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Space systems — Programme management —

Part 1: Structuring of a programme

Systèmes spatiaux — Management de programme —
Partie 1: Structuration d'un programme

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 14300 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 14300-1 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 14, *Space systems and operations*.

ISO 14300 consists of the following parts, under the general title *Space systems — Programme management*:

— *Part 1: Structuring of a programme*

— *Part 2: Product assurance*

Introduction

This part of ISO 14300 provides an overview and requirements of space programme management with the overall objective of optimizing performance, costs and schedules and of minimizing the risks.

Programme management is an integral element of any programme, but, in space, it is particularly important due to the following:

— specific environmental conditions in space;

— need for a high level of performance;

— 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;

— associated high costs involved.

The deployment of this standardized common set of programme management requirements should encourage and facilitate international space co-operation.

Space systems — Programme management —

Part 1:
Structuring of a programme

1 Scope

This part of ISO 14300 addresses the space programme management requirements, applicable through a top-down approach in a contractual relationship between customers and suppliers. The applicable requirements for product assurance are given in ISO 14300-2.

This part of ISO 14300 is intended to be used as a basis when establishing and negotiating customer programme management requirements, and guiding the supplier's responses.

It permits:

— a clear definition of the roles, responsibilities and authorities of the different customers and suppliers;

— coherence between their activities;

— communication capability between them;

— stable and rigorous programme organization;

— and, as far as possible, standardization of the rules applicable to various programmes.

It still allows for supplier flexibility in its implementation and tailoring.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 14300. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 14300 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 9000:2000, *Quality management systems — Fundamentals and vocabulary.*

ISO 9001:2000, *Quality management systems — Requirements.*

ISO 10007:1995, *Quality management — Guidelines for configuration management.*

ISO 14300-2:—[1)], *Space systems — Programme management — Part 2: Product assurance.*

1) To be published.

3 Terms and definitions

For the purposes of this part of ISO 14300, the terms and definitions given in ISO 9000 apply.

4 Abbreviated terms

CCB Configuration control board

CDR Critical design review

CI Configuration item

CM Configuration management

DF Design data file

EIDP End item data package

FS Functional specification

ILS Integrated logistic support

LSA Logistic support analysis

PDR Preliminary design review

PRR Preliminary requirements review

QR Qualification review

TS Technical specification

WBS Work breakdown structure

WPD Work package description

5 Programme management specification and plan

5.1 General

The attainment of quality throughout programme execution is the overall goal of management.

The requirements stated in ISO 9001 shall be taken into account by any company involved in a space programme.

When a level 0 customer (the first level in the contractual line issuing a contract) intends to make this part of ISO 14300 a condition of a contract, this customer shall include in the solicitation (request for proposal, invitation to tender, request for quotation, etc.) a dedicated programme management specification for its application by lower level customers and suppliers.

The application of the management requirements from the level 0 customer to the lowest level of suppliers in the contract chain shall be consistent with the criticality, complexity and cost of the product to be supplied. Thus, suppliers of less critical products may seek to have fewer requirements. Nonetheless, the continuity and the coherence of the programme requirements shall be maintained. Selection and tailoring of this part of ISO 14300 is needed at the customer level. Any adaptation of this part of ISO 14300 shall be based on specific objectives and constraints.

At a given level, the supplier shall adapt the management requirements contracted with his own customer to his own suppliers. The customer can consequently fulfil his own obligations towards the next higher level (see Figure 1).

The suppliers shall prepare a management plan in order to comply with the dedicated management specification, received from their customer.

