# FINAL DRAFT
# International Standard

# ISO/IEC FDIS 29110-5-1-4

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

## Part 5-1-4: Software engineering guidelines for the generic Advanced profile

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

*Partie 5-1-4: Lignes directrices d'ingénierie du logiciel du profil avancé générique*

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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.

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

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

This first edition cancels and replaces ISO/IEC TR 29110-5-1-4:2018, which has been technically revised.

The main changes are as follows:

— task statements reworded, and text added to facilitate their understanding and use;

— support process, software transition and disposal process added as conditional process;

— conditional tasks have been added to develop optional work products (e.g. operation guide) that have been requested by a customer. This notation replaces the ‘Optional’ notation [e.g. *(optional)] used in the TR that caused ambiguities;

— terms added and modified in Clause 3;

— "agreement” and “contract” have been replaced with “agreement”.

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

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

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# Introduction

## 0.1 Introduction to theISO/IEC29110series

For the ISO/IEC 29110 series, a very small entity (VSE) is an enterprise, an organization (e.g. government agency, non-profit organization), department or project having up to 25 people. Many VSEs develop and/or maintain systems and the software components used in those systems, either as independent products or incorporated into the larger system. Due to this a recognition of VSEs as suppliers of high-quality products is required.

VSEs around the world are creating valuable products and services. According to the World Bank, small and medium enterprises (SMEs) account for about 90 % of enterprises worldwide. According to the Organisation for Economic Co-operation and Development (OECD), SMEs represent 99 % of all businesses and generate about 60 % of employment. Almost one person out of three is employed in a micro firm with less than 10 employees. The European Union reports that micro firms, with fewer than 10 persons, account for 93,5 % of all enterprises and small firms, with 10 to 49 employees, account for 5,5 % of all enterprises. The challenge facing OECD governments is to provide a business environment that supports the competitiveness of this large heterogeneous business population and that promotes a vibrant entrepreneurial culture.

From studies and surveys conducted, the majority of international standards do not address the needs of VSEs. Implementation of and conformity with these standards is difficult, if not impossible.

Consequently, VSEs have no, or very limited, ways to be recognized as entities that produce quality systems/system elements including software in their domain. Therefore, VSEs are excluded from some economic activities.

It has been found that VSEs find it difficult to relate international standards to their business needs and to justify the effort required to apply standards to their business practices. Most VSEs can neither afford the resources, in terms of number of employees, expertise, budget and time, nor do they see a net benefit in establishing over-complex systems or software life cycle processes. To address some of these difficulties, a set of guidelines has been developed based on a set of VSE characteristics. The guidelines are based on subsets of appropriate standards processes, activities, tasks, and outcomes, referred to as profiles. The purpose of a profile is to define a subset of international standards relevant to the VSEs' context, for example, processes, activities, tasks, and outcomes of ISO/IEC/IEEE 12207 for software; processes, activities, tasks, and outcomes of ISO/IEC/IEEE 15288 for systems; and information products (documentation) of ISO/IEC/IEEE 15289 for software and systems.

VSEs can achieve recognition through implementing a profile and by being audited against ISO/IEC 29110 specifications.

The ISO/IEC 29110 series can be applied at any phase of system or software development within a life cycle. The ISO/IEC 29110 series is intended to be used by VSEs that do not have experience or expertise in adapting or tailoring ISO/IEC/IEEE 12207 or ISO/IEC/IEEE 15288 to the needs of a specific project. VSEs that have expertise in adapting or tailoring ISO/IEC/IEEE 12207 or ISO/IEC/IEEE 15288 are encouraged to use those standards instead of the ISO/IEC 29110 series.

The ISO/IEC 29110 series is intended to be used with any life cycle such as waterfall, iterative, incremental, evolutionary or agile.

The life cycle processes described in the ISO/IEC 29110 series are not intended to preclude or discourage their use by organizations bigger than VSEs.

Systems, in the context of the ISO/IEC 29110 series, are typically composed of hardware and software components.

The ISO/IEC 29110 series, targeted by audience, has been developed to improve 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.

