FINAL DRAFT
International Standard

ISO/IEC FDIS 29110-5-5

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

Part 5-5: Agile/DevOps guidelines

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

Partie 5-5: Lignes directrices Agile/DevOps

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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 required 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*.

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.

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Introduction

0.1 Introduction to theISO/IEC29110 series

For the purpose of the ISO/IEC 29110 series, a very small entity (VSE) is an enterprise, organization (e.g. government agency, non-profit organization), department or project having up to 25 people. Since many VSEs develop and/or maintain systems and the software components used in those systems, either as independent products or incorporated in a larger system, 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. With such a large proportion of business activity carried out by VSEs, their participation in the economy is key to United Nations Sustainable Development Goal 8 – to promote inclusive and sustainable economic growth and decent work for all. The challenge facing 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 find it helpful to have specified procedures appropriate to their size when beginning agile projects, rather than attempting to interpret and tailor the more flexible, high-level process requirements of ISO/IEC/IEEE. To address some of these difficulties, a set of guidelines have been developed based on a set of VSEs 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 systems; and processes of ISO/IEC/IEEE 32675:2022 for DevOps practices; 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 can be applied at any phase of system or software development and support 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, ISO/IEC/IEEE 32675, or ISO/IEC/IEEE 15288 standards 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.

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 audiences, 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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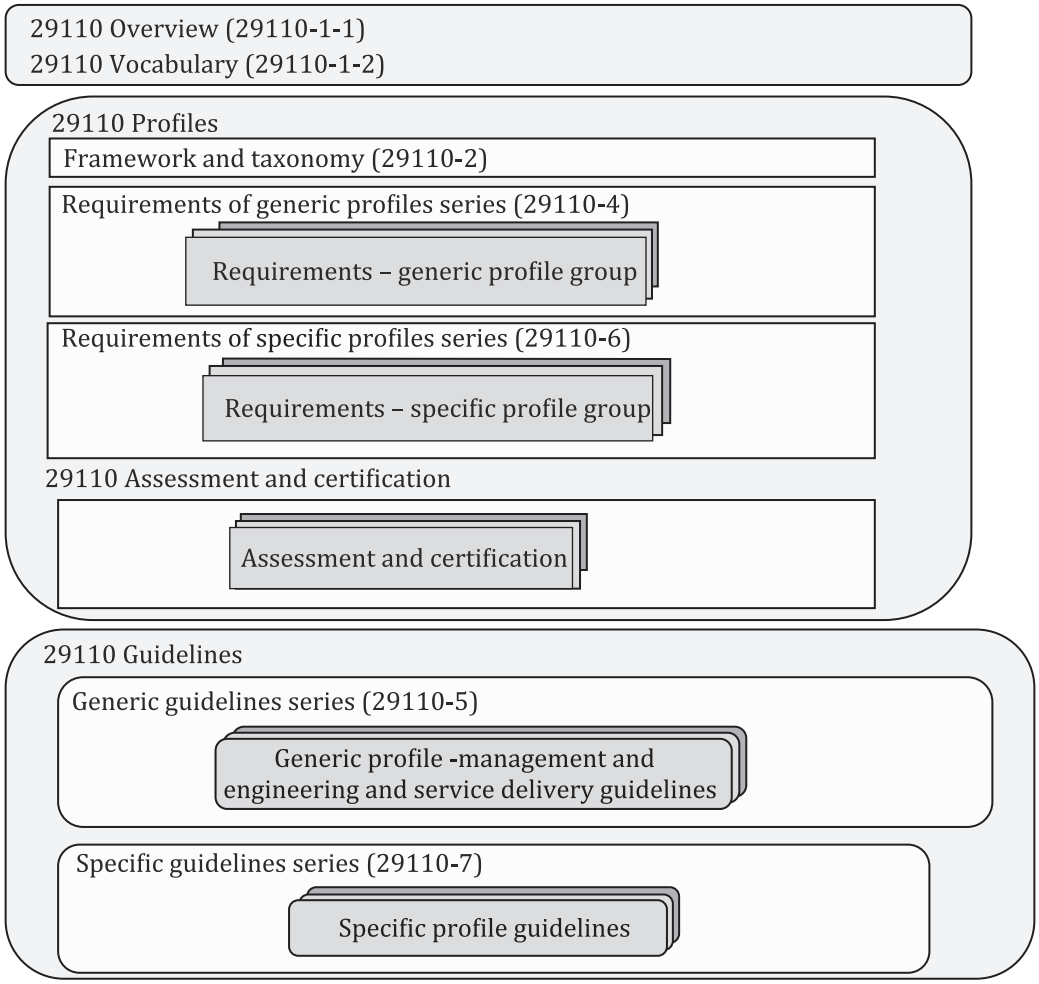


Figure 1 — The ISO/IEC 29110 series

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 (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 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 and 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.

