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Date: 21 July 2025

Origin: International

Latest date for receipt of comments: 13 September 2025

Project No. 2023/00179

Responsible committee: IST/15 Software and systems engineering

Interested committees:

Title: Draft BS ISO/IEC 29110-5-6-2 Systems and software engineering — Life cycle profiles for very small entities (VSEs). Part 5-6-2: System engineering guidelines for the generic Basic profile.

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Introduction

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

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

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
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Template for comments and secretariat observations

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



DRAFT International Standard

ISO/IEC DIS 29110-5-6-2

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

Part 5-6-2: System engineering guidelines for the generic Basic profile

ICS: 35.080

ISO/IEC JTC 1/SC 7

Secretariat: **BIS**

Voting begins on:
2025-07-21

Voting terminates on:
2025-10-13

This document is circulated as received from the committee secretariat.

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Reference number
ISO/IEC DIS 29110-5-6-2:2025(en)

Full document details: 25/30468716 DC

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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

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 or www.iec.ch/members_experts/refdocs).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

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

This first edition replaces the ISO/IEC TR 29110-5-6-1:2015, which had been revised.

The main changes are as follows:

- Many task statements have been reworded to facilitate their understanding.
- Conditional tasks have been added to develop optional work products (e.g. operation guide) that have been requested by a customer. This notation replaces the 'Optional' notation [e.g. *(optional)] used in the TR that caused ambiguities.

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

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

Introduction

0.1 Introduction to the ISO/IEC 29110 series

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

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

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

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

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

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

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

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

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

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

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

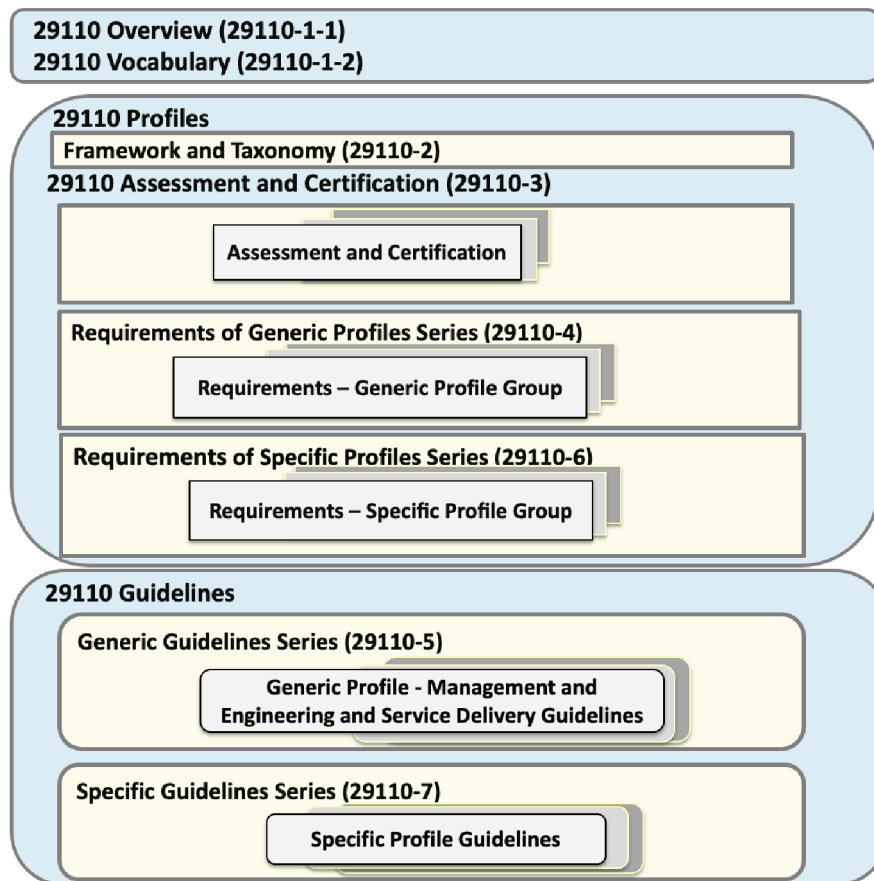


Figure 1 — ISO/IEC 29110 series

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

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

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

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

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

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

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

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

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

0.2 Introduction to this document

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

The Basic profile describes the development of a system by a VSE developing a single product by a single work team.

