# International Standard

**ISO/IEC 29110-1-1**

## Systems and software engineering — Lifecycle profiles for very small entities (VSEs) —

### Part 1-1:
### Overview

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

*Partie 1-1: Aperçu général*

First edition
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# Contents

# 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 07, *Software and systems engineering*.

This edition of ISO/IEC 29110-1-1, together with ISO/IEC 29110-1-2, cancels and replaces ISO/IEC TR 29110-1:2016, which has been technically revised.

The main changes are as follows:

— addition of concepts from parts of the ISO/IEC 29110 series published since the publication of the ISO/IEC TR 29110-1:2016.

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

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.

# Introduction

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. 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.

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, the majority of International Standards did not address the needs of VSEs. Implementation of and conformity with these standards was difficult, if not impossible. See Annex A for additional information.

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 the specifications of the ISO/IEC 29110 series.

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 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 lifecycle such as: waterfall, iterative, incremental, evolutionary or agile.

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.
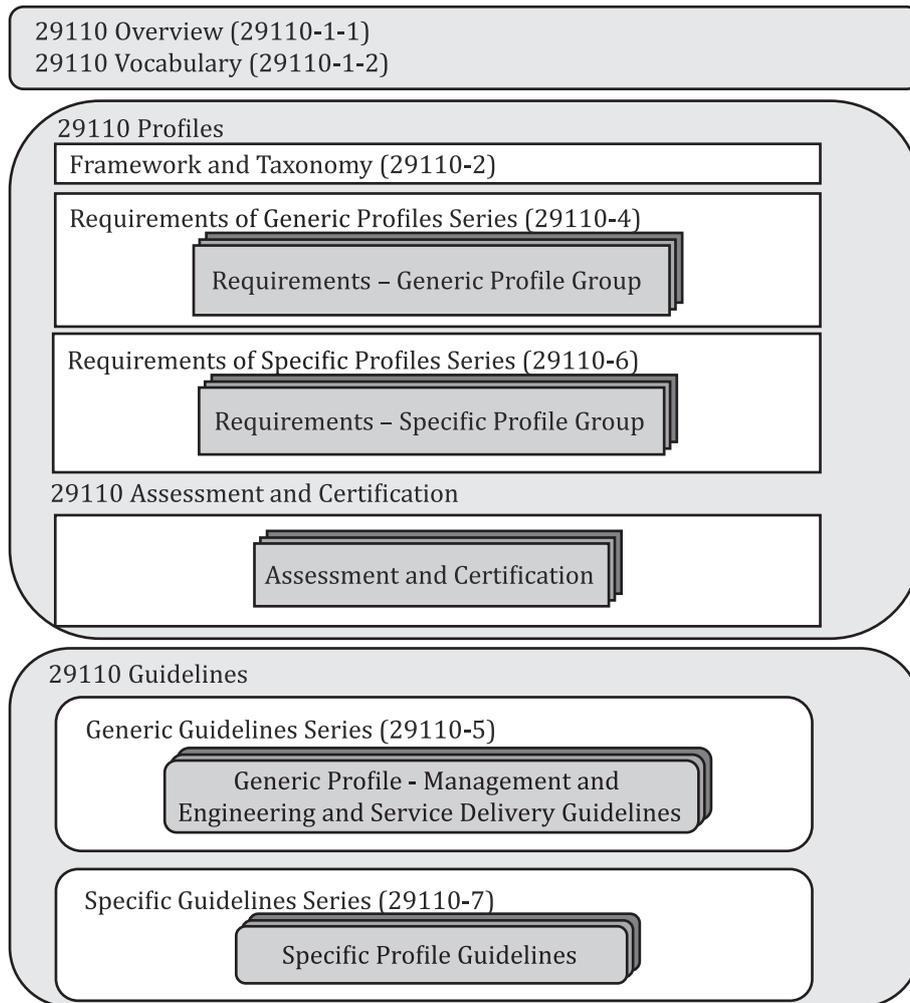
**Figure 1 — ISO/IEC 29110 series**

The life cycle processes defined in the ISO/IEC 29110 series can be used by a VSE when developing, acquiring and using, as well as when creating and supplying systems, having hardware and software elements. They can be applied at any level in a systems development, software's structure and at any stage in the life cycle. The life cycle processes defined in the ISO/IEC 29110 series are not intended to preclude or discourage the use of additional processes that a VSE finds useful.