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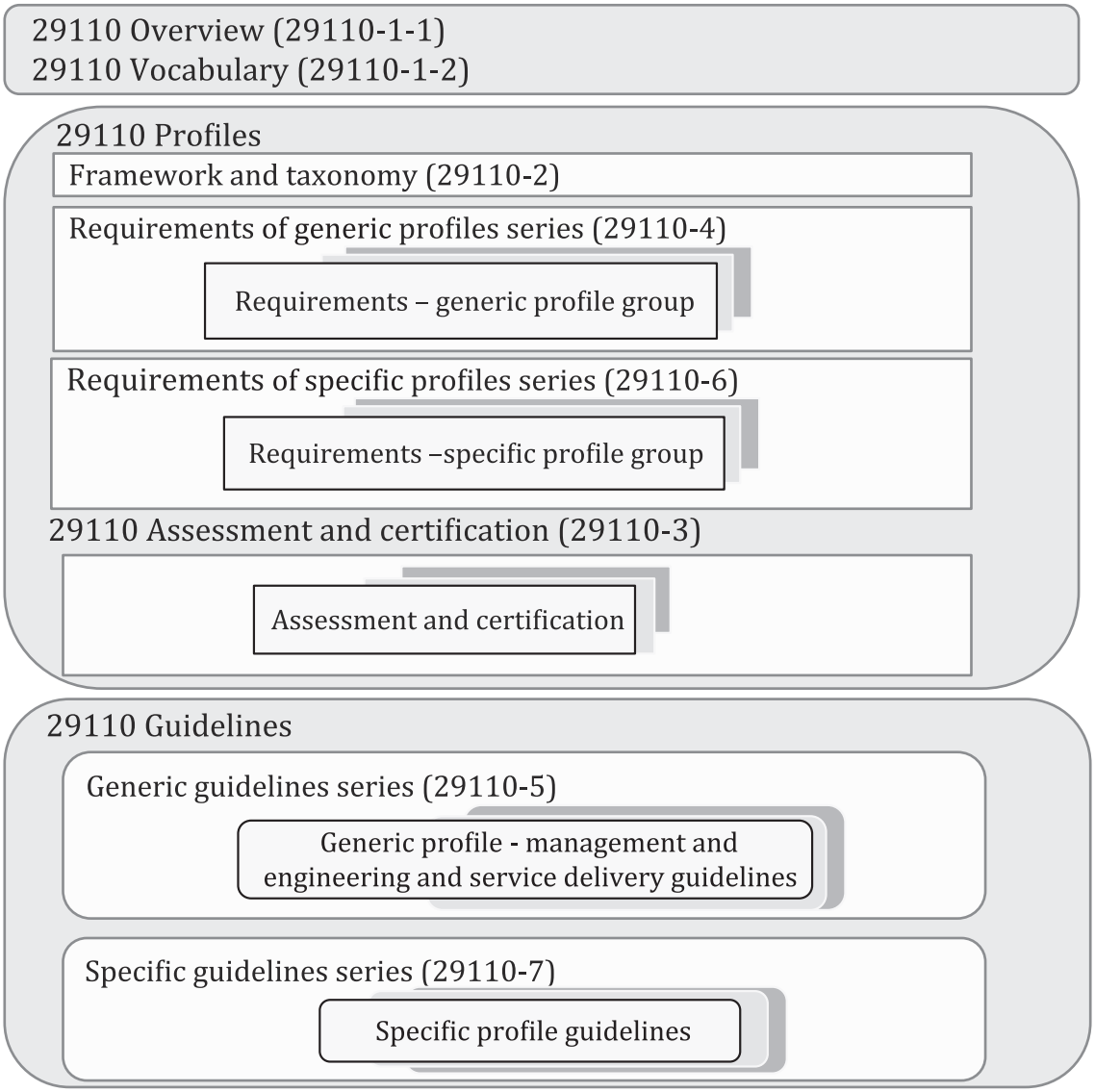



**Figure 1 — The ISO/IEC 29110 series**

ISO/IEC 29110-1-1 introduces processes, life cycle and standardization concepts, the taxonomy (catalogue) of ISO/IEC 29110 profiles and the ISO/IEC 29110 series. ISO/IEC 29110-1-1 also introduces the characteristics and needs of a VSE, and clarifies the rationale for specific profiles, documents, standards and guidelines. ISO/IEC 29110-1-2 defines the terms common to the ISO/IEC 29110 series. ISO/IEC 29110-1-1 and ISO/IEC 29110-1-2 are targeted at VSEs and their customers, assessors, standards producers, tool vendors and methodology vendors.

ISO/IEC 29110-2 introduces the concepts for systems and software engineering profiles for VSEs. It establishes the logic behind the definition and application of profiles. For standardized profiles, it specifies the elements common to all profiles (structure, requirements, conformity, and assessment). For domain-specific profiles (profiles that are not standardized and developed outside of the ISO process), it provides general guidance adapted from the definition of standardized profiles. ISO/IEC 29110-2 is targeted at profile producers, tool vendors and methodology vendors.

