BS ISO/IEC 26562:2019

BSI Standards Publication

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

Documents
Document Sharing Hub

Full document details: BS ISO/IEC 26562:2019

National foreword

This British Standard is the UK implementation of ISO/IEC 26562:2019.

The UK participation in its preparation was entrusted to Technical Committee IST/15, Software and systems engineering.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2019
Published by BSI Standards Limited 2019

ISBN 978 0 539 01323 8

ICS 35.080

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 November 2019.

Amendments/corrigenda issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: BS ISO/IEC 26562:2019

INTERNATIONAL STANDARD

ISO/IEC 26562

First edition
2019-11

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

Reference number
ISO/IEC 26562:2019(E)

Documents
Document Sharing Hub
© ISO/IEC 2019

Full document details: BS ISO/IEC 26562:2019

COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2019

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

© ISO/IEC 2019 – All rights reserved

Documents
Document Sharing Hub

Full document details: BS ISO/IEC 26562:2019

Contents

Page

Foreword ..... **v**

Introduction ..... **vi**

1 Scope **1**

2 Normative references **1**

3 Terms and Definitions **1**

4 Reference model for product line transition management **2**
- 4.1 Overview 2
- 4.2 Product line transition management 3
- 4.3 Product line transition operationalization 3
- 4.4 Product line transition support 4

5 Product line transition management **5**
- 5.1 General 5
- 5.2 Product line transition planning 5
  - 5.2.1 Principal constituents 5
  - 5.2.2 Establish organization's transition goal 6
  - 5.2.3 Determine organization's transition strategy 7
  - 5.2.4 Define key procedures for transition 7
  - 5.2.5 Formulate schedules and required resources for transition 8
  - 5.2.6 Specify how to monitor, measure, and control the effectiveness of transition 8
  - 5.2.7 Document product line transition plan 9
- 5.3 Product line transition enabling 9
  - 5.3.1 Principal constituents 9
  - 5.3.2 Establish governance policy for transition 10
  - 5.3.3 Mobilize qualified human resources for transition 10
  - 5.3.4 Identify infrastructure and resource needs for transition operationalization and support 11
  - 5.3.5 Enable quality assurance measurement for transition 11
  - 5.3.6 Improve transition process continuously 12
- 5.4 Product line transition managing 12
  - 5.4.1 Principal constituents 12
  - 5.4.2 Tailor and allocate governance policy, R & R, and resources to relevant sub functions of transition 13
  - 5.4.3 Collect data from SSPL transition sub functions 13
  - 5.4.4 Monitor, measure, and control transition operationalization and support 14
  - 5.4.5 Manage actual operation and support of transition 14
  - 5.4.6 Provide feedback to planning and enabling functions of transition 15

6 Product line transition operationalization **15**
- 6.1 General 15
- 6.2 Product line transition preparation 15
  - 6.2.1 Principal constituents 15
  - 6.2.2 Create transition scenarios to deploy transition strategy 16
  - 6.2.3 Analyse the effectiveness of the transition scenarios 17
  - 6.2.4 Select an optimal transition scenario 17
  - 6.2.5 Specify the scenario for transition launch 17
  - 6.2.6 Train human resources responsible for transition 17
- 6.3 Launching the product line transition 18
  - 6.3.1 Principal constituents 18
  - 6.3.2 Launch a pilot transition 19
  - 6.3.3 Deliver findings from launching the pilot transition 19
  - 6.3.4 Improve the transition process from the actual pilot(s) 19
  - 6.3.5 Retrain human resources responsible for transition 20
- 6.4 Product line transition operation 20

AVA Documents
Document Sharing Hub

© ISO/IEC 2019 – All rights reserved

Full document details: BS ISO/IEC 26562:2019

6.4.1 Principal constituents ... 20
6.4.2 Perform organization wide transition operation ... 21
6.4.3 Capture relevant data from the operation ... 21
6.4.4 Document the findings, strengths, and weaknesses ... 21
6.4.5 Assess gaps between to-be and as-is ... 22
6.4.6 Improve the transition process from the gap assessment results ... 22
6.5 Institutionalizing the product line transition ... 22
6.5.1 Principal constituents ... 22
6.5.2 Assign responsibilities of roles for institutionalization ... 23
6.5.3 Identify gaps to drive improvements for institutionalization ... 23
6.5.4 Exercise necessary actions to fill the gaps ... 24
6.5.5 Monitor the status/effects of the actions ... 24
6.5.6 Perform continuous improvement for institutionalization ... 24

