INTERNATIONAL STANDARD

ISO/IEC 29110-2-1

First edition
2015-11-01

Software Engineering — Lifecycle profiles for Very Small Entities (VSEs) —

Part 2-1: Framework and taxonomy

Ingénierie du logiciel — Profil de cycle de vie pour très petits organismes (TPO) —

Partie 2-1: Cadre général et taxinomie

Reference number
ISO/IEC 29110-2-1:2015(E)

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the 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

The committee responsible for this document is ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*.

This second edition cancels and replaces the first edition (ISO/IEC 29110-2:2011), which has been technically revised.

The full list of parts of ISO/IEC 29110 is available here.

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Introduction

Very Small Entities (VSEs) around the world are creating valuable products and services. For the purpose of this part 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 lifecycle processes. To address some of these difficulties, a set of guides has been developed based on a set of VSE characteristics. The guides 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 International Standards and Technical Reports can be applied at any phase of system or software development within a lifecycle. This series of International 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.

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).

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Table 1 — ISO/IEC 29110 target audience

ISO/IEC 29110	Title	Target audience
Part 1	Overview	VSEs and their customers, assessors, standards producers, tool vendors, and methodology vendors.
Part 2	Framework	Profile producers, tool vendors, and methodology vendors. Not intended for VSEs.
Part 3	Assessment guide	VSEs and their customers, assessors, accreditation bodies.
Part 4	Profile specifications	VSEs, customers, standards producers, tool vendors, and methodology vendors.
Part 5	Management and engineering guide	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 TR 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 guides.

ISO/IEC TR 29110-3 defines certification schemes, assessment guidelines, and compliance requirements for process capability assessment (ISO/IEC 33xxx), conformity assessments (ISO/IEC 17xxx), and self-assessments for process improvements. ISO/IEC TR 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 that are based on subsets of appropriate standards elements.

ISO/IEC TR 29110-5-m-n provides a management and engineering guide for each profile in one profile group.

ISO/IEC TR 29110-6-x provides management and engineering guides not tied to a specific profile.

This part of ISO/IEC 29110 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, 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.

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

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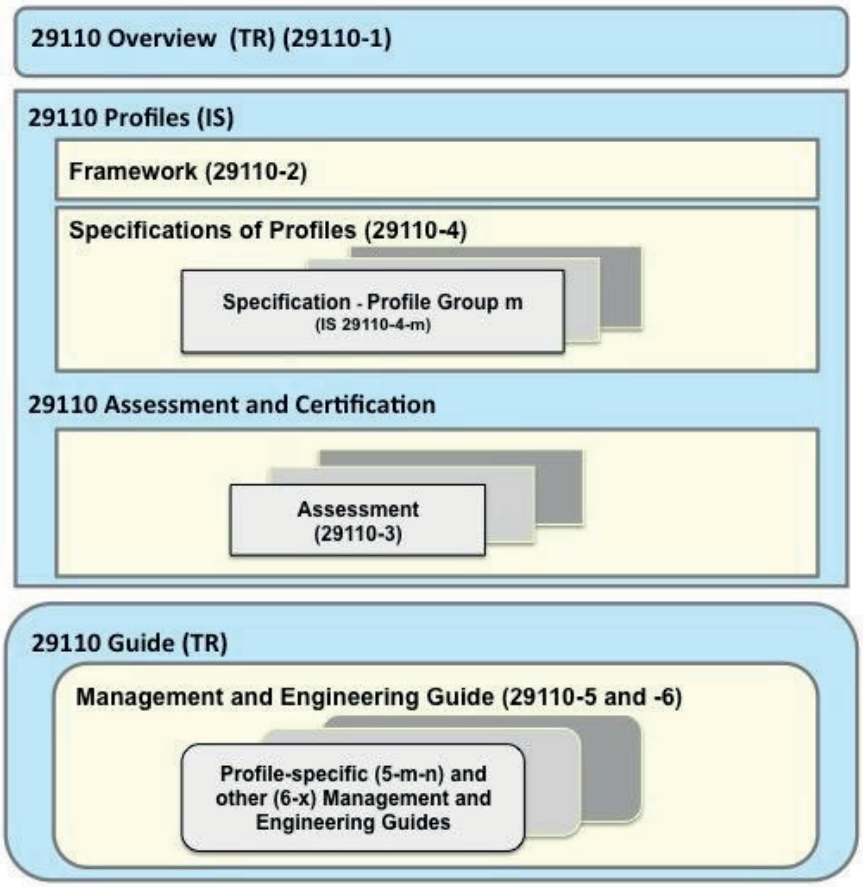


