TECHNICAL REPORT

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Systems and software engineering — Lifecycle profiles for Very Small Entities (VSEs) —

Part 2-2: Guide for the development of domain-specific profiles

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

Partie 2-2: Guide de préparation de profils spécifiques à un domaine

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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).

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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*.

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

Introduction

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

According to the Organization for Economic Cooperation and Development (OECD) SME and Entrepreneurship Outlook report (2005) "Small and Medium Enterprises (SMEs) constitute the dominant form of business organization in all countries worldwide, accounting for over 95 % and up to 99 % of the business population depending on country". The challenge facing governments and economies is to provide a business environment that supports the competitiveness of this large heterogeneous business population and that promotes a vibrant entrepreneurial culture.

From studies and surveys conducted, it is clear that the majority of International Standards do not address the needs of VSEs. Implementation of and conformance with these standards is difficult, if not impossible. Consequently VSEs have no, or very limited, ways to be recognized as entities that produce quality systems/system elements including software in their domain. Therefore, VSEs are excluded from some economic activities.

It has been found that VSEs find it difficult to relate International Standards to their business needs and to justify the effort required to apply standards to their business practices. Most VSEs can neither afford the resources, in terms of number of employees, expertise, budget and time, nor do they see a net benefit in establishing over-complex systems or software life cycle processes. To address some of these difficulties, a set of 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 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 life cycle. 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 12207 or ISO/IEC/IEEE 15288 standards to the needs of a specific project. VSEs that have expertise in adapting/tailoring ISO/IEC 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.

Table 1 — ISO/IEC 29110 target audience

ISO/IEC 29110	Title	Target audience
ISO/IEC 29110-1	Overview	VSEs and their customers, assessors, standards producers, tool vendors and methodology vendors.
ISO/IEC 29110-2	Framework for profile preparation	Profile producers, tool vendors and methodology vendors. Not intended for VSEs.
ISO/IEC 29110-3	Certification and Assessment guidance	VSEs and their customers, assessors, accreditation bodies.
ISO/IEC 29110-4	Profile specifications	VSEs, customers, standards producers, tool vendors and methodology vendors.
ISO/IEC 29110-5	Management, engineering and service delivery guides	VSEs and their customers.
ISO/IEC 29110-6	Management and engineering guides not tied to a specific profile	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 set of 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 29110-2-1 introduces the concepts for systems and software engineering profiles for VSEs. It establishes the logic behind the definition and application of profiles. For standardized profiles, it specifies the elements common to all profiles (structure, requirements, conformance, assessment). For domain-specific profiles (profiles that are not standardized and developed outside of the ISO process), it provides general guidance adapted from the definition of standardized profiles.

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

ISO/IEC 29110-4-m provides the specification for all profiles in one profile group that are based on subsets of appropriate standards elements.

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

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

This part of ISO/IEC 29110 provides to any domain-specific group the guidance for developing a profile which is domain-specific to business situation of specific kind of VSEs. It may also be used by technical advisers including consultants to VSEs on software process problems. It also enhances a conceptual framework for standardized profile developers using the ISO/IEC 29110 series concept.

Figure 1 describes the International Standards (IS) and Technical Reports (TR) 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).

