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International Standard

ISO/IEC FDIS 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

Ingénierie des systèmes et du logiciel — Profils de cycle de vie pour très petits organismes (TPO) —

Partie 5-6-2: Lignes directrices d'ingénierie des systèmes du profil basique générique

ISO/IEC JTC **1**/SC **7**

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Foreword

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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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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 ISO/IEC TR 29110-5-6-2:2014, which had been technically 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.

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Introduction

0.1 Introduction to theISO/IEC29110series

For the ISO/IEC 29110 series, a very small entity (VSE) is an enterprise, an organization (e.g. government agency, non-profit organization), a department or a project having up to 25 people. Many VSEs either develop systems or maintain systems, or both, along with 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.

VSEs around the world are creating valuable products and services. According to the World Bank, small and medium 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, 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; 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 or tailoring ISO/IEC/IEEE 12207 or ISO/IEC/IEEE 15288 to the needs of a specific project. VSEs that have expertise in adapting or 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 the process performance, and the quality of either system or service, or both. Figure 1 describes the ISO/IEC 29110 series and positions the parts within the framework of reference.

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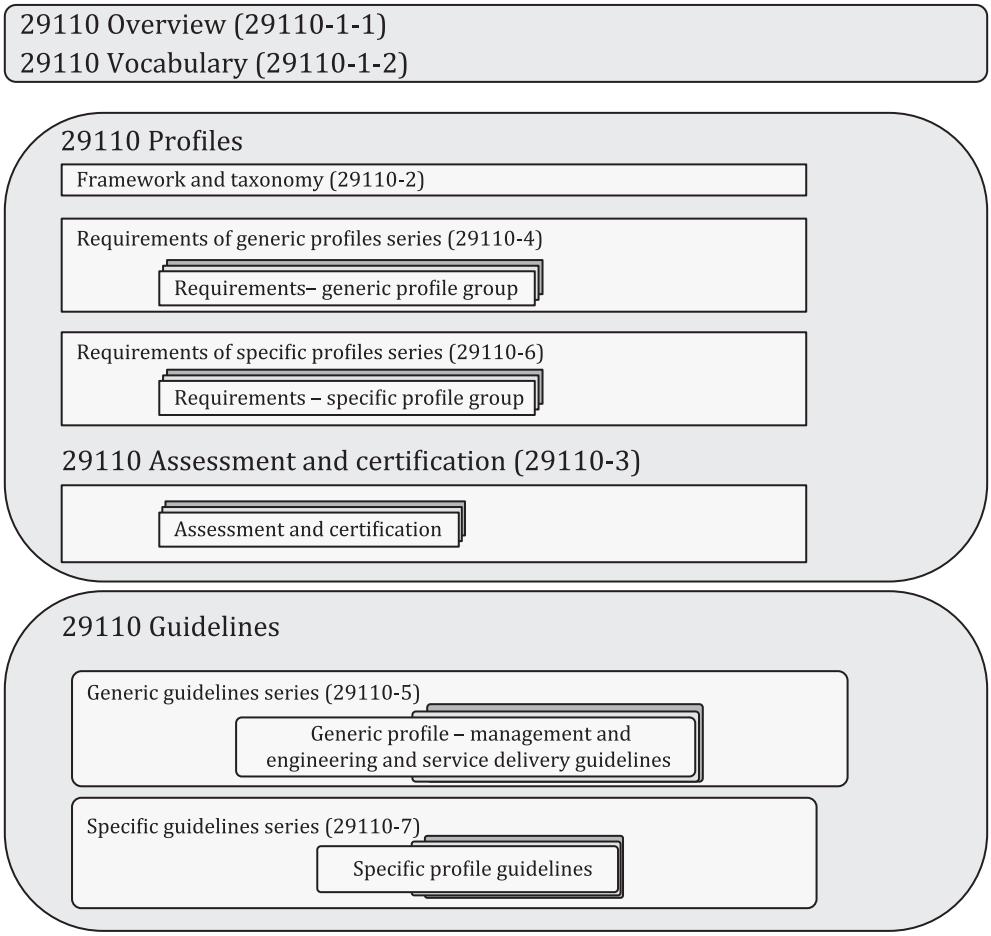


Figure 1 — The ISO/IEC 29110 series

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.

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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.

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 is performed before its start;

— project team, including project manager and system engineer, is assigned and trained;

— goods, services and infrastructure to start the project are available.

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

Annex A provides information about systems engineering deployment packages. Annex B provides a mapping between the outcomes of this document and the ISO/IEC/IEEE 15288.