Figure 1 — ISO/IEC 29110 Series

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Software Engineering — Lifecycle profiles for Very Small Entities (VSEs) —

Part 2-1: Framework and taxonomy

1 Scope

1.1 Fields of application

ISO/IEC 29110 is applicable to Very Small Entities (VSEs). The lifecycle processes described in ISO/IEC 29110 are not intended to preclude or discourage their use by organizations bigger than VSEs. However, certain issues faced by large organizations might not be covered by ISO/IEC 29110.

The lifecycle processes defined in ISO/IEC 29110 can be used by VSEs when acquiring and using, as well as when creating and supplying, a software, and systems. They can be applied at any level in a software and systems structure and at any stage in the lifecycle. The processes described in ISO/IEC 29110 are not intended to preclude or discourage the use of additional processes that VSEs find useful.

This part of ISO/IEC 29110 introduces the major concepts for software and systems engineering profiles for VSEs, and defines the terms common to the set of documents associated with VSE profiles.

It establishes the logic behind the definition and application of profiles. It specifies the elements common to all standardized profiles (structure, conformance, assessment).

This part of ISO/IEC 29110 is applicable to all profiles.

1.2 Target audience

This part of ISO/IEC 29110 is targeted at authors and reviewers of standardized profiles, authors of other parts, and authors of other VSE profiles.

2 Conformance to standardized profiles

2.1 Overview

Conformance is specified within each profile specification document, published as ISO/IEC 29110-4-6[1)] for systems engineering and ISO/IEC 29110-4-1 for software engineering. The general rules for conformance to ISO/IEC 29110 profiles are in accordance with ISO/IEC TR 10000-1 and outlined in 2.2 and 2.3.

2.2 General principles

2.2.1 Tailoring and exclusions

ISO/IEC 29110 standardized profiles are pre-tailored packages of related software and systems engineering standards, therefore

— tailoring of ISO/IEC 29110 profiles is not needed nor allowed (except in one case outlined in 2.3.2),

— partial compliance is not allowed (except in one case outlined in 2.2.3), and

1) To be published.

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— there are no levels of conformance.

2.2.2 Extensions

It is acceptable for an implementation to incorporate elements beyond what is defined in the specification of the profile.

If a profile allows extensions, each implementation shall fully support all required elements of the profile specification exactly as specified, and the extensions shall be consistent with, and permit conformance with, elements defined in the profile specification. The conformance clause of profiles that allow extensions should include some additional, more specific, requirements, such as the following.

— Extensions shall not re-define semantics for existing elements.

— Extensions shall not cause standard-conforming implementations (i.e. processes that do not use the extensions) to be performed incorrectly.

— Extensions shall follow the principles and guidelines of the specification they extend, i.e. the specifications must be extended in a standard manner (see section below).

— For implementations and/or applications that contain extensions, extensions shall be clearly described in supporting documentation and the extensions shall be marked as such within the implementation/application.

— For implementations that contain extensions, there shall be a mode under which the implementation can be directed to produce only conformant files (documents) or to operate in a strictly conformant manner.

2.2.3 Conformance to base standards

The purpose of a standardized profile is to specify the use of sets of specifications to provide clearly defined functionality. Hence, conformance to ISO/IEC 29110 standardized profile specifications always implies conformance to the referenced base standards' specifications, if it is referenced in totality in the profile.

However, if only part of the base standard is referenced in the profile, the above statement is true inasmuch as the base standard conformance clause allows for tailored and partial compliance.