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

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and the sponsor of the audit, who need guidance on ensuring that the requirements for performing an audit have been met. ISO/IEC 29110-3 is targeted at VSEs and their customers, assessors, accreditation bodies.

ISO/IEC 29110-4 provides the specifications for all generic profiles of the generic profile group that are based on subsets of appropriate standards elements. ISO/IEC 29110-4 is targeted at VSEs, customers, standards producers, tool vendors and methodology vendors.

ISO/IEC 29110-5 provides a management, engineering and service delivery guidelines for profiles of the generic profile group. ISO/IEC 29110-5 is targeted at VSEs and their customers.

ISO/IEC 29110-6 provides the specifications for specific profiles that are based on subsets of appropriate standards elements. ISO/IEC 29110-6 is targeted at VSEs, customers, standards producers, tool vendors and methodology vendors.

ISO/IEC 29110-7 provides a guideline for each profile of the specific profile group. ISO/IEC 29110-7 is targeted at VSEs and their customers.

If a new profile is needed, ISO/IEC 29110-4 or ISO/IEC 29110-6 and or ISO/IEC 29110-7, ISO/IEC 29110-5 can be developed with minimal impact to existing documents.

### 0.2 Introduction to this document

This document is the fourth software profile of a four-profile software engineering roadmap (i.e. Entry, Basic, Intermediate and Advanced).

Since a VSE may be an enterprise, a project or a department of an organization, a customer of a VSE can be internal or external to the organization.

The outcomes and tasks are guidance, not requirements, for purposes of process assessment.

To use these guidelines, a VSE should be familiar with or have implemented ISO/IEC 29110-5-1-3, i.e. the Intermediate profile guidelines for its software development projects.

Using the guidelines of the Advanced profile, VSEs can obtain the following benefits:

— management and monitoring of more than one project in parallel with more than one work team;

— reuse of existing software components (e.g. code and document) in new projects;

— continuous measurement and evaluation of projects;

— continuous evaluation and improvement processes;

— continuous sustainability and growth;

— support to customers to ensure that an operational system or component fulfils its original requirements and any subsequent modifications to those requirements;

— support to customers in the disposal of software and installation of new software.

Annex A describes the deployment packages.

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

Once the software, developed by a VSE, has been accepted by their customer, the VSE that wants to provide after-delivery services can refer to ISO/IEC 29110-5-3.

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

## Part 5-1-4: Software engineering guidelines for the generic Advanced profile

## 1 Scope

This document describes processes targeted at VSEs that want to sustain and grow as an independent competitive software development business.

This document applies to VSEs that do not develop safety-critical products.

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

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

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

**3.1**
**activity**
set of cohesive *tasks* (3.31) of a *process* (3.17)

[SOURCE: ISO/IEC/IEEE 12207:2026 3.1.3]

**3.2**
**Advanced profile**
profile targeted at *VSEs* (3.39) which want to sustain and grow as an independent competitive system and/or software development business

[SOURCE: ISO/IEC 29110-1-2:2024, 3.3, modified — The word "independent" has been added; "organization" has been replaced by "business".]

**3.3**
**agreement**
mutual acknowledgement of terms and conditions under which a working relationship is conducted

EXAMPLE Contract, memorandum of agreement.

[SOURCE: ISO/IEC IEEE 12207:2026, 3.1.5]

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**3.4**
**baseline**
formally approved version of a configuration item, regardless of media, formally designated and fixed at a specific time during the configuration item's life cycle

[SOURCE: ISO/IEC/IEEE 12207:2026, 3.1.12]

**3.5**
**Basic profile**
*profile* (3.20) targeted at *VSEs* (3.39) developing a single product by a single work team

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

**3.6**
**business objective**
strategy designed by senior management to ensure an organization's continued existence and enhance its profitability, market share, and other factors influencing the organization's success

[SOURCE: ISO/IEC IEEE 24765:2017, 3.444]

**3.7**
**conditional process**
*process* (3.17) that can be mandatory under some specified conditions, can be optional under other specified conditions, and can be out of scope or not applicable under other specified conditions

Note 1 to entry: These shall be observed if the specified conditions apply.

**3.8**
**conditional task**
*task* (3.31) that can be mandatory under some specified condition(s), can be optional under other specified conditions, and can be out of scope or not applicable under other specified conditions

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

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

**3.9**
**customer**
person or organization that could or does receive a product or a service that is intended for or required by this person or organization

EXAMPLE Consumer, client, end-user, retailer, receiver of product or service from an internal *process* (3.17), beneficiary and purchaser.

