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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/IEC DIS 29110-5-1-4

Systems and software engineering — Life cycle profiles for very small entities (VSEs) —

Part 5-1-4: Software engineering guidelines for the generic Advanced profile

ICS: 35.080

ISO/IEC JTC 1/SC 7

Secretariat: **BIS**

Voting begins on:
2025-07-17

Voting terminates on:
2025-10-09

This document is circulated as received from the committee secretariat.

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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 on 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 WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*.

A list of all parts in the ISO/IEC 29110 series can be found on the ISO website.

Introduction

0.1 Introduction to the ISO/IEC 29110 series

For the ISO/IEC 29110 series, a very small entity (VSE) is an enterprise, organisation (e.g., government agency, non-profit organisation), department or project having up to 25 people. Many VSEs develop and/or maintain systems and the software components used in those systems, either as independent products or incorporated into the larger system. Due to this a recognition of VSEs as suppliers of high-quality products is required.

Very small entities (VSEs) around the world are creating valuable products and services. According to the World Bank, small and medium-sized enterprises (SMEs) account for about 90 % of enterprises worldwide. According to the Organisation for Economic Co-operation and Development (OECD), SMEs represent 99 % of all businesses and generate about 60 % of employment. Almost one person out of three is employed in a micro firm with less than 10 employees. The European Union reports that micro firms, with fewer than 10 persons, account for 93.5 % of all enterprises and small firms, with 10 to 49 employees, account for 5.5 % of all enterprises. The challenge facing OECD governments is to provide a business environment that supports the competitiveness of this large heterogeneous business population and that promotes a vibrant entrepreneurial culture.

From studies and surveys conducted, it is clear that the majority of International Standards do not address the needs of VSEs. Implementation of and conformity with these standards is difficult, if not impossible.

Consequently, VSEs have no, or very limited, ways to be recognized as entities that produce quality systems/system elements including software in their domain. Therefore, VSEs are excluded from some economic activities.

It has been found that VSEs find it difficult to relate International Standards to their business needs and to justify the effort required to apply standards to their business practices. Most VSEs can neither afford the resources, in terms of number of employees, expertise, budget and time, nor do they see a net benefit in establishing over-complex systems or software life cycle processes. To address some of these difficulties, a set of guidelines has been developed based on a set of VSE characteristics. The guidelines are based on subsets of appropriate standards processes, activities, tasks, and outcomes, referred to as profiles. The purpose of a profile is to define a subset of International Standards relevant to the VSEs' context; for example, processes, activities, tasks, and outcomes of ISO/IEC/IEEE 12207 for software; and processes, activities, tasks, and outcomes of ISO/IEC/IEEE 15288 for systems; and information products (documentation) of ISO/IEC/IEEE 15289 for software and systems.

VSEs can achieve recognition through implementing a profile and by being audited against ISO/IEC 29110 specifications.

The ISO/IEC 29110 series can be applied at any phase of system or software development within a life cycle. The ISO/IEC 29110 series is intended to be used by VSEs that do not have experience or expertise in adapting/tailoring ISO/IEC/IEEE 12207 or ISO/IEC/IEEE 15288 standards to the needs of a specific project. VSEs that have expertise in adapting/tailoring ISO/IEC/IEEE 12207 or ISO/IEC/IEEE 15288 are encouraged to use those standards instead of the ISO/IEC 29110 series.

The ISO/IEC 29110 series is intended to be used with any life cycle such as waterfall, iterative, incremental, evolutionary or agile.

The life cycle processes described in the ISO/IEC 29110 series are not intended to preclude or discourage their use by organizations bigger than VSEs.

Systems, in the context of the ISO/IEC 29110 series, are typically composed of hardware and software components.

The ISO/IEC 29110 series, targeted by audience, has been developed to improve system or software and/or service quality, and process performance. Figure 1 describes the ISO/IEC 29110 series and positions the parts within the framework of reference.

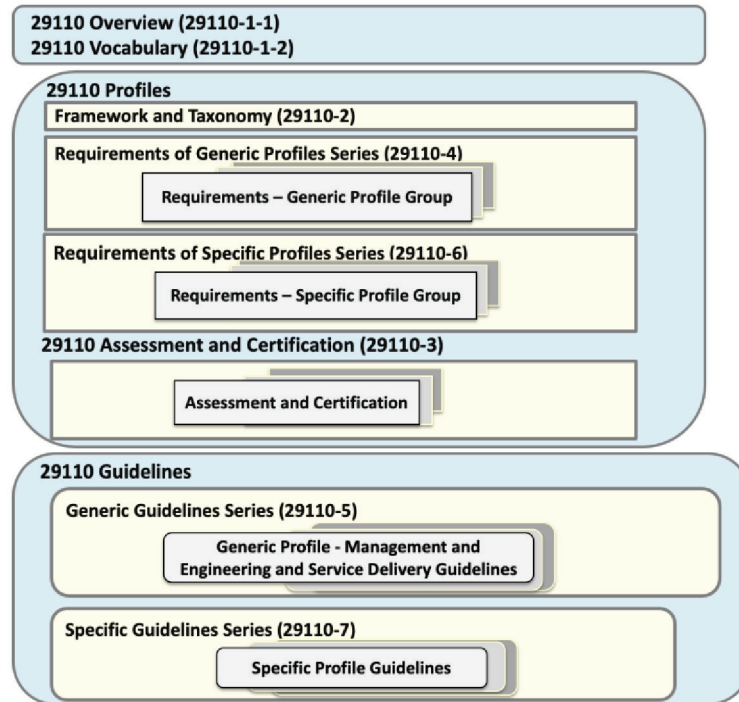


Figure 1 — ISO/IEC 29110 series

ISO/IEC 29110-1-1 introduces processes, life cycle and standardization concepts, the taxonomy (catalogue) of ISO/IEC 29110 profiles and the ISO/IEC 29110 series. ISO/IEC 29110-1-1 also introduces the characteristics and needs of a VSE, and clarifies the rationale for specific profiles, documents, standards and guidelines. ISO/IEC 29110-1-2 defines the terms common to the ISO/IEC 29110 series. ISO/IEC 29110-1-1 and ISO/IEC 29110-1-2 are targeted at VSEs and their customers, assessors, standards producers, tool vendors and methodology vendors.