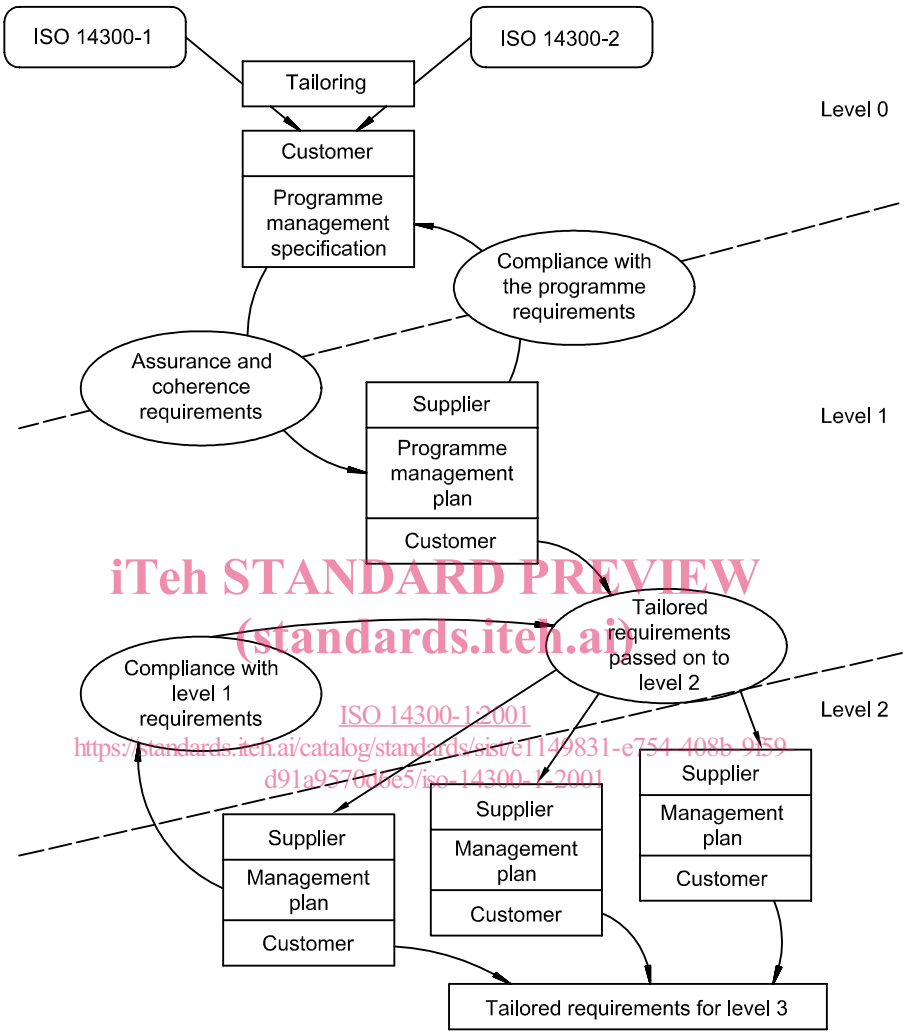

Figure 1 — Establishing programme management rules

5.2 Programme management specification

Depending on the nature of the programme or the programme phase, the programme management specification shall be issued by the level 0 customer and may include additional requirements or, on the contrary, certain elements which may be deleted with regards to this part of ISO 14300.

It is intended, as far as possible, that the wording of clauses 5 to 13 and the content of ISO 14300-2 be integrated directly into any programme management specification, i.e. for harmonization or depending on the negotiated applicability.

Each supplier of a given level acts as a customer towards his own suppliers and has to specify the management requirements in the relevant contracts through a specific document or through the statement of work itself.

5.3 Programme management plan

In response to this programme management specification, each supplier concerned prepares a programme management plan which contains descriptions of main activities, implementation methods and general procedures with respect to its organization.

Existing supplier policies, procedures and other management controls should be used, where appropriate, and in this case should be made available to his direct customer.

The supplier is encouraged to tailor any specified requirement that may provide more effective scheduling or reduce costs without loss in compliance to the intent of the requirement. Such tailored requirements should be individually identified within the supplier's programme management plan to facilitate review by the customer.

The programme management plan shall be submitted to the customer for acceptance. The plan, as accepted by the customer, becomes the basis for determining compliance with the customer programme management requirements.

6 Work breakdown structure

6.1 General

The programme work breakdown structure (WBS) is the reference system for programme management data which:

— ensures the coherence between technical, documentary, administrative and financial activities of the whole programme;

— identifies the responsibilities and authorities of each supplier.