7 Product line transition support ... 25
7.1 General ... 25
7.2 Quality assurance for product line transition ... 25
7.2.1 Principal constituents ... 25
7.2.2 Objectively evaluate transition activities ... 26
7.2.3 Objectively evaluate transition work products ... 26
7.2.4 Communicate and resolve noncompliance issues ... 27
7.2.5 Establish records of transition quality assurance activities ... 27
7.3 Measuring the success of product line transition ... 28
7.3.1 Principal constituents ... 28
7.3.2 Integrate measurement results of product line transition ... 28
7.3.3 Evaluate the success of product line transition ... 29
7.3.4 Record results and inform to the relevant stakeholders ... 29
7.3.5 Improve the product line transition process continuously ... 30
7.4 Risk management for product line transition ... 30
7.4.1 Principal constituents ... 30
7.4.2 Identify risks related to the success of transition ... 31
7.4.3 Develop mitigation plans for the identified risks ... 32
7.4.4 Monitor the execution of the mitigation plan ... 32
7.4.5 Learn from actual results of risk management for product line transition ... 32

Annex A (informative) **Exemplar product line transition strategies ... 34**

Bibliography ... 35

© ISO/IEC 2019 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO/IEC 26562:2019

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.

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) or the IEC list of patent declarations received (see http://patents.iec.ch).

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 Joint 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 www.iso.org/members.html.

© ISO/IEC 2019 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO/IEC 26562:2019

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;

© ISO/IEC 2019 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO/IEC 26562:2019

— 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.

© ISO/IEC 2019 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO/IEC 26562:2019

Documents
Document Sharing Hub

Full document details: BS ISO/IEC 26562:2019

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

© ISO/IEC 2019 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO/IEC 26562:2019

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;

© ISO/IEC 2019 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO/IEC 26562:2019

— the purpose of the subprocess;

— the inputs to produce the outcomes;

— the tasks to achieve the outcomes;

— the outcomes of the subprocess.