ISO/IEC 29110-2 introduces the concepts for systems and software engineering profiles for VSEs. It establishes the logic behind the definition and application of profiles. For standardized profiles, it specifies the elements common to all profiles (structure, requirements, conformity, and assessment). For domain-specific profiles (profiles that are not standardized and developed outside of the ISO process), it provides general guidance adapted from the definition of standardized profiles. ISO/IEC 29110-2 is targeted at profile producers, tool vendors and methodology vendors.

ISO/IEC 29110-3 defines certification schemes, assessment guidelines and compliance requirements for process capability assessment, conformity assessments, and self-assessments for process improvements. ISO/IEC 29110-3 also contains information that can be useful to developers of certification and assessment methods and developers of certification and assessment tools. ISO/IEC 29110-3 is addressed to people who have direct involvement with the assessment process, e.g., the auditor, certification and accreditation bodies and the sponsor of the audit, who need guidance on ensuring that the requirements for performing an audit have been met. ISO/IEC 29110-3 is targeted at VSEs and their customers, assessors, accreditation bodies.

ISO/IEC 29110-4 provides the specifications for all generic profiles of the generic profile group that are based on subsets of appropriate standards elements. ISO/IEC 29110-4 is targeted at VSEs, customers, standards producers, tool vendors and methodology vendors.

ISO/IEC 29110-5 provides a management, engineering and service delivery guidelines for profiles of the Generic profile group. ISO/IEC 29110-5 is targeted at VSEs and their customers.

ISO/IEC 29110-6 provides the specifications for specific profiles that are based on subsets of appropriate standards elements. ISO/IEC 29110-6 is targeted at VSEs, customers, standards producers, tool vendors and methodology vendors.

ISO/IEC 29110-7 provides a guideline for each profile of the specific profile group. ISO/IEC 29110-7 is targeted at VSEs and their customers.

If a new profile is needed, ISO/IEC 29110-4 or ISO/IEC 29110-6 and or ISO/IEC 29110-7, ISO/IEC 29110-5 can be developed with minimal impact to existing documents.

Conformity requirements for implementations of this document can be found in ISO/IEC 29110-4-1.

0.2 Introduction to this document

This document is the fourth software profile of a four-profile software engineering roadmap (i.e. Entry, Basic, Intermediate and Advanced).

Since a VSE may be an enterprise, a project or a department of an organization, a customer of a VSE can be internal or external to the organization.

The outcomes and tasks are guidance, not requirements, for purposes of process assessment.

This document applies to VSEs that do not develop safety critical software products.

To use these guidelines, a VSE should fulfil the following entrance conditions.

VSEs that are familiar with or have implemented the ISO/IEC 29110-5-1-3, i.e., the Intermediate profile guidelines for their software development projects.

Using the guidelines of the Advanced profile, VSEs can obtain the following benefits:

- management and monitoring of more than one project in parallel with more than one work team;
- reuse of existing software components (e.g. code and document) in new projects;
- continuous measurement and evaluation of projects;
- continuous evaluation and improvement processes;
- continuous sustainability and growth; and
- support to customers in the disposal of software and installation of new software.

In this document, [Annex A](#) describes a process to enable a VSE to support the software product which they developed, and [Annex B](#) describes the deployment packages.

Systems and software engineering — Life cycle profiles for very small entities (VSEs) —

Part 5-1-4: Software engineering guidelines for the generic Advanced profile

1 Scope

This document describes processes targeted at VSEs that want to sustain and grow as an independent competitive software development business.

ISO/IEC 29110-4-1 identifies the requirements applicable to the tasks and work products described in this document.

These guidelines apply to VSEs that do not develop safety critical software products.

Once the software, developed by a VSE, has been accepted by their customer, the VSE that wants to provide after-delivery services can refer to ISO/IEC 29110-5-3.

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

3.1 activity

set of cohesive tasks of a process

[SOURCE: ISO/IEC/IEEE 12207:2017, 3.1.3]

3.2 Advanced profile

profile targeted at VSEs which want to sustain and grow as an independent competitive system and/or software development business

[SOURCE: ISO/IEC 29110-1-2:2024]

3.3 agreement

mutual acknowledgement of terms and conditions under which a working relationship is conducted

EXAMPLE Contract, memorandum of agreement.

[SOURCE: ISO/IEC IEEE 12207:2017, 3.1.5]

3.4

baseline

formally approved version of a configuration item, regardless of media, formally designated and fixed at a specific time during the configuration item's life cycle

[SOURCE: ISO/IEC/IEEE 12207:2017, 3.1.11]

3.5

Basic profile

profile targeted at VSEs developing a single application by a single work team

[SOURCE: ISO/IEC 29110-1-2:2024, 4.14]

3.6

business objective

strategy designed by senior management to ensure an organization's continued existence and enhance its profitability, market share, and other factors influencing the organization's success

[SOURCE: ISO/IEC IEEE 24765:2017]

3.7

conditional process

process that may be mandatory under some specified conditions, may be optional under other specified conditions, and may be out of scope or not applicable under other specified conditions

Note 1 to entry: These are to be observed if the specified conditions apply.

[SOURCE: ISO/IEC 29110-5-1-2:2024, 3.10]

3.8

conditional task

task that can be mandatory under some specified condition(s), can be optional under other specified conditions, and can be out of scope or not applicable under other specified conditions

Note 1 to entry: These are to be observed if the specified condition(s) apply.

[SOURCE: ISO/IEC 29110-1-2:2024, 3.28]

3.9

critical product

product that is essential to the operation of a business or organization, whose sustained failure would result in significant business impacts e.g., loss of revenue or loss of reputation

[SOURCE: ISO/IEC 29110-5-1-2:2024]

3.10

customer

person or organization that could or does receive a product or a service that is intended for or required by this person or organization

EXAMPLE Consumer, client, end-user, retailer, receiver of product or service from an internal process, beneficiary and purchaser.

Note 1 to entry: A customer can be internal or external to the organization.