The conformance requirements of an ISO/IEC 29110 standardized profile shall relate to the conformance requirements in the base standards in the following ways.

a) Unconditional mandatory requirements in the base standards shall remain mandatory in the ISO/IEC 29110 profile.

b) Unconditional options in base standards may remain optional or may be changed within the profile to become:

    1) mandatory;

    2) conditional, giving rise to different statuses dependent upon some appropriate condition;

    3) out of scope, if the option is not relevant to the scope of the profile; for example, functional elements which are unused in the context of the profile;

    4) prohibited, if the use of the option is to be regarded as non-conformant behaviour within the context of the profile. This choice should only be used when really necessary, "out of scope" can often be more appropriate.

c) If the conditions in the conditional requirements in the base standards can be fully evaluated in the context of the profile, then these requirements become unconditional mandatory requirements or

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unconditional options, or they become out of scope or prohibited. Otherwise, the conditions remain conditional, with the appropriate, possibly partially, evaluated conditions.

2.3 Conformance requirements for standardized profiles

2.3.1 Conformance situations

Conformance can be interpreted differently for various situations. The relevant situation shall be identified in the claim of conformance.

ISO/IEC 29110 profiles can be implemented by organizations or projects implementing and using the processes and products prescribed by the profile.

NOTE The case where another ISO document, such as a Guide or Technical Report, complies with the profile specification is not considered implementation conformance and subject to conformance clauses. For instance, ISO/IEC TR 29110-5 guides comply with ISO/IEC 29110-4 profile specifications, and this is evidenced by a normative reference to ISO/IEC 29110-4 in ISO/IEC TR 29110-5, not by a conformance clause.

2.3.2 Conformance to a standardized profile

A product that claims conformance to an ISO/IEC 29110 standardized profile shall implement all the mandatory profile elements as identified in the profile specification ISO/IEC 29110-4-m, and the associated properties and requirements as described in the base standards when applicable. Conformance is achieved by demonstrating that the conforming product does not exclude, modify, or contradict any of the mandatory profile elements.

An organization that claims conformance to an ISO/IEC 29110 profile shall identify which profile it is claiming conformance to, and implement and use all the mandatory profile requirements as identified in the profile specific clauses of the profile specification ISO/IEC 29110-4-m, and the associated properties and requirements as described in the base standards when applicable. Conformance is achieved by demonstrating that:

— mandatory requirements for the lifecycle processes have been satisfied using the required input and output products as evidence;

— mandatory requirements for the lifecycle products (information items) and content (information item content) have been satisfied using the content of conformant work products as evidence.

Unless otherwise noted in the standardized profile conformance clause, conformance to the profile implies conformance to the base standards.

NOTE Information items are described as if it were published as a separate document. However, information items and their content will be considered as conforming if they are unpublished but available in a repository for reference, divided into separate documents or volumes, or combined with other information items into one document.

If a profile contains conditional mandatory requirements, then these requirements shall be grouped in a separately identifiable subclause, and the conformance clause in the profile specification ISO/IEC 29110-4-m shall identify what condition need to be met, and the specific subclause where there requirements are.

2.3.3 Limited conformance to the base standards included in the standardized profile

If an organization or a product cannot claim conformance to the profile, it can still claim conformance to the elements of the base standard included in the profile under the following conditions.

a) The base standard is not totally included in the profile (if it is totally included, then the implementation should claim conformance to the base standards).

b) The base standard's conformance clause allows for partial conformance and/or tailored conformance.

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In that case, the conformance clause shall refer only to the mandatory profile elements as identified in the profile specification ISO/IEC 29110-4-m that refer to the base standards in question, and are identified as mandatory (normative) in the base standards.

3 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC TR 10000-1:1998, *Information technology — Framework and taxonomy of International Standardized Profiles — Part 1: General principles and documentation framework*

4 Terms and definitions

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

4.1
activity
set of cohesive tasks of a process

[SOURCE: ISO/IEC/IEEE 12207]

4.2
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 15288:2015]

4.3
advanced profile
profile targeted at VSEs which want to sustain and grow as an independent competitive system and/or software development business

4.4
agreement
mutual acknowledgement of terms and conditions under which a working relationship is conducted

EXAMPLE Contract, memorandum of agreement.

[SOURCE: ISO/IEC/IEEE 12207]

4.5
assessment indicator
sources of objective evidence used to support the assessors' judgment in rating process attributes

EXAMPLE Work products, practice, or resource.

[SOURCE: ISO/IEC 33001]

4.6
assessor
individual who participates in the rating of process attributes

[SOURCE: ISO/IEC 33001]

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