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Software and systems engineering — Methods and tools for product line transition management

Ingénierie du logiciel et des systèmes — Méthodes et outils destinés à la gestion de la transition des gammes de produits

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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

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, with reduced time to market and better quality. As a result, it has gained increasing global attention since the 1990s.

Product line transition management supports a product line organization to launch and institutionalize the product engineering and management. The results of the product line technical probe are major inputs to determine the transition strategy and continuous improvement of product line institutionalization.

This document can be used in the following modes:

— by organizations that want to switch from single-system development to SSPL for producing their products – to provide guidance on how to launch and institutionalize the product line engineering;

— by a product line organization – to provide guidance on the evaluation and selection for methods and tools for product line transition management;

— by providers of methods and tools – to provide guidance on implementing or developing methods and/or tools by specifying a comprehensive set of methods and tools capabilities for supporting product line transition management.

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 modelling in product lines. Other standards in the ISO/IEC 26550 family of standards 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 and ISO/IEC 26560 are published. ISO/IEC 26561 is to be published. ISO/IEC 26563 and ISO/IEC 26564 are planned International Standards.

— 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;

— Processes and capabilities of methods and tools for variability mechanisms 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;

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— Processes and capabilities of methods and tools for product management are provided in ISO/IEC 26560;

— Processes and capabilities of methods and tools for product line technical probe are provided in ISO/IEC 26561 (International Standard under development);

— Processes and capabilities of methods and tools for configuration management of asset are provided in ISO/IEC 26563 (planned International Standard);

— Processes and capabilities of methods and tools for product line measurement are provided in ISO/IEC 26564 (planned International Standard);

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

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Software and systems engineering — Methods and tools for product line transition management

1 Scope

This document, within the context of methods and tools for supporting the transitioning the organization's current development approach to software and systems product line engineering**:**

— defines processes for product line transition management. 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 that automate or semi-automate tasks and methods.

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 http://www.iso.org/obp

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

3.1
aspect
special consideration within *product line* (3.8) engineering process groups and tasks to which one can associate specialized methods and tools

3.2
product line institutionalization
considering *product line* (3.8) engineering as part of working culture by involved managers and staff members

3.3
product line technical probe
technical probe
probe
diagnostic process for investigating the organization's readiness to adopt, or ability to succeed with, the *product line* (3.8) engineering and management

3.4
product line transition
transition
switching to *product line* (3.8) engineering from single system engineering

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3.5
product line transition plan
transition plan
plan that describes *product line transition strategy* (3.7), resources required, responsibilities, detailed transition processes, major changes in product development and success measures for operationalizing the *product line transition* (3.4)

3.6
product line transition scenario
transition scenario
scenario including who, what, in what procedures and orders, and how to do their roles and responsibilities for deploying *product line transition strategy* (3.7)

3.7
product line transition strategy
transition strategy
set of plans intended to switch to *product line* (3.8) engineering

3.8
software and systems product line
SSPL
product line
paradigm for the creation, exploitation, and management of a common platform for a family of products

Note 1 to entry: Typical goals of product lines are to lower costs, reduce time to market, and improve quality.

4 Reference model for product line transition management

4.1 Overview

Markets, economic pressures, competitors, and technological trends lead an organization to transition to product line. However, transition to product line engineering is not easy because product line requires investments and changes on the development paradigm to achieve the established business objectives. Once an organization decides to switch to product line engineering due to external or internal reasons, an organization should establish business objectives that motivate an organization's transition to product line engineering and that would be measures for the success of transition.

For a successful transition to product line engineering an organization should establish a proper transition strategy based on the established business objectives. In addition, the transition strategy should be designed to fit the organizational structure and an organization's capability against the essential capabilities of the product line operation. In accordance with the designed transition strategy a pilot project can be conducted or product line engineering can be introduced from a single department or for part of the whole product and thereafter a product line can be incrementally expanded. The transition strategy also considers returns on investments, and later in the scoping the results should be used for the further estimation of benefits expected from product line adoption. During the transition an organization is adapted for the successful switching to the product line engineering. Example transition strategies are provided in Annex A.

The reference model specifies the structure of supporting processes and subprocesses for product line transition management. As shown in Figure 1, product line transition management can be structured into three processes: transition management, transition operationalization and transition support. In the rest of this document, tasks, methods and tools are described in terms of processes and subprocesses defined in the reference model.

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

— the title of the subprocess;

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