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Systems and software engineering — Life cycle management —

Part 2: Guidelines for the application of ISO/IEC/IEEE 15288 (system life cycle processes)

Ingénierie des systèmes et du logiciel — Gestion du cycle de vie — Partie 2: Lignes directrices pour l'application de l'ISO/IEC/IEEE 15288 (Processus du cycle de vie du système) —

Partie 2: Lignes directrices pour l'application de l'ISO/IEC/IEEE 15288 (processus du cycle de vie du système)

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Contents

Foreword	vii
Introduction.....	ix
1 Scope	1
2 Normative references.....	1
3 Terms and definitions	1
4 Overview of ISO/IEC/IEEE 15288	1
4.1 General	1
4.2 Structure of ISO/IEC/IEEE 15288.....	2
4.3 Context of ISO/IEC/IEEE 15288	2
4.4 Comparison of ISO/IEC/IEEE 15288 to prior version.....	5
5 Application concepts	5
6 Applying ISO/IEC/IEEE 15288.....	6
6.1 Overview.....	6
6.2 Application strategy.....	6
6.2.1 Overview.....	6
6.2.2 Planning the application.....	8
6.2.3 Conduct pilot project(s)	9
6.2.4 Formalise the approach.....	9
6.2.5 Institutionalise the approach.....	10
6.3 Application of system concepts.....	10
6.3.1 General.....	10
6.3.2 Systems.....	10
6.3.3 System structure	11
6.3.4 Structure in systems and projects.....	11
6.3.5 Interfacing, enabling and interoperating systems.....	11
6.4 Application of life cycle concepts	12
6.4.1 Overview.....	12
6.4.2 Decision gates	14
6.4.3 Application approaches	15
6.5 Application of organizational concepts	21
6.5.1 Overview.....	21
6.5.2 Methods and tools.....	24
6.5.3 Considerations and techniques	24

ISO/IEC/IEEE FDIS 24748-2:2023(E)

6.5.4	Management commitment	25
6.5.5	Uses of ISO/IEC/IEEE 15288 within an organization	25
6.6	Application of project concepts	26
6.7	Application of process concepts	26
6.7.1	General	26
6.7.2	Application of agreement processes (ISO/IEC/IEEE 15288:2023, 6.1)	27
6.7.3	Application of organizational project-enabling processes (ISO/IEC/IEEE 15288:2023, 6.2) ...	30
6.7.4	Application of technical management processes (ISO/IEC/IEEE 15288:2023, 6.3)	32
6.7.5	Application of technical processes (ISO/IEC/IEEE 15288:2023, 6.4)	40
6.8	Application of conformance and adaptation concepts	58
6.8.1	Application of conformance concepts	58
6.8.2	Application of adaptation concepts	59
Annex A (informative)	Summary of typical revised points in ISO/IEC/IEEE 15288:2023 from ISO/IEC/IEEE 15288:2015	62
Annex B (informative)	Example for interfacing, enabling and interoperating systems	71
Annex C (informative)	Model-based systems and software engineering (MBSSE)	73
Bibliography	76
IEEE notices and abstract	79