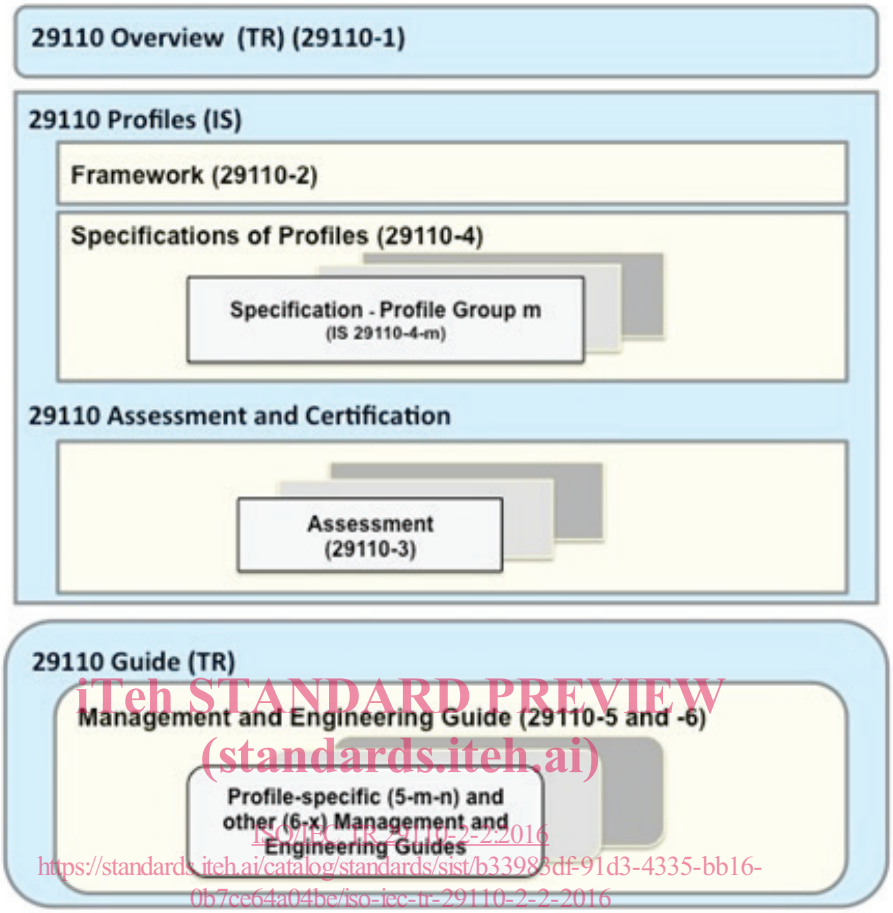


Figure 1 — ISO/IEC 29110 series

Systems and software engineering — Lifecycle profiles for Very Small Entities (VSEs) —

Part 2-2:
Guide for the development of domain-specific profiles

1 Scope

This part of ISO/IEC 29110 provides a guide for developing a profile which is domain-specific for VSEs (Very Small Entities) business situation. It may be used by technical advisers, including consultants, to help VSEs on software process problems. It also provides a conceptual framework for standardized profile developers using the ISO/IEC 29110 series concept.

2 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 29110-2-1, *Systems and software engineering — Lifecycle profiles for Very Small Entities (VSEs) —Part 2: Framework and taxonomy*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 29110-2-1 apply.

4 Abbreviations

VSE Very Small Entity

QCD Quality, Cost and Delivery

UML Unified Modelling Language

5 Overview of a domain-specific VSE profile

5.1 Preparation of a domain-specific VSE profile

The purpose of a domain-specific VSE profile is to define a subset of processes and product requirements for systems or software engineering. International Standards, such as ISO/IEC/IEEE 15288, ISO/IEC 12207, ISO/IEC/IEEE 15289 and others provide the base information for the development of the profile.

The preparation of a domain-specific VSE profile includes the following steps.

a) Determine VSE characteristics related to: finance, resources, internal business processes, target application domain characteristics and position in the supply chain.

b) Identify VSE needs, suggested knowledge and competencies derived from business and/or social practices and/or conventions and various regulation requirements.