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ISO/IEC 29110-5 provides 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 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 guidelines 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, 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 aims to help VSEs that want to reinforce their agile/DevOps environment to develop and support software products, or to add a DevOps approach to their agile approach with practices of the ISO/IEC 29110 series.

A combined agile and DevOps approach focuses on speed and quality of software development combined with continuous delivery of software into a production or production-like environment, optimizing the software development, deployment and support process. It emphasizes a self-organizing, collaborative culture that leverages automated processes and challenges non-value-added work. This can be perceived to be in opposition to the requirements to follow processes and documentation requirements specified in standards. However, this document provides a clear framework for a robust implementation of agile and DevOps practices which can facilitate the use of the ISO/IEC 29110 Basic profile.

DevOps and agile are separate approaches and do not have to be implemented together. However, they are complementary, and agile serves as an effective enabler for DevOps with its focus on small teams and high-quality code. The most likely VSE implementation of DevOps is in combination with an agile approach, which is the focus of this document.

Whilst DevOps focusses primarily on speed and quality, DevSecOps additionally focusses on integration of security as a shared responsibility throughout the IT life cycle. This document can also be used for DevSecOps guidance by highlighting the security focus when the DevOps approach is agreed.

This document provides examples of work product templates (see Annex A).

This document is based mainly on the scrum and XP agile methods (see Annex B) and on DevOps concepts (see Annex C).

This document also aims to help VSEs that want to follow the two processes of the software Basic profile of ISO/IEC 29110, as specified in ISO/IEC 29110-4-1, while performing their agile/DevOps practices (see Annex B and C).

This document has been developed, using the management and engineering guidelines of the ISO/IEC 29110-5-1-2 software Basic profile, by modifying and adding elements (e.g. task, work product, role) for VSEs involved in the development and support of software using an agile and DevOps combined approach (see Annex B and C). However, this document does not contain any requirements.

Using this document, VSEs can obtain the following benefits:

— project planning: by providing a set of events to enable the team to track the work and know what an impediment can be and assign tasks to each member of the team;

— effort estimation: by providing estimation techniques for the sprint planning event;

— progress tracking: by providing tools (e.g. burndown chart, product backlog, daily scrum) to update and track the work, the budget and the schedule until the project's closure;

— management of changes and artefacts: by providing a set of tasks to control the changes to the software and management work products;

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— clarity of each role: by providing a set of tasks for each role;

— agile risk management: by providing work products to identify and manage risks;

— reduced rework: by providing a set of tasks that minimize errors and handle the detection and correction of defects effectively;

— closer alignment between development and operations: by including operations support needs in project implementation to deliver an optimized end-to-end process;

— increased responsiveness to resolving customer issues which require development work: by integrating support incident responses into project work, rather than separating them into a separate work stream.

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

Part 5-5: Agile/DevOps guidelines

1 Scope

This document provides guidelines for very small entities (VSEs) who want to reinforce their agile/DevOps environment to develop and support software using an agile approach with practices of the ISO/IEC 29110 series.

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

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

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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

3.1.1
acceptance criteria
working *agreement* (3.1.6) on the required quality attribute that work meets before it completes a specified story or *feature* (3.1.20), item or artefact

[SOURCE: ISO/IEC 29110-5-4, 3.1.1]

3.1.2
agile
approach to development, delivery and maintenance of products and services by enabling rapid response to feedback

Note 1 to entry: The required specification for the software under development is elaborated with specific requirements only when the work is started. This lean principle is meant to avoid waste of work and to provide an *agile team* (3.1.5) with means of prioritizing their work.

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[SOURCE: ISO/IEC 33202:2024, 3.2, modified — In note 1 to entry, "need specification" has been replaced by "required specification".]

