TECHNICAL REPORT

ISO/IEC TR 29110-5-1-2

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

Part 5-1-2: Management and engineering guide: Generic profile group: Basic profile

Ingénierie du logiciel — Profils de cycle de vie pour très petits organismes (TPO) —
Partie 5-1-2: Guide d'ingénierie et de gestion: Groupe de profil générique: Profil basique

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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

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

In exceptional circumstances, when the joint technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide to publish a Technical Report. A Technical Report is entirely informative in nature and shall be subject to review every five years in the same manner as an International Standard.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC TR 29110-5-1-2 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*.

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

— *Part 1: Overview* [Technical Report]

— *Part 2: Framework and taxonomy*

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

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

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

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

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

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

Introduction

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

According to the Organisation for Economic Co-operation and Development (OECD) SME and Entrepreneurship Outlook report (2005) “SMEs constitute the dominant form of business organisation in all countries world-wide, accounting for over 95 % and up to 99 % of the business population depending on country”. The challenge facing OECD governments is to provide a business environment that supports the competitiveness of this large heterogeneous business population and that promotes a vibrant entrepreneurial culture.

From studies and surveys conducted, it is clear that the majority of International Standards do not address the needs of VSEs. Conformance with these standards is difficult, if not impossible, giving VSEs no way, or very limited ways, to be recognized as entities that produce quality software in their domain. Therefore, VSEs are often cut off from some economic activities.

It has been found that VSEs find it difficult to relate International Standards to their business needs and to justify their application to their business practices. Most VSEs can neither afford the resources, in terms of number of employees, budget and time, nor do they see a net benefit in establishing software lifecycle processes. To rectify some of these difficulties, a set of guides has been developed according to a set of VSE characteristics. The guides are based on subsets of appropriate standards elements, referred to as VSE profiles. The purpose of a VSE profile is to define a subset of International Standards relevant to the VSE context, for example, processes and outcomes of ISO/IEC 12207 and products of ISO/IEC 15289.

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

Table 1 — ISO/IEC 29110 target audience

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

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

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

ISO/IEC 29110-2 introduces the concepts for software engineering standardized profile for VSEs, and defines the terms common to the VSE Profile Set of Documents. It establishes the logic behind the definition and application of standardized profiles. It specifies the elements common to all standardized profiles (structure, conformance, assessment) and introduces the taxonomy (catalogue) of ISO/IEC 29110 profiles.

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

ISO/IEC 29110-4-1 provides the specification for all the profiles of the Generic Profile Group. The Generic Profile Group is applicable to VSEs that do not develop critical software products. The profiles are based on subsets of appropriate standards elements. VSEs' Profiles apply and are targeted to authors/providers of guides and authors/providers of tools and other support material.

This part of ISO/IEC 29110 provides an implementation management and engineering guide for the Basic Profile of the Generic Profile Group specified in ISO/IEC 29110-4-1. The Basic Profile describes software development of a single application by a single project team with no special risk or situational factors.