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Document Preview

Foreword — v

Introduction — vii

1 — Scope — 1

2 — Normative references — 1

3 — Terms and definitions — 1

4 — Overview of ISO/IEC/IEEE 15288 — 1

4.1 — General — 1

4.2 — Structure of ISO/IEC/IEEE 15288 — 3

4.3 — Context of ISO/IEC/IEEE 15288 — 3

4.4 — Comparison of ISO/IEC/IEEE 15288 to prior version — 5

5 — Application concepts — 5

6 — Applying ISO/IEC/IEEE 15288 — 5

6.1 — Overview — 5

6.2 — Application strategy — 6

6.2.1 — Overview — 6

iv

iv

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6.2.2	Planning the application	7
6.2.3	Conduct pilot project(s)	8
6.2.4	Formalise the approach	8
6.2.5	Institutionalise the approach	8
6.3	Application of system concepts	8
6.3.1	General	8
6.3.2	Systems	9
6.3.3	System structure	9
6.3.4	Structure in systems and projects	9
6.3.5	Interfacing, enabling, and interoperating systems	10
6.4	Application of life cycle concepts	11
6.4.1	Overview	11
6.4.2	Decision gates	12
6.4.3	Application approaches	13
6.5	Application of organizational concepts	19
6.5.1	Overview	19
6.5.2	Methods and tools	21
6.5.3	Considerations and techniques	21
6.5.4	Management commitment	22
6.5.5	Uses of ISO/IEC/IEEE 15288 within an organization	22
6.6	Application of project concepts	22
6.7	Application of process concepts	23
6.7.1	General	23
6.7.2	Application of agreement processes (6.1)	24
6.7.3	Application of organizational project enabling processes (6.2)	26
6.7.4	Application of technical management processes (6.3)	28
6.7.5	Application of technical processes (6.4)	34
6.8	Application of conformance and adaptation concepts	49
6.8.1	Application of conformance concepts	49
6.8.2	Application of adaptation concepts	50
	Annex A (informative) Summary of typical revised points in ISO/IEC/IEEE 15288: from the previous edition	52
	Annex B (informative) Example for interfacing, enabling, and interoperating systems	59
B.1	General	59
B.2	Aircraft and related systems	59

~~B.3 Automobile and related systems — 60~~

~~Annex C (informative) Model-based systems and software engineering (MBSSE) — 62~~

~~Bibliography — 65~~

~~IEEE notices and abstract — 68~~

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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/JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*, in cooperation with the IEEE Computer Society Systems and Software Engineering Standards Committee, under the Partner Standards Development Organization cooperation agreement between ISO and IEEE.

This second edition cancels and replaces the first edition (ISO/IEC/IEEE 24748-2:2018), which has been technically revised.

ISO/IEC/IEEE FDIS 24748-2:2023(E)

The main changes are as follows:

- updated 4.4.4 to reflect changes to ISO/IEC/IEEE 15288;
- reworked interfacing, enabling and interoperating systems;
- added considerations on agile and DevOps;
- reworked 6.5.5;
- reworked 6.7.7 to reflect changes to ISO/IEC/IEEE 15288;
- reworked 6.8.8 to reflect changes to ISO/IEC/IEEE 15288 and ISO/IEC/IEEE 24748-1;
- removed the former Annex A (guide on transitioning from former version);
- added a new Annex B to include an example on interfacing, enabling and interoperating systems;
- removed the former Annex C (engineering views and the Vee);
- added a new Annex C on model-based systems engineering.

A list of all parts in the ISO/IEC/IEEE 24748 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

This document and its companion, ISO/IEC/IEEE 24748-3, specifically support the use of ISO/IEC/IEEE 15288 and ISO/IEC/IEEE 12207, respectively. This document and ISO/IEC/IEEE 24748-3 reflect the alignment effort evident in ISO/IEC/IEEE 15288 and ISO/IEC/IEEE 12207. Terminology, structure and content in this document and ISO/IEC/IEEE 24748-3 are aligned consistent with those in ISO/IEC/IEEE 15288 and ISO/IEC/IEEE 12207. Consequently, the users of ISO/IEC/IEEE 12207 and ISO/IEC/IEEE 15288 benefit from having documents complementarily addressing all aspects of services or products over their life cycle.

This document is intended to be consistent with both ISO/IEC/IEEE 24748-1 and ISO/IEC/IEEE 15288 in its treatment of life cycle concepts and systems engineering processes.

NOTE Systems engineering for defence projects is addressed in ISO/IEC/IEEE 24748-7.

There is also increasing recognition of the importance of ensuring that all life cycle stages, and all aspects within each stage, are supported with thorough guidance enabling alignment with process documents that focus on areas besides systems and software. These can include hardware, humans, data, processes (e.g., review process), procedures (e.g., operator instructions), facilities and naturally occurring entities (e.g., water, organisms, minerals). The concept and structure of the ISO/IEC/IEEE 24748 series is intended to allow its extension to such additional domains where that will provide value to users.

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Systems and software engineering — Life cycle management — ~~Part 2: Guidance for the application of ISO/IEC/IEEE 15288 (System life cycle processes)~~ —

Part 2: Guidelines for the application of ISO/IEC/IEEE 15288 (system life cycle processes)

1 Scope

This document ~~provide~~provides guidance on the application of ISO/IEC/IEEE 15288. It addresses the application of system, life cycle, organizational, project, process, and conformance and adaption concepts, principally through references to ISO/IEC/IEEE 24748-1¹ and ISO/IEC/IEEE 15288. This document gives guidance on applying ISO/IEC/IEEE 15288 from the aspects of strategy, planning, application in organizations and application on projects. It also provides a comparison of the differences between ISO/IEC/IEEE 15288:2023 and ISO/IEC/IEEE 15288:2015.

