



**International
Standard**

**ISO/IEC/IEEE
24748-7**

**Systems and software
engineering — Life cycle
management —**

**Part 7:
Application of systems engineering
on defence programs**

Ingénierie des systèmes et du logiciel — Gestion du cycle de vie —

*Partie 7: Application de l'ingénierie des systèmes aux
programmes de défense*

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Institute of Electrical and Electronics Engineers, Inc
3 Park Avenue, New York
NY 10016-5997, USA

Email: stds.ipr@ieee.org
Website: www.ieee.org

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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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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*, in cooperation with the Systems and Software Engineering Standards Committee of the IEEE Computer Society, under the Partner Standards Development Organization cooperation agreement between ISO and IEEE.

This second edition cancels and replaces the first edition (ISO/IEC/IEEE 24748-7:2019), which has been technically revised.

The main changes are as follows:

- aligned content to ISO/IEC/IEEE 15288:2023 which was recently revised
- converted from original IEEE Std format to ISO format
- updated necessary defence specific language to include outputs
- Added/updated defence references

A list of all parts in the ISO/IEC/IEEE 24748 series can be found on the ISO and IEC websites.

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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.

Introduction

For effective and efficient application of ISO/IEC/IEEE 15288 on defence programs, additional application requirements are needed. ISO/IEC/IEEE 15288 is written in a general manner to address all types of systems and different modes of application. Thus, it does not have requirements specific to the use by defence projects that facilitate effective implementation of an acquirer-supplier agreement, such as use in defence contracts.

This document implements ISO/IEC/IEEE 15288 for application on defence programs, providing the defence-specific language and terminology to help ensure the correct application of acquirer-supplier requirements for a defence program. It provides the basis for selection, negotiation, agreement, and performance of necessary systems engineering activities and delivery of products, while allowing flexibility for both innovative implementation and tailoring of the specific systems engineering process(es) to be used by system suppliers, either contractors or government system developers, integrators, maintainers, or sustainers. This document includes the expected or required outputs and associated attributes.

Systems and software engineering — Life cycle management —

Part 7: Application of systems engineering on defence programs

1 Scope

This document establishes the requirements for systems engineering activities to be performed on projects of defence agencies, including the United States (US) Department of Defense (DoD), across the entire system life cycle. This document implements ISO/IEC/IEEE 15288 for use by defence agencies in acquiring systems or systems engineering support, including the planning, acquisition, operation, modification, and sustainment of defence systems. It provides the foundation for systems engineering within the context of ISO/IEC/IEEE 15288. This document provides detailed requirements for the application of the life cycle processes, activities, and tasks of ISO/IEC/IEEE 15288 for use on any defence system and includes the effective integration of agreement processes, technical processes, technical management processes, organizational project enabling processes, and essential specialty engineering requirements. While primarily supporting the acquirer-supplier agreement mode, this document also can be used to support the other modes: use by organizations, projects, and process assessors.

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 15288:2023, *Systems and software engineering — System life cycle processes*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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

ISO, IEC and IEEE 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 For additional terms and definitions in the field of systems and software engineering, see ISO/IEC/IEEE 24765, which is published periodically as a “snapshot” of the SEVOCAB (Systems and software Engineering Vocabulary) database and which is publicly accessible at <http://www.computer.org/sevocab>.

3.1.1**allocated baseline**

approved requirements for a product, subsystem or component, describing the functional, performance, interoperability, and interface requirements that are allocated from higher-level requirements and the verifications required to demonstrate achievement of those requirements, as established at a specific point in time and documented in the allocated configuration documentation

3.1.2**baseline**, noun

formally approved version of a *configuration item* (3.1.3), regardless of media, formally designated and fixed at a specific time during the configuration item's life cycle

Note 1 to entry: This document uses the noun form of baseline to refer only to configuration baselines managed by the configuration management process, including the *functional baseline* (3.1.4), *allocated baseline* (3.1.1), and *product baseline* (3.1.5). It does not refer to other baselines used in defence such as the acquisition program baseline.

[SOURCE: ISO/IEC/IEEE 15288:2023, 3.8, modified — Note 1 to entry has been added.]