[SOURCE: ISO 9000:2015, 3.2.4, modified - added 'service']

3.11

defect

imperfection or deficiency in a work product where that work product does not meet its requirements or specifications and needs to be either repaired or replaced

[SOURCE: IEEE 1044:2009, IEEE dictionary]

3.12

deployment package

DP

set of artefacts developed to facilitate the implementation of a set of practices, of the selected framework, in a very small entity

[SOURCE: ISO/IEC 29110-1-2:2024, 4.24]

3.13

enabling system

system that supports a system-of-interest during its life cycle stages but does not necessarily contribute directly to its function during operation

EXAMPLE A configuration management system used to control software elements during software development.

Note 1 to entry: Each enabling system has a life cycle of its own. This document is applicable to each enabling system when, in its own right, it is treated as a system-of-interest.

[SOURCE: ISO/IEC IEEE 12207:2017]

3.14

Entry profile

profile targeted at start-up VSEs (i.e. VSEs who started their operation fewer than three years ago) and/or at VSEs working on a single small project (e.g. project size of less than 6 person-months)

[SOURCE: ISO/IEC 29110-1-2:2024]

3.15

expected result

observable predicted behaviour of the test item under specified conditions based on its specification or another source

[SOURCE: ISO/IEC/IEEE 29119-1:2022, 3.35]

3.16

generic profile group

profile group applicable to VSEs (very small entities) that do not develop safety critical systems or software products

[SOURCE: ISO/IEC 29110-1-2:2024]

3.17

Intermediate profile

profile targeted at VSEs involved in the development of more than one project (3. in parallel with more than one work team

[SOURCE: ISO/IEC 29110-1-2:2024]

3.18

integration testing

testing in which software components, hardware components, or both are combined and tested to evaluate the interaction among them

[SOURCE: ISO/IEC/IEEE 24765:2017, 3.2034, modified — Note 1 to entry has been removed.]

3.19

process

set of interrelated or interacting activities that transforms inputs into outputs

[SOURCE: ISO/IEC/IEEE 12207:2017, 3.1.33]

3.20

process purpose

high-level objective of performing the process and the likely outcomes of effective implementation of the process

[SOURCE: ISO/IEC/IEEE 24774:2021, 3.12]

3.21

process outcome

observable result of the successful achievement of the process

[SOURCE: ISO/IEC/IEEE 24774:2021, 3.11]

3.22

process profile

set of process attribute ratings for an assessed process

[SOURCE: ISO/IEC 29110-1-2:2024]

3.23

profile

subset of appropriate standards' processes and their outcomes, activities and tasks combined to accomplish a particular function

Note 1 to entry: The base standards used to develop profiles for VSEs are ISO/IEC/IEEE 12207

[SOURCE: ISO/IEC 29110-1-2:2024]

3.24

report

information item that describes the results of activities such as investigations, observations, assessments, or tests

[SOURCE: ISO/IEC/IEEE 15289:2019, 3.1.22]

3.25

review

process or meeting during which a work product, or set of work products, is presented to project personnel, managers, users, customers, or other interested parties for comment or approval

[SOURCE: ISO/IEC 29110-1-2:2024, 4.51]

3.26

risk

effect of uncertainty on objectives

Note 1 to entry: An effect is a deviation from the expected — positive and/or negative.

Note 2 to entry: Objectives can have different aspects (such as financial, health and safety, and environmental goals) and can apply at different levels (such as strategic, organization-wide, project, product and process).

Note 3 to entry: Risk is often characterized by reference to potential events and consequences, or a combination of these.

Note 4 to entry: Risk is often expressed in terms of a combination of the consequences of an event (including changes in circumstances) and the associated likelihood of occurrence.

Note 5 to entry: Uncertainty is the state, even partial, of deficiency of information related to, understanding or knowledge of, an event, its consequence, or likelihood.

[SOURCE: ISO Guide 31073:2022, 3.1.1]

3.27

requirement

statement that translates or expresses a need and its associated constraints and conditions

Note 1 to entry: A constraint is externally imposed limitation on the software, its design, or implementation or on the process used to develop or modify a software.

Note 2 to entry: A condition is a measurable qualitative or quantitative attribute that is stipulated for a requirement and that indicates a circumstance or event under which a requirement applies.

[SOURCE: ISO/IEC/IEEE 12207:2017, 3.1.44, modified — Notes to entry have been added.]

3.28

security

protection against intentional subversion or forced failure, containing a composite of four attributes: confidentiality, integrity, availability, and accountability, plus aspects of a fifth, usability, all of which have the related issue of their assurance

[SOURCE: ISO/IEC/IEEE 12207:2017, 3.1.49]

3.29

security and intellectual property scheme

established and operated management system in the entity to ensure the security and intellectual property of its information items

3.30

small and medium-sized enterprise

SME

enterprises with less than 250 persons employed

[SOURCE: ISO/IEC 29110-1-2:2024]

3.31

software product

set of computer programs, procedures, and possibly associated documentation and data

[SOURCE: ISO/IEC/IEEE 12207:2017, 3.1.54, modified — Note 1 to entry has been removed.]

3.32

stakeholder

individual or organization having a right, share, claim, or interest in a system or in its possession of characteristics that meet their needs and expectations

[SOURCE: ISO/IEC/IEEE 12207:2017, 3.1.59, modified — EXAMPLE and note 1 to entry have been removed.]

3.33

task

required, recommended, or permissible action, intended to contribute to the achievement of one or more outcomes of a process

[SOURCE: ISO/IEC/IEEE 12207:2017, 3.1.66]

3.34

test item

work product that is an object of testing

[SOURCE: ISO/IEC/IEEE 29119-1:2022, 3.107]

3.35

test result

indication of whether or not a specific test case has passed or failed, i.e. if the actual result observed as test item output corresponds to the expected result or if deviations were observed

[SOURCE: ISO/IEC/IEEE 29119-1:2022, 3.122]

3.36

testing

set of activities conducted to facilitate discovery and/or evaluation of properties of one or more test items

[SOURCE: ISO/IEC/IEEE 29119-1:2022, 3.131]

3.37

traceability

degree to which a relationship can be established among two or more logical entities, especially entities having a predecessor-successor or master-subordinate relationship to one another, such as requirements, system elements, verifications, or tasks

EXAMPLE Software features and test cases are typically traced to software requirements.

