TECHNICAL REPORT

ISO/IEC TR 29110-5-1-4

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Software and systems engineering — Lifecycle profiles for very small entities (VSEs) —

Part 5-1-4: Software engineering: Management and engineering guidelines: Generic profile group: Advanced profile

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Contents

Page

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

Very Small Entities (VSEs) around the world are creating valuable products and services. For the purpose of ISO/IEC 29110, a Very Small Entity (VSE) is an enterprise, an organization, a department or a project having up to 25 people. Since many VSEs develop and/or maintain system and software components used in systems, either as independent products or incorporated in larger systems, a recognition of VSEs as suppliers of high quality products is required.

According to the Organization for Economic Co-operation and Development (OECD) SME and Entrepreneurship Outlook report (2005) "Small and Medium Enterprises (SMEs) constitute the dominant form of business organization in all countries world-wide, accounting for over 95 % and up to 99 % of the business population depending on country". The challenge facing governments and economies 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 conformance 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 of standards and technical reports can be applied at any phase of system or software development within a life cycle. This series of standards and technical reports 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 ISO/IEC 29110.

ISO/IEC 29110 is intended to be used with any lifecycle such as: waterfall, iterative, incremental, evolutionary or agile.

Systems, in the context of ISO/IEC 29110, 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. See Table 1.

Table 1 — ISO/IEC 29110 target audience

ISO/IEC 29110	Title	Target audience
ISO/IEC 29110-1	Overview	VSEs and their customers, assessors, standards producers, tool vendors and methodology vendors.
ISO/IEC 29110-2	Framework for profile preparation	Profile producers, tool vendors and methodology vendors. Not intended for VSEs.
ISO/IEC 29110-3	Certification and assessment guidance	VSEs and their customers, assessors, accreditation bodies.
ISO/IEC 29110-4	Profile specifications	VSEs, customers, standards producers, tool vendors and methodology vendors.
ISO/IEC 29110-5	Management, engineering and service delivery guidelines	VSEs and their customers.

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

ISO/IEC 29110-1 defines the terms common to the ISO/IEC 29110 series. It introduces processes, lifecycle and standardization concepts, the taxonomy (catalogue) of ISO/IEC 29110 profiles and the ISO/IEC 29110 series. It also introduces the characteristics and needs of a VSE and clarifies the rationale for specific profiles, documents, standards and guidelines.

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, conformance, 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 29110-3 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 29110-4-m provides the specification for all profiles in one profile group (a profile group may contain a single profile or multiple profiles). A profile is specified in terms of requirements imported from appropriate base standards.

ISO/IEC TR 29110-5-m provides management, engineering and service delivery guidelines for the profiles in a profile group.

This document provides management and engineering guidelines for the software engineering Advanced profile of the Generic profile group. These guidelines describe the processes targeted at VSEs that want to sustain and grow as an independent competitive software development business.

Figure 1 describes the ISO/IEC 29110 International Standards (IS) and Technical Reports (TR) and positions the parts within the framework of reference. Overview, assessment guidelines, management and engineering guidelines are available from ISO as freely available Technical Reports (TR). The Framework document, profile specifications and certification schemes are published as International Standards (IS).

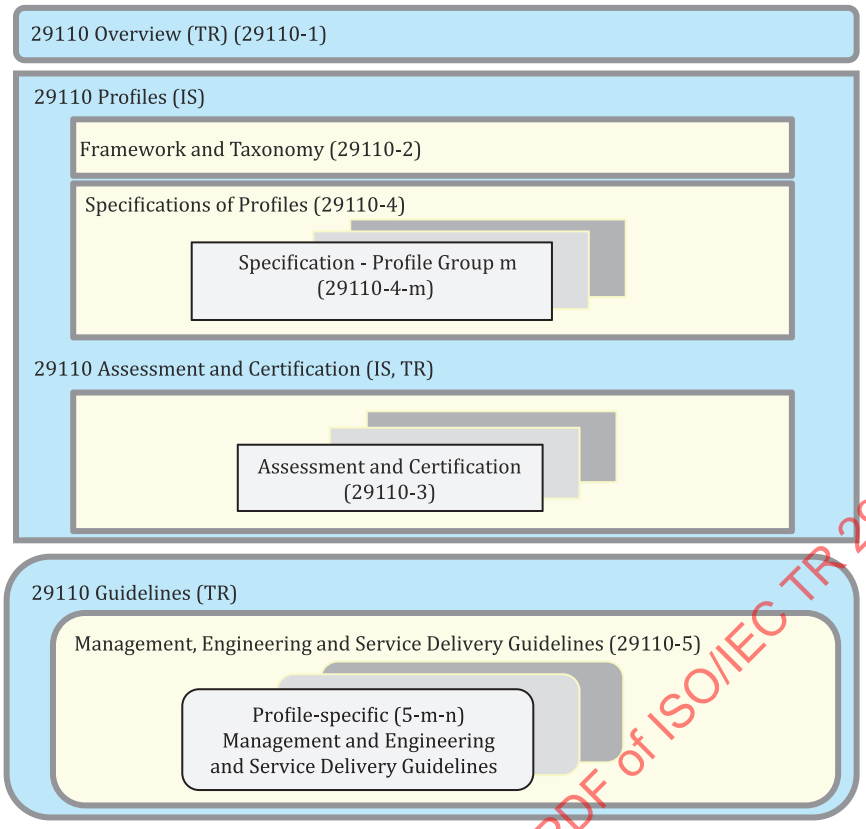

Figure 1 — ISO/IEC 29110 series

Software and systems engineering — Lifecycle profiles for very small entities (VSEs) —

Part 5-1-4:
Software engineering: Management and engineering guidelines: Generic profile group: Advanced profile

1 Scope

This document is applicable to Very Small Entities (VSEs). VSEs are enterprises, organisations, departments or projects having up to 25 people. The life cycle processes described in the set of International Standards (IS) and Technical Reports (TR) are not intended to preclude or discourage their use by organisations bigger than VSEs.

The Advanced profile is the fourth profile of a four-profile software engineering roadmap (i.e. Entry, Basic, Intermediate and Advanced). 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 develop non-critical software.

Using these guidelines, 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.

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 TR 29110-5-3.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 29110-2-1, *Software engineering — Lifecycle profiles for Very Small Entities (VSEs) — Part 2-1: Framework and taxonomy*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 29110-2-1 and the following 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
advanced profile
profile (3.12) targeted at VSEs which want to sustain and grow as an independent competitive system and/or software development business

[SOURCE: ISO/IEC 29110-2-1:2015]

3.2
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]

3.3
acquirer
stakeholder that acquires or procures a product or service from a supplier

Note 1 to entry: Other terms commonly used for an acquirer are buyer, customer, owner, purchaser or internal/organisational sponsor.

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

3.4
basic profile
profile (3.12) targeted at VSEs developing a single application by a single work team

[SOURCE: ISO/IEC 29110-2-1:2015]

3.5
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]

3.6
conditional process
process that can be mandatory under some specified conditions, 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 conditions apply.

3.7
critical software
software having the potential for serious impact on the users or environment, due to factors including safety, performance, and security

3.8
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]

3.9
entry profile
profile (3.12) targeted at start-up VSEs (i.e. VSEs who started their operation less than three years) and/or at VSEs working on small *project* (e.g. project size of less than six person-months)

[SOURCE: ISO/IEC 29110-2-1:2015]

3.10
generic profile group
profile (3.12) group applicable to VSEs (very small entities) that do not develop critical systems or critical software and have typical situational factors

[SOURCE: ISO/IEC 29110-2-1:2015]

3.11
intermediate profile
profile (3.12) targeted at VSEs involved in the development of more than one project in parallel with more than one work team

[SOURCE: ISO/IEC 29110-2-1:2015]

3.12
profile
set of one or more *base standards* and/or profiles, and where applicable, the identification of chosen classes, conforming subsets, option and parameters of those base standard, or standardized profiles necessary to accomplish a particular function

[SOURCE: ISO/IEC/TR 10000-1:1998, modified — "International Standardized Profiles" or "ISPs" have been replaced by "standardized profiles"]

3.13
security and intellectual property scheme
established and operated management system in the entity to ensure the security and intellectual property of its information items

3.14
system-of-interest
system whose life cycle is under consideration

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

4 Conventions and abbreviated terms

4.1 Naming, diagramming and definition conventions

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

Name — Process identifier, followed by its abbreviation in parentheses "()".

Purpose — General goals and results expected of the effective implementation of the process. The implementation of the process should provide tangible benefits to the stakeholders. The purpose is identified by the abbreviation of the process name.

Objectives — Specific goals to ensure the accomplishment of the process purpose. The objectives are identified by the abbreviation of the process name, followed by the letter 'O' and a consecutive number, for example RM.O1, PM.O2, etc. Each objective is followed by the square box which includes a list of the chosen processes for the Intermediate profile mainly from ISO/IEC/IEEE 12207 and its outcomes related to the objective. References to standards such as ISO/IEC/IEEE 15288, ISO/IEC/IEEE 12207 and ISO 9001 are informative and do not imply partial conformance to the standards.

Input Work products — Work products required 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 and showed as two column table of work product names and sources.

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 or Organizational Management. Identified by the abbreviation of the process name and showed as two column table of work product names and destinations.

Internal Work products — Work products generated and consumed by the process itself. An internal Work product is not reviewed or approved by the Customer. Identified by the abbreviation of the process name and showed as one column table of the work product names.

All work products' names are printed in italics and 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 a ",". The work product status may change during the process execution. See Clause 11 for the alphabetical list of the work products, its descriptions, possible statuses 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 table. See Clause 10 for the alphabetical list of the roles, its abbreviations and required 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 thin directional or bidirectional arrows indicate the input or output work products. The notation used in the diagrams does not imply the use of any specific process lifecycle.

Activity — A set of cohesive tasks. Task is a requirement, recommendation, or permissible action, intended to contribute to the achievement of one or more objectives of a process. 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 objectives surrounded by parentheses "()". For example, PM.1 Project Planning (PM.01, PM.05, PM.06, PM.07) means that the activity PM.1 Project Planning contributes to the achievement of the listed objectives: PM.01, PM.05, PM.06 and PM.07. The activity description begins with the task summary and is followed by the task descriptions table. The task description does not impose any technique or method to perform it. The selection of the techniques or methods is left to the VSE or project team.

Tasks description table contain four columns corresponding to:

— Role — the abbreviation of roles 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, and so on;

— Input Work products — work products needed to execute the task; and

— Output Work products — work products created or modified by the execution of the task.

Incorporation to *Organisational Repository* — List of work products to be saved in *Organizational Repository*.

NOTE Tables used in process description are for presentation purpose only.

4.2 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: 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 in order to facilitate readability.

4.3 Abbreviated terms

The following abbreviations are used in this document:

AM Acquisition Management

BM Business Management

BSM Business Manager

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) (enterprise, organization, department or project having up to 25 people) which is familiar with or has implemented ISO/IEC TR 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.

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.

Using these guidelines, 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.

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

— VSEs that are familiar with or have implemented ISO/IEC TR 29110–5-1-3; Generic profile group: Intermediate profile for their software development projects.

The purpose of the Business Management (BM) process is to define business objectives, identify opportunities, evaluate all in-place *Agreements* or requests from customers for fit with organisational objectives and resources, obtain and provide the VSE with the necessary resources to perform all projects, monitor and evaluate all projects, conduct lesson 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 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.

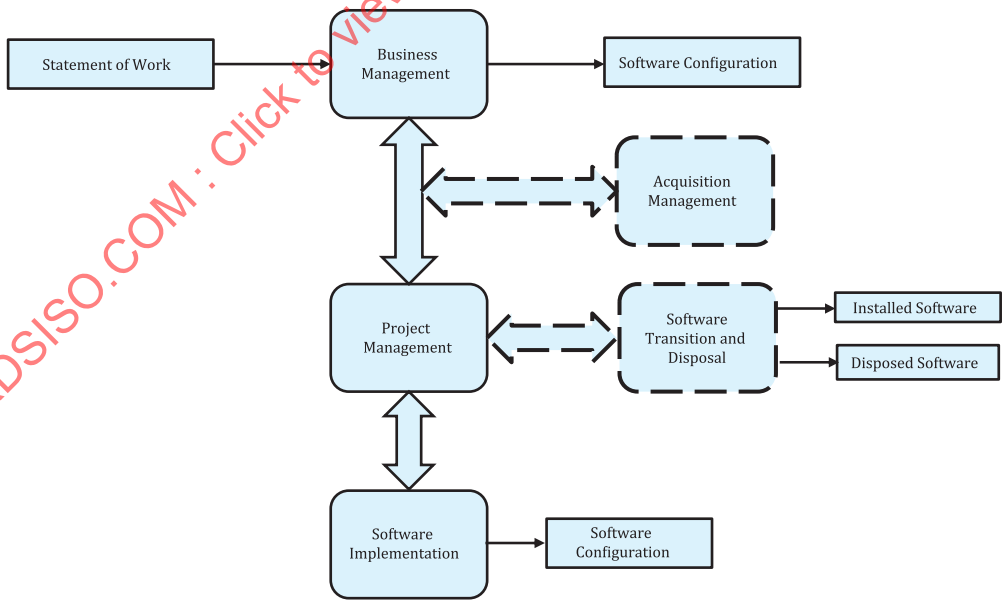

Figure 2 — Advanced profile processes

6 Business Management (BM) process

6.1 BM purpose

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

6.2 BM objectives

BM.O1. Define the business objectives of the VSE.

BM.O2. Initiate and sustain necessary, sufficient and suitable projects in order to meet the objectives of the VSE.

BM.O3. Manage Human Resource and Management and Engineering Knowledge of the VSE.

BM.O4. Provide to the customer the work product that meets the agreed requirements.

BM.O5. Provide the VSE with necessary human resources and to maintain their competencies, consistent with business needs.

BM.O6. Provide an enabling infrastructure and services to all projects to support the VSE and the project objectives throughout the life cycle.

BM.O7. Collect and analyse measures of all projects and to improve or maintain the management and engineering processes of the VSE.

BM.O8. Protect the intellectual property and the security of the assets and information items of the VSE.

BM.O9. 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.O10. 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 input work products

Table 2 provides a list of the input work products.

Table 2 — BM input work products

Name	Source
Agreement	Customer
Request for Proposal	Customer
Change Request	Customer Project Manager
Resource Request	Project Manager
Purchase Order	Project Manager
Human Resource Record	Project Manager

6.4 BM output work products

Table 3 provides a list of the output work products.

Table 3 — BM output work products

Name	Destination
Business Objectives	Business Management
Agreement	Business Management
Project Plan	Business Management
Proposal	Customer
Software Configuration	Customer

6.5 BM internal work products

Table 4 provides a list of the internal work products.

Table 4 — BM internal work products

Name
Business Objectives
Engineering Knowledge Assets
Human Resource Records
Security and Intellectual Property Protection Plan
Resource Request
Organisational Lesson Learned Record
Process Improvement Record

6.6 BM roles involved

Table 5 provides a list of the roles involved in the BM process.