This document is targeted both at the general audience wishing to understand the ISO/IEC 29110 series of documents, and more specifically, at users of the ISO/IEC 29110 series.

# Systems and software engineering — Lifecycle profiles for very small entities (VSEs) —

## Part 1-1:
## Overview

## 1 Scope

This document establishes the major concepts required to understand and use the ISO/IEC 29110 series. It specifies the characteristics and requirements of a VSE, and clarifies the rationale for VSE-specific profiles, documents, profile specifications and guidelines.

This document introduces the taxonomy (catalogue) of ISO/IEC 29110 profiles and the ISO/IEC 29110 series.

This document is applicable to a VSE but can also be used by an entity that is larger than a VSE.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 29110-1-2, *Standard atmospheres for conditioning and/or testing — Specifications*

## 3 Terms and definitions

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

## 4 Abbreviated terms

PLE        product line engineering

SSPL        software and systems product line

VSE        Very Small Entity

## 5 VSE Characteristics and VSE potential benefits

### 5.1 VSE characteristics

VSEs are subject to a number of characteristics, needs and desirable competencies that affect the contents, the nature and the extent of their activities. The profiles address a subset of VSEs which are described through the following characteristics, needs, and desirable competencies, classified in four categories: finance and resources, customer interface, internal business processes, and learning and growth. Amplification of these

characteristics is provided in ISO/IEC 29110-4, for example, ISO/IEC 29110-4-1, ISO/IEC 29110-4-2 and ISO/IEC 29110-4-3.

In some cases, a VSE is expected to perform limited missions in the entire systems and/or software development life cycle under the directions of either another organization or consortium fulfilling contract or agreement requirements. These missions may be a part of the systems development and/or software implementation project according to the statement of work. The VSE is chosen by its own competencies or by a bid for the project.

## 5.2 VSE potential benefits

From the VSE perspective, some benefits considered for using the ISO/IEC 29110 series include good internal system development processes, software management processes, greater customer confidence and satisfaction, greater systems and/or software product quality, increased sponsorship for process improvement and decreased development risk. These benefits can also help with increased competitiveness and market share.

## 6 Lifecycle process concepts

### 6.1 General

This clause provides life cycle process concepts that are considered in the ISO/IEC 29110 series and are supportive of the potential coordinated use of ISO/IEC/IEEE 12207, ISO/IEC/IEEE 15288, and ISO/IEC/IEEE 15289. It assists users in their management of information items as products of the system or software life cycle.

### 6.2 Systems concepts

The systems approach to solving a problem is to analyse and observe the system as a whole and identify the interrelationships among the parts that compose it, and also with the system environment (e.g. enabling systems). It also considers 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 can 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. Following this approach, when deploying the requirements in smaller modules, it helps ensure effective integration of the parts.

### 6.3 Life cycle models and stages

ISO/IEC/IEEE 12207:2017, 5.4.2 describes the life cycle model for the software and ISO/IEC/IEEE 15288:2015, 5.4.2 specifies the system life cycle stages.

### 6.4 Life cycle product types

This subclause helps to clarify that information items are essential to preserving what transpired when using system and/or software life cycle processes and be identified as deliverable documents. Information items allow project participants to have a common understanding of what is planned and how work is performed. The result of a process can be documented or may imply the need for a document (or information item) and often do not specify the contents.

The use of generic types simplifies the application of consistent structure, content, and formats for similar information items (records and documents), to support usability. Successive parts of the ISO/IEC 29110 series define the life cycle data of ISO/IEC/IEEE 12207 and ISO/IEC/IEEE 15288 by relating tasks and activities to generic information item types. Some example lifecycle product types are shown in Table 1.