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

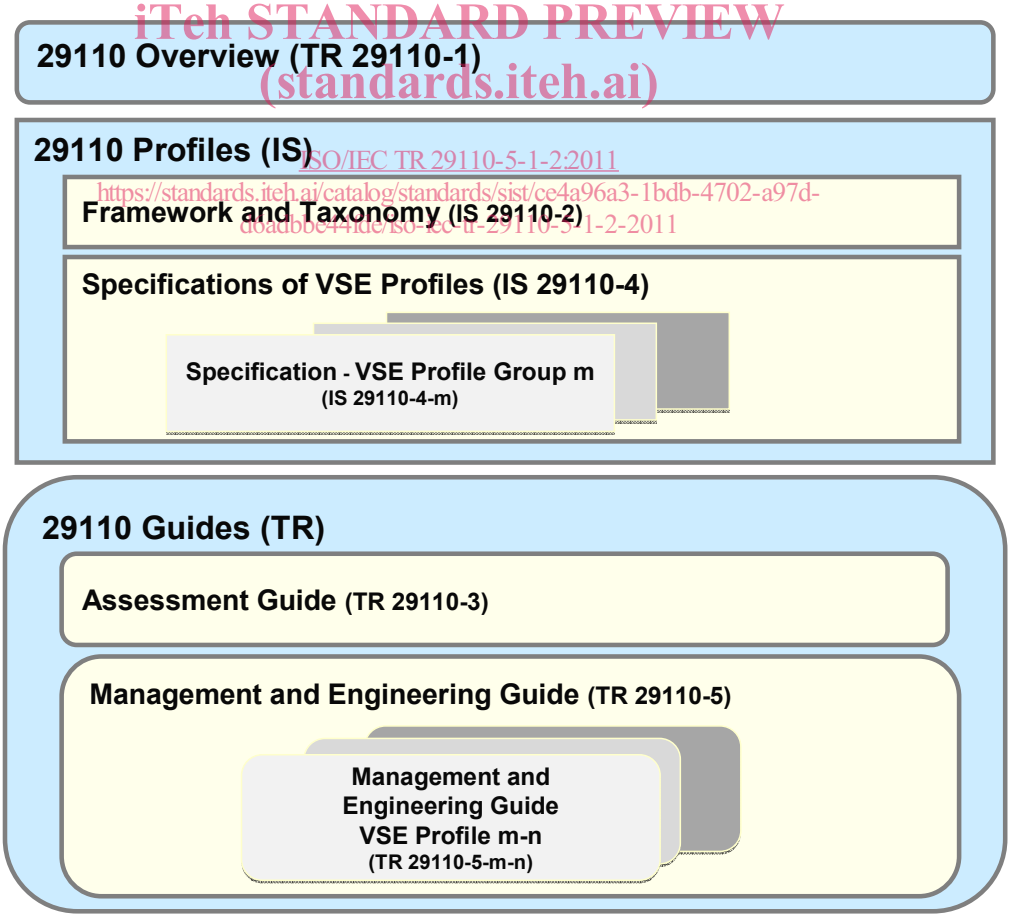


Figure 1 — ISO/IEC 29110 series

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

Part 5-1-2:
Management and engineering guide: Generic profile group: Basic profile

1 Scope

1.1 Fields of application

This part of ISO/IEC 29110 is applicable to Very Small Entities (VSEs). VSEs are enterprises, organizations, departments or projects of up to 25 people. The lifecycle processes described in ISO/IEC 29110 are not intended to preclude or discourage their use by organizations bigger than VSEs.

This part of ISO/IEC 29110 provides the management and engineering guide to the Basic VSE Profile specified in ISO/IEC 29110-4-1 through project management and software implementation processes. This part of ISO/IEC 29110 is a standalone guide; it is not intended for a VSE to use the standardized profile to implement this part of ISO/IEC 29110.

This part of ISO/IEC 29110 applies for software development projects, which can be to fulfil an external or internal contract. The internal contract need not be explicit between the project team and their Customer.

Using this part of ISO/IEC 29110, a VSE can obtain the following benefits.

- An agreed set of project requirements and expected products is delivered to the Customer.
- A disciplined management process that provides project visibility and corrective actions of project problems and deviations is performed.
- A systematic software implementation process that satisfies Customer needs and ensures quality products is followed.

1.2 Target audience

This part of ISO/IEC 29110 is targeted at VSEs.

It is intended to be used with any processes, techniques and methods that enhance the VSE's Customer satisfaction and productivity.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC TR 29110-1, *Software engineering — Lifecycle profiles for Very Small Entities (VSEs) — Part 1: Overview*

3 Terms and definitions

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

4 Conventions and abbreviated terms

4.1 Naming, diagramming and definition conventions

The following process structure description and notation are used to describe the processes.

Name – process identifier, followed by its abbreviation in brackets "( )".

Purpose – general goals and results expected of the effective implementation of the process. The implementation of the process should provide tangible benefits to the stakeholders. The purpose is identified by the abbreviation of the process name.

Objectives – specific goals to ensure the accomplishment of the process purpose. The objectives are identified by the abbreviation of the process name, followed by the letter "O" and a consecutive number, for example PM.O1, SI.O2, etc. Each objective is followed by the square box which includes a list of the chosen processes for the basic profile from ISO/IEC 12207:2008 and its outcomes related to the objective.

Input Products – products required to perform the process and its corresponding source, which can be another process or an external entity to the project, such as the Customer. Identified by the abbreviation of the process name and showed as two column table of product names and sources.

Output Products – products generated by the process and its corresponding destination, which can be another process or an external entity to the project, such as Customer or Organizational Management. Identified by the abbreviation of the process name and showed as two column table of product names and destinations.

Internal Products – products generated and consumed by the process. Identified by the abbreviation of the process name and showed as one column table of the product names.

All products' names are printed in cursive and initiate with capital letters. Some products have one or more statuses attached to the product name surrounded by square brackets "[ ]"and separated by ",". The product status may change during the process execution. See Clause 9 for the alphabetical list of the products, its descriptions, possible statuses and the source of the product. The source can be another process or an external entity to the project, such as the Customer.

Roles involved – names and abbreviation of the functions to be performed by project team members. Several roles may be played by a single person and one role may be assumed by several persons. Roles are assigned to project participants based on the characteristics of the project. The role list is identified by the abbreviation of the process name and showed as two column table. See Clause 8 for the alphabetical list of the roles, its abbreviations and required competencies description.

Diagram – graphical representation of the processes. The large round-edged rectangles indicate process or activities and the smaller square-edged rectangles indicate the products. The directional or bidirectional thick arrows indicate the major flow of information between processes or activities. The thin directional or bidirectional arrows indicate the input or output products. The notation used in the diagrams does not imply the use of any specific process lifecycle.

