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Space systems — Programme management — Requirements management

Systèmes spatiaux — Management de programme — Management des Exigences

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 ISO documents 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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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.

This document was prepared by Technical Committee 20, *Aircraft and space vehicles*, Subcommittee SC 14, *Space systems and operations*.

This second edition cancels and replaces the first edition (ISO 16404:2013), which has been technically revised.

The main changes compared to the previous edition are as follows:

— The terms and definitions have been updated to be consistent with ISO 10795.

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

There is a consensus that successful aerospace programmes/projects depend on meeting the needs and requirements of the stakeholders/customers. When the requirements are for a complex system or for a system that may take many years to be developed, a formal requirements management (RM) process is mandatory and justified.

Requirements management concerns the collection, analysis, and validation of requirements with all the communications and negotiations inherent in working with people.

This document will help to clarify and enhance current practices to improve programme management. It is intended to be used by space programmes when establishing, performing, or evaluating requirements management processes in the space sector.

This document describes requirements management functions and principles and defines a common requirements management terminology for use with any product line.

Requirements management is an integral element of any programme, but, in space, it is particularly important due to

— specific environmental conditions in space,

— a need for a high level of performance,

— a limited number of models,

— limited access to the product during operations,

— quasi-impossibility of repairing in the case of failure during flight,

— often high complexity of the organization, and

— associated high costs.

The deployment of this standardized common set of requirements management is intended to encourage and facilitate international space cooperation.

Annex A gives the general template for a requirements management plan.

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Space systems — Programme management — Requirements management

1 Scope

This document presents the requirements for requirements management (RM) for space projects.

This document addresses the space programme/project management requirements, applicable through a top-down approach in a contractual relationship between customers and suppliers.

The objective of this document is to state and establish a common reference framework for all the customers and suppliers in the space sector to deploy requirements management for all space products and projects.

This document on requirements management includes

— a definition of the requirements management scope for the space sector,

— the standard processes for requirements management within the product lifecycle management, and

— a set of rules for requirements management activities to be implemented by the actors (customers and suppliers), including rules derived from best practices.

The primary target audience for this document includes

— the requirements management/systems engineering process owners of the customers and suppliers,

— the programme/project managers managing the space programmes, and

— the chief engineers and the quality managers.

The term "programme" is understood as a group of several projects. Both “programme” and “project” can be used in the same context throughout this document.

In addition, this document allows customer/supplier flexibility in its implementation and tailoring.

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 9000, *Quality management systems — Fundamentals and vocabulary*

ISO 10795, *Space systems — Programme management and quality — Vocabulary*

ISO 14300-1, *Space systems — Programme management — Part 1: Structuring of a project*

ISO 21351, *Space systems — Functional and technical specifications*

3 Terms and definitions

For the purposes of this document, the terms and definitions in ISO 9000, ISO 10795 and the following apply.

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

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

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

3.1
design verification
evaluation of the implementation of the design (architecture, components) against the *requirements* (3.5) to determine that they can be met

Note 1 to entry: This is compliant with ISO 9001 verification.

3.2
product lifecycle
description of all stages of the product throughout its life starting from the expression of its need until the disposal, whatever the form is

3.3
product verification
evaluation of the implementation of the product against the *requirements* (3.5) to determine that they have been met

Note 1 to entry: This is compliant with ISO 9001 verification.

3.4
qualification
act or conduct by the supplier to provide evidences to prove that design, manufacturing (including manufacturing process) of hardware/software is adequate to fulfil all *requirements* (3.5) under required environment conditions

Note 1 to entry: This may be implemented by analysis, test, inspection, or demonstration.

[SOURCE: ISO 10795:2019, 3.183]

3.5
requirement
need or expectation that is stated, generally implied or obligatory

Note 1 to entry: "Generally implied" means that it is custom or common practice for the organization and interested parties, that the need or expectation under consideration is implied.

Note 2 to entry: A specified requirement is one that is stated, for example in documented information.

Note 3 to entry: A qualifier can be used to denote a specific type of requirement, e.g. product requirement, quality management requirement, customer requirement, quality requirement.

Note 4 to entry: Requirements can be generated by different interested parties or by the organization itself.

Note 5 to entry: It can be necessary for achieving high customer satisfaction to fulfil an expectation of a customer even if it is neither stated nor generally implied or obligatory.

Note 6 to entry: This constitutes one of the common terms and core definitions for ISO management system standards given in Annex SL of the Consolidated ISO Supplement to the ISO/IEC Directives, Part 1. The original definition has been modified by adding Notes 3 to 5 to entry.

[SOURCE: ISO 9000:2015, 3.6.4]

3.6
requirements baseline
set of *requirements* (3.5) that has been formally reviewed and agreed upon, that thereafter serves as the basis for further development, and that can be changed only through formal change control procedures

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3.7
requirements management
RM
discipline that covers all the tasks that are performed to manage *requirements* (3.5), such as gathering, developing, organizing, tracing, analysing, reviewing, allocating, changing, and validating requirement objects, as well as managing documents and databases that contain them with the purpose of defining and delivering the right product or service

3.8
requirements management plan
RM plan
management plan which describes all the activities related to *requirements management* (3.7) for a specific project or programme that includes the *requirement* (3.5) cascading activity and the requirements management interaction with configuration management and functional analysis

Note 1 to entry: This plan describes the activities that need to be performed to support the verification and validation activities in order that the design and product can be verified against requirements.

3.9
requirement validation
set of activities to ensure that *requirements* (3.5) are correct and complete so that the product meets upper-level requirements and user needs

3.10
stakeholder
customer, user, person who will receive the goods or services and is the direct beneficiaries of the systems, or other interested party who affects or is affected by the project, providing overarching constraints within which the customers' needs should be achieved

[SOURCE: ISO 18676:2017, 3.9, modified — The definition has been editorial updated to define "stakeholder" in its singular form.]

3.11
systems engineering
interdisciplinary approach governing the total technical and managerial effort required to transform a set of *stakeholder* (3.10) needs, expectations, and constraints into a solution and to support that solution throughout its life

[SOURCE: ISO/IEC/IEEE 24748-1:2018, 3.57]

3.12
traceability
ability to trace the history, application or location of an object

Note 1 to entry: When considering a product or a service, traceability can relate to:

— the origin of materials and parts;

— the processing history;

— the distribution and location of the product or service after delivery.

Note 2 to entry: In the field of metrology, the definition in ISO/IEC Guide 99 is the accepted definition.

[SOURCE: ISO 9000:2015, 3.6.13]

4 Abbreviated terms

The following abbreviated terms are used in this document.

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