Note 1 to entry: A customer can be internal or external to the organization.

[SOURCE: ISO 9000:—, 3.2.11]

**3.10**
**defect**
imperfection or deficiency in a *work product* (3.40) where that work product does not meet its *requirements* (3.24) or specifications and needs to be either repaired or replaced

[SOURCE: IEEE 1044:2009, IEEE dictionary]

**3.11**
**deployment package**
DP
set of artefacts developed to facilitate the implementation of a set of practices, of the selected framework, in a *very small entity* (3.39)

[SOURCE: ISO/IEC 29110-1-2:2024, 3.35]

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**3.12**
**Entry profile**
profile targeted at start-up *VSEs* (3.39) (i.e. VSEs who started their operation fewer than three years ago) and/or at VSEs working on a single small project (e.g. project size of less than 6 person-months)

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

**3.13**
**expected result**
observable predicted behaviour of the *test item* (3.32) under specified conditions based on its specification or another source

[SOURCE: ISO/IEC/IEEE 29119-1:2022, 3.35]

**3.14**
**generic profile group**
profile group applicable to *VSEs (very small entities)* (3.39) that do not develop safety critical systems or *software products* (3.28)

[SOURCE: ISO/IEC 29110-1-2:2024, 3.43]

**3.15**
**Intermediate profile**
profile targeted at *VSEs* (3.39) involved in the development of more than one project in parallel with more than one work team

[SOURCE: ISO/IEC 29110-1-2:2024, 3.48]

**3.16**
**integration testing**
testing in which software components, hardware components, or both are combined and tested to evaluate the interaction among them

[SOURCE: ISO/IEC/IEEE 24765:2017, 3.2034, modified — Note 1 to entry has been removed.]

**3.17**
**process**
set of interrelated or interacting *activities* (3.1) that transform inputs into outputs

[SOURCE: ISO/IEC/IEEE 12207:2026, 3.1.45]

**3.18**
**process purpose**
high-level objective of performing the *process* (3.17) and the likely outcomes of effective implementation of the process

[SOURCE: ISO/IEC/IEEE 24774:2021, 3.12]

**3.19**
**process outcome**
observable result of the successful achievement of the *process purpose* (3.18)

[SOURCE: ISO/IEC/IEEE 24774:2021, 3.11]

**3.20**
**profile**
subset of appropriate standards' *processes* (3.17) and their outcomes, *activities* (3.1) and *tasks* (3.31) combined to accomplish a particular function

Note 1 to entry: The base standards used to develop profiles for *VSEs* (3.39) are ISO/IEC/IEEE 12207 and ISO/IEC/IEEE 15288

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

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**3.21**
**report**
information item that describes the results of *activities* (3.1) such as investigations, observations, assessments, or tests

[SOURCE: ISO/IEC/IEEE 15289:2019, 3.1.22]

**3.22**
**review**
*process* (3.17) or meeting during which a *work product* (3.40), or set of work products, is presented to project personnel, managers, users, *customers* (3.9), or other interested parties for comment or approval

[SOURCE: ISO/IEC 29110-1-2:2024, 3.79, modified — The word "stakeholders" has been replaced by "interested parties".]

**3.23**
**risk**
effect of uncertainty on objectives

Note 1 to entry: An effect is a deviation from the expected. It can be positive, negative or both.

Note 2 to entry: Objectives can have different aspects (such as financial, health and safety, and environmental goals) and can be applied at different levels [such as strategic, organization-wide, project, product and *process* (3.17)].

Note 3 to entry: Risk is often characterized by reference to potential events and consequences, or a combination of these.

Note 4 to entry: Risk is often expressed in terms of a combination of the consequences of an event (including changes in circumstances) and the associated likelihood of occurrence.

Note 5 to entry: Uncertainty is the state, even partial, of deficiency of information related to, understanding or knowledge of, an event, its consequence, or likelihood.

[SOURCE: ISO 31073:2022, 3.1.1, modified — The original notes to entry have been replaced by new ones.]

**3.24**
**requirement**
statement that translates or expresses a need and its associated constraints and conditions

Note 1 to entry: A constraint is externally imposed limitation on the software, its design, or implementation or on the *process* (3.17) used to develop or modify a software.

Note 2 to entry: A condition is a measurable qualitative or quantitative attribute that is stipulated for a requirement and that indicates a circumstance or event under which a requirement applies.

[SOURCE: ISO/IEC/IEEE 12207:2026, 3.1.59, modified — Notes to entry have been added.]