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

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

This document provides the management and engineering guidelines to the Basic profile through project management and system definition and realization processes.

This document applies for non-critical systems development projects.

To use this document, a VSE should fulfil the following conditions:

- project needs and expectations are documented;
- feasibility of the project was performed before its start;
- project team, including project manager and system engineer, is assigned and trained; and
- goods, services and infrastructure to start the project are available.

To use this document, a VSE can obtain the following benefits:

- an agreed set of project requirements (technical part of the contract) and expected products are agreed by the acquirer;
- a disciplined management process that provides project visibility and corrective actions of project problems and deviations is performed;
- a systematic system definition and realization process, that satisfies acquirer needs and ensures quality products, is followed.

VSEs developing software that is part of a system are encouraged to use the software Basic management and engineering guidelines (ISO/IEC 29110-5-1-2).

This document provides information about systems engineering deployment packages in [Annex A](#) and [Annex B](#) provides a mapping between the outcomes of this document and the ISO/IEC/IEEE 15288.

Conformity requirements for implementations of this document can be found in ISO/IEC 29110-4-6.¹⁾

1) To be published

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

Part 5-6-2: System engineering guidelines for the generic Basic profile

1 Scope

This document describes processes targeted at VSEs that the development of a system by a VSE developing a single product by a single work team.

This document provides management and engineering guidelines for the systems engineering Basic profile of the generic profile group.

This document is applicable to VSEs that develop non-safety critical systems and have little or no experience with systems engineering (SE) process planning and implementation using the ISO/IEC/IEEE 15288.

This document is intended to be used with any processes, techniques and methods that enhance the VSE's stakeholder's satisfaction and productivity.

This document is also applicable to VSEs which are familiar with the management and engineering guidelines of the systems engineering Entry profile (ISO/IEC 29110 5-6-1) for their system development projects.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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

3.1 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, or purchaser.

[SOURCE: ISO/IEC/IEEE 15288:2023]

3.2 Advanced profile

profile targeted at VSEs which want to sustain and grow as a competitive system and/or software development organization

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

3.3

agreement

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

EXAMPLE Contract, memorandum of agreement.

[SOURCE: ISO/IEC/IEEE 15288:2023, 3.4]

3.4

Basic profile

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

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

3.5

conditional process

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

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

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

3.6

critical system

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

3.7

disposed system

A system that has been transformed (i.e., state change) by applying the disposal process.

Note 1 to entry: A systems approach considers the total system and the total life cycle of the system. This includes all aspects of the system and the system throughout its life until the day users dispose of the system and the external enterprises complete the handling of the disposed system products.

[SOURCE: Adapted from ISO/IEC/IEEE 15288: 2023]

3.8

Entry profile

profile targeted at start-up VSEs (i.e. VSEs who started their operation less than 3 years) and/or at VSEs working on small projects (e.g. project size of less than 6 person-months)

[SOURCE: ISO/IEC 29110-1-2: 2024, 3.42]

3.9

Intermediate profile

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

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

3.10

operator

Entity that performs the operations of a system

Note 1 to entry: The role of operator and the role of user may be vested, simultaneously or sequentially, in the same individual or organization.

Note 2 to entry: An individual operator combined with knowledge, skills and procedures may be considered as an element of the system.

Note 3 to entry: In the context of this specific definition, the term entity means an individual or an organization.

[SOURCE: ISO/IEC/IEEE 15288:2023]

3.11 profile

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

Note 1 to entry: The base standards used to develop profiles for VSEs are the ISO/IEC/IEEE 12207, the ISO/IEC/IEEE 15288 and the ISO/IEC/IEEE 15289.

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

3.12 systems engineering plan SEP

top level technical plan for managing the systems engineering effort which defines how the technical aspects of the *project* will be organized, structured, and conducted and how the systems engineering *processes* will be controlled to provide a product that satisfies *stakeholder* requirements

[SOURCE: ISO/IEC/IEEE 24748-4:2016, 4.14]

3.13 small and medium enterprise SME

enterprises with less than 250 persons employed

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

3.14 system

combination of interacting elements organized to achieve one or more stated purposes

Note 1 to entry: A system may be considered as a product or as the services it provides.