3.1.3**configuration item**

item or aggregation of system elements that is designated for configuration management and treated as a single entity in the configuration management process

[SOURCE: ISO/IEC/IEEE 15288:2023, 3.11, modified — 'hardware, software, or both' has been replaced with 'system elements']

3.1.4**functional baseline**

description of the system's performance (functional, interoperability, and interface characteristics) and the verification required to demonstrate the achievement of those specified characteristics

Note 1 to entry: The functional baseline is directly traceable to the operational requirements contained in the initial capabilities document or equivalent document.

3.1.5**product baseline**

description of the detailed design at a specific point in time, for production, fielding or deployment, and operations and support

Note 1 to entry: The product baseline prescribes all necessary physical (form, fit and function) characteristics and selected functional characteristics designated for production acceptance testing and production test requirements.

Note 2 to entry: The product baseline is also known as the product configuration baseline. It is intended as the product configuration.

3.1.6**system effectiveness analysis**

analytical approach used to determine how well a system performs in its intended utilization environment

3.2 Abbreviated terms

CDRL	contract data requirements list
CI	configuration item
CM	configuration management
DEMIL	demilitarization
DID	data item description

DoDAF	DoD architecture framework
DoDD	US Department of Defense Directive
DoDI	US Department of Defense Instruction
DoDM	US Department of Defense Manual
ECP	engineering change proposal
ECR	engineering change request
ESOH	environment, safety, and occupational health
EVM	earned value management
NDI	non-development item
IMP	integrated master plan
IMS	integrated master schedule
JCIDS	joint capabilities integration and development system
MODAF	UK Ministry of Defence architecture framework
SEMP	systems engineering management plan
SEP	systems engineering plan
SoS	system of systems
TPM	technical performance measures

4 Conformance

4.1 Intended usage

ISO/IEC/IEEE 15288:2023, 4.1 shall apply as stated with the following addition:

This document includes required outputs for defence applications for each process.

4.2 Full conformance

4.2.1 Full conformance to outcomes

ISO/IEC/IEEE 15288:2023, 4.2.1 shall apply as stated.

4.2.2 Full conformance to tasks

ISO/IEC/IEEE 15288:2023, 4.2.2 shall apply as stated.

4.3 Tailored conformance

ISO/IEC/IEEE 15288:2023, 4.3 shall apply as stated with the following addition:

The tailoring process shall be in accordance with ISO/IEC/IEC 15288:2023, Annex A.

5 Key concepts and their application

5.1 General

ISO/IEC/IEEE 15288:2023, 5.1 applies as stated.

5.2 System concepts

5.2.1 Systems

ISO/IEC/IEEE 15288:2023, 5.2.1 applies as stated.

5.2.2 System structure

ISO/IEC/IEEE 15288:2023, 5.2.2 applies as stated.

5.2.3 Interfacing, enabling, and interoperating systems

ISO/IEC/IEEE 15288:2023, 5.2.3 applies as stated.

5.2.4 Concepts related to the system solution context

ISO/IEC/IEEE 15288:2023, 5.2.4 applies as stated.

5.2.5 Product line engineering (PLE)

ISO/IEC/IEEE 15288:2023, 5.2.5 applies as stated.

5.3 Organizational concepts

5.3.1 Organizations

ISO/IEC/IEEE 15288:2023, 5.3.1 applies as stated.

5.3.2 Organization and project-level adoption

ISO/IEC/IEEE 15288:2023, 5.3.2 applies as stated.

5.3.3 Organization and collaborative activities

ISO/IEC/IEEE 15288:2023, 5.3.3 applies as stated.

5.4 System of systems concepts

5.4.1 Differences between systems and SoS

ISO/IEC/IEEE 15288:2023, 5.4.1 applies as stated.

5.4.2 Managerial and operational independence

ISO/IEC/IEEE 15288:2023, 5.4.2 applies as stated.

5.4.3 Taxonomy of SoS

ISO/IEC/IEEE 15288:2023, 5.4.3 applies as stated.

5.4.4 SoS considerations in life cycle stages of a system

ISO/IEC/IEEE 15288:2023, 5.4.4 applies as stated.

5.4.5 Application of this document to SoS

ISO/IEC/IEEE 15288:2023, 5.4.5 applies as stated.

5.5 Life cycle concepts

5.5.1 System life cycle model

ISO/IEC/IEEE 15288:2023, 5.5.1 applies as stated with the following additions:

NOTE 1 For use in US DoD programs, see DoDI 5000.02 for a discussion of the US DoD system life cycle model. For NATO programs see NATO AAP-20. For use on other defence programs, refer to the applicable life cycle model of the acquisition organization.