**Table 1 — Example life cycle product types**

| Type | Purpose | Sample of recommended output information types |
|---|---|---|
| Record | Characterize the data an organizational entity retains. | Configuration record<br>Problem record |
| Description | Represent a planned or actual function, design, or item | High-level software design description |
| Plan | Define when, how, and by whom specific activities are to be performed. | Project management plan |
| Procedure | Define in detail when and how to perform certain activities or tasks, including tools needed. | Problem resolution procedure |
| Report | Describe the results of activities such as investigations, assessments, and tests. | Problem report<br>Validation report |
| Request | Record information needed to solicit a response. | Change request |
| Specification | Specify a required function, performance or process (such as, requirements specification, standard, policy). | Software requirements specification |
| NOTE      Adapted from ISO/IEC/IEEE 15289. | | |

## 7 Process improvement and assessment concepts

### 7.1 Process improvement concepts

The process improvement concept is to encourage a VSE's project teams to implement systematic approaches which allow for the repetition and realism in estimating and implementing a project.

Process improvement concepts characterize all actions undertaken to improve an organization's processes to both increase their efficiency and meet the organization's business goals. Some process improvement activities are addressed in ISO/IEC 29110-3-3 and ISO/IEC TR 29110-3-4.

Ideally, process improvement is driven by business goals such as increasing quality, productivity, customer satisfaction or increasing market share. Several approaches start with organizational goals identification, followed by identification of potential problems preventing the realization of these business goals. From this diagnosis, corrections are identified and implemented.

It can be easy for a VSE to over commit to a specific customer project based on their limited resources. Periodic assessments and communication (internal and external) of the project progress help ensure customer satisfaction.

### 7.2 Capability assessment concepts

Capability assessment concept refers to the determination of the extent to which the organization's processes contribute to the achievement of its business goals and to help the organization focus on the need for process improvement. For example, the assessment can be either formal or informal, use an outside evaluator or an internal evaluator, use a standard checklist or personnel interviews, etc.

### 7.3 Conformity assessment

The conformity assessment parts describe the process for conformity assessment requirements needed to get recognition of the implementation of defined VSE profiles. The targeted audience is primarily those who perform process certifications for VSEs and who have a direct relation with the certification process based on the VSE profiles.

Certification is carried out by certification bodies that operate certification schemas. There are ISO/IEC standards and guidelines that provide guidance and set the rules for conformity assessments, certification bodies, and certification schemas.

To increase confidence in certification, it can be useful to consider accreditation of certification bodies.

# 8 Standardization concepts

## 8.1 General

Recognizing the limitations of VSEs resources, the need for minimum processes and practices are supported in the scope of the ISO/IEC 29110 series. This allows the VSE to be flexible and achieve its organizational goals without compromising systems and software engineering processes.

NOTE    Rationale for defining each profile is described in ISO/IEC 29110-2-1.

## 8.2 Standard

Systems and software engineering standards focus on both processes and products aspects. They contain formal requirements, developed and used to prescribe consistent approaches to develop systems and software. Engineering standards have several objectives:

— to provide a common framework and vocabulary for project practitioners;

— to provide a framework for two-party agreements;

— to improve and evaluate competence;

— to facilitate process or product evaluation.

Standards contain normative and, in some cases, informative parts. The normative part of standards is used as requirements for conformity evaluation. The informative part of standards contains information that either complements or facilitates the understanding of or the use of the normative part.

The need for process improvement that improves quality should be a business issue for VSEs (e.g. for-profit organizations and for non-profit organizations), motivated by efficiency and effectiveness. In large organizations, large quantities of data are tracked in sophisticated ways, including application of Lean and six sigma tools. In VSEs, process improvement can be handled more informally.

## 8.3 Guidelines

Guidelines provide practical information to facilitate the implementation and assessment of the defined profiles.

## 8.4 Profile

A profile is a set of one or more base standards and/or standardized profiles, and, where applicable, the identification of chosen classes, conforming subsets, options and parameters of those base standards, or standardized profiles necessary to accomplish a particular function.

## 8.5 Profile group

A profile group is a collection of profiles which are related by composition of processes (i.e. activities, tasks). Amplification of these characteristics is provided in ISO/IEC 29110-2-1.

## 8.6 Generic profile group

The generic profile group is applicable to VSEs that do not develop critical systems or software products. The generic profile group does not imply any specific application domain. Amplification of these characteristics is provided in ISO/IEC 29110-2-1.