Note 2 to entry: In practice, the interpretation of its meaning is frequently clarified by the use of an associative noun, e.g., aircraft system. Alternatively, the word "system" may be substituted simply by a context-dependent synonym, e.g., aircraft, though this may then obscure a system principles perspective.

[SOURCE: ISO/IEC/IEEE 15288:2023]

3.15 system structure

the decomposition of a system of interest into a set of interacting systems and system elements

Note 1 to entry: The system structure is described in a System Breakdown Structure (SBS).

[SOURCE: ISO/IEC/IEEE 15288:2023]

3.16 trade-off

decision-making actions that select from various requirements and alternative solutions on the basis of net benefit to the stakeholders

[SOURCE: ISO/IEC/IEEE 15288:2023]

3.17 user

individual or group that benefits from a system during its utilization

Note 1 to entry: The role of user and the role of operator may be vested, simultaneously or sequentially, in the same individual or organization.

[SOURCE: ISO/IEC/IEEE 15288:2023]

3.18

work breakdown structure

WBS

[Output/Input] a deliverable-oriented hierarchical decomposition of the work to be executed by the project team to accomplish the project objectives and create the required deliverables. It organizes and defines the total scope of the project.

[SOURCE: ISO/IEC/IEEE 24765:2017]

3.19

work product

artefact produced by a process

[SOURCE: ISO/IEC 15940:2013, 3.5]

4 Naming, diagramming and definitions conventions

4.1 General

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

4.2 Naming, diagramming and definition conventions

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

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

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

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

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

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

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

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

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

Diagram – Graphical representation of the processes. The large round-edged rectangles indicate process or activities, and the smaller square-edged rectangles indicate the work products. The directional or bidirectional thick arrows indicate the major flow of information between processes or activities. The

directional or bidirectional thin arrows indicate the input or output work products. The notation used in the diagrams does not imply the use of any specific process life cycle.

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

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

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

Task description tables contain four columns corresponding to:

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

input work products – work products needed to execute a task.

- output work products – work products created or modified by the execution of a task.

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

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

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

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

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

4.3 Abbreviated terms

The following abbreviations are used in this document:

PM	project management
PJM	project manager
SBS	system breakdown structure
SDD	system design document
SE	systems engineering
SEMP	system engineering management plan
SEP	systems engineering plan

SR	system definition and realization
SMART	specific, measurable, achievable, relevant and traceable
SME	small and medium enterprise
VSE	very small entity
V&V	verification, validation
WBS	work breakdown structure

5 Systems thinking

The traditional approach to solve a problem is called artisan. This approach focuses on breaking a problem into small parts and, once each part is resolved, the whole problem is solved. This approach, however, has limitations because the insight of the whole system could be lost. This limitation brings forth the systems thinking concept, which analyses and observes the system as a whole and identifies the interrelationships among the composing parts and the system environment (e.g. enabling systems).

Systems thinking allows for a better understanding of the systems as a whole. Systems thinking is used to broaden the perspective to larger environments by considering the entire life cycle of the system and the different possible applications of the system. Systems can be immersed in different environments and multiple relationships will emerge. Every project has a context in which the system is embedded. Thus, a system is not only composed of software and hardware, but is always part of a larger operation, often involving people and other systems. The designer should clearly understand these relationships before defining a solution.

The “system” perspective enables the design of an optimized system to consider all needs and constraints. This perspective also helps to invent new solutions to meet existing needs or in some cases create new needs.

For this document, systems thinking should be adopted when understanding the system to be designed so that, when identifying the requirements, all stakeholders’ needs are considered, as well as the context in which the system should operate. Following this approach, when deploying the requirements in smaller modules, it will help ensure effective integration of the parts.

6 Overview

6.1 Introduction

This document provides the following processes: project management and systems definition and realization. These processes integrate tasks selected from ISO/IEC/IEEE 15288 and ISO/IEC/IEEE 15289. [Annex A](#) provides information about deployment packages (DPs) which will facilitate the implementation of these processes.