NOTE 2 Some defence organizations are using adaptive acquisition strategies where the life cycle and life cycle stages are different depending on criteria such as complexity or project size. [Figure 1](#) is a genericized example.

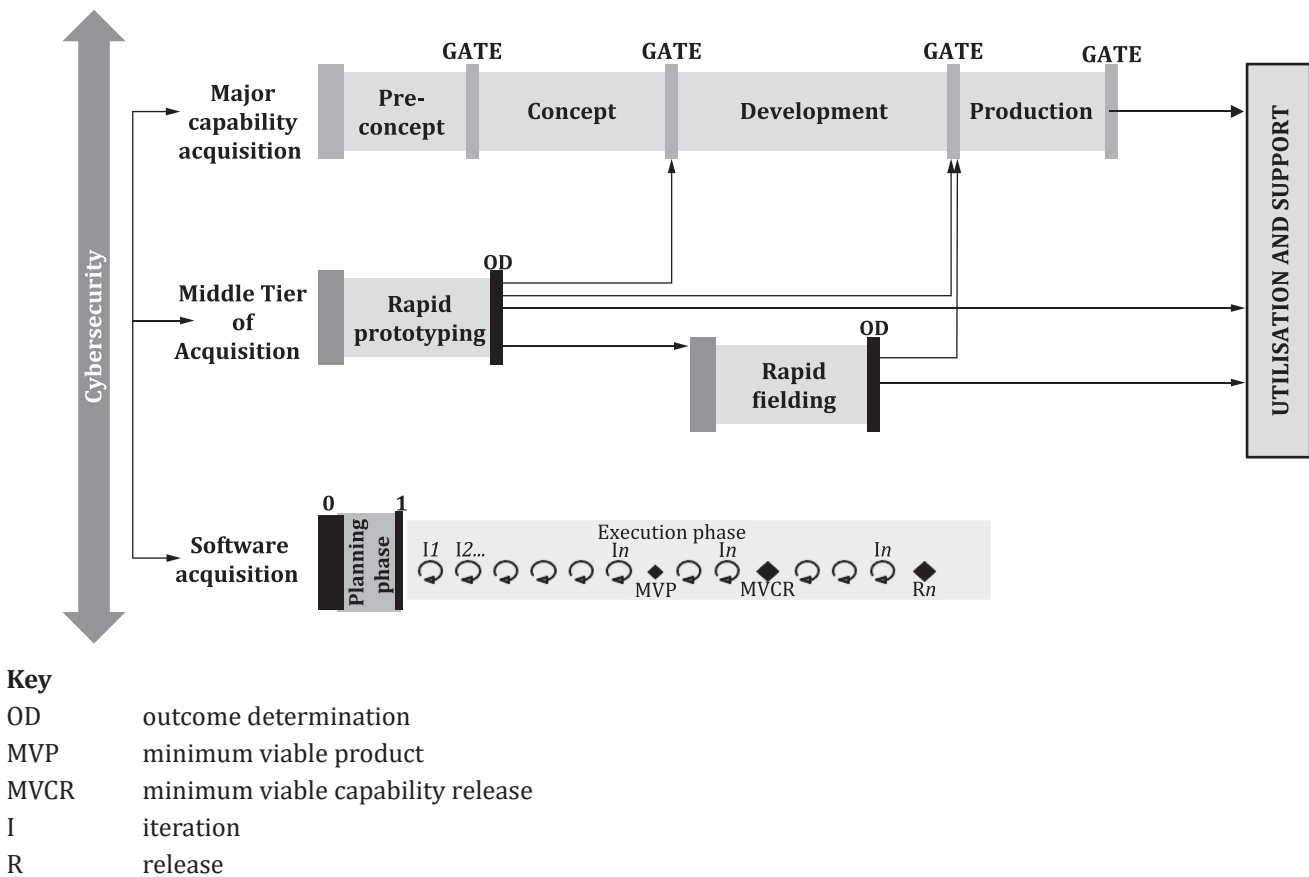


Figure 1 — Example adaptive acquisition strategy life cycle model

5.5.2 System life cycle stages

ISO/IEC/IEEE 15288:2023, 5.5.2 applies as stated with the following addition:

NOTE For use in US DoD programs, see DoDI 5000.02 for a discussion of the US DoD system life cycle stages. For NATO programs see NATO AAP-20. For use on other defence programs, refer to the applicable life cycle model of the acquisition organization.