Table 5 — BM roles involved

Role	Abbreviation
Business Manager	BSM
Project Manager	PJM
Customer	CUS

6.7 BM Process Description

6.7.1 BM Diagram

Figure 3 shows the flow of information between the Business Management Process activities including the most relevant work products and their relationships.

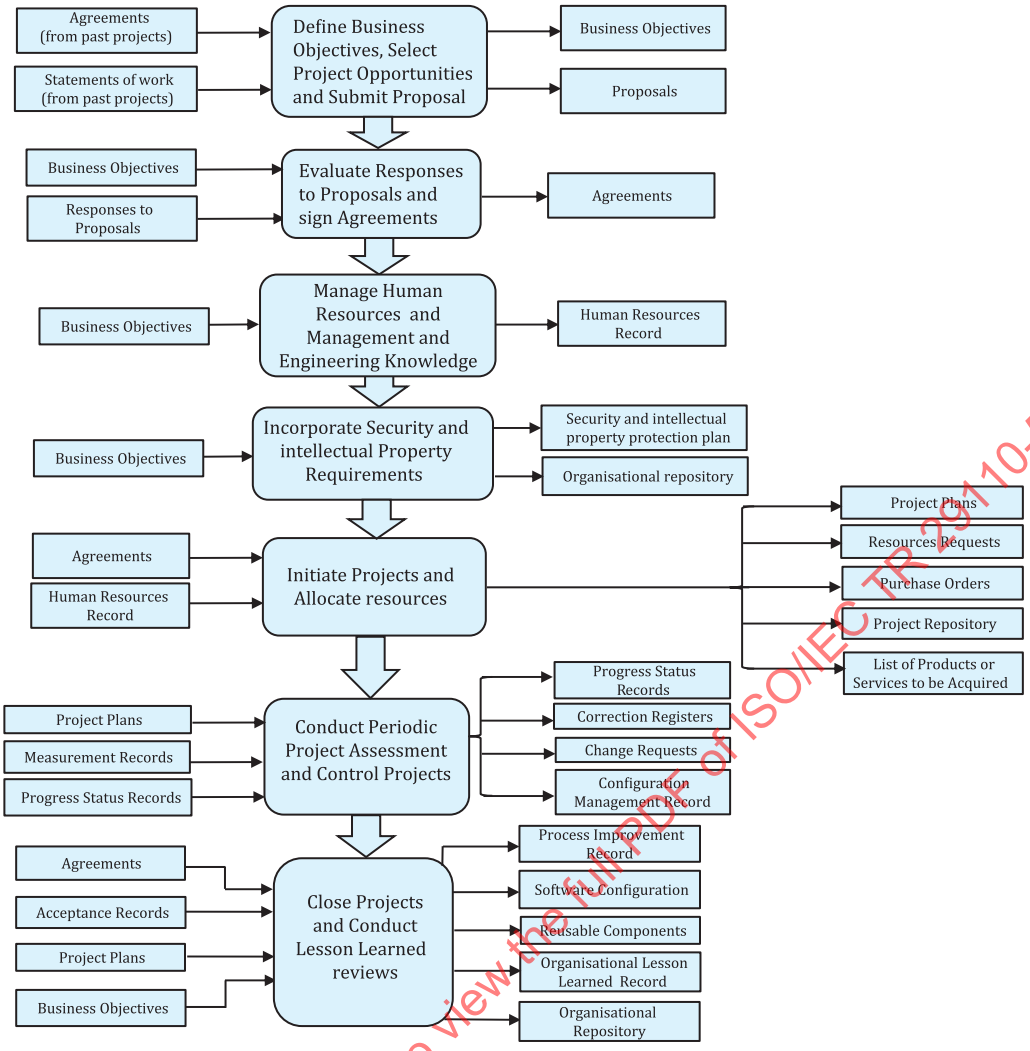

Figure 3 — Business Management process

6.7.2 BM activities

The Business Management (BM) Process has 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 Assessment and Control Projects.

— BM.07. Close Projects and Conduct Lesson Learned Reviews.

6.7.2.1 BM.01 Define the Business Objectives, select project opportunities and submit proposals (BM.O1, BM.O2)

The Define the business objectives, select project opportunities and submit proposals 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; and

— Proposals (submitted to potential customers).

The task list for BM.01 Define business objectives, select project opportunities and submit proposals is given in Table 6.

Table 6 — BM.01 task list

Role	Task List	Input Work products	Output Work products
BSM	BM.01.01 Document *Business Objectives.* Agreements (e.g. contracts) and Statements of Work from past projects could be used to identify, select and document the *Business Objectives.* *Business objectives* could be developed using the *Business objectives* template in the Work Product description section of this Guide.	*Business Objectives template* *Statements of Work (from past projects)* *Agreements (from past projects)*	*Business Objectives [initiated]*
BSM PJMs	BM.01.02 Review *Business Objectives* with PJMs and approve *Business Objectives.* NOTE 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*
BSM PJMs	BM.01.04 Prepare and approve *Proposal(s).* *Proposals* could be developed using the Proposal template in the Work Product description section of this Guide.	*Business Objectives [updated]* *Proposal template*	*Proposal(s) [approved]*
BSM	BM.01.05 Submit *Proposal(s)* to potential Customer(s).	*Proposal(s) [approved]*	*Proposal(s) [submitted]*

6.7.2.2 BM.02 Evaluate Responses to Proposals and Sign Agreements (BM.O2)

The Evaluate Responses to Proposals and Sign Agreements 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 Evaluate Responses to Proposals and Sign Agreements is given in Table 7.

Table 7 — BM.02 task list

Role	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.* Project Plans are developed according to the Planning activity of the PM Process.	*Agreement(s) [approved]*	*Projects Managers [assigned]*

6.7.2.3 BM.03 Manage Human Resources and Management and Engineering Knowledge (BM.03)

The Manage Human Resources and Management and Engineering Knowledge 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; and

— Trained Human Resources.

The task list for BM.03 Manage Human Resources and Management and Engineering Knowledge is given in Table 8.

Table 8 — BM.03 task list

Role	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. NOTE 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]*

6.7.2.4 BM.04 Incorporate Security and Intellectual Property Requirements (BM.O8, BM.O9)

The Incorporate security and intellectual property requirements 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; and

— Organisational Repository to store assets and information items securely.

The task list for BM.05 Incorporate Security and Intellectual Property Requirements is given in Table 9.

Table 9 — BM.04 task list

Role	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 Template*	*Security and Intellectual Property Protection Plan [initiated]*
BSM PJMs	BM.04.02 Review and approve the *Security and Intellectual Property Protection Plan*. NOTE 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.* 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]*

6.7.2.5 BM.05 Initiate Projects and Allocate Resources (BM.02, BM.05, BM.06)

The Initiate Projects and Allocate Resources 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); and

— Human Resource Record.

The task list for BM.05 Initiate Projects and Allocate Resources is given in Table 10.

Table 10 — BM.05 task list

Role	Task List	Input Work products	Output Work products
BSM PJMs	BM.05.01 Review and Approve all *Project Plans* and all *Resource Requests.* NOTE — Project Plans are developed by the Project Planning activity of the PM process — All *Project Plans* and *Resource Requests* are approved by the BSM.	*Agreements [approved]* *Project Plans [initiated]* *Resources Requests [initiated]* Human Resource Record [approved]	*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. NOTE 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*. 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]*

6.7.2.6 BM.06 Conduct periodic Project Assessment and Control Projects (BM.O2, BM.O6, BM.O7)

The Conduct periodic Project Assessment and Control Projects 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); and

— Change Request(s).

The task list for BM.06 Conduct Periodic Project Assessment and Control Projects is given in Table 11.

Table 11 — BM.06 task list

Role	Task List	Input Work products	Output Work products
BSM PJMs	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 NOTE The information needed to perform this task is produced in the Project Assessment and Control activity of the PM process.	*Project Plans [approved]* *Progress Status Records* *Measurement Records*	*Progress Status Records [evaluated]*
BSM PJMs	BM.06.02 Establish actions to correct deviations or problems and identified risks. Concerning the accomplishment of the plan, as needed, document them in *Correction Register* and track them to closure.	*Progress Status Records [evaluated]*	*Correction Registers*
BSM PJMs	BM.06.03 Identify changes to requirements and/or *Project Plans.* 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*	*Configuration Management Records [updated]*

6.7.2.7 BM.07 Close Projects and Conduct Lesson Learned Reviews (BM.O1, BM.O2, BM.O4,)

The Close Project and Conduct Lesson Learned Reviews 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; and

— Updated Business Objectives.

The task list for BM.07 Close Projects and Conduct Lesson Learned Reviews is given in Table 12.

Table 12 — BM.07 task list

Role	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.* As established in the *Project Plans,* providing acceptance support and getting the *Acceptance Record* signed from the Customers.	*Agreements [approved]* *Acceptance Records [initiated]* *Delivery Instructions [signed by Customer]* *Software Configuration [delivered internally]*	*Acceptance Records [signed]* *Delivery Instructions [signed by Customer]* *Software Configuration [accepted]*
BSM PJMs	BM.07.02 Conduct a lesson learned review of all projects and document them using the *Organisational Lesson Learned Record* template.	*Agreements [approved]* *Project Plans* *Meeting Records* *Project Lesson Learned Record* *Measurement Records* *Organizational Lesson Learned Record* template	*Organisational Lesson Learned Record [initiated]*
BSM PJMs	BM.07.03 Analyse lesson learned to identify improvements to processes and work products, and prioritize them using the *Process Improvement Record* template.	*Organisational Lesson Learned Record [initiated]* *Process Improvement Record template*	*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]*
BSM PJMs	BM.07.06 Identify *Reusable Components* from *Project Repositories* and store them in the *Organisational Repository.*	*Software Configuration* *Project Repositories*	*Organisational Repository [updated]* — Reusable Components
BSM PJMs	BM.07.07 Update *Organisational Repository.*	*Software Configuration [accepted]* *Project Repositories*	*Organisational Repository [updated]*

6.7.3 BM incorporation to the *Organisational Repository*

The list of work products to be saved in *Organisational Repository* is given in Table 13.

Table 13 — BM repository work products

Work product
Business Objectives
Project Opportunities
Proposal
Project Plan
Agreement
Acceptance Record
Security and Intellectual Property Protection Plan
Organisational Lesson Learned Record
Process Improvement Record
Meeting Record
Purchase Order
Reusable Components
Resource Request
Human Resource record

7 Project Management (PM) process

7.1 PM purpose

The purpose of the Project Management process is to establish and carry out in a systematic way the *Tasks* of the software implementation project, which allows complying with the project's *Objectives* in the expected quality, time and costs.

The PM process, of the Intermediate profile, has been complemented with additional objectives, tasks and work products in a context where a VSE is conducting more than one project with more than one work team. In addition, new tasks have been added, to the PM process of the Intermediate profile, to improve the management of projects.

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

— added text is underlined; and

— deleted/modified text is struck out as follows: ~~the text is struck out~~.

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

7.2 PM objectives

PM.O1. The *Project Plan* for the execution of the project is developed according to the *Agreement* and reviewed and accepted by the Customer. The *Tasks* and *Resources* necessary to complete the work are sized and estimated.

PM.O2. Progress of the project is monitored against the *Project Plan* and recorded in the *Progress Status Record.* Corrections to remediate problems and deviations from the plan are taken when project targets are not achieved. Closure of the project is performed to get the Customer acceptance documented in the *Acceptance Record*. The Software is disposed according to the Agreement.

PM.O3. The *Change Requests* are addressed through their reception and analysis. Changes to software requirements are evaluated for cost, schedule and technical impact.

PM.O4. Review meetings with the Work Team and the Customer are held. Reviews of work products of activities are conducted. Agreements are registered and tracked.

PM.O5. *Risks* are identified as they develop and during the progress of the project.

PM.O6. A software *Configuration Management Strategy* is developed. Items of *Software Configuration* are identified, defined and baselined. Modifications and releases of the items are controlled and made available to the Customer and Work Team. The status of the items and modifications are recorded and reported; The completeness and consistency of the items is ensured; The storage, handling and delivery of the items are controlled.

PM.O7. Software Quality Assurance is performed to provide assurance that work products and processes comply with the *Project Plan* and *Requirements Specification*. Lessons learned are captured.

7.3 PM input work products

Table 14 provides a list of the input work products.

Table 14 — PM input work products

Name	Source
Agreement	Customer
Software Configuration	Software Implementation
Change Request	Customer Software Implementation

7.4 PM output work products

Table 15 provides a list of the output work products.

Table 15 — PM output work products

Name	Destination
Project Plan	Software Implementation
Acceptance Record	Organisational Management
Measurement Record	Organisational Management
Project Repository	Software Implementation
Meeting Record	Customer
Software Configuration	Customer

7.5 PM internal work products

Table 16 provides a list of the internal work products.

Table 16 — PM internal work products

Name
Change Request
Correction Register
Meeting Record
Project Lesson Learned Record
Measurement Record

Table 16 *(continued)*

Name
Verification Results
Progress Status Record
Project Repository Backup

7.6 PM roles involved

Table 17 provides a list of the roles involved in the PM process.

Table 17 — PM roles involved

Role	Abbreviation
Customer	CUS
Project Manager	PJM
Technical Leader	TL
Work Team	WT

7.7 PM Process Description

7.7.1 PM Diagram

Figure 4 shows the flow of information between the Project Management Process activities including the most relevant work products and their relationship.

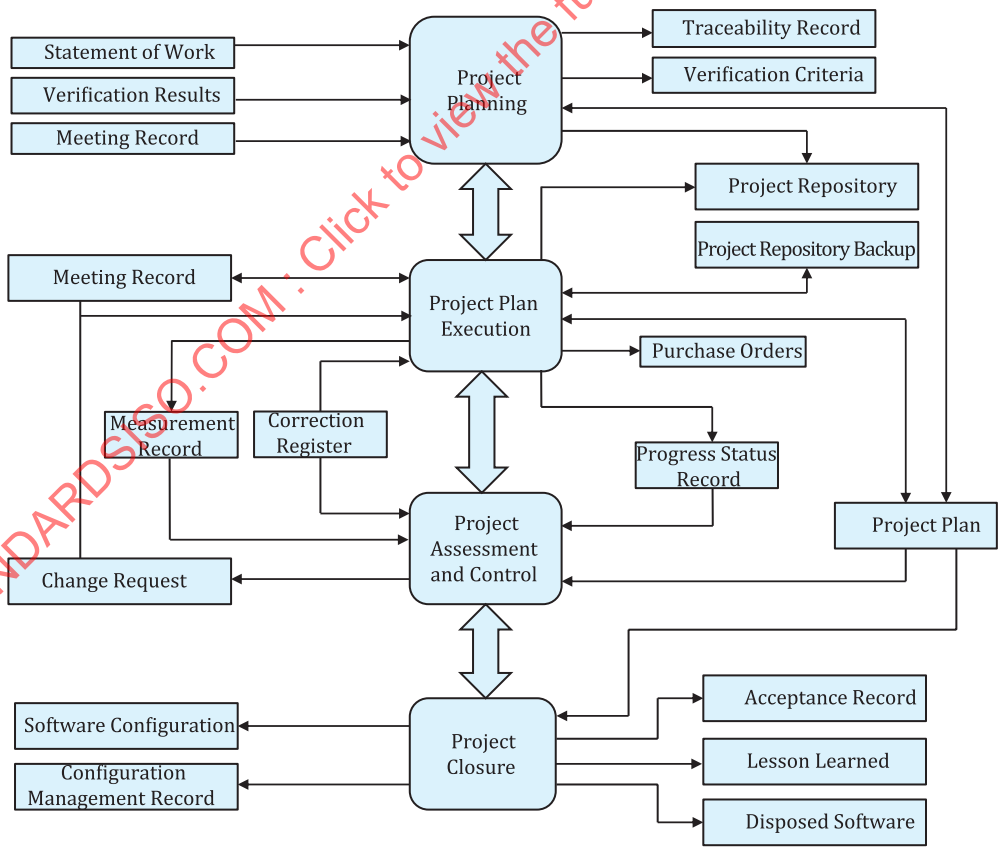

Figure 4 — Project Management process diagram

7.7.2 PM activities

The Project Management Process has the following activities:

— PM.01 Project Planning;

— PM.02 Project Plan Execution;

— PM.03 Project Assessment and Control; and

— PM.04 Project Closure.

