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Software and systems engineering — Tools and methods for product line requirements engineering

Ingénierie du logiciel et des systèmes — Outils et méthodes pour l'ingénierie d'exigences pour gammes de produits

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electro-technical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 26551 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*.

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Introduction

The major purpose of this International Standard is to deal with the capabilities of tools and methods of software and systems product line (SSPL) requirements engineering. This International Standard defines how the tools and methods can support for the software and systems product line-specific requirements engineering processes.

Decision for the initial boundaries of domain is conducted in advance by defining a product line scope before initiating domain requirements engineering processes. Domain requirements engineering will be carried out in a comprehensive manner because common and variable requirements and captured variabilities have consequential impacts on member products in a product line. The outcomes of domain requirements engineering processes are transferred into the requirements of a family of products at the application requirements engineering processes. Therefore requirements engineering tools and methods should consider both engineering processes namely domain requirements engineering and application requirements engineering.

Product line requirements engineering can be differentiated from a single product requirement engineering because of the following aspects:

— There are two core processes in requirements engineering: domain requirements engineering and application requirements engineering. The major aims of the domain requirements engineering processes are to analyze commonality and variability for a family of products, and to prepare necessary variability information for variability modelling. The major aims of the application requirements engineering processes are to define application specific requirements and bind variability defined in domain requirements engineering processes.

— It is essential to analyse the costs and benefits estimation of a product line and thereby an organization can make a go/no-go decision. Moreover, the costs and benefits estimation plays a pivotal role as an indicator for assessing the effectiveness and efficiency of a product line.

This International Standard can be used in the following modes:

— By the users of this International Standard – to benefit people who develop, operate, and manage requirements engineering for software and systems product lines.

— By a product line organization – to provide guidance in the evaluation and selection for tools and methods for product line requirements engineering.

— By providers of tools and methods – to provide guidance in implementing or developing tools and methods by providing a comprehensive set of the capabilities of tools and methods for product line requirements engineering.

ISO/IEC 26550 (ISO/IEC 26550, Software and systems engineering — Reference model for product line engineering and management) addresses both engineering and management processes and covers the key characteristics of product line development. ISO/IEC 26550 provides an overview of the consecutive international standards (i.e., ISO/IEC 26551 through ISO/IEC 26556) as well as the structure of the model:

— Processes and capabilities of methods and tools for product line scoping, domain requirements engineering, and application requirements engineering are provided as ISO/IEC 26551, *Software and systems engineering — Tools and methods for product line requirements engineering*.

— Processes and capabilities of methods and tools for domain design and application design are provided as ISO/IEC 26552, *Software and systems engineering — Tools and methods for product line architecture design*.

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— Processes and capabilities of methods and tools for domain realization and application realization are provided as ISO/IEC 26553, *Software and systems engineering — Tools and methods for product line realization*.

— Processes and capabilities of methods and tools for domain verification and validation and application verification and validation are provided as ISO/IEC 26554, *Software and systems engineering — Tools and methods for product line verification and validation*.

— Processes and capabilities of methods and tools for technical management are provided as ISO/IEC 26555, *Software and systems engineering — Tools and methods for product line technical management*.

— Processes and capabilities of methods and tools for organizational management are provided as ISO/IEC *26556, Software and systems engineering — Tools and methods for product line organizational management*.

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Software and systems engineering — Tools and methods for product line requirements engineering

1 Scope

This International Standard deals with the tools and methods of requirements engineering for software and systems product line. The scope of this International Standard is as follows:

- provide the terms and definitions specific to requirements engineering for software and systems product lines.
- define process groups and their processes performed during product line requirements engineering. Those processes are described in terms of purpose, inputs, tasks, and outcomes.
- define method capabilities to support the defined tasks of each process.
- define tool capabilities to automate/semi-automate tasks or defined method capabilities.

This International Standard does not concern processes and capabilities of requirements tools and methods for a single system but rather deals with those for a family of products.

NOTE This International Standard is not suitable for handling physical artifacts. In the Systems arena, the word "Product" must be understood as System-level artefacts, such as requirement documents, architectural data, validation plans, Behavioral Models, etc. In any case, the word "Product" must not be understood as physical items such as electronic boards, mechanical parts or qualified human operators. In the case of the Software components of a Systems, this International Standard can apply twice: once to handle the System-Level Product Line and a second time to handle the Software Part Product Line, if any. The Product Line processes are recursive within the different levels of Products.

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 26550, *Software and systems engineering — Reference model for product line engineering and management*

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