Activity – a set of cohesive tasks. Task is a requirement, recommendation, or permissible action, intended to contribute to the achievement of one or more objectives of a process. A process activity is the first level of process workflow decomposition and the second one is a task. Activities are identified by process name abbreviation followed by consecutive number and the activity name.

Activity Description – each activity description is identified by the activity name and the list of related objectives surrounded by brackets "( )". For example PM.1 Project Planning (PM.O1, PM.O5, PM.O6, PM.O7) means that the activity PM.1 Project Planning contributes to the achievement of the listed objectives: PM.O1, PM.O5, PM.O6 and PM.O7. The activity description begins with the task summary and is followed by the task descriptions table. The task description doesn't impose any technique or method to perform it. The selection of the techniques or methods is left to the VSE or project team.

Tasks description table contain four columns corresponding to:

— Role - the abbreviation of roles involved in the task execution.

— Task - description of the task to be performed. Each task is identified by activity ID and consecutive number, for example PM1.1, PM1.2, and so on.

— Input Products - products needed to execute the task.

— Output Products - products created or modified by the execution of the task.

Incorporation to *Project Repository* – list of products to be saved in *Project Repository*; the *Version Control Strategy* has to be applied to some of them (see Clause 6.7.2 and 7.7.2). It is useful as a checklist for project manager and technical leader.

NOTE: Tables used in process description are for presentation purpose only.

4.2 Abbreviated terms

VSE Very Small Entity

5 Overview

The Basic VSE Profile Management and Engineering Guide applies to a Very Small Entity (VSE) (enterprise, organisation, department or project up to 25 people) dedicated to software development. The project may fulfil an external or internal contract. The internal contract between the project team and its Customer need not be explicit.

The Guide provides Project Management and Software Implementation processes which integrate practices based on the selection of ISO/IEC 12207:2008, *Systems and software engineering — Software life cycle processes* and ISO/IEC 15289:2006, *Systems and software engineering — Content of systems and software life cycle process information products (Documentation)* standards elements. Annex A provides information about Deployment Packages which will facilitate the implementation of these processes.

This part of ISO/IEC 29110 is intended to be used by the VSE to establish processes to implement any development approach or methodology including, e.g., agile, evolutionary, incremental, test driven development, etc. based on the VSE organization or project needs.

Using the Guide, VSE can obtain benefits in the following aspects:

— An agreed set of project requirements and expected products is delivered to the Customer.

— A disciplined management process that provides project visibility and corrective actions of project problems and deviations is performed.

— A systematic software implementation process that satisfies Customer needs and ensures quality products is followed.

To use the Guide the VSE needs to fulfil the following entry conditions:

— project *Statement of Work* is documented;

— feasibility of the project was performed before its start;

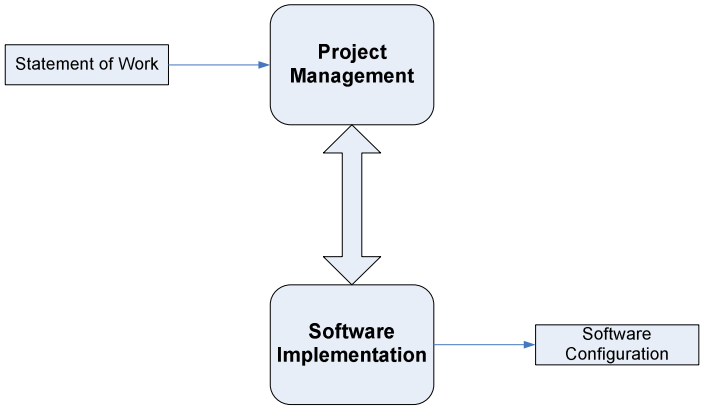
— project team, including project manager, is assigned and trained; and

— goods, services and infrastructure to start the project are available.

The purpose of the Project Management process is to establish and carry out in a systematic way the *Tasks* of the software implementation project, which allows complying with the project's *Objectives* in the expected quality, time and cost.

The purpose of the Software Implementation process is the systematic performance of the analysis, design, construction, integration and tests activities for new or modified software products according to the specified requirements.

Both processes are interrelated (see Figure 2).



NOTE Diagram notation is explained in 4.1.

Figure 2 — Basic profile guide processes

PM process uses the Customer's *Statement of Work* to elaborate the *Project Plan*. The PM project assessment and control tasks compare the project progress against the *Project Plan* and actions are taken to eliminate deviations or incorporate changes to the *Project Plan*. The PM project closure activity delivers the *Software Configuration*, produced by SI, and gets the Customer's acceptance to formalize the end of the project. A *Project Repository* is established to save the work products and to control its versions during the project.

