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Systems and software engineering — Capabilities of issue management tools

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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.*

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Introduction

Issue management tools have become increasingly important in project management and been applied to a wide range of lifecycle processes, from development process to operation process. Information managed by these tools has been expanded further than ever before, such as work items and claims as well as defects. These tools need to cooperate with many other tools such as configuration management tools, build tools, etc.

There are many issue management tools on the market but with no clear definition of their category and their capabilities. Therefore, it is becoming difficult for project managers to choose the right tool.

This document provides a framework of category of issue management tools and a list of their capabilities. The capabilities are gathered from existing tools (see Annex B). This document is prepared as one of the capability series to select the appropriate tool in combination with ISO/IEC 20741 "Guideline for the evaluation and selection of software engineering tools" (see Annex A).

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Systems and software engineering — Capabilities of issue management tools

1 Scope

This document defines the capabilities of issue management tools and is used to select the most appropriate one from many issue management tools. The evaluation and selection of the issue management tools is performed in accordance with ISO/IEC 20741 which defines the general evaluation selection process and evaluation characteristics. Issue management is based on the tasks described in several activities in their processes (e.g. project assessment and control, decision management, and system/software requirements definition) of ISO/IEC/IEEE 12207.

This document is independent of development methodology or approaches (e.g. Waterfall or Agile) or lifecycle processes (e.g. implementation or operation).

2 Normative reference

There is no normative reference in this document.

3 Terms and definitions

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

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

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

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

3.1
defect
imperfection or deficiency in a work product where that work product does not meet its requirements or specifications and needs to be either repaired or replaced

[SOURCE: IEEE 1044:2009, 2]

3.2
incident
anomalous or unexpected event, set of events, condition, or situation at any time during the life cycle of a project, product, *service* (3.5), or system

[SOURCE: ISO/IEC/IEEE 15288:2015, 4.1.21]

3.3
issue
observation that deviates from expectations

EXAMPLE Potential *defect* (3.1), improvement or point needing clarification.

[SOURCE: ISO/IEC 20246:2017, 3.9]

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3.4
problem
cause of one or more actual or potential *incidents* (3.4)

[SOURCE: ISO/IEC 20000-10:2018, 3.2.10]

3.5
service
means of delivering value for the user by facilitating results the user wants to achieve

[SOURCE: ISO/IEC TS 25011:2017, 3.3.1, modified — Notes 1 and 2 to entry have been removed.]

4 Object model for issue management tools

4.1 Overview of issue management

The overall structure of object model of issue management consists of the following elements:

a) issue management use case; defined in 4.2, a use case for describing issue management as an integrated activity, building on the activities and tasks described in ISO/IEC/IEEE 12207 in generic way,

b) issue management entity; defined in 4.3 and Clause 5, a set that represents identifiable information which appears in issue management tasks and described as a class in the object model, and

c) issue management tool; defined Clause 6, a tool that supports creating, referring, updating and deleting an issue management entity.