5.6 Process concepts

5.6.1 Criteria for processes

ISO/IEC/IEEE 15288:2023, 5.6.1 applies as stated.

5.6.2 Description of processes

ISO/IEC/IEEE 15288:2023, 5.6.2 applies as stated with the following addition:

For use on defence programs, each process in [Clause 6](#) includes specific defence related systems engineering outputs with attributes. ISO/IEC/IEEE 15288:2023 Annex B is applicable for defence programs regarding process artefacts and information with the added outputs in [Clause 6](#).

5.6.3 General characteristics of processes

ISO/IEC/IEEE 15288:2023, 5.6.3 applies as stated.

5.7 Processes in this document

5.7.1 General

ISO/IEC/IEEE 15288:2023, 5.7.1 applies as stated.

5.7.2 Agreement processes

ISO/IEC/IEEE 15288:2023, 5.7.2 applies as stated with the following additions:

The agreement between the acquirer and supplier shall include the systems engineering requirements based on the tailoring (or other adaptation) of the requirements of this document to address the program situation.

The agreement shall include the means by which conformance is to be determined which may include accomplishment of outcomes, completion of tasks, or delivery of outputs.

NOTE 1 The acquirer request for proposal can include the intended tailoring (or other adaptation) of the systems engineering requirements from this document. The supplier can propose changes or alternatives during the steps to finalize the agreement.

NOTE 2 The acquirer-supplier agreement developed by the agreement processes can take on a much broader scope and significance in a defence government or contractor environment. This agreement, often a negotiated and signed contract for the full system or product of interest, provides much of the context for implementation and governance of the other processes defined throughout this standard.

[Figure 2](#) illustrates the application of agreement processes for products, systems and system elements.

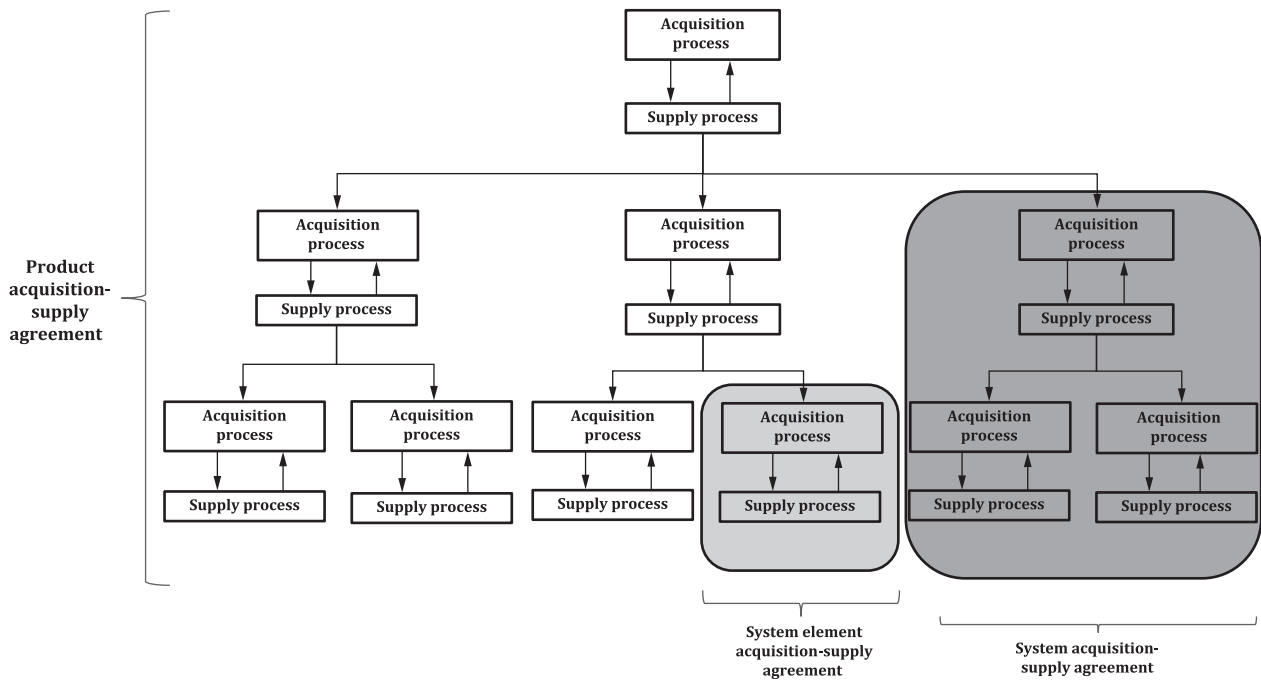


Figure 2 — Application of the agreement processes for products, systems, and system elements