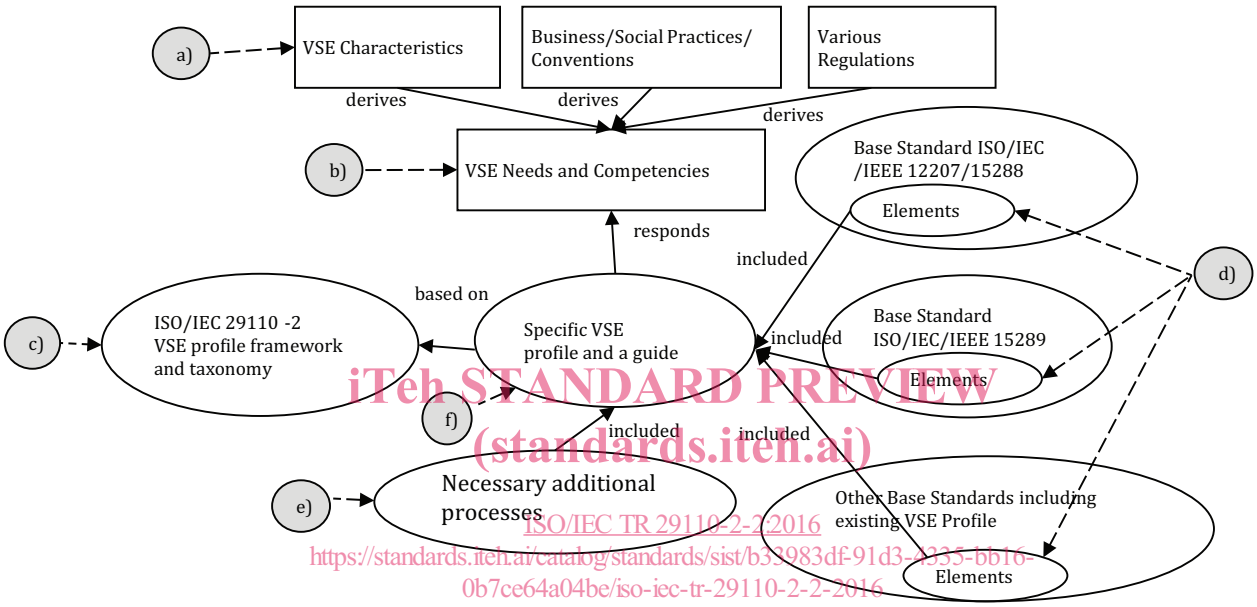
c) Specify domain-specific VSE profile elements required to respond to the VSE's needs and suggested competencies according to ISO/IEC 29110-2-1.

d) Select and link to the subset of specific VSE profile elements that map to the ISO/IEC/IEEE 15288, ISO/IEC 12207 processes or other appropriate domain specific process standard and to the subset of specific VSE product elements that map to the ISO/IEC/IEEE 15289 product elements or other appropriate domain specific work product standard.

e) Identify and specify other process and product elements.

f) Define a domain-specific VSE profile and/or its Management and Engineering Guide.

Figure 2 illustrates the steps to prepare a domain-specific VSE profile.



Key

rectangles	VSE situational elements
ellipses	standards or subsets of their elements
solid arrow	labeled relationships
circles with dashed arrows	reference to preparation steps

Figure 2 — Domain-specific VSE Profile preparation

A profile can be built not only from standards but also from a standardized profile. For example, a domain-specific profile could be built using the ISO/IEC 29110 Basic Profile and adding necessary processes following procedures introduced in Clause 7 and Clause 8.

A domain-specific profile may be defined by an organization other than a de-jure standardization organization. In such a case, the domain-specific profile is not a standardized profile in accordance with the ISO/IEC TR 10000-1 definition and the ISO/IEC 29110-2-1 definition.

5.2 Implementation of a domain-specific VSE profile

To implement a domain-specific VSE profile, a typical contract or agreement should be identified. This may be based on the customer and/or market requirements and/or regulations, supplemented by the business practices and/or conventions. Business practices and/or conventions are sometimes used to avoid the detailed requirement, but such an assumption should be clarified.

A VSE system or software development project follows the domain-specific VSE profile to fulfil the statement of work and to generate the products. A VSE can perform other activities to support the project, as required.

Figure 3 illustrates the context of the implementation rationale for a domain-specific VSE profile.