7.7.2.1 PM.1 Project Planning, (PM.01, PM.05, PM.06, PM.07)

The Project Planning activity documents the planning details needed to manage the project. The activity provides:

— Reviewed *Agreement* and the *Tasks* needed to provide the ~~contract~~ Agreement *Deliverables* and to satisfy Customer requirements.

— Project lifecycle, including task dependencies and duration.

— Project quality assurance strategy through verification and validation of Work products/*Deliverables*, Customer and Work Team reviews.

— Work Team and Customer roles and responsibilities.

— Project *Resources* and training needs.

— Estimates of effort, cost and schedule.

— Identified project risks.

— Project version control and baseline strategy.

— *Project Repository* to store, handle and deliver controlled work product and document versions and baselines.

— The task list for PM.01 Project planning is given in Table 18.

Table 18 — PM.01 task list

Role	Task List	Input Work products	Output Work products
PJM TL	PM.01.01 Review the *Agreement.*	*Agreement*	*Agreement [reviewed]*
PJM CUS	PM.01.02 Define with the Customer the *Delivery Instructions* of each one of the *Deliverables, the standards and format* specified in the *Agreement.*	*Agreement [reviewed]*	*Project Plan* — *Delivery Instructions*
PJM CUS	PM.01.03 Define a *Software Disposal Approach* if required in the *Agreement.* (Conditional) NOTE If a software has to be disposed, it is done by using the Disposal Management process of these guidelines.	*Agreement [reviewed]*	*Project Plan* — *Software Disposal Approach*

Table 18 *(continued)*

Role	Task List	Input Work products	Output Work products
PJM CUS	PM.01.04 Define a *Software Transition Approach* if required in the *Agreement*. * (Conditional) NOTE If a software has to be installed, it is done by using the Software Disposal and Transition process of these guidelines.	*Agreement [reviewed]*	*Project Plan* *Software Transition Approach*
PJM TL	PM.01.05 Document the requirements of the *Agreement* in the *Traceability Record.*	*Agreement [reviewed]* *Traceability Record template*	*Traceability Record [initiated]*
PJM TL	PM.01.06 Identify the specific *Tasks* to be performed in order to produce the *Deliverables* and their *Software Components* identified in the *Agreement.* Include *Tasks* in the SI process along with verification, validation and reviews with Customer and Work Team *Tasks* to ensure the quality of work products. Determine the type of review and the effort required which will be conducted for each type of work products developed (e.g. desk-check, walk-through, inspection). Criteria for verification of all required software work products is identified. Identify the *Tasks* to perform the *Delivery Instructions.* Document the *Tasks.* Include task to perform a lesson learned review (i.e. post-mortem) at the end of the project.	*Agreement [reviewed]*	*Project Plan* — *Tasks* — *Verification criteria*
PJM TL	PM.01.07 Establish the *Estimated Duration* to perform each task.	*Project Plan* — *Tasks*	*Project Plan* — *Estimated Duration*
PJM TL	PM.01.08 Identify and document the *Resources*: human, material, equipment and tools, standards. Including the required training of the Work Team to perform the project. Include in the schedule the dates when *Resources* and training will be needed.	*Agreement*	*Project Plan* — *Resources*
PJM TL	PM.01.09 Establish the *Composition of Work Team* assigning roles and responsibilities according to the *Resources.*	*Project Plan* — *Resources*	*Project Plan* — *Composition of Work Team*
PJM TL	PM.01.10 Assign estimated start and completion dates to each one of the *Tasks.* In order to create the *Schedule of the Project Tasks* taking into account the assigned *Resources*, sequence and dependency of the *Tasks*.	*Project Plan* — *Tasks* — *Estimated Duration* — *Composition of Work Team*	*Project Plan* — *Schedule of the Project Tasks*
PJM	PM.01.11 Calculate and document the project *Estimated Effort and Cost.*	*Project Plan* — *Schedule of the Project Tasks* — *Resources*	*Project Plan* — *Estimated Effort and Cost*

Table 18 *(continued)*

Role	Task List	Input Work products	Output Work products
PJM TL	PM.01.12 Identify, analyse, prioritize, mitigate and document the risks which may affect the project and the security risks to the project specific information collected and stored (e.g. intellectual property).	*All elements previously defined*	*Project Plan* — *Identification of Project Risks*
PJM TL	PM.01.13 Define an appropriate set of measures The Goal-Question-Metric approach could be used to select a set of measures that would help a VSE to evaluate its progress towards defined goals (e.g. number defects, effort spent to detect/correct defects). The project measures should be stored in the Project Repository.	*Agreement*	*Project Plan* — *Identification of Project measures*
PJM TL	PM.01.14 Define and plan the collection and analysis of an appropriate set of project's measures.	*All elements previously defined*	*Project Plan* — *Identification of Project measures and the documentation of the collection and analysis procedure*
PJM TL	PM.01.15 Document the *Configuration Management Strategy* in the *Project Plan.*		*Project Plan* — *Configuration management Strategy*
PJM	PM.01.16 Generate the *Project Plan* integrating the elements previously identified and documented.	*All elements previously defined*	*Project Plan* — *Tasks* — *Estimated Duration* — *Resources* — *Composition of Work Team* — *Schedule of the Project Task* — *Estimated Effort and Cost* — *Identification of Project Risks* — *Version Control Strategy* — *Delivery Instructions*
PM TL	PM.01.17 Include Work Product Description, Scope, Objectives and Deliverables in the Project Plan	*Agreement* — *Work product Description* — *Scope* — *Objectives* — *Deliverables*	*Project Plan* — *Work product Description* — *Scope* — *Objectives* — *Deliverables*

Table 18 *(continued)*

Role	Task List	Input Work products	Output Work products
PJM TL	PM.01.18 Select an appropriate type of review for the set of Work Products selected to be reviewed (e.g. plan, specification, architecture, code) NOTE ISO/IEC 20246 could be used to help in the selection of the type of review.	*Project Plan* — *Work product Description* — *Scope* — *Objectives* — *Deliverables*	*Project Plan* — *Work product Description* — *Scope* — *Objectives* — *Deliverables* *Type of review selected for work products*
PM TL	PM.01.19 Verify and obtain approval of the *Project Plan.* Verify that all *Project Plan* elements are viable and consistent. The results found are documented in a *Verification Results* and corrections are made until the document is approved by PM.	*Project Plan*	*Verification Results* *Project Plan [verified]*
PM BSM	PM01.20 Develop the *Resource Request* and obtain approval of *Project Plan* from BSM.	*Project Plan [verified]* *Resource Request Template*	*Project Plan [approved]* *Resource Request [approved]*
PM CUS	PM.01.21 Review and accept the *Project Plan.* Customer reviews and accepts the *Project Plan*, making sure that the *Project Plan* elements match with the *Agreement.*	*Project Plan [verified]*	*Meeting Record* *Project Plan [accepted]*
PJM	PM.01.22 Update, if needed, the *Traceability Record.*	*Traceability Record [initiated]*	*Traceability Record [updated]*
PM TL	PM.01.23 Establish the *Project Repository* using the *Configuration Management Strategy*. The *Project Repository* should protect the security of information in order to mitigate the security risks identified.	*Configuration management Strategy*	*Project Repository*

7.7.2.2 PM.02 Project Plan Execution (PM.02, PM.03, PM.04, PM.05, PM.07)

The Project Plan Execution activity implements the documented plan on the project. The activity provides:

— *Progress Status Record* of the project updated.

— Analysed and evaluated change requests to the plan impacting cost, schedule and technical requirements.

— Approved changes to the plan.

— Reviews and agreements with the Work Team (WT) and Customer (CUS).

— Back up of the *Project Repository*, and its recovery if necessary.

The task list for PM.02 Project plan execution is given in Table 19.

Table 19 — PM.02 task list

Role	Task List	Input Work products	Output Work products
PJM TL WT	PM.02.01 Monitor the *Project Plan* execution and record actual data in *Progress Status Record.*	*Project Plan*	*Progress Status Record*
PJM TL WT	PM.02.02 Collect and analyse project's measures. Project's measures to be collected are: — resources — cost — effort — time (of the schedule) — risk — defect	*Project Plan* *Measurement collection and analysis procedure*	*Measurement Record*
PJM TL	PM.02.03 Analyse and evaluate the *Change Request* for cost, schedule and technical impact. The *Change Request* can be initiated externally by the Customer or internally by the Work Team. Update the *Project Plan*, if the accepted change does not affect agreements with Customer. *Change Request*, which affects those agreements, needs to be negotiated by both parties (see PM.2.4).	*Change Request [initiated]* *Project Plan* *Traceability Record*	*Change Request [evaluated]* *Project Plan [updated]* *Traceability Record [updated]*
PJM TL WT	PM.02.04 Conduct revision meetings with the Work Team, identify problems, review risk status, record agreements and track them to closure.	*Project Plan* *Progress Status Record* *Correction Register* *Meeting Record*	*Meeting Record [updated]*
PJM CUS TL WT	PM.02.05 Conduct revision meetings with the Customer, record agreements and track them to closure. *Change Request* initiated by Customer or initiated by Work Team, which affects the Customer, needs to be negotiated to reach acceptance of both parties. If necessary, update the *Project Plan* according to new agreement with Customer.	*Project Plan* *Progress Status Record* *Change Request [evaluated]* *Meeting Record*	*Meeting Record [updated]* *Change Request [accepted]* *Project Plan [updated]*
PJM	PM.02.06 Initiate and obtain approval of *Purchase Order(s)*. NOTE This task is executed only if a *Purchase Order* has to be initiated. All Purchase Orders are approved by the BSM during the execution of the BM.05 activity.	*Purchase Order template*	*Purchase Order(s) [initiated]*
PJM	PM.02.07 Perform backup according to the *Version Control Strategy.*	*Version Control Strategy*	*Project Repository Backup*
PJM	PM.02.08 Perform *Project Repository* recovery using the *Project Repository Backup*, if necessary.	*Project Repository Backup*	*Project Repository [recovered]*

7.7.2.3 PM.03 Project Assessment and Control (PM.O2)

The Project Assessment and Control activity evaluates the performance of the plan against documented commitments. The activity provides:

— Evaluation of actual plan performance and progress against targets.

— Identified and evaluated significant cost, schedule and technical performance deviations and problems.

— Review of project risks and identification of new risks.

— Documented change requests, appropriate corrective action defined, and changes tracked to closure.

The task list for PM.03 Project Assessment and Control is given in Table 20.

Table 20 — PM.03 task list

Role	Task List	Input Work products	Output Work products
PJM TL WT	PM.03.01 Evaluate project progress with respect to the *Project Plan*, 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	*Project Plan* *Progress Status Record* — *Project Measures*	*Progress Status Record [evaluated]*
PJM TL WT	PM.03.02 Establish actions to correct deviations or problems and identified risks concerning the accomplishment of the plan. As needed, document them in *Correction Register* and track them to closure.	*Progress Status Record [evaluated]*	*Correction Register*
PJM TL WT	PM.03.03 Identify changes to requirements and/or *Project Plan* to address major deviations, potential risks or problems concerning the accomplishment of the plan. Document them in *Change Request* and track them to closure.	*Progress Status Record [evaluated]* *Traceability Record [updated]*	*Change Request [initiated]* *Traceability Record [updated]*
TL WT	PM.03.04 Record and report the status of the items and modifications.	*Configuration management strategy*	*Configuration Management Record*

7.7.2.4 PM.04 Project Closure (PM.O2)

The Project Closure activity provides the project's documentation and work products in accordance with ~~contract~~ Agreement requirements. The activity provides:

— Delivery of the work product as specified in the *Delivery Instructions*.

— Support of Customer work product acceptance in accordance to *Delivery Instructions*.

— Completion of the project and sign of the *Acceptance Record.*

The task list for PM.04 Project Control is given in Table 21.

Table 21 — PM.04 task list

Role	Task List	Input Work products	Output Work products
PJM TL WT CUS	PM.04.01 Execute the *Software Disposal Approach* using the Software Transition and Disposal process of these Guidelines. ** (Conditional)*	*Project Plan* *Software Disposal Approach*	*Disposed Software*
PJM TL WT CUS	PM.04.02 Execute the *Software Transition Approach* using the Software Transition and Disposal process of these Guidelines. ** (Conditional)*	*Project Plan* *Software Transition Approach*	*Software [installed]*
PJM CUS	PM.04.03 Formalize the completion of the project according to the *Delivery Instructions* established in the *Project Plan.* Providing acceptance support and getting the *Acceptance Record* signed by the Customer.	*Project Plan* — *Delivery Instructions* *Traceability Record [updated]* *Acceptance Record [initiated]* *Software Configuration [delivered internally]*	*Acceptance Record [signed]* *Software Configuration [accepted]*
PJM TL WT	PM.04.04. Conduct a lesson learned review. Evaluate project accomplishments (e.g. estimates, resources, schedule, quality) with respect to the Project Plan.	*Project Plan* *Meeting Records* *Changes Requests*	*Project Lesson learned Record*
PJM	PM.04.05. Update *Project Repository.*	*Software Configuration [accepted]* *Project Repository*	*Project Repository [updated]*

7.7.3 PM incorporation to *Project Repository*

The list of work products to be saved in *Project Repository* is given in Table 22. After the incorporation, *Configuration Management Strategy* should be applied: *Project Plan.*

Table 22 — PM repository work products

Work product
Project Plan
Change Request
Acceptance Record
Meeting Record
Correction Register
Project Lesson Learned Record
Progress Status Record
Traceability Record
Verification Results

8 Software Implementation (SI) process

8.1 SI purpose

The purpose of the Software Implementation process is the systematic performance of the analysis, design, construction, integration and test activities for new or modified software work products according to the specified requirements.

The SI process, of the Advanced profile, has been complemented with additional objectives, tasks and work products in a context where a VSE wants to sustain and grow as an independent competitive software development business. In addition, new tasks have been added, to the SI process of the Intermediate profile, to improve the software implementation process.

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

— added text is underlined; and

— deleted/modified text is struck out as follows: ~~the text is struck out~~.

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

8.2 SI objectives

SI.01. *Tasks* of the activities are performed through the accomplishment of the current *Project Plan*.