5.7.3 Organizational project-enabling processes

ISO/IEC/IEEE 15288:2023, 5.7.3 applies as stated.

5.7.4 Technical management processes

ISO/IEC/IEEE 15288:2023, 5.7.4 applies as stated.

5.7.5 Technical processes

ISO/IEC/IEEE 15288:2023, 5.7.5 applies as stated with the following addition:

NOTE The results of systems engineering technical process activities are captured and stored by the supplier, including product support analysis results, assessments, trade studies, and verifications, in accordance with the acquirer-supplier agreement. This includes decisions and the rationale for those decisions so that they can be reviewed throughout the life of the system. These artefacts are maintained in the supplier's format and made available to support the system throughout its lifecycle. The technical process activities to be captured are documented in the systems engineering management plan (SEMP).

5.8 Process application

5.8.1 Overview

ISO/IEC/IEEE 15288:2023, 5.8.1 applies as stated with the following addition:

Project planning, system analysis, and project assessment and control are key systems engineering processes, with emphasis on their contribution to enabling technical decision making. These processes coordinate and control the performance of the other processes across the life cycle for the systems engineering application. This set of process applications:

- identifies the work to be performed and develops schedules and costs estimates for the effort;
- coordinates the other process activities and helps ensure that all are operating from the same set of agreements and system definition iteration;

- evaluates the outputs of the other activities and conducts independent studies to determine which alternate approach is best suited to the application;
- determines when results of one activity require the action of another activity and directs the action to be performed;
- documents the results of analyses and studies, maintains control of the evolving configuration, and measures and reports progress.

The success of any project or program is dependent upon the systems engineering planning and control of the project and its processes. Project planning not only contributes to planning the work to be performed and the schedule for the effort, but it is also used to plan how all the other technical and technical management processes should be employed throughout the system life cycle.

The systems engineering control function is dependent upon the analyses (requirements analysis, trade-off studies or design analysis) of the data and information upon which to base decisions. These analyses, conducted for each iteration of the systems engineering processes, are performed to support any of the technical management processes (6.3) and the technical processes (6.4) that require the analytical data to support decisions. Also, note that performance of the processes focused on concept and system definition require input from processes that focus on system realization, deployment, and use. All this needs to be accomplished across the life cycle.

Model-based systems and software engineering is also applicable for defence applications to implement processes and achieve expected outcomes. See ISO/IEC/IEEE 15288:2023, Annex D for additional information.

NOTE See DoDI 5000.97 and the Digital Engineering Body of Knowledge for additional information on US DoD applications.

5.8.2 Process iteration, recursion, and concurrency

ISO/IEC/IEEE 15288:2023, 5.8.2 applies as stated.

5.8.3 Process views

ISO/IEC/IEEE 15288:2023, 5.8.3 applies as stated with the following addition as a note under the bullet 'specialty engineering':

NOTE Specialty engineering includes but is not limited to such areas as availability, maintainability, reliability, safety, security, human factors, and usability. In addition, other defence related considerations include cyber security, survivability/vulnerability/susceptibility, nuclear weapons effects, electronic warfare, part and material obsolescence, counterfeit part concerns, industrial base/capability, automatic and special test equipment, airworthiness, conditioned based maintenance, non-destructive inspection and testing, and product assurance.

5.9 Concept and system definition

ISO/IEC/IEEE 15288:2023, 5.9 applies as stated.

5.10 Assurance and quality characteristics

ISO/IEC/IEEE 15288:2023, 5.10 applies as stated.

5.11 Process reference model

ISO/IEC/IEEE 15288:2023, 5.11 applies as stated with the following addition:

For defence applications, ISO/IEC/IEEE 15288:2023, Annex C is applicable with guidance on creating a process reference model for assessment purposes.