[Table 1](#) illustrates the 4-stage systems engineering (SE) roadmap. The 1st column on the left lists the 2 processes of the ISO/IEC 29110-5-6-1 Entry profile. The list of processes of the Basic profile of the 2nd column is incrementally built from the left column, so that the processes for the 2nd column are all the ones from the Entry profile plus a conditional process, new tasks and new work products. The list of the processes of the Intermediate profile of the 3rd column are the processes in the second column plus two new processes. The list of the process of the Advanced profile of the 4th column are the processes in the 3rd column plus one new process.

Table 1 — Systems engineering 4-stage roadmap

ISO/IEC 29110-5-6-1 Entry profile	ISO/IEC 29110-5-6-2 Basic profile	ISO/IEC 29110-5-6-3 Intermediate profile	ISO/IEC 29110-5-6-4 Advanced profile
— System definition and realization process — Project management process	Processes of ISO/IEC 29110-5-6-1 and: — Conditional process: acquisition management — additional tasks and work products	Processes of ISO/IEC 29110-5-6-2 and: — Technical management	Processes of ISO/IEC 29110-5-6-3 and: — Conditional process: System transition and disposal process

The purpose of the project management (PM) process is to establish and carry out, in a systematic way, the tasks of the system definition and realization process, while conforming to the project's objectives for the expected quality, time, cost, and risks.

The purpose of the system definition and realization (SR) process is the systematic performance of the analysis, design, implementation, integration, verification, and validation activities for a new or modified system, according to the specified requirements.

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

6.2 Processes and activities of the systems engineering Basic profile

This document provides 3 processes: a project management (PM) process, a system definition and realization process, and a conditional process - the acquisition management (AM) process. The three processes are interrelated as illustrated in [Figure 2](#).

The processes illustrated in [Figure 2](#) are intended to be used with any life cycle such as waterfall, iterative, incremental, evolutionary or agile.

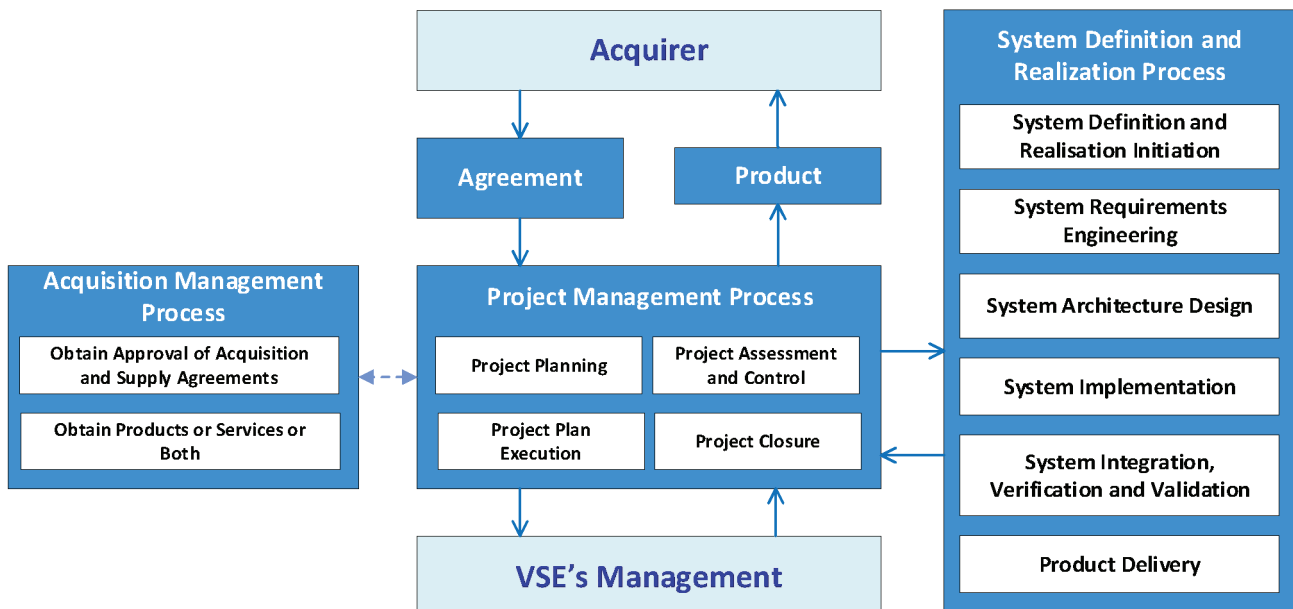


Figure 2 — Processes and activities of the SE Basic profile

The project management (PM) process uses the acquirer's agreement to elaborate the project plan. If there is no agreement available from the customer, the project management, in collaboration with the work

team, has to clarify the basis to develop the agreement. The project assessment and control tasks compare the project progress against the project plan and actions are taken to eliminate deviations or incorporate changes to the project plan. The project closure activity ensures delivery of the product (new or modified product), produced by system definition and realization (SR) process, and gets the acquirer's acceptance to formalize the end of the project. A project repository is established to save the work products and to control its versions during the project.