SI.02. Software requirements are defined, analysed for correctness and testability, approved by the Customer, baselined and communicated.

SI.03. Software architectural and detailed design is developed and baselined. It describes the *Software Components* and internal and external interfaces of them. Consistency and traceability to software requirements are established.

SI.04. *Software Components* defined by the design are produced. Unit test are defined and performed to verify the consistency with requirements and the design. Traceability to the requirements and design are established.

SI.05. *Software* is produced performing integration of *Software Components* and verified using *Test Cases and Test Procedures*. Results are recorded at the *Test Report*. Defects are corrected and consistency and traceability to *Software Design* are established.

SI.06. A *Software Configuration*, that meets the *Requirements Specification* as agreed to with the Customer, which includes user, operation and maintenance documentations is integrated, baselined and stored at the *Project Repository*. Needs for changes to the *Software Configuration* are detected and related change requests are initiated.

SI.07. Verification and Validation *Tasks* of all required work products are performed using the defined criteria to achieve consistency among output and input work products in each activity. Defects are identified, and corrected; records are stored in the *Verification/Validation Results*.

8.3 SI input work products

Table 23 provides a list of the input work products.

Table 23 — SI input work products

Name	Source
Project Plan	Project Management
Project Repository	Project Management

8.4 SI output work products

Table 24 provides a list of the output work products.

Table 24 — SI output work products

Name	Destination
Software Configuration — *Requirements Specification* — *Software Design* — *Traceability Record* — *Software Components* — *Software* — *Test Cases and Test Procedures* — *Test Report* — *Product Operation Guide* — *Software User Documentation* — *Maintenance Documentation*	Project Management
Change Request	Project Management

8.5 SI internal work products

Table 25 provides a list of the internal work products.

Table 25 — SI internal work products

Name
Validation Results
Verification Results

8.6 SI roles involved

Table 26 provides a list of the roles involved in the SI process.

Table 26 — SI roles involved

Role	Abbreviation
Customer	CUS
Analyst	AN
Designer	DES
Programmer	PR
Project Manager	PJM
Technical Leader	TL
Work Team	WT

8.7 SI Process description

8.7.1 SI diagram

Figure 5 shows the flow of information between the Software Implementation Process activities including the most relevant work products and their relationship.

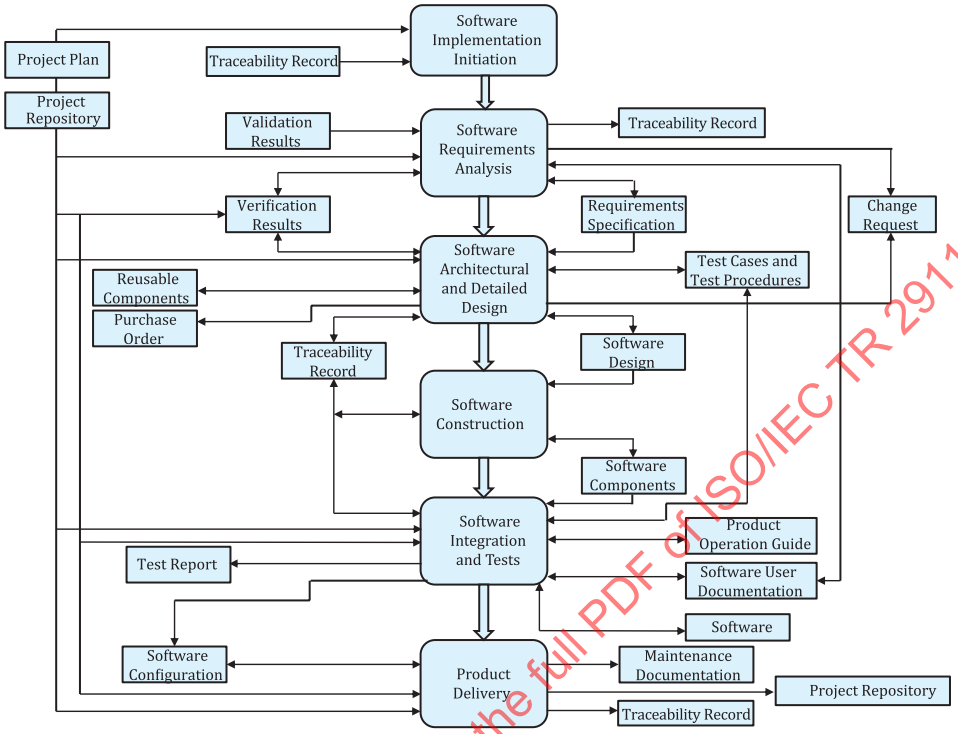

Figure 5 — Software Implementation process diagram

8.7.2 SI activities

The Software Implementation Process has the following activities:

— SI.01 Software Implementation Initiation

— SI.02 Software Requirements Analysis

— SI.03 Software Architectural and Detailed Design

— SI.04 Software Construction

— SI.05 Software Integration and Test

— SI.06 Product Delivery

8.7.2.1 SI.01 Software Implementation Initiation (SI.01)

The Software Implementation Initiation activity ensures that the *Project Plan* established in Project Planning activity is committed to by the Work Team. The activity provides:

— Review of the *Project Plan* by the Work Team to determine task assignment.

— Commitment to *Project Plan* by the Work Team and Project Manager.

— An implementation environment established.

The task list for SI.01 Software Implementation Initiation is given in Table 27.

Table 27 — SI.01 task list

Role	Task List	Input Work products	Output Work products
PJM TL WT	SI.01.01 Revision of the current *Project Plan* with the Work Team members. In order to achieve a common understanding and get their engagement with the project.	*Project Plan* *Traceability Record [updated]*	*Project Plan [reviewed]* *Traceability Record [updated]*
TL WT	SI.01.02 Set or update the implementation environment. The security of information should be ensured.	*Project Plan [reviewed]*	*Implementation Environment*
TL WT	SI.01.03 Collect project's measures and store them in the *Project Repository.*	*Project Plan*	*Measurement Record* *Project Repository [Updated]*

8.7.2.2 SI.02 Software Requirements Analysis (SI.02, SI.06, SI.07)

The Software Requirements Analysis activity analyses the agreed Customer's requirements and establishes the validated project requirements. The activity provides:

— Work Team review of the *Project Plan* to determine task assignment.

— Elicitation, analysis and specification of Customer's requirements.

— Agreement on the Customer requirements.

— Verification and validation of requirements.

— Version control of the software requirements work products.

The task list for SI.02 Software Requirements Analysis is given in Table 28.

Table 28 — SI.02 task list

Role	Task List	Input Work products	Output Work products
TL WT	SI.02.01 Assign *Tasks* to the Work Team members in accordance with their role, based on the current *Project Plan.*	*Project Plan [reviewed]* — *Tasks*	*Tasks of Project Plan [assigned]*
AN CUS	SI.02.02 Document or update the *Requirements Specification.* Identify and consult information sources (Customer, users, previous systems, documents, etc.) in order to get new requirements. Identify and quantify the required quality characteristics. Analyse the identified requirements to determinate the *Scope* and feasibility Generate or update the *Requirements Specification.*	*Project Plan* — *Work product Description* *Traceability Record [updated]*	*Requirements Specification* *Traceability Record [updated]*
AN TL	SI.02.03 Verify against defined criteria and obtain approval of the *Requirements Specification.* Verify the correctness and testability of the *Requirements Specification* and its consistency with the *Product Description*. Additionally, review that requirements (e.g. walk-through, inspection) are complete, unambiguous and not contradictory. The results found are documented in a *Verification Results* and corrections are made until the document is approved by AN. If significant changes were needed, initiate a *Change Request.*	*Requirements Specification* *Project Plan* — *Product Description* — *Verification criteria* *Traceability Record [updated]*	*Verification Results* *Requirements Specification [verified]* *Change Request [initiated]* *Traceability Record [updated]*
CUS AN	SI.02.04 Validate and obtain approval of the *Requirements Specification.* Validate that *Requirements Specification* satisfies needs and agreed upon expectations, including the user interface usability. The results found are documented in a *Validation Results* and corrections are made until the document is approved by the CUS.	*Requirements Specification [verified]* *Traceability Record [updated]*	*Validation Results* *Requirements Specification [validated]*
AN	SI.02.05 Document the preliminary version of the **Software User Documentation* or update the present manual, if appropriate. *(Optional)	*Requirements Specification [validated]*	**Software User Documentation [preliminary]*

Table 28 *(continued)*

Role	Task List	Input Work products	Output Work products
AN TL	SI.02.06 Verify and obtain approval of the **Software User Documentation*, if appropriate. Verify consistency of the **Software User Documentation* with the *Requirements Specification*. The results found are documented in a *Verification Results* and corrections are made until the document is approved by AN. If significant changes were needed, initiate a *Change Request.* *(Optional)	**Software User Documentation [preliminary]* *Requirements Specification*	*Verification Results* **Software User Documentation [preliminary, verified]* *Change Request [initiated]*
TL	SI.02.07 Incorporate the *Requirements Specification,* and **Software User Documentation* to the *Software Configuration* in the baseline. *(Optional)	*Requirements Specification [validated]* *Traceability Record [updated]* **Software User Documentation [preliminary, verified]*	*Software Configuration* — *Requirements Specification [validated, baselined]* — **Software User Documentation [preliminary, verified, baselined]*
TL WT	SI.02.08 Collect project's measures and store them in the *Project Repository*.	*Project Plan*	*Measurement Record* *Project Repository [Updated]*

8.7.2.3 SI.03 Software Architectural and Detailed Design (SI.03, SI.06, SI.07)

The Software Architectural and Detailed Design activity transforms the software requirements to the system software architecture and software detailed design. The activity provides:

— Work Team review of the *Project Plan* to determine task assignment.

— Design software architecture, *Software Components* and associated interfaces.

— Detailed design of the *Software Components* and interfaces.

— Work Team review of the Requirements Specification.

— *Software Design* verified, and defects corrected.

— Verified *Test Cases and Test Procedures* for integration testing.

— Traceability of the software requirements to the *Software Design*, *Test Cases and Test Procedures*.

— Design work products and documents under version control.

NOTE Software Architecture and Detailed Design can be performed separately according to the project schedule.

The task list for SI.03 Software Architectural and Detailed Design is given in Table 29.

Table 29 — SI.03 task list

Role	Task List	Input Work products	Output Work products
TL AN DES	SI.03.01 Assign *Tasks* to the Work Team members related to their role according to the current *Project Plan.*	*Project Plan* — *Tasks*	*Tasks of Project Plan [assigned]*
AN DES	SI.03.02 Review the *Requirements Specification* for understandability. Identify the artefacts to reuse. Decide whether to develop, buy or reuse. * (conditional) Elaborate the Purchase Order (PO) using the PO template for the artefact to be purchased. NOTE All *Purchase Order* are reviewed by the PM during the PM.02 activity and approved by the BSM during the execution of BM.05 activity.	*Requirements Specification [validated, baselined]* *Traceability Record [updated]* *Purchase Order template* *Organisational Repository* — Reusable Components	*Verification Results* * *Purchase Order(s) [initiated]*
AN DES	SI.03.03 Document or update the *Software Design.* Analyse the *Requirements Specification* to generate the architectural design, its arrangement in subsystems and *Software Components* defining the internal and external interfaces. Describe in detail, the appearance and the behaviour of the interface, based on the *Requirements Specification* in a way that *Resources* for its implementation can be foreseen. Provide the detail of *Software Components* and their interfaces to allow the construction in an evident way. Identify the artefacts to reuse. Decide whether to develop, buy or reuse. * (Optional) Document the details of the Purchase Order (PO) for the artefact to be purchased. Generate or update the *Traceability Record.*	*Requirements Specification [validated, baselined]* *Traceability Record* *Organisational Repository* — Reusable Components	*Software Design* *Traceability Record* *Traceability Record [updated]* **Purchase order [initiated]*
AN DES	SI.03.04 Verify against defined criteria and obtain approval of the *Software Design.* Verify correctness of *Software Design* documentation, its feasibility, reusability and consistency with their *Requirement Specification*. Verify that the *Traceability Record* contains the adequate relationships between requirements and the *Software Design* elements. The results found are documented in a *Verification Results* and corrections are made until DES approves the document. If significant changes were needed, initiate a *Change Request*.	*Software Design* *Project Plan* — *Verification criteria* *Traceability Record* *Requirements Specification [validated, baselined]*	*Verification Results* *Software Design [verified]* *Traceability Record [verified]* *Change Request [initiated].*
DES	SI.03.05 Establish or update *Test Cases and Test Procedures* for integration testing based on *Requirements Specification* and *Software Design.* Customer provides testing data, if needed.	*Requirements Specification [validated, baselined]* *Software Design [verified, baselined]*	*Test Cases and Test Procedures*
TL DES	SI.03.06 Define an integration approach.	*Software Design*	*Integration Approach*

Table 29 *(continued)*

Role	Task List	Input Work products	Output Work products
DES AN	SI.03.07 Verify and obtain approval of the *Test Cases and Test Procedures.* Verify consistency among *Requirements Specification*, *Software Design* and *Test Cases and Test Procedures*. The results found are documented in a *Verification Results* and corrections are made until the document is approved by AN.	*Test Cases and Test Procedures* *Requirements Specification [validated, baselined]* *Software Design [verified, baselined]*	*Verification Results* *Test Cases and Test Procedures [verified]*
DES	SI.03.08 Update the *Traceability Record* incorporating the *Test Cases and Test Procedures.*	*Test Cases and Test Procedures [verified]* *Traceability Record [updated]*	*Traceability Record [updated]*
TL	SI.03.09 Incorporate the *Software Design, and Traceability Record* to the *Software Configuration* as part of the baseline. Incorporate the *Test Cases, and Test Procedures* to the *Project Repository.*	*Software Design [verified]* *Test Cases and Test Procedures [verified]* *Traceability Record [verified]*	*Software Configuration* — *Software Design [verified, baselined]* — *Test Cases and Test Procedures [verified]* — *Traceability Record [verified, baselined]*
TL WT	SI.03.10 Collect Project's measures and store them in the *Project Repository*.	*Project Plan*	*Measurement Record* *Project Repository [Updated]*

8.7.2.4 SI.04 Software Construction (SI.04, SI.06, SI.07)

The Software Construction activity develops the software code and data from the *Software Design*. The activity provides:

— Work Team review of the *Project Plan* to determine task assignment.

— Work Team review of the *Software Design* to determine software construction sequence.

— Coded *Software Components* and applied unit tests.

— Traceability between Software Components and Software Design.

The task list for SI.04 Software Construction is given in Table 30.