[SOURCE: ISO/IEC/IEEE 12207:2017, 3.1.69]

3.38

validation

confirmation, through the provision of objective evidence, that the requirements for a specific intended use or application have been fulfilled

Note 1 to entry: A system is able to accomplish its intended use, goals and objectives (i.e., meet stakeholder requirements) in the intended operational environment. The right system was built.

Note 2 to entry: In a life cycle context, validation involves the set of activities for gaining confidence that a system is able to accomplish its intended use, goals and objectives in an environment like the operational environment.

[SOURCE: ISO/IEC/IEEE 12207:2017, 3.171]

3.39

verification

confirmation, through the provision of objective evidence, that specified requirements have been fulfilled

Note 1 to entry: Verification is a set of activities that compares a system or system element against the required characteristics. This includes, but is not limited to specified requirements, design, descriptions, and the system itself. The system was built right.

[SOURCE: ISO 9000:2015, 3.8.12, modified — Notes 1 to 3 to entry have been replaced by a new note 1 to entry.]

3.40

version control

establishment and maintenance of baselines and the identification and control of changes to baselines that make it possible to return to the previous baseline

[SOURCE: ISO/IEC/IEEE 26511:2018, 3.1.40]

3.41

very small entity

VSE

enterprise, organization (e.g. government agency, non-profit organization), department or project having up to 25 people

[SOURCE: ISO/IEC 29110-1-2:2024, 4.71, modified — "(e.g. government agency, non-profit organization)" has been added.]

3.42

work product WP

artefact produced by a process

EXAMPLE Project plan, requirements specification, design documentation, source code, test meeting minutes, schedules, budgets.

Note 1 to entry: A subset of the work products can be baselined to be used as the basis of further work and some form the set of project deliverables.

[SOURCE: ISO/IEC 20246:2017, 3.20]

3.43

system-of-interest

system whose life cycle is under consideration

[SOURCE: ISO/IEC IEEE 12207:2017]

4 Naming, diagramming and definitions conventions

4.1 General

Conventions for naming, diagramming, describing and defining profiles are defined in ISO/IEC 29110-2-1:2015.

4.2 Naming, diagramming and definition conventions

The following process structure description and notation are used to describe the processes.

Process name – process identifier, followed by its abbreviation in parentheses “()”.

Process purpose – high-level objective of performing the process and the likely outcomes of effective implementation of the process.

Process outcomes – observable result of the successful achievement of the process purpose. Outcomes are identified by the abbreviation of the process name, followed by the letter “O” and a consecutive number, for example PM.O1, SI.O2, etc.

Input work products – Work products which can be used to perform the process and its corresponding source, which can be another process or an external entity to the project, such as the customer. Identified by the abbreviation of the process name.

Output work products – Work products generated by the process and its corresponding destination, which can be another process or an external entity to the project, such as customer. Identified by the abbreviation of the process name.

Internal work products – Work products generated (i.e., output work product) and consumed (i.e., input work product) by the process. An internal work product is not reviewed or approved by the customer.

All work products’ names initiate with capital letters. Some work products have one or more statuses attached to the work product name surrounded by square brackets “[]” and separated by “;”. The work product state may change during the process execution. See [Clause 9](#) for the alphabetical list of the work products, its descriptions, possible states and the source of the work product. The source can be another process or an external entity to the project, such as the customer.

Roles involved – Names and abbreviation of the functions to be performed by project team members. Several roles may be played by a single person and one role may be assumed by several persons. Roles are assigned to project participants based on the characteristics of the project. The role list is identified by the abbreviation of the process name and showed as two column tables. See [Clause 8](#) for the alphabetical list of the roles, its abbreviations and recommended competencies description.

Diagram – Graphical representation of the processes. The large round-edged rectangles indicate process or activities, and the smaller square-edged rectangles indicate the work products. The directional or bidirectional thick arrows indicate the major flow of information between processes or activities. The directional or bidirectional thin arrows indicate the input or output work products. The notation used in the diagrams does not imply the use of any specific process life cycle.

Activity – A set of cohesive tasks of a process. The task statements in this guideline are not imperative. A process activity is the first level of process workflow decomposition, and the second one is a task. Activities are identified by process name abbreviation followed by consecutive number and the activity name.

Activity description – Each activity description is identified by the activity name and the list of related process outcomes surrounded by parentheses “()”. For example, activity PM.01 project planning (PM.01, PM.05, PM.06, PM.07) means that the activity PM.01 project planning contributes to the achievement of the listed outcomes: PM.01, PM.05, PM.06 and PM.07.

Task description – Each task description begins with an active verb (e.g., assign, test) and is followed by an object (e.g., review the project plan). To facilitate their implementation, a few tasks are broken down in elementary tasks. The task description doesn't impose any technique or method to perform it. The selection of the techniques or methods is left to the VSE or project team.

Task description tables contain four columns corresponding to:

- role - the abbreviation of role(s) involved in the task execution.
- task - description of the task to be performed. Each task is identified by activity ID and consecutive number, for example PM.01.01, PM.01.02. Notes are added to provide additional information intended to assist the understanding or use of tasks. Each note is numbered using the following notation: x).
- input work products – work products needed to execute a task.
- output work products – work products created or modified by the execution of a task.

NOTE 1 A conditional task is executed if its associated work product (e.g., software user documentation) is required by the customer and listed in the delivery instructions. A conditional task statement is preceded with this text: " x) Conditional task". A work product associated to a conditional task is identified as an 'optional' work product.

Incorporation to project repository – list of work products to be saved in the project repository; the version control strategy has to be applied to some of them. A few work products (e.g., requirements) are baselined, a change to a baselined work product can be done through an approved change request.

NOTE 2 Tables used in process description are for presentation purposes only.

NOTE 3 The term 'Basic' is using a capital 'B' to indicate an ISO/IEC 29110 profile (e.g., the Basic profile) while the term 'basic' is used when referring to the most important part of something (e.g., basic principles).