3.1.3
agile development
development approach based on iterative development, frequent inspection and adaptation, and incremental deliveries in which requirements and solutions evolve through collaboration in cross-functional teams and through continuous stakeholder feedback

[SOURCE: ISO/IEC/IEEE 26515:2018, 3.1, modified — Note 1 to entry has been removed.]

3.1.4
agile environment
organizational culture, *infrastructure* (3.1.23), and methodologies that support *agile development* (3.1.3)

[SOURCE: ISO/IEC/IEEE 26515:2018, 3.2]

3.1.5
agile team
organization or team using *agile development* (3.1.3) methods and approaches

Note 1 to entry: Typically, with roles such as team lead, project manager, user or user representative, software and information developers, and testers.

[SOURCE: ISO/IEC/IEEE 26515:2018, 3.3]

3.1.6
agreement
mutual acknowledgement of terms and conditions under which a working relationship is conducted

EXAMPLE Contract, memorandum of agreement.

[SOURCE: ISO/IEC/IEEE 12207:2017, 3.1.5]

3.1.7
backlog
collection of *agile* (3.1.2)*features* (3.1.20) or stories of both functional and *operational requirements* (3.1.26) that are typically sorted in an order based on value priority

[SOURCE: ISO/IEC/IEEE 26515:2018, 3.4, modified — "nonfunctional requirements" has been replaced by "operational requirements".]

3.1.8
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 12207:2017, 3.1.11]

3.1.9
Basic profile
profile targeted at VSEs developing a single product by a single work team

[SOURCE: ISO/IEC 29110-1-2:2024, 4.14]

3.1.10
build
operational version of a system or component that incorporates a specified subset of the capabilities that the final product will provide

[SOURCE: IEEE 828-2012, 2.1, IEEE dictionary]

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3.1.11
burndown chart
graph that represents the work remaining to do on a project

[SOURCE: ISO/IEC/IEEE 26511:2018, 3.1.6]

3.1.12
burnup chart
graphical representation of the work completed toward the release of a product

[SOURCE: Agile Practice Guide, Project Management Institute, 2017]

3.1.13
continuous integration
technique that continually merges artefacts, including source code updates from all developers on a team, into a shared mainline to build and test the developed system

[SOURCE: ISO/IEC/IEEE 32675:2022, 3.1]

3.1.14
daily scrum
brief daily meeting in *agile development* (3.1.3) methods where team members share accomplishments from the prior daily meeting, plans for the current day and identification of impediments

[SOURCE: ISO/IEC 29110-5-4, 3.1.29]

3.1.15
definition of done
DoD
statement on the required quality attributes that work meets before the work completes a specified life cycle activity or task and is ready for use

Note 1 to entry: 'Done' in a *DevOps* (3.1.16) environment includes deployment into a production environment or a production-like environment.

[SOURCE: ISO/IEC/IEEE 33202:2024, 3.13, modified — Note 1 to entry has been removed.]

3.1.16
DevOps
set of principles and practices which enable better communication and collaboration between relevant stakeholders for the purpose of specifying, developing, and operating software and systems products and services, and continuous improvements in all aspects of the life cycle

Note 1 to entry: DevOps uses lean principles to increase speed and quality of software delivery and may be regarded as the logical continuation of the *agile* (3.1.2) software journey.

[SOURCE: ISO/IEC/IEEE 32675:2022, 3.1, modified — Note 1 to entry has been added.]

3.1.17
DevOps specialist
DS
DevOps engineer
individual with a wide-ranging knowledge of both development and operations including coding, *infrastructure* (3.1.23) management, system administration and *DevOps* (3.1.16) tools

3.1.18
DevSecOps
DevOps (3.1.16) extended to include security capabilities as an essential and integral part of the development and operations processes

Note 1 to entry: Whilst DevOps is focused on increasing speed and quality of software development and delivery, the primary focus of DevSecOps is on securing the software development process by integrating security from the very beginning of the life cycle and throughout the software development, testing and support life cycle.

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[SOURCE: ISO/IEC TS 23167:2020, 3.11, modified — Note 1 to entry has been added.]

3.1.19
event
ceremony
key meeting in which a set of tasks are performed to help the *scrum lead* (3.1.38), *product owner* (3.1.32), and developer to organize, evaluate, and adjust the work to be done to develop a product

EXAMPLE *Sprint* (3.1.41) planning, *daily scrum* (3.1.14), sprint review and sprint retrospective.