**3.25**
**safety-critical product**
system whose failure or malfunction can result in one (or more) of the following outcomes: death or serious injury to people, loss or severe damage to equipment or property, or environmental harm

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

**3.26**
**security**
protection against intentional subversion or forced failure

Note 1 to entry: Security includes authenticity, accountability, confidentiality, integrity, availability, non- repudiation, and reliability, all of which have the related issue of their assurance.

[SOURCE: ISO/IEC/IEEE 12207:2026, 3.1.64]

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**3.27**
**small and medium enterprise**
**SME**
enterprise with less than 250 persons employed

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

**3.28**
**software product**
set of computer programs, procedures, and possibly associated documentation and data

[SOURCE: ISO/IEC/IEEE 12207:2026, 3.1.76, modified — Note 1 to entry has been removed.]

**3.29**
**stakeholder**
individual or organization having a right, share, claim, or interest in a system or in its possession of characteristics that meet their needs and expectations

[SOURCE: ISO/IEC/IEEE 12207:2026, 3.1.76, modified — EXAMPLE and notes to entry have been removed.]

**3.30**
**support**
set of activities necessary to ensure that an operational system or component fulfils its original requirements and any subsequent modifications to those requirements

Note 1 to entry: See also software life cycle, system life cycle.

EXAMPLE software or hardware maintenance, user training

**3.31**
**task**
required, recommended, or permissible action, intended to contribute to the achievement of one or more outcomes of a *process* (3.17)

[SOURCE: ISO/IEC/IEEE 12207:2026, 3.1.83]

**3.32**
**test item**
*work product* (3.40) to be tested

[SOURCE: ISO/IEC/IEEE 29119-1:2022, 3.107]

**3.33**
**test result**
indication of whether or not a specific test case has passed or failed, i.e. if the actual result observed as *test item* (3.32) output corresponds to the *expected result* (3.13) or if deviations were observed

[SOURCE: ISO/IEC/IEEE 29119-1:2022, 3.122, modified — The words "observed as test item output" have been added.]

**3.34**
**testing**
set of *activities* (3.1) conducted to facilitate discovery and evaluation of properties of one or more *test items* (3.32)

[SOURCE: ISO/IEC/IEEE 29119-1:2022, 3.131, modified — The words "one or more" have been added.]

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**3.35**
**traceability**
association established between two or more logical entities, especially entities having a predecessor-successor or primary-secondary relationship to one another, such as *requirements* (3.27), system elements, *verifications* (3.39), or *tasks* (3.33)

EXAMPLE Software features and test cases are typically traceable to software requirements.

[SOURCE: ISO/IEC/IEEE 12207:2026, 3.1.86]

**3.36**
**validation**
confirmation, through the provision of objective evidence, that the *requirements* (3.24) for a specific intended use or application have been fulfilled

Note 1 to entry: In a life cycle context, validation involves the set of *activities* (3.1) for gaining confidence that a system can accomplish its intended use, goals and objectives in an environment like the operational environment. The right system was built.

[SOURCE: ISO/IEC/IEEE 12207:2026, 3.1.89]

**3.37**
**verification**
confirmation, through the provision of objective evidence, that specified *requirements* (3.24) have been fulfilled

Note 1 to entry: Verification is a set of *activities* (3.1) that compares a system or system element against the required characteristics. This includes, but is not limited to specified requirements, design, descriptions, and the system itself. The system was built right.

[SOURCE: ISO 9000:—, 3.12.11, modified — Notes 1 to 3 to entry have been replaced by a new note 1 to entry.]

**3.38**
**version control**
establishment and maintenance of *baselines* (3.4) and the identification and control of changes to baselines that make it possible to return to the previous baseline

[SOURCE: ISO/IEC/IEEE 26511:2018, 3.1.40]

**3.39**
**very small entity**
**VSE**
enterprise, organization (e.g. government agency, non-profit organization), department or project having up to 25 people

[SOURCE: ISO/IEC 29110-1-2:2024, 3.124, modified — "(e.g. government agency, non-profit organization)" has been added.]

**3.40**
**work product**
**WP**
artefact produced by a *process* (3.17)

EXAMPLE Project plan, *requirements* (3.24) specification, design documentation, source code, test meeting minutes, schedules, budgets.

Note 1 to entry: A subset of the work products can be baselined to be used as the basis of further work and some form the set of project deliverables.

[SOURCE: ISO/IEC 20246:2017, 3.20, modified — The abbreviated term "WP" has been added; the words "and incident reports" have been removed from the EXAMPLE.]

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