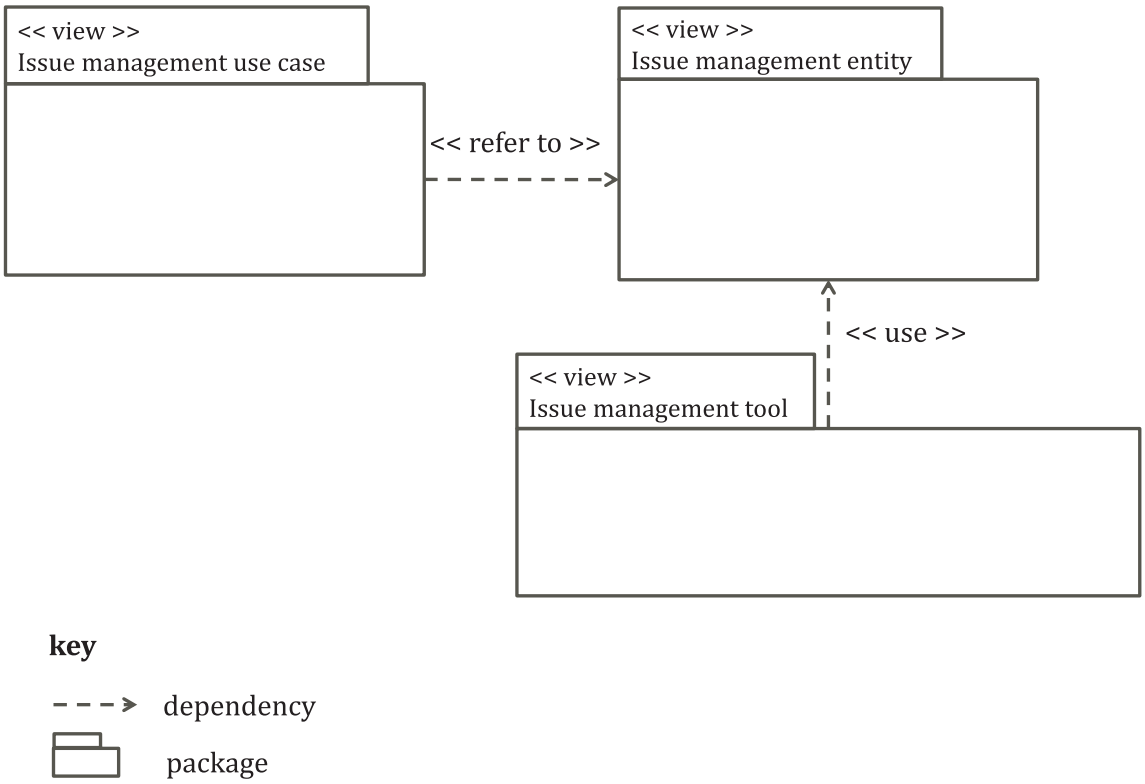

Figure 1 — Object model of issue management

The issue management entity comprises multiple entities. A set of entities is created when an issue occurs, and referred, updated through its life to keep track the status, and archived after closing the issue. There are two type of entities. One is the information of the issue itself such as issue-ID, date

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etc. Another is the relationship information between the issue and the related artifacts such as requirements specification, source code, etc. The artifacts themselves are not included in this issue management entity.

The issue management tool takes issue management entities as the input and produces issue management entities as the output. The issue management tool effectively supports the management tasks by producing issue management entities automatically.

The object model diagrams, Figure 1 to Figure 10, are described using Unified Modeling Language (UML) 2 (ISO/IEC 19505-2).

4.2 Use case of issue management

4.2.1 Use case

Issue management is a task that is performed through the development and operation of a system. It is not defined as a process or an activity, but it is described as a task in multiple processes and activities in ISO/IEC/IEEE 12207. Therefore, these different use cases have different information related to the issue, and it is not proper to describe them all in one use case.

In this subclause, three use cases for each of the different life cycle processes are identified as follows:

a) work management in development process: the response to various issues in system development process such as requirement analysis, design definition and implementation;

b) defect management in testing process: the response to obstacles in the test process of the system;

c) incident management under operation process: the response to challenges centred on failure of the system in the operation process.