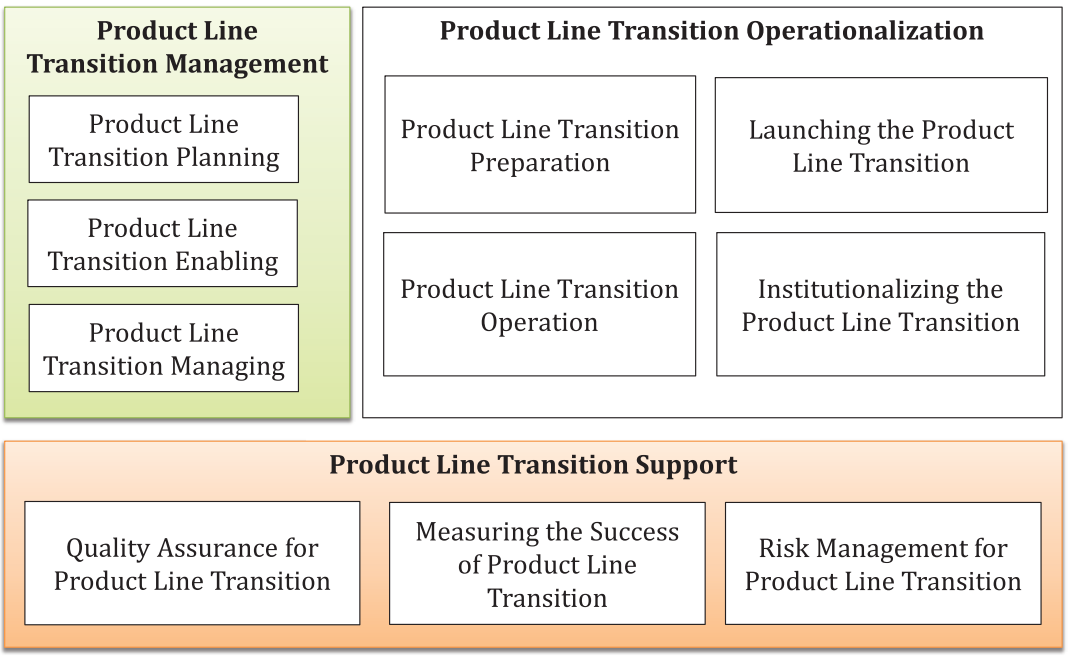

Figure 1 — Reference model for product line transition management

4.2 Product line transition management

The transition management process provides managerial supports for planning transition (e.g. resource estimation, responsibility allocation, success measures), supports for providing necessary resources, tools and infrastructures for implementing transition plans and supports for analysing the plan versus the actual status of the transition. The transition management shall do the following:

— *product line transition planning* establishes plans for transition operationalization;

— *product line transition enabling* defines, maintains and assures the availability of environments, guidance, and measurement necessary to switching to the product line engineering and management;

— *product line transition managing* provides integrated management for the product line transition operationalization; this subprocess reviews the transition operationalization's actual status against plans, controls issues, and takes corrective actions if necessary.

4.3 Product line transition operationalization

The product line transition operationalization process performs operations for establishing suitable product line transition. This process deals with the organization's readiness for transitioning to producing product family via a product line from the single system development. The transition operationalization shall do the following:

— *product line transition preparation* evaluates the readiness of the transition to product line engineering and initiates to launch the transition;

— *launching the product line transition* prepares and initiates for switching to the product line engineering;

© ISO/IEC 2019 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO/IEC 26562:2019

— *product line transition operation* switches to the product line engineering and management in accordance with the defined product line transition strategy; many changes in business, architecture, process, and organization structure occur; and

— *institutionalizing the product line transition* settles the product line engineering and management through the continuous improvement; an organization adapts its business, architecture, process, and organization structure to the product line engineering and management paradigm.

4.4 Product line transition support

The product line transition support process provides supports required for switching an organization's ways of offering products to markets to the product line engineering and management. To achieve these, the product line transition support shall do the following:

— *quality assurance for transition* objectively evaluates the activities and artefacts of the implemented product line transition;

— *measuring the success of transition* verifies the product line transition strategy and validates the relevant decisions; and

— *risk management for transition* identifies and mitigates risks related to product line transition.

The identification and analysis of the key differentiators between single-system engineering and management and product line engineering and management can help the organizations to understand the product line and to formulate a strategy for successful implementation of product line engineering and management. The key aspects have been defined in ISO/IEC 26550 and Table 1 shows the category of the key aspects.

Table 1 — Key aspects for identifying product line transition management tasks

Category	Aspects
Reuse management	application engineering, domain assets, domain engineering, product management, platform, reusability
Variability management	binding, variability
Complexity management	collaboration, configuration, enabling technology support, reference architecture, texture, traceability
Quality management	measurement and tracking, cross functional verification and validation

The following are the descriptions for each aspect concerning product line transition management. The product line transition and its management processes and tasks shall be identified on the basis of these aspects. The concerns for product line transition and its management will enable the organization to understand the transition and its management processes, subprocesses, tasks, methods and tools' capabilities.

— Application engineering: Strategies and tactics to use in order to switch to the product line engineering include how application engineering derives member products based on the platforms. The application engineering process varies with the defined transition strategies.

— Binding: Cost of binding variants is one of the major costs that should be considered when an organization estimates costs of reusing domain assets, which are one of the major components consisting product line cost model. Estimated product line costs are used for determining the transition strategy.

— Collaboration: In accordance with a transition strategy, the product line organization structure and required collaborations among organization units differ.

— Configuration: Ways to derive configurations based on domain assets differ from the product line transition strategy.

© ISO/IEC 2019 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO/IEC 26562:2019