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Software and systems engineering — Methods and tools for product line technical probe

Ingénierie du logiciel et des systèmes — Méthodes et outils destinés à la vérification technique des gammes de produits

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Foreword

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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 technical probe diagnoses an organization's ability necessary to successfully adopt product line engineering and management. Product line engineering and management require abilities to deal with markets, competitors, costs, benefits, two different and closely related domain and application engineering processes, and the distribution of different domain and application engineering over organizations. Before transitioning to product line engineering, an organization should assess its ability from these aspects and decide whether or not to switch to product line engineering. Based on the results of product line technical probe, an organization can establish plans to continuously improve its abilities.

This document can be used in the following modes:

— by organizations that want to adopt SSPL for producing their products – to provide guidance on how to probe the organization's capabilities necessary to adopt or improve product line engineering;

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

— by providers of methods and/or 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 technical probe.

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 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 26562 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;

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— 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;

— Processes and capabilities of methods and tools for product line transition management are provided in ISO/IEC 26562 (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 technical probe

1 Scope

This document, within the context of methods and tools for supporting the diagnosis of the organization's capability to adopt or improve software and systems product line engineering**:**

— defines processes for product line technical probe; those processes are described in terms of purpose, inputs, tasks and outcomes;

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

— 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* (3.9) engineering process groups and tasks to which one can associate specialized methods and tools

3.2
main probe
phase to perform repetitive cycle for gathering and analysing data for finding strengths and challenges of an organization

3.3
post-probe
optional phase to prepare action plans for addressing challenges

3.4
pre-probe
phase to understand an organization's basic context such as current structure, terminology, product maturity level, implementation and documentation

3.5
product line adoption plan
plan that describes the changes in process, organization structure, and product building methods to get from the current to *product line* (3.9) engineering

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3.6
product line adoption scenario
scenario that gives concrete sequence of actions related to *product line* (3.9) adoption

3.7
product line technical probe
technical probe
probe
diagnostic process for investigating the organization's readiness to adopt, or ability to succeed with, *product line* (3.9) engineering and management

3.8
product line transition
transition
switching to *product line* (3.9) engineering through the right procedures, so as to achieve business objectives that lead an organization to product line engineering

3.9
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 Abbreviated terms

CONOPS concept of operations

MCDM multiple condition decision method

5 Reference model for product line technical probe

5.1 Overview

A product line technical probe diagnoses an organization's readiness to adopt product line engineering. The technical probe includes whether an organization has abilities to succeed with product line engineering. When an organization considers the adoption of product line engineering, a product line technical probe informs an organization whether the organization has essential capabilities necessary to adopt product line engineering and at which maturity level the organization is based on the essential organizational, technical and software engineering framework. A product line technical probe provides overall pictures about an organization's current capability level compared with essential capabilities necessary to successfully provide products that conform to market and customer needs.

In accordance with the results of a product line technical probe, an organization can make a go/no-go decision about product line adoption; or in the case that an organization determines product line adoption, it establishes and implements action plans for resolving weaknesses found, so an organization can shift to product line engineering after it has the essential capabilities. During product line engineering and management, a product line technical probe supports continuous improvements of an organization's product line capability.

Software and systems product line requires mature capability level in both system and software engineering. In adopting a product line engineering approach, an organization extends the portfolio management process of ISO/IEC/IEEE 15288 and applies specializations of its product development, technical management, and infrastructure processes. Thus, a product line technical probe should diagnose an organization's ability from architecture and organizational management viewpoints as well as process capability. For successful product line adoption, an organization should continuously diagnose and improve its process, architecture, business, and organizational management capabilities.

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