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

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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 develop 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 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 terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1 Terms and definitions

3.1.1
acquirer
stakeholder that acquires or procures a *system* (3.1.14), product or service from a supplier

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

[SOURCE: ISO/IEC/IEEE 15288:2023, 3.1]

3.1.2
Advanced profile
profile (3.1.11) targeted at VSEs which want to sustain and grow as a competitive *system* (3.1.14) and/or software development organization

[SOURCE: ISO/IEC 29110-1-2:2024, 3.3]

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3.1.3
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]

3.1.4
Basic profile
profile (3.1.11) targeted at VSEs developing a single product by a single work team

[SOURCE: ISO/IEC 29110-1-2:2024, 3.18]

3.1.5
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.

[SOURCE: ISO/IEC 29110-5-6-4:2025, 3.6]

3.1.6
conditional task
task that can be mandatory under some specified condition(s), can be optional under other specified conditions, and can be out of scope or not applicable under other specified conditions

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

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

3.1.7
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

3.1.8
Entry profile
profile (3.1.11) targeted at start-up VSEs (i.e. VSEs who started their operation fewer than three years ago) and/or at VSEs working on a single small project (e.g. project size of less than 6 person-months)

[SOURCE: ISO/IEC 29110-1-2:2024, 3.40]

3.1.9
Intermediate profile
profile (3.1.11) 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, 3.48]

3.1.10
operator
individual or organization that performs the operations of a system

Note 1 to entry: The role of operator and the role of *user* (3.1.15) can be vested, simultaneously or sequentially, in the same individual or organization.

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

[SOURCE: ISO/IEC/IEEE 15288:2023, 3.24, modified — Note 3 to entry has been removed.]

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3.1.11
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 ISO/IEC/IEEE 12207, ISO/IEC/IEEE 15288 and ISO/IEC/IEEE 15289.

[SOURCE: ISO/IEC 29110-1-2:2024, 3.70]

3.1.12
safety-critical system
system whose failure or malfunction can result in one (or more) of the following outcomes:

— death or serious injury to people

— loss or severe damage to equipment or property

— environmental harm

EXAMPLE Examples of safety-critical systems are critical infra-structures, medical equipment, transportation, and nuclear power plants. Safety-critical systems are also sometimes called life-critical systems.

[SOURCE: ISO/IEC 23643:2020, 3.15]

3.1.13
small and medium enterprise
SME
enterprises with fewer than 250 persons employed

[SOURCE: ISO/IEC 29110-1-2:2024, 3.92, modified]

3.1.14
system
arrangement of parts or elements that together exhibit a stated behaviour or meaning that the individual constituents do not

Note 1 to entry: A system is sometimes 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" is substituted simply by a context-dependent synonym (e.g. aircraft), though this potentially obscures a system principles perspective.

Note 3 to entry: A complete system includes all of the associated equipment, facilities, material, computer programs, firmware, technical documentation, services, and personnel required for operations and support to the degree necessary for self-sufficient use in its intended environment.

[SOURCE: ISO/IEC/IEEE 15288:2023, 3.46]

3.1.15
user
individual or group that ineteracts with a *system* (3.1.14) or benefits from a system during its utilization

Note 1 to entry: The role of user and the role of *operator* (3.1.10) are sometimes vested, simultaneously or sequentially, in the same individual or organization.

[SOURCE: ISO/IEC/IEEE 15288:2023, 3.53]

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3.1.16
work breakdown structure
WBS
deliverable-oriented hierarchical decomposition of the work to be executed by the project team to accomplish the project objectives and create the required deliverables

Note 1 to entry: It organizes and defines the total scope of the project.

[SOURCE: ISO/IEC/IEEE 26511:2018, 3.1.42, modified — Note 1 to entry has been added.]

3.1.17
work product
artefact produced by a process

[SOURCE: ISO/IEC 15940:2013, 2.5, modified — Note 1 to entry has been removed.]

4 Conventions and abbreviated terms

4.1 General

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

4.2 Abbreviated terms

ACQ	acquirer
BM	business manager
DES	designer
DEV	developer
HW	hardware
PJM	project manager
PM	project management
SW	software
SBS	system breakdown structure
SDD	system design document
SE	systems engineering
SEMP	systems engineering management plan
SMART	specific, measurable, achievable, relevant and traceable
SR	system definition and realization
STK	stakeholder
SUP	supplier
SYS	systems engineer
V&V	verification, validation

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