[SOURCE: ISO/IEC 29110-5-4, 3.1.14]

3.1.20
feature
functional or operational distinguishing characteristic of a system

[SOURCE: ISO/IEC/IEEE 26515:2018, 3.7, modified — "nonfunctional" has been replaced by "operational"; the original note 1 to entry has been replaced by a new one.]

3.1.21
incident
anomalous or unexpected event, set of events, condition, or situation at any time during the life cycle of a project, product, service, or system

[SOURCE: ISO/IEC 12207:2017, 3.1.23]

3.1.22
increment
tested, deliverable version of a *software product* (3.1.39) that provides new or modified capabilities

[SOURCE: ISO/IEC 33202:2024, 3.17]

3.1.23
infrastructure
facilities such as power and physical security of the data centre, networking, hardware, and software needed to support the systems life cycle and maintain IT services

Note 1 to entry: Infrastructure does not include the associated people, processes, or documentation. In *DevOps* (3.1.15), software defined infrastructure enables elasticity.

[SOURCE: ISO/IEC/IEEE 32675:2021, 3.1]

3.1.24
left-shift
prioritizing the involvement of relevant stakeholders in applying quality activities, security, privacy, performance, verification, and validation earlier in the life cycle

[SOURCE: ISO/IEC/IEEE 32675:2021, 3.1]

3.1.25
measure
measure, noun
variable to which a value is assigned as the result of measurement

Note 1 to entry: The plural form “measures” is used to refer collectively to base measures, derived measures and indicators.

[SOURCE: ISO/IEC/IEEE 15939:2017, 3.15]

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3.1.26
operational requirement
non-functional requirement
requirement which defines how well a product or the environment in which it is developed and deployed performs

Note 1 to entry: Operational requirements include aspects such as performance, security, scalability, maintainability, automation. They complement functional requirements which are expressed in *agile* (3.1.2) methodologies as *user stories* (3.1.48).

3.1.27
pair programming
practice from eXtreme Programming (XP) that typically involves one developer writing source code or configuring a system while a second developer observes the work to look for errors and to determine whether the work completed is accurate and meets its requirements

Note 1 to entry: Pairs alternate roles periodically so a different developer writes code while the other developer observes.

[SOURCE: ISO/IEC 29110-5-4, 3.1.17]

3.1.28
planning poker
team-based estimation approach whereby relative estimates of the effort required to develop and test each *user story* (3.1.48) and *operational requirement* (3.1.27) are set via consensus

Note 1 to entry: The approach uses poker cards that are typically based on a Fibonacci sequence (i.e. 1, 2, 3, 5, 8, 13).

3.1.29
process purpose
high-level objective of performing the process and the likely outcomes of effective implementation of the process

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

3.1.30
process outcome
observable result of the successful achievement of the *process purpose* (3.1.29)

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

3.1.31
product backlog
emergent, ordered list of what is needed to improve the product

Note 1 to entry: It is the single source of work undertaken by the *agile team* (3.1.5).

[SOURCE: ISO/IEC 29110-5-4, 3.1.19]

3.1.32
product owner
designated stakeholder accountable for defining and accepting outcomes of the work and managing *backlog* (3.1.7), while aligning with the stakeholder needs

Note 1 to entry: A product owner is also the 'voice of the user' or the user representative on the team.

[SOURCE: ISO/IEC 33202:2024, 3.2, modified — Note 1 to entry has been added.]

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3.1.33
profile
subset of appropriate standards' processes and their outcomes, activities and tasks combined to accomplish a particular function

Note 1 to entry: The base standards used to develop profiles for VSEs are ISO/IEC/IEEE 12207, ISO/IEC/IEEE 15288 and ISO/IEC/IEEE 15289. With the addition of DevOps to the scope of the 29110 series, ISO/IEC/IEEE 32675 is introduced as a base standard for this document.

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

3.1.34
repository
organized and persistent data storage that allows data retrieval

[SOURCE: ISO/IEC/IEEE 26511:2018, 3.1.24]

3.1.35
safety-critical product
software 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

— environmental harm

[SOURCE: ISO/IEC 23643:2020, 3.15, modified — EXAMPLE has been removed.]

3.1.36
self-organizing team
group composed of motivated individuals working together toward meeting a goal

Note 1 to entry: They have the ability and authority for decision-making. They manage their work and readily adapt to changing demands.