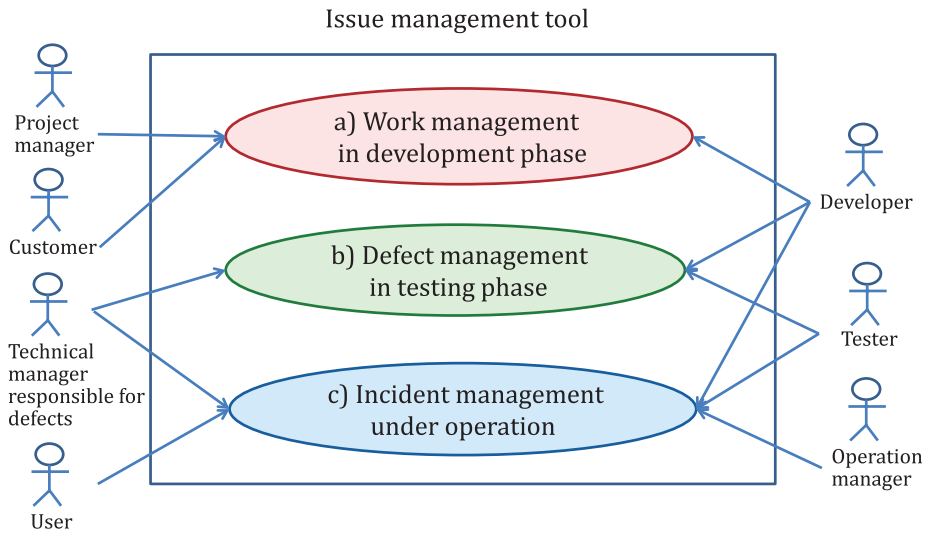

Figure 2 — Use case diagram of issue management

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4.2.2 Use case scenarios

4.2.2.1 Use case scenario of work management in system development process

In system development process, various issues occur and need to be properly managed. For example, in the requirement analysis process, a number of questions are raised against the initial analysis results, and those questions need to be tracked until it is resolved. In case of design review, once the design is complete, a review task is scheduled, and the results are tracked. The details of the review task are defined in ISO/IEC 20246. Work product reviews, and the capabilities of the review tool are defined in ISO/IEC 23396. After the review, the unresolved issues by the review will be taken over as general issues during the system development process. In this way, issues arise for different processes, different actors, different work products and considerations, but in most cases the form of use case scenario is the same. Figure 3 shows the work management use cases that are commonly handled during the system development process.

a) The project manager instructs work and assigns it to the assigned customer or developer.

b) The assigned customer or developer performs the assigned work and report the results.

c) The project manager approves the result and the work content is completed.