The execution of the system definition and realization (SR) process is driven by the systems engineering management plan (SEMP). An early SR activity is to generate a SEMP. The SEMP will guide the execution of the requirements elicitation, analysis, system design, system implementation, integration and verification, validation, product delivery, maintenance and disposal activities.

As illustrated in [Figure 2](#), the acquirer provides an agreement as an input to project management process and receives a product as a result of system definition and realization process execution. The execution of the acquisition management (AM) process is executed if a work product or a service needs to be obtained from a supplier by the VSE.

7 Project management (PM) process

7.1 PM process purpose

The purpose of the project management process is to achieve the project's time, quality and cost objectives by establishing and executing the tasks of the software implementation project systematically. It also carries out administrative tasks relating to the storage, handling, protection and delivery of work products and configuration items.

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 or project needs.

7.2 PM process outcomes

PM.01: The project plan, the agreement and commitments are reviewed and accepted by both the acquirer and the project manager. The tasks and resources necessary to complete the work are sized and estimated.

PM.02: 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 acquirer acceptance documented in the product acceptance record.

PM.03: Change requests are addressed through their reception and analysis. Changes to system requirements are evaluated by the project team for cost, schedule, risks and technical impact.

PM.04: Review meetings with the work team and the acquirer, suppliers are held. Agreements are registered and tracked.

PM.05: A risk management approach is developed. Risks are identified, analyzed, prioritized, and monitored as they develop and during the conduct of the project. Resources to manage the risks are determined.

PM.06: A product management strategy is developed. Items of product are identified, defined and baselined. Modifications and releases of the items are controlled and made available to the acquirer and work team. The storage, handling and delivery of the items are controlled.

PM.07: Quality assurance is performed to provide assurance that work products and processes comply with the project plan and system requirements specifications.

NOTE The implementation of the quality assurance is through the performance of the verifications, validations and review tasks performed in project management and system definition and realization processes.

PM.08: A disposal management approach is developed to end the existence of the system entity.

7.3 PM roles involved

Table 2 provides a list of the roles involved in the PM process.

Table 2 — PM roles involved

Role	Abbreviation
Acquirer	ACQ
Stakeholder	STK
Project manager	PJM
Work team	WT
Designer	DES
Systems engineer	SYS

7.4 PM activities and tasks

7.4.1 Overview of the PM process

Figure 3 shows the flow of information between the project management process activities including the most relevant work products and their relationship.