Table 30 — SI.04 task list

Role	Task List	Input Work products	Output Work products
TL PR	SI.04.01 Assign *Tasks* to the Work Team members related to their role, according to the current *Project Plan.*	*Project Plan* — *Tasks*	*Tasks of Project Plan [assigned]*
PR	SI.04.02 Review the *Software Design* for understandability.	*Software Design [verified, baselined]*	*Verification Results*
PR	SI.04.03 Construct or update *Software Components* based on the detailed part of the *Software Design*.	*Software Design [verified, baselined],* *Traceability Record [verified, baselined]*	*Software Components* *Traceability Record [updated]*

Table 30 *(continued)*

Role	Task List	Input Work products	Output Work products
PR	SI.04.04 Design or update unit test cases and apply them to verify that the *Software Components* implements the detailed part of the *Software Design*.	*Software Components*	*Software Components [unit tested]*
PR	SI.04.05 Correct the defects found, using the verification criteria, until successful unit test (reaching exit criteria) is achieved.	*Software Components [unit tested]* *Project Plan* — *Verification criteria*	*Software Components [corrected]*
PR	SI.04.06 Update the *Traceability Record* incorporating *Software Components* constructed or modified.	*Software Components [corrected]* *Traceability Record [verified, baselined].*	*Traceability Record [updated]*
TL	SI.04.07 Incorporate *Software Components* and *Traceability Record* to the *Software Configuration* as part of the baseline.	*Software Components [corrected]* *Traceability Record [updated]*	*Software Configuration* — *Software Components [corrected, baselined]* — *Traceability Record [updated baselined]*
TL WT	SI.04.08 Collect project's measures and store them in the *Project Repository*.	*Project Plan*	*Measurement Record* *Project Repository [Updated]*

8.7.2.5 SI.05 Software Integration and Test (SI.05, SI.06, SI.07)

The Software Integration and Test activity ensures that the integrated *Software Components* satisfy the software requirements. The activity provides:

— Work Team review of the *Project Plan* to determine task assignment.

— Understanding of *Test Cases and Procedures* and the integration environment.

— Integrated *Software Components*, corrected defects and documented results.

— Traceability of requirements and design to the integrated software product.

— Documented and verified operational and software user documentations.

— Verified *Software* baseline.

The task list for SI.05 Software Integration and Test is given in Table 31.

Table 31 — SI.05 task list

Role	Task List	Input Work products	Output Work products
TL PR	SI.05.01 Assign *Tasks* to the work team members related to their role, according to the current *Project Plan.*	*Project Plan* — *Tasks*	*Tasks of Project Plan [assigned]*
TL	SI.05.02 Define acceptance criteria	*Project Plan*	*Acceptance criteria*
PR	SI.05.03 Review the *Test Cases and Test Procedures* for understandability. Set or update the testing environment.	*Test Cases and Test Procedures [verified]*	*Verification Results*

Table 31 *(continued)*

Role	Task List	Input Work products	Output Work products
PR	SI.05.04 Integrate, using the Integration Approach, the *Software* using *Software Components* and updates *Test Cases and Test Procedures* for integration testing, as needed.	*Integration Approach* *Software Components [corrected, baselined]* *Test Cases and Test Procedures [verified]* *Traceability Record [updated, baselined]*	*Software* *Test Cases and Test Procedures*
PR CUS	SI.05.05 Perform *Software* tests using *Test Cases and Test Procedures* for integration and document results in *Test Report*.	*Software* *Test Cases and Test Procedures*	*Software [tested]* *Test Report*
PR	SI.05.06 Correct the defects found, using the verification criteria, and perform regression test until exit criteria is achieved.	*Software [tested]* *Project Plan* — *Verification criteria* *Test Report* *Test Cases and Test Procedures* *Traceability Record [updated, baselined]*	*Software [corrected]* *Test Report [defects eliminated]*
PR	SI.05.07 Updates the *Traceability Record,* if appropriate.	*Software [corrected]* *Traceability Record [updated, baselined]*	*Traceability Record [updated]*
PR	SI.05.08 Document the **Product Operation Guide* or update the current guide, if appropriate. *(Optional)	*Software [tested]*	**Product Operation Guide*
PR DES	SI.05.09 Verify, using the verification criteria, and obtain approval of the **Product Operation Guide*, if appropriate (see SI.5.7). Verify consistency of the *Product Operation Guide* with the *Software*. The results found are documented in a *Verification Results* and corrections are made until the document is approved by DES. *(Optional)	**Product Operation Guide* *Software [tested]*	*Verification Results* **Product Operation Guide [verified]*
AN	SI.05.10 Document the **Software User Documentation* or update the current one, if appropriate. *(Optional)	*Software [tested]* **Software User Documentation [preliminary]*	**Software User Documentation*

Table 31 *(continued)*

Role	Task List	Input Work products	Output Work products
AN CUS	SI.05.11 Verify, using the verification criteria, and obtain approval of the **Software User Documentation*, if appropriate (see SI.5.9). Verify consistency of the *Software User Documentation* with the *Software*. The results found are documented in a *Verification Results* and corrections are made until the document is approved by CUS. *(Optional)	**Software User Documentation* *Software [tested]*	*Verification Results* **Software User Documentation [verified]*
TL	SI.05.12 Incorporate the *Test Cases and Test Procedures, Software, Traceability Record, Test Report, *Product Operation Guide and *Software User Documentation* to the *Software Configuration* as part of the baseline. *(Optional)	*Test Cases and Test Procedures* *Software [tested]* *Test Report* *Traceability Record [updated]* **Product Operation Guide [verified]* **Software User Documentation [verified]*	*Software Configuration* — *Test Cases and Test Procedures [baselined]* — *Software [tested, baselined]* — *Traceability Record [updated, baselined]* — *Test Report [baselined]* — **Product Operation Guide [verified, baselined]* — **Software User Documentation [verified, baselined]*
TL WT	SI.05.13 Collect project's measures and store them in the *Project Repository*.	*Project Plan*	*Measurement Record* *Project Repository [Updated]*

8.7.2.6 SI.06 Product Delivery (SI.06, SI.07)

The Product Delivery activity provides the integrated software Product to the Customer. The activity provides:

— Work Team review of the *Project Plan* to determine task assignment.

— Verified Maintenance Documentation.

— Delivery of the software Product and applicable documentation in accordance with the *Delivery Instructions*.

The task list for SI.06 Product Delivery is given in Table 32.

Table 32 — SI.06 task list

Role	Task List	Input Work products	Output Work products
TL WT	SI.06.01 Assign tasks to the work team members related to their role, according to the current *Project Plan.*	*Project Plan* — *Tasks*	*Tasks of Project Plan [assigned]*
DES	SI.06.02 Review the *Software Configuration* for understandability.	*Software Configuration*	*Verification Results*
DES	SI.06.03 Document the *Maintenance Documentation* or update the current one.	*Software Configuration*	*Maintenance Documentation*

Table 32 *(continued)*

Role	Task List	Input Work products	Output Work products
DES TL	SI.06.04 Verify, using the verification criteria, and obtain approval of the *Maintenance Documentation.* Verify consistency of *Maintenance Documentation* with *Software Configuration*. The results found are documented in a *Verification Results* and corrections are made until the document is approved by TL.	*Maintenance Documentation* *Software Configuration*	*Verification Results* *Maintenance Documentation [verified]*
TL	SI.06.05 Incorporate the *Maintenance Documentation* as baseline for the *Software Configuration.*	*Software Configuration* *Maintenance Documentation [verified]*	*Software Configuration* *— Maintenance Documentation [verified, baselined]*
TL	SI.06.06 Update the *Traceability Record.*	*Traceability Record*	*Traceability Record [updated]*
TL WT	SI.06.07 Verify the completeness and consistency of software configuration.	*Software Configuration* *Configuration Management Strategy [approved]*	*Software Configuration [Status]*
TL PJM	SI.06.08 Perform delivery to PJM according to *Delivery Instructions.*	*Project Plan* *— Delivery Instructions* *Software Configuration*	*Software Configuration [delivered internally]*
TL WT	SI.06.09 Collect project's measures and store them in the *Project Repository*.	*Project Plan*	*Measurement Record* *Project Repository [Updated]*

8.7.3 SI incorporation to the *Project Repository*

The list of work products to be saved in *Project Repository* is given in Table 33. After the incorporation, *Version Control Strategy* should be applied to: *Requirements Specification, Software Design, Traceability Record, Test Cases and Test Procedures, Software Components, Software, Work product Operation Guide, Software User Documentation, Maintenance Documentation and Measurement Record*.

Table 33 — SI repository work products

Work product
Requirements Specification
Software User Documentation
Software Design
Traceability Record
Test Cases and Test Procedures
Software Components
Software
Product Operation Guide
Maintenance Documentation
Measurement Record
Test Report

Table 33 *(continued)*

Work product
Traceability Record
Verification Results
Validation Results

9 Acquisition Management process (AM)

9.1 AM purpose

The purpose of the Acquisition Management (AM) process is to obtain a product or a service required by the VSE.

This process, a conditional process, should be executed if a VSE requires work products or services from an external supplier. If this is the case, this process is included in the scope of an audit or an assessment.

9.2 AM objective

AM.O1. Obtain the work product and/or service that satisfies the needs expressed by the VSE.

9.3 AM input work products

Table 34 provides a list of the input work products.

Table 34 — AM input work products

Name	Source
Purchase Order	Business Management
Statement of Work	Business Management or Project Management

9.4 AM output work products

Table 35 provides a list of the output work products.

Table 35 — AM output work products

Name	Destination
Supplier Agreement	Supplier Business Management
Delivery Instructions	Supplier Project Management
Acceptance Record	Project Management
Meeting Record (with supplier)	Project Management Business Management

9.5 AM internal work products

Table 36 provides a list of the internal work products.

Table 36 — AM internal work products

Name
List of potential Suppliers
Meeting Record

9.6 AM roles involved

Table 37 provides a list of the roles involved in the AM process.

Table 37 — AM roles involved

Role	Abbreviation
Business Management	BSM
Project Manager	PJM
Supplier	SUP

9.7 AM Process description

9.7.1 AM Diagram

The following diagram shows the flow of information between the Acquisition Management process activities including the most relevant work products and their relationship.

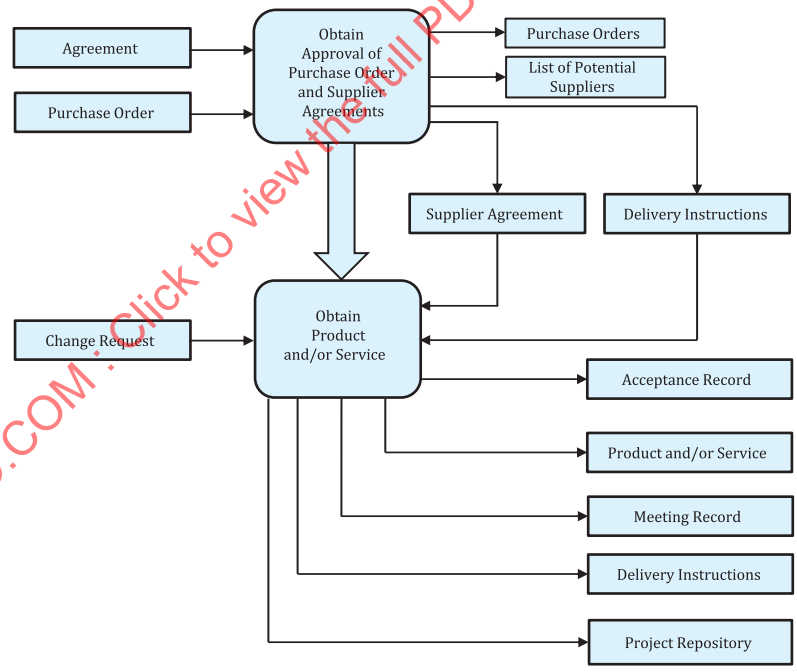

Figure 6 — Acquisition Management process

9.7.2 AM activities

The Acquisition Process has the following activities:

— AM.01 Obtain approval of Purchase Order(s) and Supplier Agreement;

— AM.02 Obtain Product(s) and/or Service(s).

9.7.2.1 AM.01 Obtain approval of Purchase Order(s) and Supplier Agreement (AM.O1)

The Obtain approval of Purchase Order(s) and Supplier Agreement activity ensures that the products and/or services that satisfy the need expressed by the VSE are obtained.

The activity provides:

— Approved Purchase Order(s);

— Approved Supplier Agreement.

The task list for AM.01 Obtain approval of *Purchase Order(s)* and *Supplier Agreement* is given in Table 38.

Table 38 — AM.01 task list

Role	Task List	Input Work products	Output Work products
PJM	AM.01.01 Obtain approval of *Purchase Order(s)* from BSM. NOTE A *Purchase Order* is approved in BM during the BM.05 activity.	*Agreement* *Purchase Order(s) [initiated]*	*Purchase Order(s) [approved]*
PJM	AM.01.02 Develop, using the approved *Purchase Order(s)*, the *Supplier Agreement* and the *Delivery Instructions.* NOTE A *Purchase Order* may describe a product or a service.	*Purchase Order(s) [approved]*	*Supplier Agreement [initiated]* *Delivery Instructions [initiated]*
PJM BSM	AM.01.03 Obtain approval from BSM of the *Supplier Agreement* and the *Delivery Instructions.*	*Supplier Agreement [initiated]* *Delivery Instructions [initiated]*	*Supplier Agreement [approved]* *Delivery Instructions [approved]*
PJM BSM	AM.01.04 Identify and select *Supplier(s)* and document/update potential suppliers on the *List of potential Suppliers.*	*List of potential Suppliers*	*Selected Supplier(s)* *List of potential Suppliers [updated]*
PJM BSM SUP	AM.01.05 Obtain signature of the *Supplier Agreement* and the *Delivery Instructions* from the Supplier.	*Supplier(s) Agreement [approved]* *Delivery Instructions [approved]*	*Supplier(s) Agreement [signed by BSM and Supplier]* *Delivery Instructions [signed by BSM and Supplier(s)]*

9.7.2.2 AM.02 Obtain Products and/or Services (AM.O1)

The Obtain Product(s) and/or Service(s) activity ensures that the products and/or services that satisfy the need expressed in the *Supplier(s) Agreement* is obtained. The activity provides:

— Products and/or Services required by the *Supplier Agreement*;

— Acceptance Record;

— Delivery Instructions.

The task list for AM.02 Obtain Products and/or Services is given in Table 39.

Table 39 — AM.02 task list

Role	Task List	Input Work products	Output Work products
PJM SUP	AM.02.01 Monitor the *Supplier Agreement(s)* such that specified constraints such as cost, schedule and quality are met. If needed, document a change to the *Supplier Agreement(s)* in a *Change Request*. Document any issue in *Meeting Record* and obtain signature of *Supplier(s).*	*Supplier Agreement(s) [signed by VSE and Supplier]* *Delivery Instructions*	*Meeting Record [signed by PJM and supplier(s)]* *Change Request*
PJM BSM SUP	AM.02.02 Accept Supplier deliverable(s) specified in the *Supplier Agreement(s)* and *Delivery Instructions*, describe open items in *Meeting Records* and obtain signature of supplier of the *Acceptance Record.* NOTE If the product/service does not meet the acceptance criteria. PJM produces *Meeting Record* to document the issue(s).	*Supplier Agreement(s) [signed by BSM and Supplier]* *Delivery Instructions [approved]* *Meeting Record [signed by PJM and Supplier(s)]*	*Acceptance Record [signed by PJM and Supplier(s)]* *Meeting Record [signed by PJM and Supplier(s)]* *Product/Service [accepted] or [pending acceptance]*
BSM PJM SUP	AM.02.03 Track open item(s) in a satisfactory conclusion to the VSE and to the Supplier(s) and obtain signature of Supplier(s) of the *Acceptance Record and update the List of potential Suppliers.*	*Supplier Agreement(s)* *Delivery Instructions [approved]* *Product/Service [pending acceptance]* *Meeting Record [signed by VSE and Supplier(s)]* *Acceptance Record [signed by PJM and Supplier(s)]* *List of potential Suppliers [initiated]*	*Product/Service [accepted]* *Acceptance Record [signed by PJM and Supplier(s)]* *List of potential Suppliers [updated]*
BSM PJM	AM.02.04 Collect documents and store in the *Project Repository*.	*Software Disposal Plan* *Acceptance Record*	*Project Repository [Updated]*

9.7.3 AM incorporation to the *Project Repository*

The list of work products to be saved in *Project Repository* is given in Table 40.