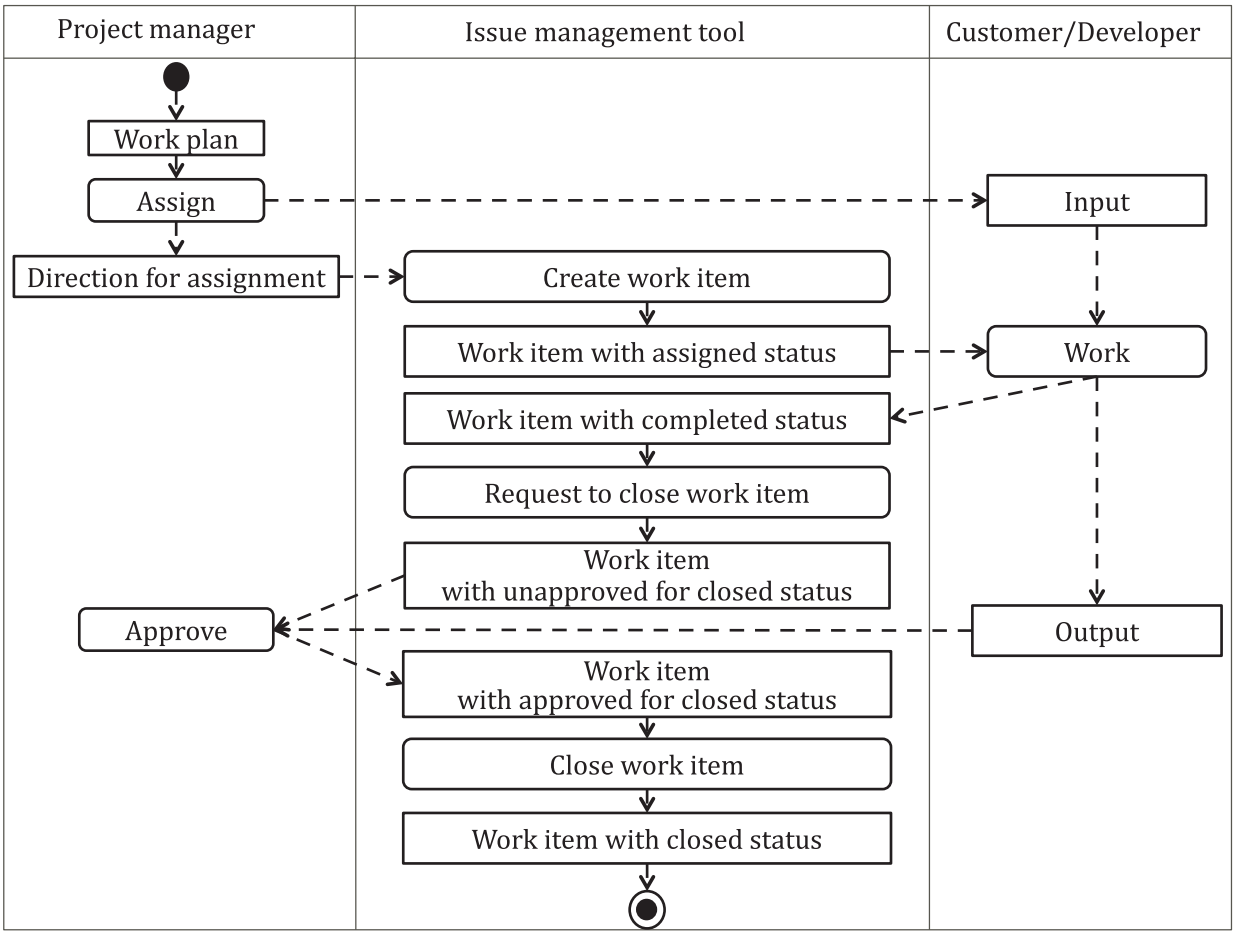

Figure 3 — Activity diagram of work management

Table 1 notes that input, output, and actors are different from the use cases in work management in system development process.

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Table 1 — Explanation for the use cases in work management in system development process

Process	Name of actor	Input	Output
Requirement analysis (to customer)	Customer	Research items	Result of research
Requirement analysis (to developer)	Developer (system analyst)	Research items	Result of research
Design definition	Developer (designer)	Requirement	Design
Implementation	Developer (programmer)	Design	Source code

4.2.2.2 Use case scenario of defect management in testing process

Issue management can be used for managing defects which are found during dynamic testing. The actors are the technical manager responsible for defects, developer, tester, and system shown in Figure 4. These actors work in the following scenario.

a) The tester tests the system. In the event of a defect, the tester will create a defect work item.

b) The technical manager responsible for defects approves the defect work item and assigns the correction of the defect to the developer.

c) The developer identifies the cause of the defect assigned by the technical manager responsible for defects and corrects the system.

d) The developer retests with the corrected test system and reports the result to the technical manager responsible for defects.

e) The technical manager responsible for defects confirms the modified system, approves that the issue has been resolved, and closes it.