NOTE 4 A work product is baselined when it has been approved and uploaded in the repository.

4.3 Notation used to document new processes, additions and modifications to the Intermediate profile processes

The Advanced profile is the fourth profile of a four-profile software engineering roadmap (i.e. Entry, Basic, Intermediate and Advanced). The Advanced profile has been designed to build upon the processes of the Intermediate profile such that, when moving from the Intermediate profile to the Advanced profile, a VSE should add to its existing Intermediate profile processes the new processes (e.g. objectives, activities, tasks, roles and work products) described in this document.

Since, in the Advanced profile, there are additions and modifications to the Intermediate profile processes, this document has been written such that it will be easy for a VSE to identify these additions and modifications. The processes of the Intermediate profile have been complemented with additional objectives, tasks and work products in a context where a VSE is conducting more than one project in parallel with more than one work team.

The following notation is used to highlight the addition/deletion/modification to the Intermediate profile:

- added text
 - is underlined;
 - except for the processes of the Intermediate profile;
- deleted/modified text is struck out as follows: ~~the text is struck out~~.

The Advanced profile has one new process that is not in the Intermediate profile: the software transition and disposal process (STD).

The purpose of the software transition and disposal process is to move the software in an orderly, planned manner into the operational status such that the system is functional and operable in the operational environment of the customer and to end the existence of a system element or system for a specified intended use, appropriately handle replaced or retired elements, and to properly attend to identify critical disposal needs (e.g. per an agreement, per organisational policy, or for environmental, safety, security aspects).

The STD process is a conditional process. It is executed if a VSE is required, in the agreement (e.g. statement of work), to install and/or dispose a software at the customer operational environment. If this is the case, this process is included in the scope of an audit or an assessment.

To facilitate the identification of additional abbreviations, roles and work products of the STD process of the Advanced profile, these items are underlined. To facilitate reading, the STD process has not been underlined.

The Advanced profile terminology has been aligned to the ISO/IEC IEEE 12207 and ISO/IEC IEEE 15289. The following terms of old standards have been replaced with the new terms:

- “Agreement” and “contract” have been replaced with “agreement”; and
- Work products are identified with a unique code WP.XX where XX is a sequential number in [Clause 12](#). These codes have not been used in the descriptions of activities and tasks to facilitate readability.

4.4 Abbreviated terms

The following abbreviations are used in this document:

AM	acquisition management
BM	business management
<u>BSM</u>	<u>business manager</u>
OLR	organisational lesson learned record
OR	organisational repository
PJM	project manager
PLR	project lesson learned record
PO	purchase order
RFP	request for proposal
RR	resource request
SOW	statement of work
SUP	supplier

STD software transition and disposal

VSE very small entity

5 Overview

The Advanced profile management and engineering guidelines apply to a very small entity (VSE) is familiar with or has implemented the ISO/IEC 29110-5-1-3 for their software development projects.

These guidelines provide business management, project management, software implementation, acquisition management and software transition and disposal processes which integrate practices mainly based on the selection of ISO/IEC IEEE 12207 and ISO/IEC IEEE 15289 standards elements. [Annex A](#) provides information about deployment packages that facilitate the implementation of these processes.

[Table 1](#) illustrates the 4-stage software engineering roadmap. The 1st column on the left lists the 2 processes of the ISO/IEC 29110-5-1-1 Entry profile. The list of processes of the Basic profile of the 2nd column is incrementally built from the left column, so that the processes for the 2nd column are all the ones from the Entry profile plus a conditional process, new tasks and new work products. The list of the processes of the Intermediate profile of the 3rd column are the processes in the second column plus two new processes. The list of the process of the Advanced profile of the 4th column are the processes in the 3rd column plus one new process.

Table 1 — Software engineering 4-stage roadmap

ISO/IEC 29110-5-1-1 Entry profile	ISO/IEC 29110-5-1-2 Basic profile	ISO/IEC 29110-5-1-3 Intermediate profile	ISO/IEC 29110-5-1-4 Advanced profile
— Software implementation process — Project management process	Processes of ISO/IEC 29110-5-1-1 and: — Additional tasks and work products	Processes of ISO/IEC 29110-5-1-2 and: — Business management process	Processes of ISO/IEC 29110-5-1-3 and: — Conditional process: Software transition and disposal process

This document is intended to be used by VSEs to establish processes to implement any development approach or methodology including, e.g. agile, evolutionary, incremental, test-driven development, etc. based on a VSE or project needs.

The purpose of the business management (BM) process is to identify opportunities, evaluate all in-place agreements or requests from customers for fit with organisational goals and resources, obtain and provide the VSE with the necessary resources to perform all projects, monitor and evaluate all projects, conduct lessons learned to improve the VSE and protect its intellectual property and the security of its assets and information items.

The purpose of the project management (PM) process is to establish and carry out in a systematic way the tasks of the software implementation process, which allows complying with the project's Objectives in the expected quality, time and costs.

The purpose of the software implementation (SI) process is the systematic performance of the analysis, design, construction, integration and tests activities for new or modified software work products according to the specified requirements.

The purpose of the acquisition management (AM) process, a conditional process, is to obtain a product or service required by the VSE. The execution of the AM process is required if a product/service needs to be obtained from a supplier by the VSE (i.e. a conditional process).

The purpose of the software transition and disposal (STD) process is to move the software in an orderly, planned manner into the operational status such that the system is functional and operable in the operational environment of the customer and to end the existence of a system element or system for a specified intended use, appropriately handle replaced or retired elements, and to properly attend to identify critical disposal needs (e.g. per an agreement, per organisational policy, or for environmental, safety, and security aspects).

The processes are interrelated (see [Figure 2](#)). The arrows connecting the AM process, the STD process to the other processes are dashed to indicate that these 2 processes are conditional processes.