Table 40 — AM repository work products

Work product
Purchase Order
Supplier Agreement
Delivery Instructions
Acceptance Record
Meeting Record
Product/Service (from Supplier)

10 Software Transition and Disposal process (STD)

10.1 STD purpose

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 disposal of software encompasses the termination of services and disposal of software elements, stored data, media and firmware, information items, and associated hardware elements that will not be reused or transitioned to another system.

The STD process, a conditional process, should be executed if a VSE is required, in the Agreement. If this is the case, the STD process is included in the scope of an audit or an assessment.

10.2 STD objectives

STD.O1. Plan the installation of the software minimizing security risks, disruption, and downtime.

STD.O2. Install and test the software in the target environment.

STD.O3. Plan the disposal of the software minimizing security risks and disruption.

STD.O4. Remove software from its operational environment.

10.3 STD input work products

Table 41 provides a list of the input work products.

Table 41 — STD input work products

Name	Source
Delivery Instructions	PM
Agreement	PM

10.4 STD output work products

Table 42 provides a list of the output work products.

Table 42 — STD output work products

Name	Destination
Software Installation Plan	Software Transition and Disposal
Installed and tested software	Software Transition and Disposal
Software Disposal Plan	Software Transition and Disposal
Disposed Software	Software Transition and Disposal
Acceptance Record	Business Management

10.5 STD internal work products

Table 43 provides a list of the internal work products.

Table 43 — STD internal work products

Name
Installation Plan Template
Software Disposal Plan Template

10.6 STD roles involved

Table 44 provides a list of the roles involved in the STD process.

Table 44 — STD roles involved

Role	Abbreviation
Project Manager	PJM
Customer	CUS
Team Leader	TL
Work Team	WT

10.7 STD process description

10.7.1 STD Diagram

Figure 7 shows the flow of information between the Software Transition and Disposal process activities including the most relevant work products and their relationship.

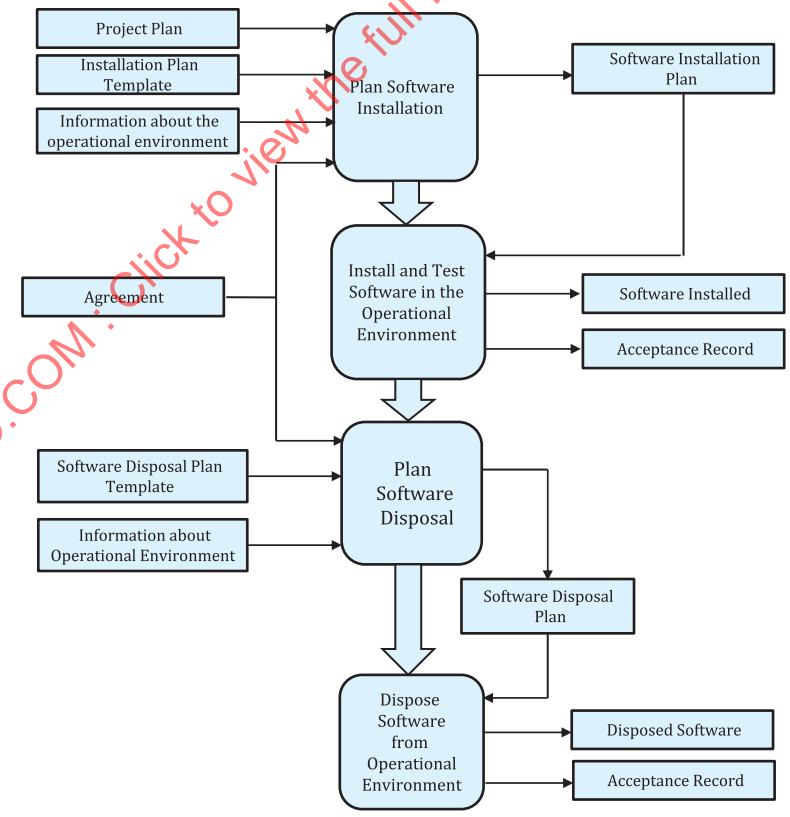

Figure 7 — Software Transition and Disposal process diagram

10.7.2 STD activities

The Software Transition and Disposal process has the following activities:

— STD.01 Plan software installation

— STD.02 Install and test the software in the operational environment

— STD.03 Plan software disposal

— STD.04 Dispose the *Software* from operational environment

10.7.2.1 STD.01 Plan software installation (STD.O1)

The Software *Installation Plan* ensures that the VSE has developed and obtained approval from the Customer of a *Software Installation Plan*. The activity provides:

— Approved Software Installation Plan.

The task list for STD.01 Plan software installation is given in Table 45.

Table 45 — STD.01 task list

Role	Task List	Input Work Products	Output Work Products
PJM CUS TL	STD.01.01 Obtain from Customer information required to install the *Software* in the selected operational environment.	*Agreement* *Project Plan* *Delivery Instructions* *Installation Plan Template* *Information about the* operational *environment*	*Software Installation Plan* *Description of the* operational *environment*
PJM TL	STD.01.02 Document the *Software Installation Plan using the Delivery Instructions approved by the Customer.* Tasks, schedule, composition of WT, resources and installation and information security risks are documented in the *Installation Plan*	*Software Installation Plan* *Description of the* operational *environment* *Agreement* *Delivery Instructions*	*Software Installation Plan [Initiated]* *Description of the* operational *environment* *Tasks* *Composition of WT* *Estimated effort* *Estimated cost* *Schedule* *Resources* *Risks*
PJM CUS	STD.01.03 Review the *Software Installation Plan* with Customer.	*Software Installation Plan [Initiated]*	*Software Installation Plan [Reviewed]*
PJM CUS	STD.01.04 Obtain approval of the *Software Installation Plan* from Customer.	*Software Installation Plan [Reviewed]*	*Software Installation Plan [Approved]*

10.7.2.2 STD.02 Install and test software in the operational environment (STD.O2)

The software is installed and tested in the operational environment of the Customer and, the Customer has approved the installation. The activity provides:

— Software installed in the operational environment;

— Software tested in the operational environment; and

— *Acceptance Record* signed by Customer.

The task list for STD.02 Install and test the software in the operational environment is given in Table 46.

Table 46 — STD.02 task list

Role	Task List	Input Work products	Output Work products
PJM TL WT	STD.02.01 Install *Software* in the operational environment of the Customer.	*Software Installation Plan [Approved]*	*Software Installed [Initiated]*
TL WT	STD.02.02 Test the *Software* in the operational environment of the Customer.	*Software Installed [Initiated]*	*Software Installed [Tested]*
PJM CUS	STD.02.03 Obtain approval of installation of *Software* from Customer.	*Software Installed [Tested]*	*Acceptance Record [Approved]*
PJM TL	STD.02.04 Collect documents and store in the *Project Repository*.	*Software Disposal Plan* *Acceptance Record*	*Project Repository [Updated]*

10.7.2.3 Plan Software Disposal (STD.03)

The *Software Disposal Plan* activity ensures that the VSE has developed and obtained approval from the Customer of a *Software Disposal Plan (or Retirement Plan)*. The activity provides:

— Software Disposal Plan.

The task list for STD.03 Plan software disposal is given in Table 47.

Table 47 — STD.03 task list

Role	Task List	Input Work Products	Output Work Products
PJM TL CUS	STD.03.01 Obtain from Customer information about the operational environment of the *Software* to be disposed.	*Agreement* *Software Disposal Plan Template* *Information about the* operational *environment of the Customer*	*Software Disposal Plan* — Description of the operational environment of the Customer
PJM TL CUS	STD.03.02 Document with Customer constraints on disposal of the *Software*.	*Software Disposal Plan* — *Description of the* operational *environment of the Customer* — Disposal constraints	*Software Disposal Plan* — *Description of the* operational *environment of the Customer* — Disposal constraints
PJM TL	STD.03.03 Document the *Software Disposal Plan.* Tasks, schedule, composition of WT, resources and installation and information security risks are documented in the Software *Disposal Plan.*	*Software Disposal Plan* — *Description of the* operational *environment of the Customer* — *Disposal constraints* *Agreement*	*Software Disposal Plan [Initiated]* — *Description of the* operational *environment of the Customer* — *Disposal constraints* *Tasks* — *Composition of WT* — *Estimated effort* — *Estimated cost* — *Schedule* — *Resources* — Risks
PJM CUS	STD.03.04 Obtain approval to access the Customer operational environment.	*Software Disposal Plan* — *Description of the* operational *environment of the Customer* — *Disposal constraints* *Tasks* — *Composition of WT* — *Estimated effort* — *Estimated cost* — *Schedule* — *Resources* — Risks	*Software Disposal Plan* — *Description of the* operational *environment of the Customer* — *Disposal constraints* *Tasks* — *Composition of WT* — *Estimated effort* — *Estimated cost* — *Schedule* — *Resources* — *Risks* — Access to operational environment of the Customer granted
PJM TL	STD.03.05 Review the *Disposal Plan* with Customer.	*Software Disposal Plan [Initiated]*	*Software Disposal Plan [Reviewed]*
PJM CUS	STD.03.06 Obtain approval of the *Disposal Plan* from Customer.	*Software Disposal Plan [Reviewed]*	*Software Disposal Plan [Approved]*

10.7.2.4 Dispose the software from operational environment. (STD.04)

The software is disposed from the operational environment of the Customer. The activity provides:

— Disposed Software; and

— Acceptance Record.

The task list for STD.04 Dispose the *Software* from operational environment is given in Table 48.

Table 48 — STD.04 task list

Role	Task List	Input Work Products	Output Work Products
TL WT CUS	STD.04.01 Deactivate the selected *Software* to prepare it for disposal.	*Software Disposal Plan [Approved]*	*Deactivated Software*
TL WT CUS	STD.04.02 Remove the deactivated *Software* from the operational environment of the Customer.	*Deactivated Software*	*Disposed Software*
PJM CUS	STD.04.03 Obtain acceptance of completed *Disposed Software* from Customer.	*Disposed Software*	*Acceptance Record [Approved]*
PJM TL	STD.04.04 Collect documents and store in the *Project Repository*.	*Software Disposal Plan* *Acceptance Record [Approved]*	*Project Repository [Updated]*

10.7.3 STD Incorporation to the *Project Repository*

The list of work products to be saved in *Project Repository* is given in Table 49.

Table 49 — STD repository work products

Software Installation Plan
Delivery Instructions
Acceptance Record (of Installed Software)
Software Disposal Plan
Acceptance Record (of Disposed Software)

11 Roles

This is an alphabetical list of the roles; their abbreviations and suggested competencies description is given in Table 50. This list is showed as a four-column table for presentation purpose only.

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

— added text is underlined; and

— deleted/modified text is struck out as follows: ~~the text is struck out~~.

Table 50 — Roles

	Role	Abbreviation	Knowledge and competency
1.	Analyst	AN	Knowledge and experience eliciting, specifying and analysing the requirements. Knowledge in designing user interfaces and ergonomic criteria. Knowledge of the revision techniques. Knowledge of the editing techniques. Experience on the software development and maintenance.
2.	Business Manager	~~BM~~ BSM	Knowledge of technical domain of VSE. Knowledge of customers of the VSE. Knowledge of VSE's objectives. Knowledge of the management of more than one project in parallel with more than one work team. Knowledge of all processes of the VSE. Knowledge of capabilities and deficiencies of the VSE. Knowledge of marketing techniques.
3.	Customer	CUS	Knowledge of the Customer processes and ability to explain the Customer requirements. The Customer (representative) should have the authority to approve the requirements and their changes. The Customer includes user representatives in order to ensure that the operational environment is addressed. Knowledge and experience in the application domain.
4.	Designer	DES	Knowledge and experience in the *Software Components* and architecture design. Knowledge of the revision techniques. Knowledge and experience in the planning and performance of integration tests. Knowledge of the editing techniques. Experience on the software development and maintenance.
5.	Programmer	PR	Knowledge and/or experience in programming, integration and unit tests. Knowledge of the revision techniques. Knowledge of the editing techniques. Experience on the software development and maintenance.
6.	Project Manager	PJM	Leadership capability with experience making decisions, planning, personnel management, delegation and supervision, finances and software development.
7.	Supplier	SUP	Knowledge and experience in the software application domain. Knowledge of the Customer processes and ability to explain the Customer requirements.
8.	Technical Leader	TL	Knowledge and experience in the software process domain.
9.	Work Team	WT	Knowledge and experience according to their roles on the project: TL, AN, DES, and/or PR. Knowledge on the standards used by the Customer and/or by the VSE.

12 Work product description

Tables 51 and 52 are alphabetical lists of the input, output and internal process work products, its descriptions, possible states and the source of the work products. The source can be another process or an external entity to the project, such as the Customer.

The lists are shown as a four-column table for presentation purpose only. Work product items in the following tables are based on ISO/IEC/IEEE 15289 Information Items with some exceptions. Information items may be combined or subdivided consistent with the project, service, or processes, phases, and stakeholder needs by a VSE.

The product status gives the information to the project team about the type of work (tasks) already done on the product (for example: evaluated, verified, tested, baselined). This information can be used to start next tasks that can use the product as an input. Some products have no status assigned because they are only informative, and they do not change the content (for example: Acceptance Record, Correction Register, Project Repository Backup, Verification/Validation Results).

Table 51 lists the work products of the Intermediate profile. The following notation is used to highlight the addition/deletion/modification to the work products of the Intermediate profile:

— added text is underlined; and

— deleted/modified text is struck out as follows: ~~the text is struck out~~.

Table 52 lists the work products developed specifically for the Advanced profile.

Work products are identified with a unique code WP.XX where XX is a sequential number. These codes have not been used in the descriptions of activities and tasks in order to facilitate readability.