This profile group is a collection of four profiles (Entry, Basic, Intermediate, Advanced) providing a progressive approach to satisfying a vast majority of VSEs. VSEs targeted by the Entry profile are VSEs

working on small projects (e.g. project size of less than six person-months) and for start-up VSEs. The Basic profile describes a single product by a single project team of a VSE. The Intermediate profile is targeted at VSEs involved in the development of more than one project in parallel with more than one work team. The Advanced profile is targeted to VSEs which want to sustain and grow as an independent competitive system and/or software development business.

NOTE        The titles of the profiles are listed with a capital letter. As an example, the term 'Basic' is using a capital 'B' to indicate a profile of the ISO/IEC 29110 series (e.g. the Basic profile), while the term 'basic' is used when referring to the most important part of something (e.g. basic principles).

## 8.7   Use of profiles

Profiles are designed to be used by a VSE to implement specific functionality using guidelines published as an International Standard. At a minimum, each profile of the ISO/IEC 29110 series is linked to an assessment guideline and one or more implementation guidelines (e.g. management and engineering guidelines).

Additional materials, such as a deployment package, a set of artefacts developed to facilitate the implementation of a set of practices of the selected framework, are available to further facilitate the implementation of profiles by a VSE.

References to standardized profiles can simplify deployment and assessment of capabilities, processes, and services.

## 8.8   Conformity to profiles

Conformity to profiles may be complete, when all the required elements of the profile are satisfied or partially satisfied when a selected subset is completed.

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

For methodology related products and tools, conformity means that the proposed method or tools implements the required elements of the profile.

For the implementation of the required elements within a VSE, conformity means that all the requirements of the profile are met by the implementation. This can be evaluated through an assessment process.

These concepts provide the context and standardization details for the format and content of the profile, as required to support the principles and classification schema selected for them. Conformity to a VSE profile should be evaluated through an assessment defined in the assessment guidelines referenced by the VSE profile.

By conforming to International Standards, the VSE shows that their documents and work products are produced and supported consistent with defined process outcomes or activities.

## 9   Catalogue of VSE profile-based documents

### 9.1   General

NOTE        The profile identifier should not be confused with the part number in the ISO/IEC 29110 series, which generally use the profile identifier as a suffix to the part number.

### 9.2   Profile-based documents

Table 2 provides a list of the current documents of the ISO/IEC 29110 series.

**Table 2 — VSE profile-related documents**

| Profile group | Guidelines part ref. | Specification part ref. | Profile group ID | Profile identifier |
|---|---|---|---|---|
| Software engineering - generic | ISO/IEC 29110-5-1-1 | ISO/IEC 29110-4-1:2018, Clause 7 | 29110.1 | 29110.1.1 - Entry |
| | ISO/IEC 29110-5-1-2 | ISO/IEC 29110-4-1:2018, Clause 8 | | 29110.1.2 - Basic |
| | ISO/IEC TR 29110-5-1-3 | ISO/IEC 29110-4-1:2018, Clause 9 | | 29110.1.3 - Intermediate |
| | ISO/IEC TR 29110-5-1-4 | ISO/IEC 29110-4-1:2018, Clause 10 | | 29110.1.4 - Advanced |
| | ISO/IEC 29110-5-4 | | 29110.G4 | 29110.G1.4- Agile |
| Organizational management | ISO/IEC TR 29110-5-2-1 | ISO/IEC 29110-4-2:2021, Clause 7 | 29110.2 | 29110.2 – Organizational management |
| Service delivery | ISO/IEC TR 29110-5-3 | ISO/IEC 29110-4-3:2018, Clause 7 | 29110.3 | 29110.3.1 - Governance |
| | ISO/IEC TR 29110-5-3 | ISO/IEC 29110-4-3:2018, Clause 8 | | 29110.3.2 – Supporting processes |
| | ISO/IEC TR 29110-5-3 | ISO/IEC 29110-4-3:2018, Clause 9 | | 29110.3.3 – Continual improvement |
| Systems engineering - generic | ISO/IEC TR 29110-5-6-1 | | 29110.6 | 29110.6.1 - Entry |
| | ISO/IEC TR 29110-5-6-2 | | | 29110.6.2 - Basic |
| | ISO/IEC TR 29110-5-6-3 | | | 29110.6.3 - Intermediate |
| | ISO/IEC 29110-5-6-4 | | | 29110.6.4 - Advanced |

## 9.3 The software engineering generic profile group

### 9.3.1 General

The generic profile group has been identified as applicable to software engineering within the vast majority of VSEs that do not develop critical software and have typical situational factors. The generic profile group does not imply any specific application domain. However, it is envisaged that in the future new domain-specific sub-profiles may be developed.