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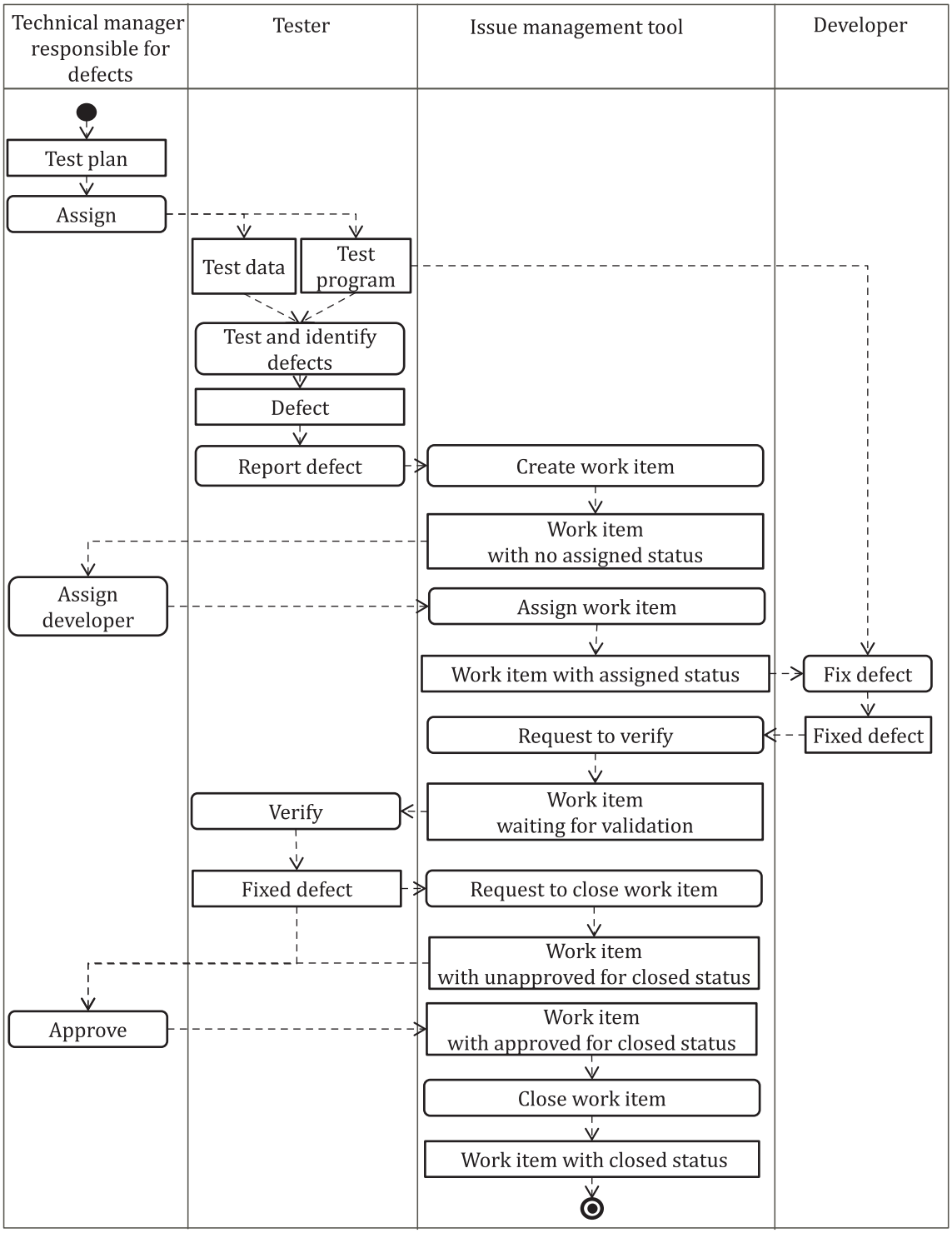

Figure 4 — Activity diagram of defect management in testing process

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4.2.2.3 Use case scenario of incident management in a system under operation

Issue management can be used for user concerns during operations. The actors are the user, operation manager, technical manager responsible for defects, developer, tester, and system in Figure 5. These actors work in the following scenario.

a) If the user finds an incident using the system, the user notifies the operation manager of the incident contents.

b) The operation manager receives a notification from the user and creates an incident report.

c) The technical manager responsible for defects approves the incident report and assigns the work to solve that issue to the developer.

d) The developer identifies the cause of the issue assigned by the technical manager and corrects the system under test environment.

e) The tester retests the modified system of the test environment and reports the result to the technical manager.

f) The technical manager checks the modified system and if it is confirmed to be fixed then approves it and requests the developer to release it.

g) With the approval of the technical manager, the developer releases the modified system to the operation environment.

h) The technical manager confirms that the issue has been resolved in the operation environment and reports to the user that the incident has been resolved.

i) The user confirms that the incident has been resolved in the operation environment and contacts the operation manager.

j) The operation manager closes the incident report.

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