Table 51 — Work product Descriptions — Intermediate Profile

Work product identification	Name	Description	Source
WP.01	*Acceptance Record*	Documents the Customer acceptance of the *Deliverables* of the project. It may have the following characteristics: — Record of the receipt of the delivery — Identifies the date received — Identifies the delivered elements — Records the verification of any Customer acceptance criteria defined — Identifies any open issues (if applicable) — Signed by receiving Customer and Supplier The applicable statuses are: initiated and signed.	Project Management
WP.02	*Change Request*	Identifies a *Software*, or documentation problem or desired improvement, and requests modifications. It may have the following characteristics: — Identifies purpose of change — Identifies request status — Identifies requester contact information — Impacted system(s) — Impact to operations of existing system(s) defined	Software Implementation Customer Project Management

Table 51 *(continued)*

Work product identification	Name	Description	Source
		— Impact to associated documentation defined — Criticality of the request, date needed The applicable statuses are: initiated, evaluated, rejected and accepted.	
WP.03	*Correction Register*	Identifies activities established to correct a deviation or problem concerning the accomplishment of a plan. It may have the following characteristics: — Identifies the initial problem — Defines a solution — Identifies corrective actions taken — Identifies the ownership for completion of defined actions — Identifies the open date and target closure date — Contains a status indicator — Indicates follow up actions The applicable status is: published.	Project Management
WP.04	*Maintenance Documentation*	Describes the *Software Configuration* and the environment used for development and testing (compilers, design tools, construction and tests). It may have the following characteristics: — Includes or refers to all *Software Configuration* elements developed during implementation — Identifies environment used for development and testing (compilers, design tools, construction and tests tools) It is written in terms that maintenance personnel can understand. The applicable statuses are: verified and baselined.	Software Implementation
WP.05	*Meeting Record*	Records the agreements established with Customer and/or Work Team. It may have the following characteristics: — Purpose of meeting — Attendees — Date, place held — Reference to previous minutes — What was accomplished — Identifies issues raised — Any open issues — Agreements — Next meeting, if any. The applicable status is: updated.	Project Management

Table 51 *(continued)*

Work product identification	Name	Description	Source
WP.06	*Product Operation Guide*	Contains the necessary information to install and manage the *Software*. It may have the following characteristics: — Criteria for operational use — A description of how to operate the product including: — operational environment required — supporting tools and material (e.g. user manuals) required — possible safety warnings — start-up preparations and sequence — frequently asked questions (FAQ) — sources of further information and help to operate the product — Certification and safety approvals — Warranty and replacement instructions — It should be written in terms that the personnel responsible for the operation can understand. The applicable statuses are: verified and baselined.	Software Implementation
WP.07	*Progress Status Record*	Records the status of the project against the *Project Plan*. It may have the following characteristics: — Project measures — Status of actual *Tasks* against planned *Tasks* — Status of actual results against established *Objectives*/goals — Status of actual resource allocation against planned *Resources* — Status of actual cost against budget estimates — Status of actual time against planned schedule — Status of actual risk and mitigation against previously identified — Record of any deviations from planned *Tasks* and reason why. The applicable status is: evaluated.	Project Management
WP.08	*Project Plan*	Presents how the project processes and activities will be executed to ensure the project's successful completion, and the quality of the deliverable products. It Includes the following elements which may have the characteristics as follows: — *Product Description* — Purpose — General Customer requirements	Project Management

Table 51 *(continued)*

Work product identification	Name	Description	Source
		— *Scope* description of what is included and what is not — *Objectives* of the project — *Deliverables* - list of work products to be delivered to Customer, standards and format required by the SOW — *Software Disposal Approach* — *Tasks*, including verification, validation and reviews with Customer and Work Team, to ensure the quality of work products. *Tasks* may be represented as a Work Breakdown Structure (WBS). — *Estimated Duration* of tasks — *Resources* (humans, materials, standards, equipment and tools) including the required training, and the schedule when the *Resources* are needed. — *Composition of Work Team* — *Schedule of the Project Tasks,* the expected start and completion date for each task, and the relationship and dependencies of the *Tasks*. — *Estimated Effort and Cost* — *Identification, prioritization and mitigation of Project Risks* — *Verification criteria (e.g. maximum estimated number of defects left in a software unit) for each software unit (e.g. specifications, architecture)* — *Measures, a set of measures is listed including the unit of measurement, measures are stored in the project repository* — *Configuration management Strategy* — Work product repository tools or mechanism identified — Location and access mechanisms for the repository specified — Version identification and control defined — Backup and recovery mechanisms defined — Status of items and their modifications recorded and reported — Completeness and consistency of items ensured — Storage, handling and delivery (including archival and retrieval) mechanisms specified — *Delivery Instructions* — Elements required for product release identified (i.e. hardware, software, documentation etc.)	

Table 51 *(continued)*

Work product identification	Name	Description	Source
		— Delivery requirements — Sequential ordering of *Tasks* to be performed — Applicable releases identified — Identifies all delivered *Software Components* with version information — Identifies any necessary backup and recovery procedures The applicable statuses are: initiated, verified, accepted, updated and reviewed.	
WP.09	*Project Repository*	Electronic container to store project work products and deliverables. It may have the following characteristics: — Stores project work products — Stores released *Deliverables* work products — Storage and retrieval capabilities — Ability to browse content — Listing of contents with description of attributes — Sharing and transfer of work products between affected groups — Effective controls over access — Maintain work products descriptions — Recovery of archive versions of work products — Ability to report work products status — Changes to work products are tracked to *Change Requests* The applicable statuses are: recovered and updated.	Project Management
WP.10	*Project Repository Backup*	Repository used to back up the *Project Repository* and, if necessary, to recover the information.	Project Management
WP.11	*Requirements Specification*	Identifies the software requirements. It may have the following characteristics: — Introduction — general description of *Software* and its use within the *Scope* of the Customer business; — Requirements description: — Functionality — established needs to be satisfied by the *Software* when it is used in specific conditions. Functionality should be adequate, accurate and safe — User interface — definition of those user interface characteristics that allow to understand and learn the *Software* easily, so the user be able to perform his/her *Tasks* efficiently including the interface exemplar description	Software Implementation

Table 51 *(continued)*

Work product identification	Name	Description	Source
		— External interfaces — definition of interfaces with other software or hardware — Reliability — specification of the software execution level concerning the maturity, fault tolerance and recovery — Efficiency — specification of the software execution level concerning the time and use of the *Resources* — Maintenance — description of the elements facilitating the understanding and execution of the future *Software* modifications — Portability — description of the *Software* characteristics that allow its transfer from one place to other — Design and construction limitations/ constraints — needs imposed by the Customer — Interoperability — capability for two or more systems or *Software Components* be able to change information each other and use it — Reusability — feature of any product/ sub-product, or a part of it, so that it can be used by several users as an end product, in the own software development, or in the execution of other software products Each requirement is identified, unique and it is verifiable or can be assessed. The applicable statuses are: verified, validated and baselined.	
WP.12	*Software*	Software item (*Software* source and executable code) for a Customer, constituted by a collection of integrated *Software Components*. The applicable statuses are: tested and baselined.	Software Implementation
WP.13	*Software Components*	A set of related code units. The applicable statuses are: unit tested, corrected and baselined.	Software Implementation

Table 51 *(continued)*

Work product identification	Name	Description	Source
WP.14	*Software Configuration*	A uniquely identified and consistent set of software products including: — *Requirements Specification* — *Software Design* — *Traceability Record* — *Software Components* — *Software* — *Test Cases and Test Procedures* — *Test Report* — *Product Operation Guide* — *Software User Documentation* — *Maintenance Documentation* The applicable statuses are: delivered and accepted.	Software Implementation
WP.15	*Software Design*	Textual and graphical information on the *Software* structure. This structure may include the following parts: Architectural high-level software design — Describes the overall *Software* structure: — Identifies the required *Software Components* — Identifies the relationship between *Software Components* — Consideration is given to any required: — *Software* performance characteristics — hardware, software and human interfaces — security characteristics — database design requirements — error handling and recovery attributes Detailed low-level software design — includes details of the *Software Components* to facilitate its construction and test within the programming environment; — Provides detailed design (could be represented as a prototype, flow chart, entity relationship diagram, pseudo code, etc.) — Provides format of input/output data — Provides specification of data storage needs — Establishes required data naming conventions — Defines the format of required data structures — Defines the data fields and purpose of each required data element — Provides the specifications of the program structure The applicable statuses are: verified and baselined.	Software Implementation

Table 51 *(continued)*

Work product identification	Name	Description	Source
WP.16	*Software User Documentation*	Describes the way of using the *Software* based on the user interface. It may have the following characteristics: — User procedures for performing specified *Tasks* using the *Software* — Installation and de-installation procedures — Brief description of the intended use of the *Software* (the concept of operations) — The supplied and required *Resources* — Needed operational environment — Availability of problem reporting and assistance — Procedures to access and exit the *Software* — Lists and explains *Software* commands and system-provided messages to the user — As appropriate for the identified risk, it includes warnings, cautions, and notes, with corrections — It includes troubleshooting and error correction procedures. It is written in terms understandable by users. The applicable statuses are: preliminary, verified and baselined.	Software Implementation
WP.17	*Statement of Work or Agreement*	Description of work to be done related to *Software* development. It may include: — *Product Description* — Purpose — General Customer requirements — *Scope* description of what is included and what is not — *Objectives* of the project — *Deliverables* list of work products to be delivered to Customer The applicable status is: reviewed.	Customer
WP.18	*Test Cases and Test Procedures*	Elements needed to test code. Test Case may include: — Identifies the test case — Test items — Input specifications — Output specifications — Environmental needs — Special procedural requirements — Interface dependencies	Software Implementation

Table 51 *(continued)*

Work product identification	Name	Description	Source
		Test Procedures may include: — Integration approach — Integration tests — Regression tests — Identifies: test name, test description and test completion date — Identifies potential implementation issues — Identifies the person who completed the test procedure — Identifies prerequisites — Identifies procedure steps including the step number, the required action by the tester and the expected results The applicable statuses are: verified and baselined.	
WP.19	*Test Report*	Documents the tests execution. It may include: — A summary of each defect — Identifies the related test case — Identifies the tester who found each defect — Identifies the severity for each defect — Identifies the affected function(s) for each defect — Identifies the date when each defect originated — Identifies the date when each defect was resolved — Identifies the person who resolved each defect The applicable status is: baselined.	Software Implementation
WP.20	*Traceability Record*	Documents the relationship among the requirements included in the *Requirements Specification, Software Design* elements, *Software Components, Test Cases and Test Procedures.* It may include: — Identifies requirements of *Requirements Specification* to be traced — Provides forward and backward mapping of requirements to *Software Design* elements, *Software Components*, *Test Cases and Test Procedures*. The applicable statuses are: verified, baselined and updated.	Software Implementation
WP.21	*Verification Results*	Documents the verification execution. It may include the record of: — Participants — Date — Place — Duration	Project Management Software Implementation

Table 51 *(continued)*

Work product identification	Name	Description	Source
		— Verification check-list — Passed items of verification — Failed items of verification — Pending items of verification — Defects identified during verification The applicable statuses are: initiated, approved.	
WP.22	*Validation Results*	Documents the validation execution, it may include the record of: — Participants — Date — Place — Duration — Validation check-list — Passed items of validation — Failed items of validation — Pending items of validation — Defects identified during validation The applicable statuses are: initiated, approved.	Software Implementation
WP.23	*Agreement*	Describes the mutual acknowledgement of terms and conditions under which a working relationship is conducted. Example: Contract, memorandum of agreement It may have the following characteristics: — Identifies customer requirements (functional and non-functional) — Identifies time frame for delivery — Identifies budget and resources provided by both parts — Identifies what is to be purchased — Identifies any warranty information — Identifies any copyright and licensing information — Identifies acceptance criteria (e.g. Delivery Instructions) — Identifies change management and problem resolution procedures — Identifies the role of the Customer — Evidence of review and approval by authorized signatories The applicable statuses are: initiated, approved, and updated.	Business Management

Table 51 *(continued)*

Work product identification	Name	Description	Source
WP.24	*Configuration Management Record*	Documents the configuration and status of software and associated documentation. It may have the following characteristics: — List of the approved configuration, — Status of proposed changes to the configuration, — Implementation status of approved changes. — 'As delivered' *Software Configuration* The applicable statuses are: initiated, approved and published.	Project Management
WP.25	*Human Resource Record*	Personnel and training information of human resources. It may have the following characteristics: — *Human Resource Register* — Personal data — Education — Experience — Roles assigned — Training — *Training Plan/Record* description of the training activities. It may have the following characteristics: — Courses, workshops, mentoring, on the job training, etc. — Calendar (planned and actual information) — Trainers — Logistics The applicable statuses are: initial, approved, published and updated.	Business Management
WP.26	*Integration Approach*	Describes the approach used to integrate the software components in order to obtain the software. One approach is a *global integration (*big-bang integration) where all the software elements are assembled in only one step. Another approach is to integrate software components as they become available. Other known approaches are top-down integration, risk driven integration (i.e. most critical components are integrated first) and bottom-up integration. It may have the following characteristics: — The order for assembling the implemented software components based on the priorities of the software requirements and architecture definition focusing on the interfaces — Regression strategy — Minimization of integration time, cost, and risks. The applicable statuses are: verified and approved.	Software Implementation

Table 51 *(continued)*

Work product identification	Name	Description	Source
WP.27	*List of Products or Services*	List the products or services to be acquired from Supplier(s). It may have the following characteristics: — Software component(s) — Service(s) — Potential supplier(s) — Delivery Instructions The applicable status is: initiated and approved.	Business Management
WP.28	*List of potential suppliers*	List potential Suppliers that could provide the product or service required. It may have the following characteristics: — Product(s) required — Service(s) required — Potential supplier(s) The applicable statuses are: initiated and updated.	Acquisition Management
WP.29	*Measurement collection and analysis procedure*	Describes a collection procedure to ensure that the right data are collected, is collected and stored properly and analysed. It may have the following characteristics: — Specify the business/project goal of each measure — Specify the unit of each measure — Specify how to collect and store the data for each required measure — Specifies who is responsible for obtaining measurement data — Specifies how data are stored, retrieved — Specifies the appropriate data analysis methods and tools. — Specifies the data storage format and location — Specifies the format of measurement reporting — Specifies who should receive the *Measurement Record* The applicable statuses are: verified and baselined.	Project Management
WP.30	*Measurement Record*	Records measurements collected during the execution of the tasks. It may have the following characteristics: — Process measures — e.g. effort (person-hour), estimation accuracy (e.g. estimated/actual start and end dates), estimated cost, cost of rework, productivity	All processes

Table 51 *(continued)*

Work product identification	Name	Description	Source
		— Work product measures — e.g. quality (number of defects), size (number of requirements, number of pages, number of lines of code, number of function points) The applicable statuses are: updated, approved, published.	
WP.31	*Organisational Lesson Learned Record*	A lesson learned meeting is conducted after a few projects have been completed. The objective is to capture and document the organisational knowledge gained after a few projects have been completed and closed to improve the performance of the VSE. The information from the following documents could be used when performing a lesson learned review: — Organisational Management Plan — Business Objectives — Project Plans — Progress Status Records — Correction Register — Meeting Records It may have the following characteristics: — Potential causes of problems — Recommendations to improve the performance of VSE and projects such as quality, estimates, schedule. The applicable statuses are: initiated, approved, published.	Business Management
WP.32	*Organisational Repository*	Electronic container to store organisational documents such as processes and work products. It may have the following characteristics: — Agreement — Agreements with Customers — Agreements with Suppliers — Reusable components — Organisational lesson learned — Stores project work products — Stores released products — Storage and retrieval capabilities — Ability to browse content — Listing of contents with description of attributes — Sharing and transfer of work products between affected groups	Business Management