Software can include computer programs, procedures, and possibly associated documentation and data pertaining to the operation of a computer system.

### 9.3.2 The Entry profile

The Entry profile is targeted at start-up VSEs (i.e. VSEs who started their operation less than 3 years) and/or at VSEs working on small project (e.g. project size of less than 6 person-months). The Entry profile is intended to be used with any processes, techniques and methods that enhance the VSE's customer satisfaction and productivity.

### 9.3.3 The Basic profile

The Basic profile is targeted at VSEs developing a single product by a single work team. The project may be to fulfil an external or internal contract. The internal contract does not need to be explicit between the project team and their client.

### 9.3.4    The Intermediate profile

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

### 9.3.5    The Advanced profile

The Advanced profile is targeted at VSEs which want to sustain and grow as an independent competitive system and/or software development business.

### 9.3.6    The agile profile

The agile profile provides guidelines for VSEs that want to reinforce their agile environment to develop software using an agile approach based on Scrum and XP with practices of the ISO/IEC 29110 series. The agile guidelines also facilitate the implementation of an agile approach for VSEs that are already using the software Basic profile of the ISO/IEC 29110 series.

## 9.4    The systems engineering generic profile group

### 9.4.1    General

The generic profile group has been identified as applicable to systems engineering within the vast majority of VSEs that do not develop critical system elements or products within the systems engineering processes and have typical situational factors. The generic profile group does not imply any specific application domain. However, it is envisaged that in the future new domain-specific sub-profiles may be developed.

A system can include the associated equipment, facilities, material, software, firmware, technical documentation, services and personnel required for operations and support to the degree necessary for use in its intended environment, e.g. enabling system, system-of-interest, system of systems.

### 9.4.2    The Entry profile

The Entry profile is targeted at start-up VSEs (i.e. VSEs who started their operation less than 3 years) and/or at VSEs working on small project (e.g. project size of less than 6 person-months). The Entry profile is intended to be used with any processes, techniques and methods that enhance the VSE's customer satisfaction and productivity.

### 9.4.3    The Basic profile

The Basic profile describes system development of a single product by a single work team with no special risk or situational factors. The project may be to fulfil an external or internal contract. The internal contract does not need to be explicit between the project team and their client.

### 9.4.4    The Intermediate profile

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

### 9.4.5    The Advanced profile

The Advanced profile is targeted at VSEs which want to sustain and grow as an independent competitive system and/or software development business.

## 9.5    The organizational management profile group

This profile group provides additional organizational management profile and guidance for systems engineering and software engineering profiles. Using the guidance, a VSE can obtain benefits in the following aspects for multiple project execution, and supervision of its performance making sure all processes are

executed according to the organizational strategy, continuous monitoring of the customer satisfaction, deployment and improvement of the organizational standard processes in all projects, and controlled provision of required resources.

## 9.6 The service delivery profile group

Service delivery is a set of services provided to customers (internal or external) after the system or software development phase. This profile group is targeted at VSEs that need to perform and manage service delivery processes, either for systems or software product that they have developed, or that were developed by others, and want to improve their competitiveness and competence.

## 9.7 Specific profile group — The space profile

The space profile provides a common framework for VSEs developing or maintaining software for the space domain, i.e. space VSEs. This profile is targeted at acquirers of space systems and software and services and for small suppliers, developers, managers, and quality assurance managers of software in the space domain.

# 10 Overview of the ISO/IEC 29110 series

## 10.1 General

The ISO/IEC 29110 series is comprised of multiple documents with different purposes and audiences. Documents are grouped in three categories overview, profiles and guidelines. The overview document, this document, is the introductory document for the set of other documents. The profile documents are the technical specifications for the packaging of the various profile elements. The guidelines are the user-oriented documents. Figure 1 describes the ISO/IEC 29110 series.