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/IEEE 15288, *Systems and software engineering — System life cycle processes*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC/IEEE 15288 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/>
- ~~—~~IEEE Standards Dictionary Online: available at: <http://dictionary.ieee.org>

NOTE Definitions for other systems and software engineering terms typically can be found in ISO/IEC/IEEE 24765, available at www.computer.org/sevocab.

4 Overview of ISO/IEC/IEEE 15288

4.1 General

ISO/IEC/IEEE 15288 defines a set of processes to facilitate system development and information exchange among acquirers, suppliers and other stakeholders in the life cycle of a system. It applies to the

¹ Under preparation. Stage at the time of publication: ISO/IEC/IEEE ~~DIS~~FDIS 24748-1:20222023.

acquisition of systems, which can be comprised of products, services or both, as well as to the supply, development, operation, maintenance and disposal of systems, whether performed internally or externally to an organization.

In the context of this document, ISO/IEC/IEEE 15288 and ISO/IEC/IEEE 12207, there is a continuum of human-made systems from those that use little or no software to those in which software is the primary interest. When software is the predominant system or element of interest, ISO/IEC/IEEE 12207 should be used. Both documents have the same process model, share most activities and tasks and differ primarily in descriptive notes. The determination of the applicability of ISO/IEC/IEEE 15288 and ISO/IEC/IEEE 12207 should be decided by the nature of the system and its enabling systems. Often, a mixed tailoring of each standard can be appropriate.

The purpose of ISO/IEC/IEEE 15288 is to provide a defined set of processes to facilitate communication among acquirers, suppliers and other stakeholders in the life cycle of a system. ISO/IEC/IEEE 15288 is written for acquirers of systems and other stakeholders like suppliers, developers, operators, maintainers, managers, quality assurance managers and users of systems.

4.2 Structure of ISO/IEC/IEEE 15288

ISO/IEC/IEEE 15288 contains requirements in two clauses:

- a) ~~a)~~ ISO/IEC/IEEE 15288:2023, Clause 6 defines the requirements for the system life cycle processes;
- b) ~~b)~~ ISO/IEC/IEEE 15288:2023, Annex A provides requirements for tailoring of ISO/IEC/IEEE 15288.

See ISO/IEC/IEEE 15288:2023, Clause 5 for key concepts used in that International Standard.

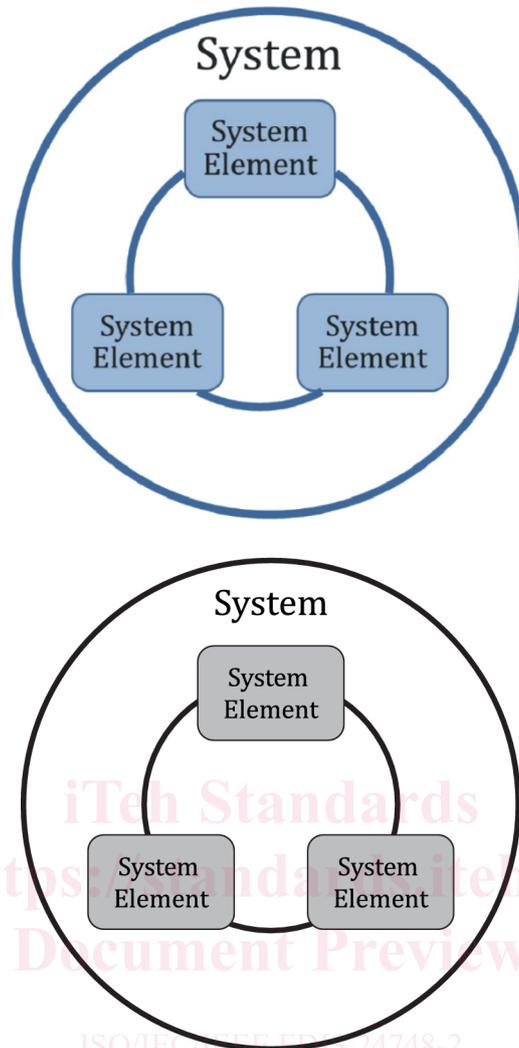
Three informative annexes support the use of ISO/IEC/IEEE 15288:

- ~~—~~ ISO/IEC/IEEE 15288:2023, Annex B provides information on possible information items that can be associated with each process in ISO/IEC/IEEE 15288;
- ~~—~~ ISO/IEC/IEEE 15288:2023, Annex C provides information about use of the ISO/IEC/IEEE 15288 system life cycle processes as a process reference model to support process assessment;
- ~~—~~ ISO/IEC/IEEE 15288:2023, Annex D provides an informative description of the implementation of system life cycle processes in an MBSE approach.