Table 51 *(continued)*

Work product identification	Name	Description	Source
		— Effective controls over access — Maintain work products descriptions — Recovery of archive versions of work products — Ability to report work products status The applicable statuses are: established, recovered and updated.	
WP.33	*Processes Improvements Record*	The repository of all improvement suggestions and for the selected actions to be carried out to deploy the improvements suggestions. It may have the following characteristics: — Process Improvement Suggestions (e.g. notation, activity, task, work product, tool) — Process Improvement Actions The applicable statuses are: published, implemented.	Business Management
WP.34	*Project lesson Learned Record*	A lesson learned meeting is conducted after a project has been completed. The objective is to capture and document the knowledge gained during a project to improve the performance of future projects. The information from the following documents is used when performing a lesson learned review: — Project Plan — Progress Status Record — Correction Register — Meeting Record It has the following characteristics: — Potential causes of problems — Recommendations to improve the performance of projects such as quality, estimates, schedule. The applicable statuses are: initiated, approved, published.	Project Management
WP.35	*Project Opportunities*	Lists the business opportunities of the VSE. It may have the following characteristics: — New functionalities for actual product — Potential customers (e.g. name of organization, name of contact) — Potential business partners The applicable statuses are: initiated, updated and approved.	Business Management

Table 51 *(continued)*

Work product identification	Name	Description	Source
WP.36	*Proposal*	Describes what the VSE is proposing to a customer either after having evaluated an Agreement of a customer or as a result of an analysis of opportunities. It may have the following characteristics: — proposed solution — proposed schedule — scope of initial proposal: — requirements that would be satisfied — requirements that could not be satisfied, and provides a justification of variants — Identifies conditions (e.g. time, location) that affect the validity of the proposal — Identifies obligations of the acquirer and the consequences of these not being met — Defines the estimated price of proposed development, product, or service The applicable statuses are: initiated, approved and submitted.	Business Management
WP.37	*Purchase Order*	Defines a product or service to be acquired. It may have the following characteristics: — Name and address of supplier — Description of the product or service to be acquired — Agreed price — Quantity — Delivery date The applicable statuses are: initiated, approved.	Software Implementation
WP.38	*Resource Request*	The Resource Request may have the following characteristics: — Plan for the necessary resources, knowledge and skills needed to perform the process or project. The request may include: — Human Resource requirements (knowledge and skills). — Infrastructure requirements (hardware, software, tools) — Requests for resource acquisition of the elements or any training needed. The request may include: — Description — Due date The applicable statuses are: initiated, approved.	All processes

Table 51 *(continued)*

Work product identification	Name	Description	Source
WP.39	*Request for Proposal*	A document used to request proposals from sellers of products or services. It may have the following characteristics: — Reference to the requirements specifications — Identifies desired characteristics, such as: — system architecture, configuration requirements — quality criteria or requirements — project schedule requirements — expected delivery/service dates — cost/price expectations — regulatory standards/requirements — Identifies submission date for resubmission of the response The applicable statuses are: received, approved, rejected.	Customer
WP.40	*Security and Intellectual Property Protection Plan*	Documents how the VSE protects the security and intellectual property of its assets and information items. It may include: — Objectives of the plan — Security requirements — Roles and responsibilities — Identification of intellectual Property items to protect — Organisational Repository security procedure The applicable statuses are: initiated, approved, and implemented.	Business Management
WP.41	*Supplier Agreement*	Documented agreement (e.g. contract) between the acquirer, i.e. the VSE, and a supplier. It may include (adapted from the CMMI-DEV): — Establishing the agreement, specification, terms and conditions, list of deliverables, schedule, budget, and acceptance process — Identifying who from the project and supplier are responsible and authorized to make changes to the supplier agreement — Identifying how requirements changes and changes to the supplier agreement are to be determined, communicated, and addressed — Identifying standards and procedures that will be followed	Acquisition Management

Table 51 *(continued)*

Work product identification	Name	Description	Source
		— Identifying critical dependencies between the project and the supplier — Identifying the types of reviews that will be conducted with the supplier — Identifying the supplier's responsibilities for on-going maintenance and support of the acquired products — Identifying warranty, ownership, and rights of use for the acquired products — Identifying acceptance criteria — Identifying and signing the *Delivery Instructions* The applicable statuses are: reviewed, approved, and signed by supplier.	
WP.42	*Test Cases and Test Procedures*	Elements needed to test code. Test Case may include: — Identifies the test case — Test items — Input specifications — Output specifications — Environmental needs — Special procedural requirements — Interface dependencies Test Procedures may include: — Integration approach — Integration tests — Regression tests — Identifies: test name, test description and test completion date — Identifies potential implementation issues — Identifies the person who completed the test procedure — Identifies prerequisites — Identifies procedure steps including the step number, the required action by the tester and the expected results. The applicable statuses are: verified and baselined.	Software Implementation

Table 52 lists the work products developed specifically for the Advanced profile.

Table 52 — Work product Descriptions — Advanced Profile

Work product identification	Name	Description	Source
WP.43	*Business Objectives*	Documents strategy designed by senior management to ensure a VSE's continued existence and enhance its profitability, market share, and other factors influencing the organization's success. Business objectives, or strategic objectives, are usually complemented with short-term (e.g. 6–12 months) operational or tactical objectives. The business objectives are used to evaluate project opportunities, to make decision about the submission of proposals to potential customers or partners. It includes the following elements which may have the following characteristics: — Business domain and boundaries — SWOT analysis (Strengths, Weaknesses, Opportunities, Threat) — Operational or tactical objectives — Objectives should be SMART (Specific, Measurable, Achievable, Realistic, Time constrained). — Potential customers — Potential partners — Potential suppliers — Project opportunity selection criteria — List of project opportunities selected The applicable statuses are: initiated, approved, updated.	Business Management
WP.44	*Customer Complaint*	Record of customer's comments and complaints during the execution of a project. It may have the following characteristics: — Customer Name — Date — Type (comment or complaint) — Description — Name of person who made the comment or complaint The applicable statuses are: initiated, reviewed.	Business Management

Table 52 *(continued)*

Work product identification	Name	Description	Source
WP.45	*Process Evaluation Procedure*	The information needed to carry out an evaluation of a process in a VSE. It may have the following characteristics: — *Identification of project evaluated* — *Identification of process evaluated* — *Identification of participants to the evaluation* — *Date the evaluation was conducted* — *Evaluation Criteria* The applicable statuses are: initiated, approved.	Business Management
WP.46	*Process Evaluation Report*	Report that contains the needed information to carry out and the results of an evaluation. It may have the following characteristics: — *Identification of project evaluated* — *Identification of process evaluated* — *Identification of participants to the evaluation* — *Date the evaluation was conducted* — *Evaluation Criteria* — *Strengths identified* — *Weakness identified* — *Proposed improvements* The applicable statuses are: initiated, approved.	Business Management
WP.47	*Proposal*	Description of an offer of a VSE to develop a product or a service for a prospective customer. The proposal defines the management and technical requirements of a product or service proposed to a Customer. It may have the following characteristics: — Overview of the proposal — Description of the VSE — Proposed Statement of Work — Assumptions and constraint about the project — Description of the conditions (e.g. staff, schedule, features, cost, quality) that affect the validity of the proposal — Proposed solution to the requirements of a Customer — The requirement(s) (functional and non-functional) that would be satisfied — The requirement(s) (functional and non-functional) that could not be satisfied — Proposed schedule — Proposed deliverables	Business Management

Table 52 *(continued)*

Work product identification	Name	Description	Source
		— Proposed cost — Proposed process — List of the project partner(s) and supplier(s), and the contribution of each partner and supplier of the proposal The applicable statuses are: initiated, reviewed, approved, submitted.	
WP.48	*Software Disposal Plan*	Documents the tasks, resources and calendar of to dispose software from its operational environment. Tasks to deactivate, disassemble and remove a *Software* are estimated and planned. The plan may also include tasks to destroy data and/or data storage devices. It includes the following elements which may have the characteristics as follows: — *Tasks*, including verification, validation and reviews with Customer. *Tasks* may be represented as a Work Breakdown Structure (WBS). — *Estimated Duration* of tasks — *Resources* (humans, materials, standards, equipment and tools) including the required training, and the schedule when the *Resources* are needed. — *Composition of Work Team* — *Schedule of the disposition Tasks,* the expected start and completion date for each task, and the relationship and dependencies of the *Tasks*. — *Estimated Effort and Cost* — *Identification, prioritization and mitigation of disposition Risks* — *Identification, prioritization and mitigation of Information Security Risks* — *Identification of constraints* — *Disposition criteria* The applicable statuses are: initiated, verified, approved.	Software Transition and Disposal
WP.49	*Software Installation Plan*	Documents the tasks, resources and calendar of to install and obtain approval of the *Software*. It includes the following elements which may have the characteristics as follows: — *Tasks*, including verification, validation and reviews with Customer and Work Team, to ensure the quality of work products. *Tasks* may be represented as a Work Breakdown Structure (WBS).	Software Transition and Disposal

Table 52 *(continued)*

Work product identification	Name	Description	Source
		— *Estimated Duration* of tasks — *Resources* (humans, materials, standards, equipment and tools) including the required training, and the schedule when the *Resources* are needed. — *Composition of Work Team* — *Schedule of the Installation Tasks,* the expected start and completion date for each task, and the relationship and dependencies of the *Tasks*. — *Estimated Effort and Cost* — *Identification, prioritization and mitigation of Installation Risks* — *Identification, prioritization and mitigation of Information Security Risks* — *Installation criteria* The applicable statuses are: initiated, verified, approved.	

13 Software tools requirements

13.1 General

Software tools that could be used to perform process activities (see Table 53 to Table 57).

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

— added text is underlined;

— deleted/modified text is struck out as follows: ~~the text is struck out~~.

13.2 Business Management process

Table 53 — Business Management tools

Activity	Resource List
Document and Select Project Opportunities Evaluation of Requests, Submission of Proposals and signature of Contract Periodic Project Assessment and Control Project Closure, *Organisational Lesson Learned* and *Process Improvement*	Tools allowing documentation, management and control and the use and management of the *Project Repository*

13.3 Project Management process

Table 54 — Project Management tools

Activity	Resource List
Project Planning Project Plan Execution Project Assessment and Control Project Closure	Tools allowing documentation, management and control the *Project Plan* and the use and management of the *Project Repository*

13.4 Software Implementation process

Table 55 — Software Implementation tools

Activity	Resource List
Software Implementation Initiation Software Requirements Analysis Software Architectural and Detailed Design Software Construction Software Integration and Tests Product Delivery	Documentation tools
Software Requirements Analysis	*Requirements Specification* tools
Software Architectural and Detailed Design	*Software Design* tools
Software Construction	*Construction* Tools
Software Integration and Tests	Tests tools, bug tracking tools

13.5 Acquisition Management (AM) process (conditional process)

Table 56 — Acquisition Management tools

Activity	Resource List
Obtain approval of *Purchase Order* and *Supplier Contract* Obtain Product and/or Service	Tools allowing documentation, management and control and the use and management of the *Project Repository*

13.6 Software Transition and Disposal (STD) process (conditional process)

Table 57 — Software Transition and Disposal tools

Activity	Resource List
Plan software installation Install and test the software in the operational environment Plan software disposal Dispose the Software from operational environment	Tools allowing documentation, management and control and the use and management of the Project Repository

Annex A
(informative)

Software Engineering Deployment Packages

In order to facilitate the implementation, by VSEs, of a Profile, a set of Deployment Packages are available. A deployment package is a set of artefacts developed to facilitate the implementation of a set of practices, of the selected framework, in a VSE. But, a deployment package is not a complete process reference model. Deployment packages are not intended to preclude or discourage the use of additional guidelines that VSEs find useful.

The elements of a typical deployment package are technical description, relationships with ISO/IEC 29110, key definitions, detailed description of processes, activities, tasks, steps, roles, products, template, checklist, example, references and mapping to standards and models, and a list of tools. The mapping is only given as information to show that a Deployment Package has explicit links to ISO/IEC TR 29110-5, such as ISO/IEC/IEEE 12207 and ISO/IEC/IEEE 15289, or models such as the CMMI-DEV[1)] developed by the Software Engineering Institute. Hence, by deploying and implementing a package, a VSE can see its concrete step to achieve or demonstrate coverage to ISO/IEC TR 29110-5. Deployment Packages are designed such that a VSE can implement its content, without having to implement the complete framework at the same time. The table of content of a system engineering deployment package is illustrated in Table A.1.

Table A.1 — Table of Content of a Software Engineering Deployment Package

1 Technical Description
  Purpose of this document
  Why this Topic is important?
2 Definitions
3 Relationships with ISO/IEC 29110
4 Overview of Processes, Activities, Tasks, Roles and Products
5 Description of Processes, Activities, Tasks, Steps, Roles and Products
  Role Description
  System Description
  Artefact Description
6 Template(s)
7 Example(s)
8 Checklist(s)
9 Tool(s)
10 References to other Standards and Models (e.g. ISO 9001, ISO/IEC/IEEE 12207, CMMI-DEV®)
11 References
12 Evaluation form

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

— added text is underlined;

1) CMMI-DEV® is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO or IEC of this product.

— deleted/modified text is struck out as follows: ~~the text is struck out~~.

Some Deployment Packages have been updated (e.g. Project Management) to include the modifications/additions to the Intermediate profile. These Deployment Packages are indicated by adding “Updated” in parenthesis.

For the Advanced Profile, a set of Software Engineering Deployment Packages is available, at no cost, on the Internet:

a) Business Management;

b) Requirements Analysis;

c) Architecture and Detailed Design;

d) Construction and Unit Testing;

e) Integration and Test;

f) Verification and Validation;

g) Configuration Management;

h) Project Management;

i) Product Delivery;

j) Acquisition Management;

k) Transition and Disposal Management; and

l) Self-Assessment.

Annex B
(informative)

Mapping between the objectives of ISO/IEC TR 29110-5-1-4 and ISO/IEC/IEEE 12207 and ISO 9001:2015

B.1 General

The sections of this annex present the mapping between the objectives of ISO/IEC TR 29110-5-1-4 and the base standards used to develop this profile (e.g. ISO/IEC/IEEE 12207:2017 and ISO 9001:2015).

NOTE Alignment of this annex with ISO/IEC 29110-4-1 will be verified once the Advanced profile is specified in ISO/IEC 29110-4-1.

B.2 Business Management (BM) objectives

BM.O1. Define the business objectives of the VSE.

6.4.1 Business or Mission Analysis process
a) The problem or opportunity space is defined.
[ISO/IEC/IEEE 12207:2017, 6.4.1.2]
3.4.2 Opportunity evaluation and project initiation
[ISO/IEC 21500:2012]

BM.O2. Initiate and sustain necessary, sufficient and suitable projects in order to meet the objectives of the VSE.

6.2.3 Portfolio Management Process
a) Business venture opportunities, investments or necessities are qualified and prioritized.
b) Projects are identified.
c) Resources and budgets for each project are allocated.
d) Project management responsibilities, accountability, and authorities are defined.
[ISO/IEC/IEEE 12207:2017, 6.2.3]