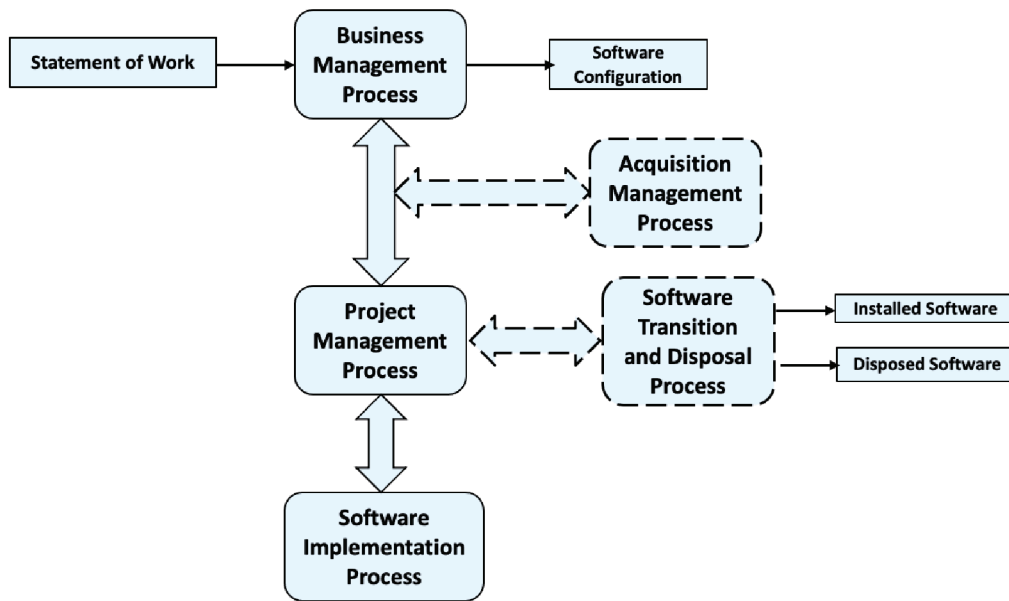


Figure 2 — Processes of the Advanced profile

6 Business management (BM) process

6.1 BM process purpose

The purpose of the business management process is to identify opportunities, evaluate all in-place agreements or requests from customers for fit with organizational objectives and resources, obtain and provide the VSE with the necessary resources to perform all projects, monitor and evaluate all projects, conduct lessons learned to improve the VSE and protect its intellectual property and the security of its assets and information items.

6.2 BM process outcomes

BM.01. Define the business objectives of the VSE.

BM.02. Initiate and sustain necessary, sufficient and suitable projects to meet the objectives of the VSE.

BM.03. Manage human resource and management and engineering knowledge of the VSE.

BM.04. Provide to the customer the work product that meets the agreed requirements.

BM.05. Provide the VSE with necessary human resources and to maintain their competencies, consistent with business needs.

BM.06. Provide an enabling infrastructure and services to all projects to support the VSE and the project objectives throughout the life cycle.

BM.07. Collect and analyse measures of all projects and to improve or maintain the management and engineering processes of the VSE.

BM.08. Protect the intellectual property and the security of the assets and information items of the VSE.

BM.09. Establish an organisational repository, integrate and store the projects' relevant documentation. The organisational repository should protect the security of its assets and information items.

BM.010. Projects are evaluated on a periodic basis. Projects meeting agreement and stakeholder requirements are continued, Projects not meeting agreements and stakeholder requirements are terminated. Projects that have completed agreements and stakeholder requirements are closed.

6.3 BM process roles

The roles involved in the BM process are:

- Business manager
- Project manager
- Customer

6.4 BM process description

6.4.1 BM process diagram

[Figure 3](#) shows the flow of information between the business management process activities including the most relevant work products and their relationships.