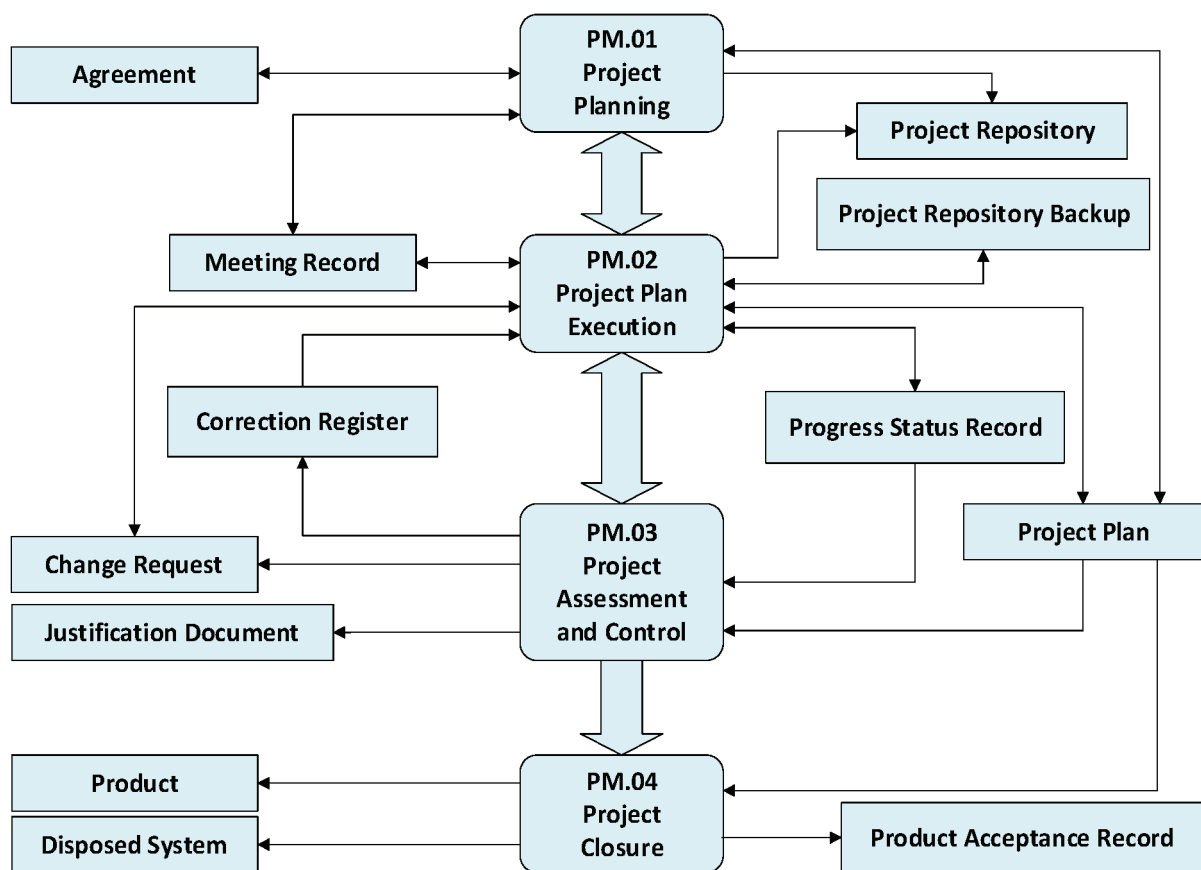


Figure 3 — Project management process diagram

NOTE Feedback lines and work products are not all displayed to facilitate readability.

7.4.2 PM activities

7.4.2.1 General

The project management process has the following activities:

PM.01: Project planning

PM.02: Project plan execution

PM.03: Project assessment and control

PM.04: Project closure

7.4.2.2 PM.01 Project planning (contributes to outcomes 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 deliverables
- system breakdown structure (SBS), to provide the list of system and system elements of the project
- project life cycle, including task dependencies and duration
- project quality assurance strategy through verification and validation of work products/deliverables, acquirer, stakeholders and work team reviews
- work team, acquirer and other stakeholders' roles and responsibilities
- project resources and training needs
- estimates of effort cost and schedule
- risk management approach
- disposal management approach
- change control process and configuration management strategy
- project repository to store, handle and deliver controlled product and document versions and baselines.

The task list for activity PM.01 is given in [Table 3](#).

Table 3 — PM.01 task list

Role	Task List	Input work products	Output work products
PJM SYS	PM.01.01 Review the agreement(s). 1) ISO/IEC 20246 defines different types of work product reviews.	Agreement(s) [approved]	Agreement(s) [reviewed]
PJM ACQ	PM.01.02 Define with the acquirer the delivery instructions of each one of the deliverables specified in the agreement(s).	Agreement(s) [reviewed]	Project plan [initiated]: — Delivery instructions
PJM DES	PM.01.03 Define the system breakdown structure (SBS) that represents the relationship between the system and its system elements.	System design document	Project plan [initiated]: — System breakdown structure

Table 3 (continued)