## 10.2 Profile specific documents

### 10.2.1 VSE profiles

VSE profiles are defined to formally package references to other documents and/or parts of other documents to adapt them to a VSEs needs and characteristics. It involves producing two types of documents, the profile specifications and the profile guidelines.

### 10.2.2 Generic profile group

The generic profile group is applicable to VSEs that do not develop critical systems or software products. The generic profile group does not imply any specific application domain.

### 10.2.3 Profile specifications

There is a profile specification for each profile. The purpose of the profile specifications is to provide the formal composition of a profile, provide normative references to the normative subset of standards (e.g. ISO/IEC/IEEE 12207, ISO/IEC/IEEE 15288 or ISO/IEC/IEEE 15289 used in the profile), and to provide informative references to "input" documents. There is one profile specification document for each profile group, which is identified as ISO/IEC 29110-4-1 for software engineering.

### 10.2.4 Management and engineering guidelines

The management and engineering guidelines provide guidance for implementation and use of a profile. They are targeted at VSEs management and technical staff and VSE-related organizations such as technology transfer centres, government industry ministries, national standards, consortiums and associations, academic use for training, authors of derived products (software, courseware), acquirers and suppliers.

Guidelines on how to implement and use profiles (e.g. recommended activities, measures, techniques, templates, models, methods) are provided. Generally, there is one management and engineering guideline document for each profile within each profile group.

### 10.2.5 Product line engineering

Intermediate and advance profiles may find product line engineering (PLE) beneficial to their work products. As the software and systems product line (SSPL) field has matured and achieved widespread attention in industry, a specific and repeatable approach to SSPL has emerged. This approach takes advantage of commercial off-the-shelf industrial-strength tools and technology, along with robust best practices for methods and processes, which automate and formalize many of the processes in domain and application engineering.

ISO/IEC 26580 provides a reference model consisting of an abstract representation of the key technical elements, tools, and methods of feature-based software and systems product line engineering (feature-based PLE). The result of feature based PLE is that less upfront analysis, design, and implementation effort is required prior to gaining the benefits from the approach.

Feature-based PLE is a specialization of SSPL engineering and management that is described in the more generalized ISO/IEC 26550 approach to SSPL. Both ISO/IEC 26580 and ISO/IEC 26550 focus on the benefits of exploiting a common platform of reusable assets for a product family.

## 10.3 Introductory documents

### 10.3.1 Overview

The overview introduces all the major concepts required to understand and use the ISO/IEC 29110 series. It introduces the characteristics and requirements of a VSE, and clarifies the rationale for VSE-specific profiles, documents, standards and guidelines. It also introduces process, life cycle and standardization concepts, the taxonomy (catalogue) and the ISO/IEC 29110 series. It is targeted both at a general audience interested in these documents, and more specifically at users of these documents. This document serves as the overview document.

### 10.3.2 Vocabulary

The vocabulary document defines the terms common to the ISO/IEC 29110 series. The vocabulary document is identified as ISO/IEC 29110-1-2.

## 10.4 Framework

The framework document establishes the logic behind the definition and application of process profiles. It specifies the elements common to all process profiles (structure, conformity, assessment) of ISO/IEC 29110 profiles. The framework document is applicable to all profiles and is identified as ISO/IEC 29110-2-1.

## 10.5 Domain specific profile

ISO/IEC TR 29110-2-2 provides the guidance for the elaboration of domain specific profiles.

## 10.6 Certification and assessment guidelines

### 10.6.1 Guidelines

Guidelines are developed for the process implementation and assessment based on the domain's issues, business practices and risks. Guidelines are targeted at VSEs, and should be accessible to VSEs, both in terms of style and cost.

### 10.6.2 Certification guidelines

The certification guidelines contain information that can be useful to developers of certification methods and certification tools. The targeted audience is primarily those who perform process certifications for VSEs and who have a direct relation with the certification process based on the VSE profiles, e.g. the auditor and the sponsor of the audit, who need guidance on ensuring that the requirements for performing an audit have been met. The assessment guidelines are applicable to all profiles and are identified as ISO/IEC 29110-3-3 and ISO/IEC 29110-3-4.