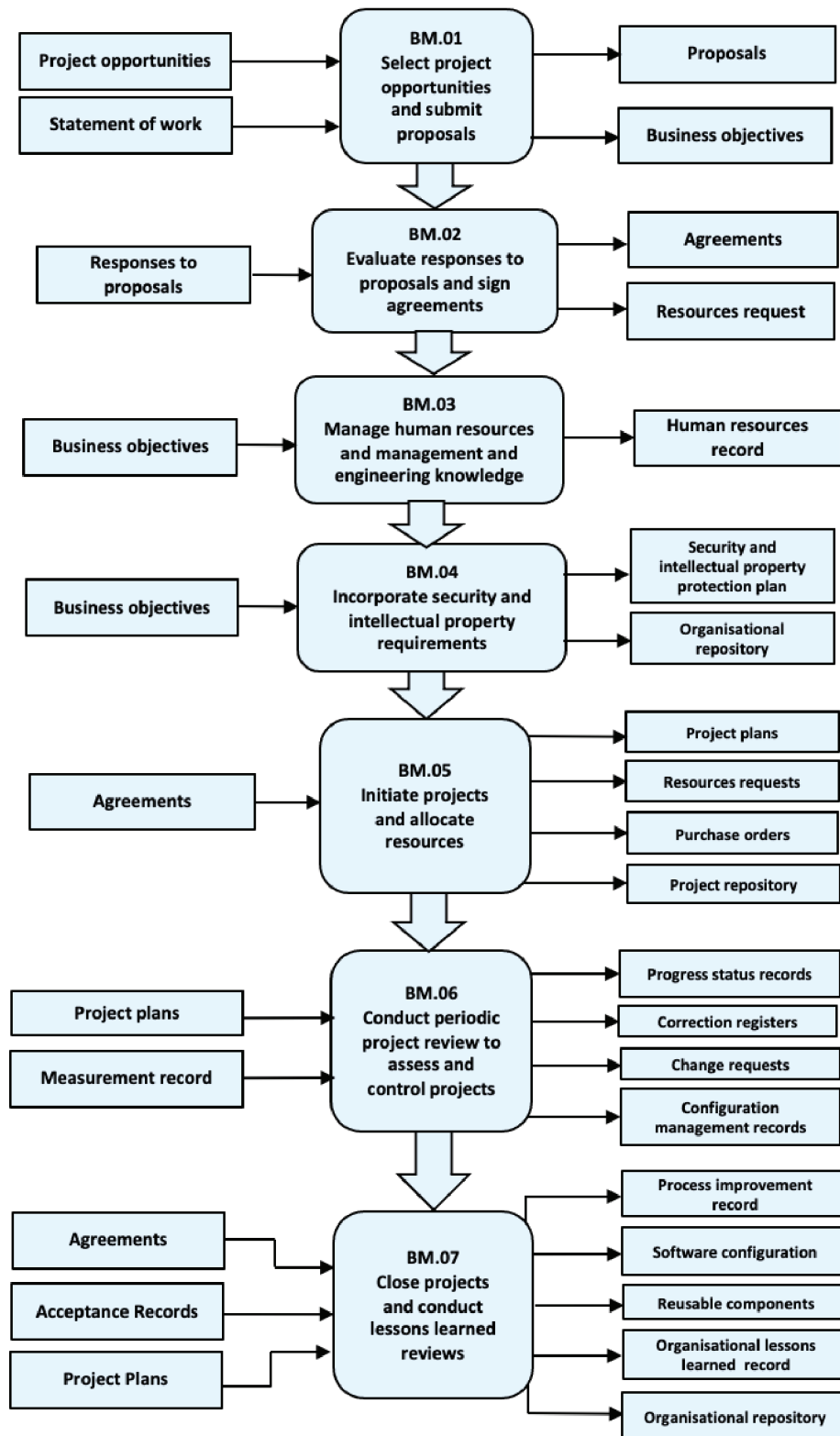


Figure 3 — Business Management process

6.4.2 BM process activities

The business management (BM) process provides the following activities:

- BM.01. Define the business objectives, select project opportunities and submit proposals.

- BM.02. Evaluate responses to proposals and sign agreements.
- BM.03. Manage human resources and management and engineering knowledge.
- BM.04. Incorporate security and intellectual property requirements.
- BM.05. Initiate projects and allocate resources.
- BM.06. Conduct periodic project review to assess and control projects.
- BM.07. Close projects and conduct lesson learned reviews.

6.4.2.1 BM.01 Define the business objectives, select project opportunities and submit proposals (contributes to outcomes BM.01, BM.02)

This activity describes the tasks and information items needed to define business objectives of the VSE, document project opportunities and develop proposals sent to potential customers.

The activity provides:

- Business objectives;
- Proposals (submitted to potential customers).

The task list for activity BM.01 is given in [Table 2](#).

Table 2 — BM.01 task list

Roles	Task list	Input work products	Output work products
BSM	BM.01.01 Document business objectives. 1) Agreements (e.g. contracts) and statements of work from past projects could be used to identify, select and document the business objectives. 2) Business objectives could be developed using the business objectives template in the work product description section of this document.	Statements of work (from past projects) Agreements (from past projects)	Business objectives [initiated]
BSM PJMs	BM.01.02 Review business objectives with the PJMs and approve business objectives. 1) The business objectives are approved by the BSM.	Business objectives [initiated]	Business objectives [approved]
BSM PJMs	BM.01.03 Identify project opportunities using opportunity selection criteria listed in the business objectives.	Business objectives [approved] Statements of work (from past projects) Agreements (from past projects) Proposals (from past projects)	Business objectives [updated]: — Project opportunities

Table 2 (continued)

Roles	Task list	Input work products	Output work products
BSM PJMs	BM.01.04 Prepare and approve proposal(s). 1) Proposals could be developed using the proposal template in the work product description section of this guide.	Business objectives [updated]	Proposal(s) [approved]
BSM	BM.01.05 Submit proposal(s) to potential customer(s).	Proposal(s) [approved]	Proposal(s) [submitted]

6.4.2.2 BM.02 Evaluate responses to proposals and sign agreements (contributes to outcome BM.02)

This activity involves the evaluation of the responses to the proposals submitted to customers, the negotiation and signature of agreements with customers. Once an agreement is signed, a project manager is assigned to the project, and the project manager documents its project plan according to the project management (PM) process of these guidelines.

The activity provides:

- Agreements.

The task list for BM.02 is given in [Table 3](#).

Table 3 — BM.02 task list

Roles	Task list	Input work products	Output work products
BSM	BM.02.01 Evaluate all responses to proposals from potential customers and prepare agreements for the accepted proposals.	Business objectives [approved] Proposal(s) [submitted]	Agreement(s) [initiated]
BSM CUS	BM.02.02 Negotiate, finalise and sign agreement(s) with customers.	Business objectives [approved] Agreement(s) [initiated]	Agreement(s) [signed]
BSM	BM.02.03 Approve projects and assign project managers to develop project plans and resources requests. 1) Update project opportunities (if applicable). 2) Project plans are developed according to the planning activity of the PM process.	Agreement(s) [approved]	Projects managers [as-signed] Project opportunities [updated]

6.4.2.3 BM.03 Manage human resources and management and engineering knowledge (contributes to outcome BM.03)

This activity describes tasks and information items needed to manage organisational human resources and provide management and engineering knowledge to maintain adequate engineering capability of the VSE.

The activity provides:

- Human resource record
- Trained human resources.

The task list for activity BM.03 is given in [Table 4](#).

Table 4 — BM.03 task list

Roles	Task list	Input work products	Output work products
PJMs	BM.03.01 Identify and document skills and knowledge necessary to perform the approved projects.	Business objectives [approved]	Human resource record [initial]
BSM	BM.03.02 Review and approve the human resource record.	Human resource record [initial]	Human resource record [approved]
BSM PJMs	BM.03.03 Obtain human resources necessary to perform the approved projects.	Business objectives [approved] Human resource record [approved]	Human resource record [updated]
BSM PJMs	BM.03.04 Train human resources. 1) The training plan of the human resource record is used to document the training, schedule of the human resources that will be get management and/or engineering training.	Business objectives [approved] Human resource record [updated]	Human resource record [updated]

6.4.2.4 BM.04 Incorporate security and intellectual property requirements (contributes to outcomes BM.08, BM.09)

This activity documents the tasks and information items needed to develop and implement security of its assets and information items and the protection of the intellectual property of the VSE.

The activity provides:

- Security and intellectual property protection plan
- Organisational repository to store assets and information items securely.

The task list for activity BM.05 is given in [Table 5](#).