The execution of the SI process is driven by the *Project Plan*. SI process starts with an initiation activity of the *Project Plan* revision. *Project Plan* will guide the execution of the software requirements analysis, software architectural and detailed design, software construction, software integration and test, and product delivery activities.

To remove product's defects verification, validation and test *Tasks* are included in the activities workflow.

The Customer provides a *Statement of Work* as an input to Project Management process and receives a *Software Configuration* as a result of Software Implementation process execution (see Figure 2).

6 Project Management (PM) process

6.1 PM purpose

The purpose of the Project Management process is to establish and carry out in a systematic way the *Tasks* of the software implementation project, which allows complying with the project's *Objectives* in the expected quality, time and costs.

This part of ISO/IEC 29110 is intended to be used by the VSE to establish processes to implement any development approach or methodology including, e.g., agile, evolutionary, incremental, test driven development, etc. based on the VSE organization or project needs.

6.2 PM objectives

PM.O1. The *Project Plan* for the execution of the project is developed according to the *Statement of Work* and reviewed and accepted by the Customer. The *Tasks* and *Resources* necessary to complete the work are sized and estimated.

6.3.1 Project Planning Process

a) the scope of the work for the project is defined;

c) the tasks and resources necessary to complete the work are sized and estimated;

e) plans for the execution of the project are developed; and

f) plans for the execution of the project are activated.

6.3.7 Measurement Process

a) the information needs of technical and management processes are identified.

[ISO/IEC 12207:2008, 6.3.1, 6.3.7]

PM.O2. Progress of the project is monitored against the *Project Plan* and recorded in the *Progress Status Record.* Corrections to remediate problems and deviations from the plan are taken when project targets are not achieved. Closure of the project is performed to get the Customer acceptance documented in the *Acceptance Record.*

6.3.2 Project Assessment and Control Process

a) progress of the project is monitored and reported;

c) actions to correct deviations from the plan and to prevent recurrence of problems identified in the project, are taken when project targets are not achieved; and

d) project objectives are achieved and recorded.

6.3.7 Measurement Process

d) the required data are collected, stored, analyzed, and the results interpreted; and

e) information products are used to support decisions and provide an objective basis for communication.

6.4.8 Software Acceptance Support Process

a) the product is completed and delivered to the acquirer;

7.2.8 Software Problem Resolution Process

b) problems are recorded, identified and classified; and

e) problems are tracked to closure.

[ISO/IEC 12207:2008, 6.3.2, 6.3.7, 6.4.8, 7.2.8]

PM.O3. The *Change Requests* are addressed through their reception and analysis. Changes to software requirements are evaluated for cost, schedule and technical impact.

7.1.2 Software Requirements Analysis Process

g) changes to the software requirements are evaluated for cost, schedule and technical impact.

[ISO/IEC 12207:2008, 7.1.2]

PM.O4. Review meetings with the Work Team and the Customer are held. Agreements are registered and tracked.

7.2.6 Software Review Process

a) management and technical reviews are held based on the needs of the project;

c) review results are made known to all affected parties;

d) action items resulting from reviews are tracked to closure.

[ISO/IEC 12207:2008, 7.2.6]

PM.O5. *Risks* are identified as they develop and during the conduct of the project.

6.3.4 Risk Management Process

c) risks are identified as they develop and during the conduct of the project;

7.2.6 Software Review Process

e) risks and problems are identified and recorded.

[ISO/IEC 12207:2008, 6.3.4, 7.2.6]

PM.O6. A software *Version Control Strategy* is developed. Items of *Software Configuration* are identified, defined and baselined. Modifications and releases of the items are controlled and made available to the Customer and Work Team. The storage, handling and delivery of the items are controlled.

7.2.2 Software Configuration Management Process

a) a software configuration management strategy is developed;

b) items generated by the process or project are identified, defined and baselined;

c) modifications and releases of the items are controlled;

d) modifications and releases are made available to affected parties;

g) the storage, handling and delivery of the items are controlled.

[ISO/IEC 12207:2008, 7.2.2]

PM.O7. Software Quality Assurance is performed to provide assurance that work products and processes comply with the *Project Plan* and *Requirements Specification*.

NOTE: The implementation of the Software Quality Assurance process is through the performance of the verifications, validations and review *Tasks* performed in Project Management and Software Implementation processes.

7.2.3 Software Quality Assurance Process

a) a strategy for conducting quality assurance is developed;

b) evidence of Software quality assurance is produced and maintained;

c) problems and/or non-conformance with requirements are identified and recorded; and

d) adherence of products, processes and activities to the applicable standards, procedures and requirements are verified.

[ISO/IEC 12207:2008, 7.2.3]

6.3 PM input products

Table 2 — PM input products

Name	Source
Statement of Work	Customer
Software Configuration	Software Implementation
Change Request	Customer Software Implementation