Role	Task List	Input work products	Output work products
	1) The system boundaries must be defined. 2) This task is iterative as the SBS is based on the system design document (SDD). The SDD is at the beginning a preliminary version and all system elements hierarchy is not necessarily defined completely. 3) The SBS is updated while the SDD is progressively completed.		
PJM WT	PM.01.04 Select a life cycle and define milestones according to the agreement.	Project plan [initiated]: — System breakdown structure	Project plan [initiated]: — Milestones
PJM	PM.01.05 Identify the specific tasks to be performed to produce the deliverables and their system elements identified in the agreement. 1) Include tasks in the SR process along with verification, validation and reviews with acquirer/other stakeholders and work team tasks to assure the quality of work products. 2) Identify the tasks to perform the delivery instructions. 3) Document the tasks.	Agreement(s) [reviewed] Project plan [initiated]: — System breakdown structure	Project plan [initiated]: — Tasks
PJM	PM.01.06 Establish the estimated duration to perform each task.	Project plan [initiated]: — Tasks	Project plan [initiated]: — Estimated duration
PJM	PM.01.07 Identify and document the resources. 1) Resources are: human, material, equipment and tools, standards, including the required training of the work team to perform the project. 2) Include in the schedule the dates when resources and training will be needed.	Agreement(s) [reviewed]	Project plan [initiated]: — Resources
PJM	PM.01.08 Establish the composition of work team assigning roles and responsibilities according to the resources.	Project plan [initiated]: — Resources	Project plan [initiated]: — Composition of work team
PJM	PM.01.09 Assign estimated start and completion dates to each one of the tasks. 1) To create the schedule of the project tasks considering the assigned resources, sequence and dependency of the tasks. 2) Define milestones of the project (e.g. end of phases, payments, deliveries)	Project plan [initiated]: — Tasks — Estimated duration — Composition of work team	Project plan [initiated]: — Schedule of the project tasks — Milestones
PJM	PM.01.10 Calculate and document the project estimated effort and cost.	Project plan [initiated]: — Schedule of the project tasks — Resources	Project plan [initiated]: — Estimated effort and cost

Table 3 (continued)

Role	Task List	Input work products	Output work products
PJM	PM.01.11 Identify and document a risk management approach. 1) The risks which may affect the project are identified	All elements previously defined	Project plan [initiated]: — Risk management approach
PJM	PM.01.12 Identify and document a disposal management approach. 1) Conditional task: If required in the agreement.	Agreement(s) [reviewed]	Project plan [initiated]: — Disposal management approach
PJM	PM.01.13 Document the configuration management strategy in the project plan. 1) Identify the configuration items. 2) Define the applicable configuration status. 3) Define the tasks and actors to manage the changes and the configuration.	Project plan [initiated]: — System breakdown structure	Project plan [initiated]: — Configuration management strategy
PJM	PM.01.14 Include system description, scope, objectives, deliverables, and reference to the agreement in the project plan.	Agreement [reviewed]	Project plan [initiated]: — System description — Scope — Objectives — Deliverables — Reference to the agreement
PJM	PM.01.15 Generate the project plan integrating the elements previously identified and documented.	All elements previously defined Project plan [initiated]: — Objectives — System description — Scope — System breakdown structure — Tasks — Deliverables	Project plan [initiated]: — Objectives — System description — Scope — System breakdown structure — Tasks — Deliverables — Estimated duration — Resources

Table 3 (continued)

Role	Task List	Input work products	Output work products
		— Estimated duration — Resources — Composition of work team — Schedule of the project task — Estimated effort and cost — Risk management approach — Configuration management strategy — Delivery instructions — Disposal management approach	— Composition of work team — Schedule of the project task — Estimated effort and cost — Risk management approach — Configuration management strategy — Delivery instructions — Disposal management approach
PJM WT	PM.01.16 Verify and obtain approval of the project plan. 1) Verify that all project plan elements are viable and consistent. 2) The results found are documented in a verification record and corrections are made until the document is approved by PJM.	Project plan [initiated]	Project plan verification record [published] Project plan [verified]
PJM ACQ STK	PM.01.17 Review and accept the project plan. 1) Acquirer and other stakeholders review and accept the project plan, making sure that the project plan elements match with the agreement.	Project plan [verified]	Project plan [approved] Meeting record [signed]
PJM	PM.01.18 Establish the project repository using the configuration management strategy.	Project plan [approved]: — Configuration management strategy	Project repository [established]
PJM WT	PM.01.19 Assign tasks to the work team members related to their role, according to the current project plan.	Project plan [initiated]: — Tasks	Project plan [assigned]: — Tasks

7.4.2.3 PM.02 Project plan execution (contributes to outcomes 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