
**Software and systems engineering —
Methods and tools for variability
mechanisms in software and systems
product line**

*Ingénierie du logiciel et des systèmes — Méthodes et outils pour les
mécanismes de variabilité dans les chaînes de production de logiciels
et de systèmes*

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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 ISO documents 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).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*.

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 1990s.

Variability, which differentiates a member product from other products within a product line, plays an important role in SSPL. Variability mechanism means ways to implement variability; it realizes variability in the product line artefacts. Variability mechanisms differ in accordance with the binding time of variability, and variability of a product line is introduced from product line scoping through product line testing and its binding can occur at any stages of product line development. Thus, variability mechanism should be systematically managed for the right operation in domain engineering and for the right binding in application engineering. Furthermore, variability mechanisms should support easy variability management and traceability management. Accordingly, this document provides processes with their supporting methods and tools capabilities for variability mechanism operationalization and for managerial supports for the right use of variability mechanisms at domain engineering stages and the right bindings at application engineering stages.

This document can be used in the following modes:

- by the users of this document: to benefit people who want to adopt SSPL for producing their products by guiding variability mechanism operationalization, variability mechanism management and variability mechanism supports;
- by a product line organization: to provide guidance in the evaluation and selection for methods and tools for the tasks of providing variability mechanism operationalization, variability mechanism management and variability mechanism supports;
- 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 methods and tools for supporting variability mechanism operationalization, variability mechanism management and variability mechanism supports.

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 ISO/IEC 26550 family of standards are as follows.

ISO/IEC 26550, ISO/IEC 26551 and ISO/IEC 26555 are published. ISO/IEC 26558 and ISO/IEC 26559 are under preparation. ISO/IEC 26552, ISO/IEC 26553, ISO/IEC 26554, ISO/IEC 26556, ISO/IEC 26560, ISO/IEC 26561, ISO/IEC 26562 and ISO/IEC 26563 are planned.

- 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 (planned).
- Processes and capabilities of methods and tools for domain realization and application realization are provided in ISO/IEC 26553 (planned).
- Processes and capabilities of methods and tools for domain testing and application testing are provided in ISO/IEC 26554 (planned).
- 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 (planned).

- 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 product management are provided in ISO/IEC 26560 (planned).
- Processes and capabilities of methods and tools for technical probe are provided in ISO/IEC 26561 (planned).
- Processes and capabilities of methods and tools for transition management are provided in ISO/IEC 26562 (planned).
- Processes and capabilities of methods and tools for configuration management of asset are provided in ISO/IEC 26563 (planned).
- Others (ISO/IEC 26564 to ISO/IEC 26599): planned.

Software and systems engineering — Methods and tools for variability mechanisms in software and systems product line

1 Scope

This document, within the context of tools and methods of variability mechanisms for software and system product lines:

- provides the terms and definitions related to variability mechanisms for software and systems product lines;
- defines processes and their subprocesses for operating variability mechanisms at each product line life cycle stages and those for providing managerial supports. 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:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp/>

3.1

application configuration

derivation for a member product specific executables from domain assets in *realization* (3.10)

Note 1 to entry: The specific configuration of an application is the *binding* (3.3) results for the *variation points* (3.19) with the selected *variants* (3.17).

3.2

aspect

special consideration within product line engineering process groups and tasks to which we can associate specialized methods and tools

3.3

binding

task for making a *decision* (3.7) on relevant *variants* (3.17) using domain *variability model* (3.16) and *decision tables* (3.8)