The rules to be observed when producing, modifying and using the programme WBS are specified hereafter.

6.2 Objectives

The programme WBS is the structured and comprehensive breakdown of the whole programme. On the basis of the product tree (see 6.4.3) or the function tree (see 6.4.2), it identifies the tasks and principal resources[2)] required to complete products intended to satisfy the expressed requirements.

This breakdown is achieved in a consistent way at different levels of responsibility and authority.

The programme WBS is used as a common reference for the level 0 customer and the suppliers so as to identify all tasks required to entirely complete the programme, regardless if these tasks are:

— on the programme budget or not;

— under the responsibility and authority of the suppliers or other organizations.

The programme WBS ensures management, planning, performance and control of all tasks implied by the programme.

2) Principal resources include the development of all hardware and software (e.g. test benches, tools) necessary for the programme and also the resources required for the adaptation or the reuse of existing means, that means all those whose unavailability may be a constraint for the programme.

6.3 Responsibility and authority for development

Each supplier shall:

- develop the product tree for his own supplies and limit it to interfaces with his own customer and suppliers;
- express his requirements concerning the establishment of the WBS to his suppliers.

These requirements are in particular associated with the programme organization (see clause 7) and the configuration items, CIs (see clause 10).

6.4 Rules for defining the WBS

6.4.1 Main aspects

The coding of tasks, resources and products (and possibly, functions) shall be unique and constant in time.

The tasks to be performed have to be linked to each level of the product tree (see 6.4.3).

As long as the system's product tree has not been defined, it is possible to associate tasks with functions of the function tree (see 6.4.2).

The principal resources to be used to accomplish each task shall be clearly identified.

When the resources involved in the programme have to be developed (specific resources), they shall be considered in the same way as the products to be provided.

6.4.2 Function tree

The function tree gives the framework of system performance by breaking it down into functions. Each function can be decomposed into subfunctions, independent of the products involved.

It is possible to link tasks to functions at the early stages of the programme, i.e. at least up to the system definition phase (phases 0, A and B, see 8.2).

At the system level, the function tree assures coherence of the whole system and the configuration control.

6.4.3 Product tree

The product tree gives the top-down framework of the product by breaking down the system into elements, i.e. from the system, to subsystem, to equipment, to component level where appropriate.

All product tree elements are under configuration control, the identifiers have to be consistent with all related work packages and documentation.

The product approach is based on *a priori* knowledge or knowledge gained since the programme started concerning the products to be provided.

The product tree has to be established at the end of phase B (see 8.2.4) at the latest.

Products indicated in the product tree shall include, as a minimum, each product having a TS.

6.4.4 Tasks

The tasks can be described in work package description (WPD).

NOTE A WPD is the information associated with tasks and work packages.

Each task is mainly characterized by:

a) the customer/supplier relationship;

b) a unique and identified person or organization in charge;

c) its content, including:

— a title,

— an objective (e.g. qualification test),

— a description with excluded tasks, if necessary,

— a task type (design, production, product assurance, management, tests, etc.);

d) its link to an element (product or function);

e) its planning constraints, including:

— a planned duration,

— one (or several) input event(s) and data,

— one (or several) output event(s) and data,

— possibly, intermediate events (key events for the task);

f) its conditions of performance;

g) the resources required for its performance.

The resources used shall be associated with the task which implement them.

6.5 Management rules for changes

Changes in the WBS shall not modify its organization, so as not to disrupt programme management.

Each added product, function, resource or task shall be given a new identification (re-use of identifiers having already been used at any other stage shall not be allowed).

The changes take into account the modifications of mandatory services and/or requirements which shall be accomplished in compliance with the contractual specifications (modification of clauses, riders, etc.).

7 Programme organization

7.1 General

The implementation of a programme organization is required to ensure consistent programme performance and to control programme execution.

This clause defines the organizational principles (organization at customer and industrial levels for programme management) and specifies the organizational requirements concerning information circuits, internal and external to the programme and its environment.