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

Ingénierie du logiciel et des systèmes — Outils et méthodes pour la gestion des gammes de produits



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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by 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 https://www.iso.org/members.html.

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Introduction

Software and Systems Product Line (SSPL) engineering and management creates, exploits and manages a common platform to develop a family of products (e.g. software products, systems architectures) at lower cost, reduced time to market and with better quality. As a result, it has gained increasing global attention since the 1990s. Strategic management and supports are provided by product line product management for a product family and its evolution. Product management should collaborate with product line scoping process for the detailed definition of a product family. Also markets, technologies and competitors are carefully and continuously observed for product family definition and its continuous evolution. Product management deals with the economic aspects of product family and in particular with the market strategy.

There are needs for defining product line-specific product management processes that integrate the involved product line disciplines with those for a single product. Furthermore, support of tools and methods are required so that a product line organization can perform product management under the systematic control of complexities. This document addresses the product line-specific processes in product management by dividing those into product management enablement, product management operation and product management support process areas with the guidance of a set of tools and methods capabilities for supporting tasks for product line product management.

This document is intended to benefit people who acquire, supply, develop, operate, and maintain tools and methods for product line product management. This document can be used in one or more of the following modes:

— By an organization intended to implement or operate product lines – to understand, adopt and enact the processes, tools and methods for product line product management. This also helps the organization to evaluate and select relevant tools and methods based on business and user-related criteria.

— By a tool vendor who facilitates or leverages product line engineering practices – to provide a set of tool capabilities that should be embodied in a tool for supporting product management enablement, product management operation and product management support.

The ISO/IEC 26550 family of standards addresses both engineering and management processes and capabilities of methods and tools in terms of the key characteristics of product line development. This document provides processes and capabilities of methods and tools for variability mechanisms in product lines. Other standards in the ISO/IEC 26550 family are as follows:

ISO/IEC 26550, ISO/IEC 26551, ISO/IEC 26552, ISO/IEC 26553, ISO/IEC 26554, ISO/IEC 26555, ISO/IEC 26556, ISO/IEC 26557, ISO/IEC 26558, ISO/IEC 26559 are published. ISO/IEC 26561 and ISO/IEC 26562 are to be published. ISO/IEC 26563 is a planned International Standard.

— Processes and capabilities of methods and tools for domain requirements engineering and application requirements engineering are provided in ISO/IEC 26551;

— Processes and capabilities of methods and tools for domain design and application design are provided in ISO/IEC 26552;

— Processes and capabilities of methods and tools for domain realization and application realization are provided in ISO/IEC 26553;

— Processes and capabilities of methods and tools for domain testing and application testing are provided in ISO/IEC 26554;

— Processes and capabilities of methods and tools for technical management are provided in ISO/IEC 26555;

— Processes and capabilities of methods and tools for organizational management are provided in ISO/IEC 26556;

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— Processes and capabilities of methods and tools for variability mechanism are provided in ISO/IEC 26557;

— Processes and capabilities of methods and tools for variability modelling are provided in ISO/IEC 26558;

— Processes and capabilities of methods and tools for variability traceability are provided in ISO/IEC 26559;

— Processes and capabilities of methods and tools for technical probe are provided in ISO/IEC 26561;

— Processes and capabilities of methods and tools for transition management are provided in ISO/IEC 26562;

— Processes and capabilities of methods and tools for configuration management of asset are provided in ISO/IEC 26563;

— Others (ISO/IEC 26564 to ISO/IEC 26599): To be developed.

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

1 Scope

This document, within the context of methods and tools for product line product management**:**

— defines product line-specific processes and their subprocesses for product management of software and systems product lines. Those processes are described in terms of purpose, inputs, tasks and outcomes;

— defines method capabilities to support the defined tasks of each process;

— defines tool capabilities to automate/semi-automate tasks or defined method capabilities.

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

2 Normative references

There are no normative references 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
binding
task to make a decision on relevant variants, which will be application assets, from *domain* (3.3) assets using the domain *variability* (3.7) model and from application assets using the application variability model

3.2
commonality
set of functional and non-functional characteristics that is shared by all applications belonging to the *product line* (3.4)

3.3
domain
distinct scope, within which common and variable characteristics are exhibited, common rules and *binding* (3.1) mechanisms are observed, and over which a distribution transparency is preserved

3.4
product line
product family
software and systems product line
set of products and/or services sharing explicitly defined and managed common and variable features and relying on the same *domain* (3.3) architecture to meet the common and variable needs of specific markets

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3.5
product roadmap
schedule when the products have to be ready for market launch

3.6
technology roadmap
outline of required and anticipated changes in technologies, with expected dates, which will enable achievement or transformation of a product or *product family* (3.4)

3.7
variability
set of functional and non-functional characteristics that may differ among members of the *product line* (3.4)

4 Abbreviated terms

COTS component off-the-shelf

SSPL software and systems product line

5 Reference model for product line product management

5.1 Overview

The success of a product line depends on how well a product line management comprehends markets, technical trends and competitors' capability. Product management deals with the situation of markets, technical trends and competitors' capability, and defines a product family to deliver to markets. Product management should reflect the company's goals defined by top management. The company's objectives govern the whole decision made in product line product management. The initial product family definition shall be delivered to product line scoping for the detailed product family definition of a product line.

Product management provides strategic management for product families while organization management deals with managerial supports for implementing a successful product line. For this, product management is responsible for the economic and business concerns of product line engineering and management and the resulting product line(s). It deals particularly with the market strategy and the competitive strategy. Outcomes produced in product management are major inputs of organization management and product line scoping. Product management monitors markets, competitors and technical changes so as to cope proactively with market changes and new offerings from competitors, and to evolve product family continuously.

The reference model specifies the structure of product line-specific processes and subprocesses for product management. As shown in Figure 1, Product line product management can be structured into three processes: product management enablement, product management operation and product management support. In the rest of this document, tasks, methods and tools are described in terms of product line-specific processes and subprocesses defined in the reference model. Annex A describes key artefact flows between product management and other key roles of software and systems product line.

Each process is divided into subprocesses and each subprocess is described in terms of the following attributes:

— the title of the subprocess;

— the purpose of the subprocess;

— the inputs to produce the outcomes;

— the tasks to achieve the outcomes;

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