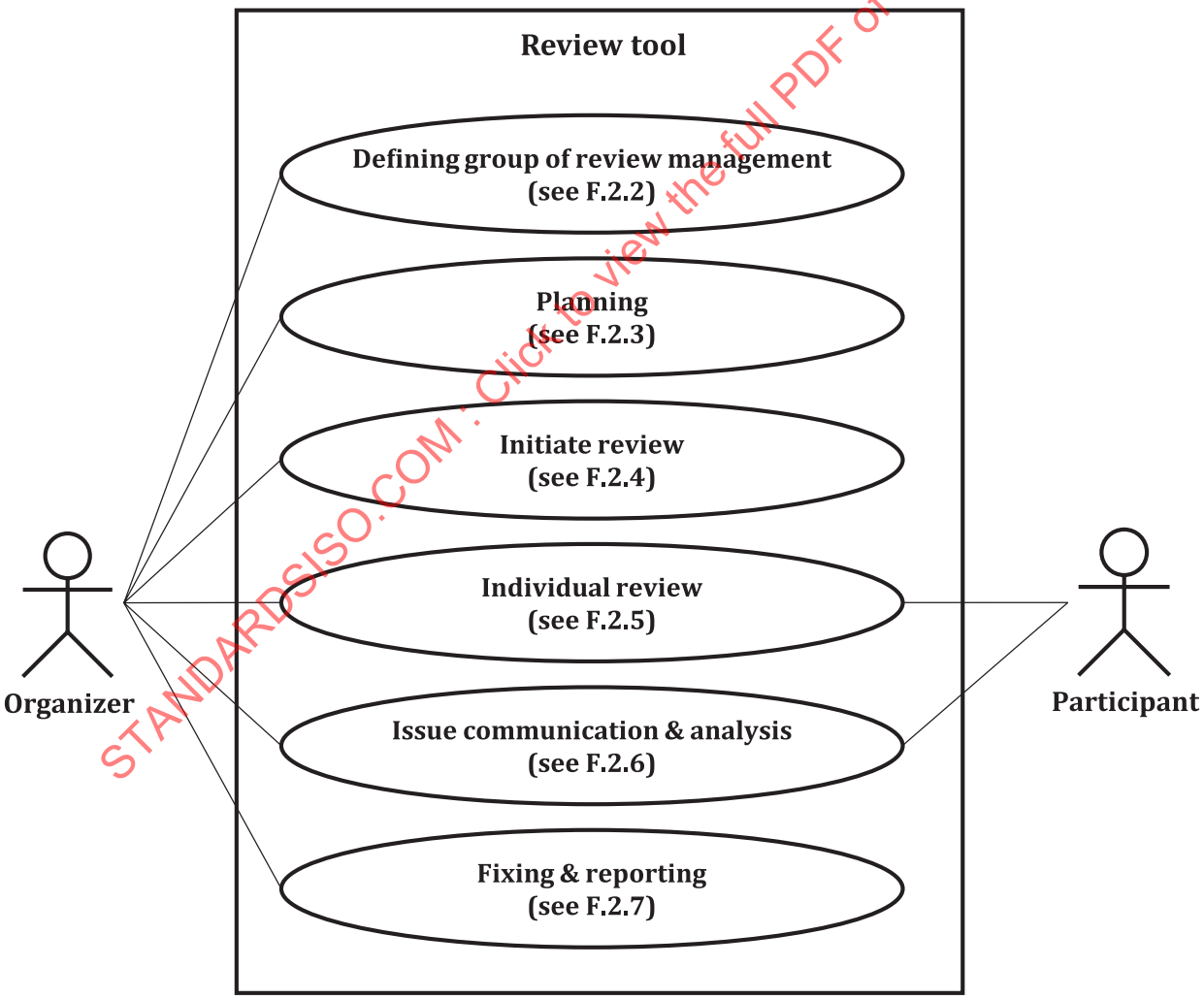


Figure F.1 — Use case diagram of a review tool