INTERNATIONAL STANDARD

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

Part 2:
Framework and taxonomy

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

Partie 2: Cadre général et taxinomie

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

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.

ISO/IEC 29110-2 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*.

ISO/IEC 29110 consists of the following parts, under the general title *Software engineering — Lifecycle profiles for Very Small Entities (VSEs)*:

— *Part 1: Overview* [Technical Report]

— *Part 2: Framework and taxonomy*

— *Part 3: Assessment guide* [Technical Report]

— *Part 4-1: Profile specifications: Generic profile group*

— *Part 5-1-2: Management and engineering guide: Generic profile group: Basic profile* [Technical Report]

Parts 4 and 5 can be developed to accommodate new profile specifications and management and engineering guides as follows:

— *Part 4-m: Profile specifications: Profile group aaaaa*

— *Part 5-m-n: Management and engineering guide: Profile group aaaaa: Profile bbbbb* [Technical Report]

Introduction

The software industry recognizes the value of Very Small Entities (VSEs) in contributing valuable products and services. For the purpose of ISO/IEC 29110, a Very Small Entity (VSE) is an entity (enterprise, organization, department or project) having up to 25 people. VSEs also develop and/or maintain software that is used in larger systems; therefore, recognition of VSEs as suppliers of high quality software is often required.

According to the Organization for Economic Co-operation and Development (OECD) SME and Entrepreneurship Outlook report (2005) 'SMEs constitute the dominant form of business organisation in all countries world-wide, accounting for over 95 % and up to 99 % of the business population depending on country'. 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. Conformance with these standards is difficult, if not impossible. Subsequently VSEs have no, or very limited, ways to be recognized as entities that produce quality software in their domain. Therefore, VSEs are often cut off 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 application of the standards to their business practices. Most VSEs can neither afford the resources, in terms of number of employees, budget and time, nor do they see a net benefit in establishing software life cycle processes. To rectify some of these difficulties, a set of guides has been developed according to a set of VSE characteristics. The guides are based on subsets of appropriate standards elements, referred to as VSE Profiles. The purpose of a VSE profile is to define a subset of International Standards relevant to the VSE context, for example, processes and outcomes of ISO/IEC 12207 and products of ISO/IEC 15289.

ISO/IEC 29110, targeted by audience, has been developed to improve product and/or service quality, and process performance. See Table 1. ISO/IEC 29110 is not intended to preclude the use of different life cycles, such as waterfall, iterative, incremental, evolutionary or agile.

Table 1 — ISO/IEC 29110 target audience

ISO/IEC 29110	Title	Target audience
Part 1	Overview	VSEs, assessors, standards producers, tool vendors, and methodology vendors
Part 2	Framework and taxonomy	Standards producers, tool vendors and methodology vendors. Not intended for VSEs.
Part 3	Assessment guide	Assessors and VSEs
Part 4	Profile specifications	Standards producers, tool vendors and methodology vendors. Not intended for VSEs.
Part 5	Management and engineering guide	VSEs

If a new profile is needed, ISO/IEC 29110-4 and ISO/IEC TR 29110-5 can be developed without impacting existing documents and they become ISO/IEC 29110-4-m and ISO/IEC 29110-5-m-n, respectively, through the ISO/IEC process.

ISO/IEC TR 29110-1 defines the business terms common to the VSE Profile Set of Documents. It introduces processes, lifecycle and standardization concepts, and the ISO/IEC 29110 series. It also introduces the characteristics and requirements of a VSE, and clarifies the rationale for VSE-specific profiles, documents, standards and guides.

This part of ISO/IEC 29110 introduces the concepts for software engineering standardized profiles for VSEs, and defines the terms common to the VSE Profile Set of Documents. It establishes the logic behind the definition and application of standardized profiles. It specifies the elements common to all standardized profiles (structure, conformance, assessment) and introduces the taxonomy (catalogue) of ISO/IEC 29110 profiles.