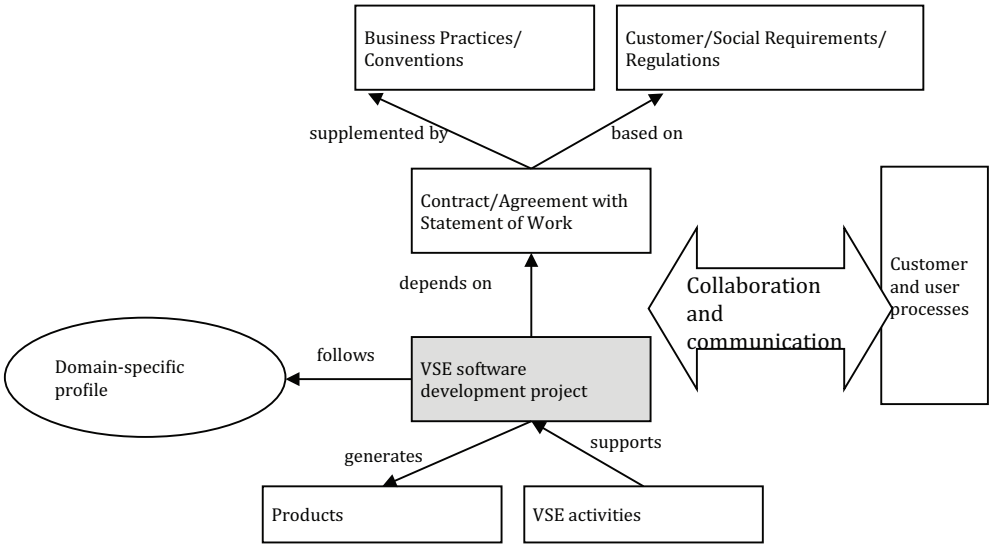


Figure 3 — Context of the implementation rationale for a domain-specific VSE profile

The notation of Figure 3 is similar to the notation of Figure 2.

5.3 VSE profile in a supply chain and operational environments

A software and/or system supplied to users are sometimes an output from a supply chain, i.e. a series of suppliers contributing to final products. The software and software intensive IT system is valuable while used and their criticality or integrity levels are defined based on the environment and context in which they are used. Stakeholders in a software and/or system supply chain should share necessary processes and/or practices to support software and/or system criticality or integrity levels. The VSE roles and responsibilities depend on their backgrounds.

A software and software intensive IT system sometimes has a wide range of influence on users, consumers and the public while in use. The consumer and public viewpoint should be considered when risks are analysed for software/system use. This consideration should also cover any environmental change impact of the systems usage.

Figure 4 shows the relationship between risk/integrity recognition and a domain-specific VSE profile.

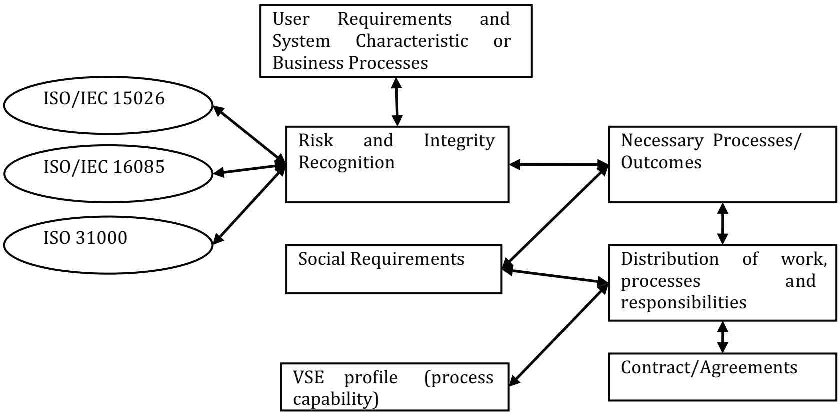


Figure 4 — Risk and/or integrity recognition for a domain-specific VSE profile

6 Background factors to identify a new domain-specific profile

6.1 User view for process purposes

A software or a system is expected to be dependable throughout its whole lifecycle by customers, end-user, and society. The user expects that the developer's lifecycle processes are complete and accurate for delivery of a dependable software/system.

Quality aspects of industrial processes are characterized to include quality, cost, and delivery (QCD). In addition, safety, security, and usability requirements are emphasized as important factors along with system functionality and benefits. Sometimes one software program and/or system is connected with another software program and/or system on a network. Some software program works with hardware components, such as control devices, so, in many situations, fully inter-operable and dependable software is required.

Operational mistakes often result from insufficient usability and integrity of software and IT systems. Systems and software used in an organization should support business continuity and sustainability of the organization. Based on this, system and/or software developed by VSEs should have the appropriate dependable quality characteristics from the user's point of view.

In addition, industrial software and/or system development should provide a dependable product with a reasonable cost and delivery schedule. That means integrity recognition is needed for a profile development.

A VSE should fulfil such expectations through its organizational activities and system and/or software processes. A domain-specific VSE profile should be developed to meet such expectations.

6.2 Contract and distribution of processes

A VSE usually works under an agreement or a contract with the acquirer. The contract should define a statement of work (SOW) for the VSE. The SOW should show explicitly, or implicitly in an appropriate case, the processes that the VSE should perform for that contract to fulfil and processes performed by the acquirer. From the user point of view, every necessary process should be distributed between the