### 10.6.3 Assessment guidelines

The assessment guidelines describe the process to follow in performing an assessment to determine the process capabilities. This is used when an organization wants an assessment performed to obtain a process capability profile of the implemented processes and/or an organizational process maturity level. It is also applicable if a customer asks for a third-party assessment evaluation. This can also be used to obtain a capability level profile of the implemented process by the software implementation and maintenance provider and is also suitable for a self-assessment. The assessment guidelines are applicable to all profiles and are identified as ISO/IEC TR 29110-3-1.

### 10.6.4 Framework of autonomy-based improvement

The concept and framework of autonomy-based improvement method, targeted at VSEs that wants to improve their activities by themselves, is defined in ISO/IEC TR 29110-3-4.

## 10.7 Specific profile guidelines

These guidelines provide guidance for implementation and use of a particular technique within the context of one or multiple profiles. They are targeted at VSE management and technical staff and VSE-related.

# Annex A
## (informative)

# Reference works

## A.1 Rationale

Industry and organizations recognize the value of very small entities in contributing valuable products and services to economy. As quality increasingly becomes a subject of concern, and process approaches are maturing and gaining the confidence of companies, the use of ISO/IEC standards is spreading in organizations of all sizes. However, these standards were not written for development organizations having up to 25 people and are consequently difficult to apply in such small settings.

The ISO/IEC 29110 series aims to address those difficulties by developing profiles and by providing guidance for conformity with ISO/IEC systems and software engineering standards. The ISO/IEC 29110 series facilitates the use of ISO/IEC/IEEE 12207 software engineering processes, ISO/IEC/IEEE 15288 systems engineering processes, ISO/IEC/IEEE 15289 information items, and ISO 9001, and provide conformity to subsets of selected base standards by providing VSE profiles. Guidance is provided for each process profile together with a roadmap for conformity with ISO/IEC/IEEE 12207, ISO/IEC/IEEE 15288, and ISO 9001.

## A.2 Market study

A market survey of VSEs was conducted to ask questions about their utilization of ISO/IEC standards. The purpose of the survey was to collect data to identify problems and potential solutions to help VSEs apply ISO/IEC standards and become more competitive.

The survey underlined that there are three main reasons preventing VSEs from using ISO/IEC standards. The first is a lack of resources (28 %); the second is that standards are not required (24 %); and the third derives from the nature of the standards themselves: 15 % of the respondents consider that the standards are difficult and bureaucratic, and do not provide adequate guidance for use in a small business environment.

However, for a large majority (74 %) of VSEs, it is very important to be recognized or certified against a standard. ISO certification is requested by 40 % of them. However, VSEs are expressing the need for assistance to adopt and implement standards. Over 62 % would like more guidance with examples, and 55 % are asking for lightweight and easy-to-understand standards complete with templates.

## A.3 Users' study

In 2018, a survey was conducted in English, Spanish and French to obtain feedback from VSEs, their customers, auditors and assessors and educators.

VSEs were asked if they were satisfied with their overall ISO/IEC 29110 implementation. Over 88 % of the respondents indicated that they were completely or largely satisfied. Only 11 % indicated that they were partially satisfied. VSEs were also asked if they noticed improvements to quality and productivity: improvements in productivity (64 %), in quality (58 %) and process (73 %) were observed in the first six months after the implementation of ISO/IEC 29110. Only 4 respondents (7 %) did not observe an improvement to productivity or quality.

About to 80 % of customers were completely or largely satisfied with the VSEs that develop a product for them.

Since the ISO/IEC 29110 series is taught in over 20 countries, the survey obtained feedback from professors. The fact that the ISO/IEC 29110 guidelines are easily understandable, and many are freely available has greatly helped their adoption by professors.

For instance, in Thailand over ten universities are teaching and in Mexico over eleven universities have even obtained a formal ISO/IEC 29110 certification for their internal software development centres where teams of students execute their capstone projects. Professors also indicated that the management and engineering guidelines can be used 'as is' by students. Also, a few guidelines have been translated in Spanish, Portuguese, Czech and French. A motivation for academia to teach or use the ISO/IEC 29110 series in students' projects is the interest from local enterprises and public organizations.

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