4.3 Context of ISO/IEC/IEEE 15288

ISO/IEC/IEEE 15288 focuses on the processes that are used by or for a project that exists in a defined relationship with the organization, other projects and enabling systems. Typically, a project is assigned responsibility that encompasses one or more life cycle stages of the system-of-interest (SoI). ISO/IEC/IEEE 15288 is applicable to organizations and projects whether they act as the acquirer or the supplier of a system and whether the system is comprised of products, services or a combination of both.

The ISO/IEC/IEEE 15288 processes are described in relation to a system, see [Figure 1](#) ~~Figure 1~~. As shown in [Figure 1](#) ~~Figure 1~~, a system is composed of a set of interacting system elements. System elements may include software elements, hardware elements, services, and utilization and support resources.



NOTE See ISO/IEC/IEEE 15288:2023, Figure 1.

Figure 1 — System and system element relationship

When an organization applies ISO/IEC/IEEE 15288 to a particular system that system becomes the SoI. The SoI has a life cycle that consists of multiple stages through which the system passes during its lifetime. These stages are not necessarily sequential and their execution can be completely or partially in parallel, as well as iterative or recursive. Examples of typical stages are:

- concept;
- development;
- production;
- utilization;
- support;

— ~~—~~retirement.

NOTE 1 Stages are described in ISO/IEC/IEEE 15288:2023, 5.5.2 and in ISO/IEC/IEEE 24748-1:—, 4.3.2 and Clause 5.

NOTE 2 The management of the transition from one stage to another is not necessarily a linear, sequential, progression and engineering activities are associated with providing appropriate work products and decision-making information in each stage.

A number of enabling systems are deployed throughout the system life cycle to provide the SoI with support as needed. Each life cycle stage can require one or more enabling systems. An enabling system has its own life cycle and when ISO/IEC/IEEE 15288 is applied to it, it then becomes an SoI.

NOTE 3 The role and use of enabling systems are described in [6.3.5](#)~~6.3.5.~~

NOTE 4 For related material on enabling systems, see also ISO/IEC/IEEE 15288:2023, 5.2.3 and ISO/IEC/IEEE 24748-1:—, 4.2.4.

ISO/IEC/IEEE 15288 is applicable at any level of the structure associated with an SoI. As a system is decomposed recursively into its system elements, the processes of ISO/IEC/IEEE 15288 may be used for each system and system element in the system structure, including enabling systems. Each system and system element has a life cycle of its own and its own set of enabling systems.

NOTE 5 For related material on system structure, see ISO/IEC/IEEE 15288:2023, 5.2.2 and ISO/IEC/IEEE 24748-1:—, 4.2.3.

In order to perform needed operations and transformations upon systems during their life cycles, the organization creates and monitors projects. Projects have a defined scope, resources (including time) and focus. The scope can involve managing all of the stages of the life cycle, a subset of the stages, one or more defined processes or one or more process activities. The time scale can be of varying duration, for example a few weeks or tens of years. The focus of the project is related to the SoI and its systems and system elements in some form of system structure or stage partitioning.

NOTE 6 System life cycle concepts are described in ISO/IEC/IEEE 24748-1:—, 4.3.

Organizations focus on systems that are created or transformed by projects within the organization or in conjunction with other organizations. Projects have a span of interest that includes the SoI and its related enabling systems. Some enabling systems are under direct control of the project. The SoI and those enabling systems make up the project span of control.

The work performed by projects is on or with the SoI within one or more life cycle stages. ISO/IEC/IEEE 15288 includes the requirement to define an appropriate life cycle for a system, the selection of processes to be applied throughout the life cycle and the application of these processes to fulfil agreements and achieve customer satisfaction.

ISO/IEC/IEEE 15288 can be applied to all types of product- or service-focused systems and system elements consisting of one or more of the following: hardware, software, humans, processes, procedures, facilities and naturally occurring entities. The use of ISO/IEC/IEEE 15288 for systems within this broad scope is one of its main advantages.

The use of the standard may be adapted to accommodate the varying project requirements in treating system life cycles.

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