ISO/IEC TR 29110-3 defines the process assessment guidelines and compliance requirements needed to meet the purpose of the defined VSEs Profiles. ISO/IEC TR 29110-3 also contains information that can be useful to developers of assessment methods and assessment tools. ISO/IEC TR 29110-3 is addressed to people who have direct relation with the assessment process, e.g. the assessor and the sponsor of the assessment, who need guidance on ensuring that the requirements for performing an assessment have been met.

ISO/IEC 29110-4-m provides the specification for all the profiles in one profile group that are based on subsets of appropriate standards elements. VSE Profiles apply and are targeted to authors/providers of guides and authors/providers of tools and other support material.

ISO/IEC TR 29110-5-m-n provides an implementation management and engineering guide for the VSE Profile described in ISO/IEC 29110-4-m.

Figure 1 describes the ISO/IEC 29110 series and positions the parts within the framework of reference. Overviews and guides are published as Technical Reports (TR), and profiles are published as International Standards (IS).
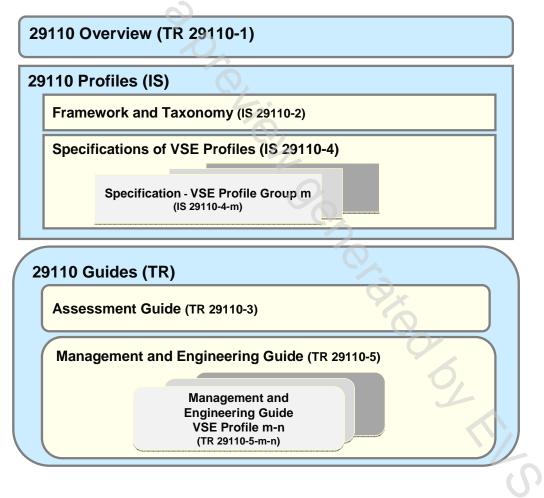
Figure 1 — ISO/IEC 29110 series

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

Part 2:
Framework and taxonomy

1 Scope

1.1 Fields of application

ISO/IEC 29110 is applicable to Very Small Entities (VSEs). The life cycle 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 life cycle processes defined in ISO/IEC 29110 can be used by VSEs when acquiring and using, as well as when creating and supplying, a software system. They can be applied at any level in a software system's 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 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) and introduces the taxonomy (catalogue) of ISO/IEC 29110 profiles.

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 Introduction

Conformance is specified within each profile specification document, published as ISO/IEC 29110-4-m. The general rules for conformance to ISO/IEC 29110 profiles are 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 engineering standards, therefore:

— Tailoring of ISO/IEC 29110 profiles is not needed nor allowed.

— Partial compliance is not allowed (except in one case outlined in 2.2.3).

— 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. However this can cause implementation interoperability problems, and could be accommodated by defining or using a richer 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 not contradict nor cause the non-conformance of 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 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 may 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:

— developers of products that facilitate the implementation and the use of the profile within organizations – these can be methods, courses, teaching aids, tools, forms;

— 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 a ISO/IEC 29110 profile shall implement and use 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:

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

— mandatory requirements for the lifecycle processes have been satisfied using the outcomes and products as evidence.

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

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.

— 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).

— The base standard's conformance clause allows for partial conformance and/or tailored performance.

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 referenced documents are indispensable for the application 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 TR 29110-1, *Software engineering — Lifecycle profiles for Very Small Entities (VSEs) — Part 1: Overview*

4 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC TR 29110-1 apply.

5 Conventions and abbreviated terms

5.1 Naming, diagramming and definition conventions

None.

5.2 Abbreviations

VSE   Very Small Entity

VSEs   Very Small Entities

SE   Software Engineering

6 Software engineering profiles for VSEs

6.1 Basic concepts

The context of Functional Standardization is one part of the overall field of IT standardization activities covering:

Base Standards, which define fundamentals and generalized procedures. They provide an infrastructure that can be used by a variety of applications, each of which can make its own selection from the options offered by them.