Table 5 — BM.04 task list

Roles	Task list	Input work products	Output work products
BSM	BM.04.01 Develop a security and intellectual property protection plan using the template provided in the work product description section.	Business objectives [approved]	Security and intellectual property protection plan [initiated]
BSM PJMs	BM.04.02 Review and approve the security and intellectual property protection plan. 1) The security and intellectual property protection plan is approved by the BSM.	Security and intellectual property protection plan [initiated]	Security and intellectual property protection plan [approved]
BSM PJMs	BM.04.03 Implement the security and intellectual property protection plan.	Security and intellectual property protection plan [approved]	Security and intellectual property protection plan [implemented]
BSM	BM.04.04 Establish and maintain an organisational repository. 1) The repository should protect the security and intellectual property of the VSE and of its customers.	Security and intellectual property protection plan [approved]	Organisational repository [established]

6.4.2.5 BM.05 Initiate projects and allocate resources (contributes to outcomes BM.02, BM.05, BM.06)

This activity is initiated with the approval of project plans and the resources requests. Human resources are allocated to projects. If products or services have to be acquired, purchase orders are approved. A project repository is established.

The activity provides:

- Approved project plan(s);
- Approved resources request(s);
- Approved purchased order(s);
- Human resource record.

The task list for activity BM.05 is given in [Table 6](#).

Table 6 — BM.05 task list

Roles	Task list	Input work products	Output work products
BSM PJMs	BM.05.01 Review and approve all project plans and all resource requests. 1) Project plans are developed by the project planning activity of the PM process. 2) All project plans and resource requests are approved by the BSM. 3) Required human resources and other resources to project (e.g. work team, computer facilities) are assigned.	Agreements [approved] Project plans [initiated] Resources requests [initiated] Human resource record [published]	Project plans [approved] Resources requests [approved]
BSM PJMs	BM.05.02 Obtain resources and train project team members if needed.	Resource requests [approved] Human resource record [approved]	Resources obtained and trained Human resource record [updated]
BSM PJMs	BM.05.03 Decide if products or services have to be acquired from suppliers and list the products or services to be acquired. 1) If a product (e.g. software component) or a service has to be acquired from supplier(s), use the acquisition management process of these guidelines.	Project plans [approved]	List of products or services to be acquired [initiated]
BSM	BM.05.04 Approve the list of products or services to be acquired and all purchase orders to obtain products or services from suppliers. 1) Purchase orders are initiated during the project plan execution activity of the PM process.	List of products or services to be acquired [initiated] Purchase orders [initiated]	List of products or services to be acquired [approved] Purchase orders [approved]
PJMs	BM.05.05 Establish and maintain a project repository.	Security and intellectual property protection plan [approved]	Project repository [established]

6.4.2.6 BM.06 Conduct periodic project review to assess and control projects (contributes to outcomes BM.02, BM.06, BM.07)

This activity evaluates the performance of all the plans against documented commitments. The information items needed to perform this activity are the outputs of the project assessment and control activity of the PM process.

The activity provides:

- Progress status records;
- Correction register(s);
- Change request(s).

The task list for activity BM.06 is given in [Table 7](#).

Table 7 — BM.06 task list

Roles	Task list	Input work products	Output work products
BSM PJM	BM.06.01 Evaluate all projects progress with respect to the project plans, comparing: — actual tasks against planned tasks — actual results against established project objectives — actual resource allocation against planned resources — actual cost against budget estimates — actual time against planned schedule — actual risk against previously identified 1) The information needed to perform this task is produced in the project assessment and control activity of the PM process.	Project plans [ap-proved] Progress status records [published] Measurement records [published]	Progress status records [evaluated]
BSM PJM	BM.06.02 Establish actions to correct deviations or problems and identified risks. 1) Concerning the accomplishment of the plan, as needed, document them in correction register and track them to closure.	Progress status records [evaluated]	Correction register [initiated]
BSM PJM	BM.06.03 Identify changes to requirements and/or project plans. 1) To address major deviations, potential risks or problems concerning the accomplishment of the plan, document them in change requests and track them to closure.	Progress status records [evaluated]	Change request(s) [initiated]
BSM	BM.06.04 Record and report the status of the items and modifications.	Configuration management strategy Configuration management records [published]	Configuration management records [updated, published]

6.4.2.7 BM.07 Close projects and conduct lesson learned reviews (contributes to outcomes BM.01, BM.02, BM.04)

This activity formalises, at the organisational level, the project closure activity of the PM process, by delivering the products to customers. organisational lesson learned reviews are performed using the output of the project closure activity of the PM process. Process improvement opportunities are document and implemented and reusable components are identified and stored in the organisational repository. business objectives are updated if necessary.

The activity provides:

- acceptance record;
- delivery instructions signed by customer;
- software configuration;
- organisational lesson learned;
- process improvement record;
- reusable components;
- updated organisational repository;
- updated business objectives.

The task list for activity BM.07 is given in [Table 8](#).

Table 8 — BM.07 task list

Roles	Task list	Input work products	Output work products
BSM PJMs CUS	BM.07.01 Formalize the completion of the projects according to the delivery instructions. 1) As established in the project plans, providing acceptance support and getting the acceptance record signed from the customers.	Agreements [approved] Acceptance records [initiated] Project plan [approved]: — Delivery instructions Software configuration [delivered internally]	Acceptance records [published] Project plan [approved]: — Delivery instructions Software configuration [initiated]
BSM PJMs	BM.07.02 Conduct a lesson learned review of all projects. 1) Lessons learned from each project, as documented in the PM process, are collected. 2) Lessons learned are used identify the improvements to processes, are documented and are prioritized in the improvement record. 3) Implement selected improvements.	Agreements [approved] Project plans [approved] Meeting records [published] Measurement records [published] Project lesson learned record [published]	Organisational lesson learned record [initiated]
BSM PJMs	BM.07.03 Analyse lesson learned to identify improvements to processes and work products 1) Lessons are prioritized using the process improvement record template.	Organisational lesson learned record [initiated]	Process improvement record [published]
BSM PJMs	BM.07.04 Review and update business objectives.	Business objectives [approved] Organisational lesson learned record [initiated]	Business objectives [updated]
BSM PJMs	BM.07.05 Implement the selected improvements documented in the process improvement record.	Process improvement record [published]	Process improvement record [implemented]