Note 2 to entry: Principles of self-organizing teams are competency, collaboration, motivation, trust, respect and continuity.

3.1.37
scrum
iterative project management framework used in *agile development* (3.1.3), in which a team agrees on development items from *product backlog* (3.1.31) and produces them within a short duration of a few weeks

[SOURCE: ISO/IEC 29110-1-2:2024, 3.81]

3.1.38
scrum lead
person who facilitates the *scrum* (3.1.37) process within a team or project

[SOURCE: ISO/IEC/IEEE 24765:2017, 3.3638, modified — The term has been changed from "scrum master" to "scrum lead".]

3.1.39
service level agreement
SLA
documented agreement between a service provider and a customer that identifies services and service targets

[SOURCE: ISO/IEC 20110-1-2, 3.90]

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3.1.40
software product
set of computer programs, procedures, and possibly associated documentation and data

[SOURCE: ISO/IEC/IEEE 12207:2017, 3.1.54, modified – Note 1 to entry has been removed.]

3.1.41
sprint
short time frame, in which a set of software *features* (3.1.20) is developed, leading to a working product that can be demonstrated to stakeholders

Note 1 to entry: In some organizations, a sprint is known as an iteration.

[SOURCE: ISO/IEC/IEEE 24765:2017, 3.3914]

3.1.42
sprint backlog
iteration backlog
sprint catalogue
set of *backlog* (3.1.7) items [e.g. *user stories* (3.1.48)] that are selected for inclusion in a given *sprint* (3.1.40)

[SOURCE: ISO/IEC 29110-5-4, 3.1.32]

3.1.43
story points
units of measure for expressing an estimate of the overall effort required to fully implement a *product backlog* (3.1.31) item or any other piece of work

[SOURCE: ISO/IEC 29110-5-4, 3.1.33]

3.1.44
time-boxed
having a prescribed duration limit for a project task

[SOURCE: ISO/IEC 29110-5-4, 3.1.34]

3.1.45
task board
kanban board
scrum board
visual representation of an *agile team's* (3.1.5) progress within an iteration

[SOURCE: ISO/IEC 29110-5-4, 3.1.35]

3.1.46
technical debt
deferred cost of work not done at an earlier point in the product life cycle

[SOURCE: Software Extension to the PMBOK Guide Fifth Edition]

3.1.47
unit test
testing of individual routines and modules by the developer or an independent tester

[SOURCE: ISO/IEC/IEEE 24765:2017, 3.4429, definition 1]

3.1.48
user story
brief description of desired functionality

Note 1 to entry: A user story can describe the stakeholder roles, goals, benefits, and motivation.

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Note 2 to entry: Work items in the *backlog* (3.1.7) can also be referred in other ways like epics, *features* (3.1.20), items or artefacts.

[SOURCE: ISO/IEC 33202:2024, 3.27, modified – In Note 2 to entry, "work" has been replaced by "work items"; "items or artefacts" has been added.]

3.1.49
velocity
rate of current work unit completion, measured as work units completed per fixed time period, such as *story points* (3.1.43), delivered *features* (3.1.20), functions, function points, *user stories* (3.1.48), use cases, or requirements completed in a given time period

Note 1 to entry: Used as a measure of burndown rate or burnup rate.

[SOURCE: ISO/IEC/IEEE 32675:2022, 3.1]

3.2 Abbreviated terms

AN analyst

DES designer

DOT DevOps team

CUS customer

PM project management

PR programmer

PJM project manager

PO product owner

SIS software implementation and support

SL scrum lead

TE task event

TL technical lead

VSE very small entity

WP work product

4 Naming, diagramming and definition conventions

This clause provides a description of the process structure and the notation used to describe the processes.

Process name – process identifier, followed by its abbreviation in parentheses “( )”.

Process purpose – high level objective of performing the process and the likely outcomes of effective implementation of the process.

Process outcomes – observable result of the successful achievement of the process purpose. Outcomes are identified by the abbreviation of the process name, followed by the letter “O” and a consecutive number, for example PM.O1, SIS.O2.

Events – key meetings throughout the software development to organize, evaluate, and adjust the work to be done to develop a product in an agile environment. For the purpose of this document, an event is composed of a set of tasks to be performed. An event is the first level of process workflow decomposition, and the

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