INTERNATIONAL STANDARD

ISO 14300-1

Third edition
2023-12

Space systems — Programme management —

Part 1: Structuring of a project

Systèmes spatiaux — Management de programme —

Partie 1: Structuration d'un projet

Reference number
ISO 14300-1:2023(E)

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

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Foreword

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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 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).

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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.

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

This third edition cancels and replaces the second edition (ISO 14300-1:2011), which has been technically revised.

The main changes are as follows:

— update of normative references, related references in the text and related terms and definitions;

— update of the Bibliography;

— update of Annex A.

A list of all parts in the ISO 14300 series can be found on the ISO website.

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

Introduction

This document 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 making repairs 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 encourages and facilitates international space co-operation.

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

The applicable requirements for product assurance are given in ISO 14300-2. Annex A gives the general ISO standards framework for space systems programme management.

This document is intended to be used as a basis when establishing and negotiating customer project management requirements and guiding the supplier's responses.

It allows:

— 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 project organization;

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

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

Space systems — Programme management —

Part 1:
Structuring of a project

1 Scope

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

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 10007, *Quality management — Guidelines for configuration management*

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

ISO 11893, *Space systems — Programme management — Project organization*

ISO 14300-2, *Space systems — Programme management — Part 2: Product assurance*

ISO 16192, *Space systems — Experience gained in space projects (Lessons learned) — Principles and guidelines*

ISO 17666, *Space systems — Risk management*

ISO 21886, *Space systems — Configuration management*

ISO 21349, *Space systems — Project reviews*

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

ISO 23460, *Space projects — Programme management — Dependability assurance requirements*

ISO 27026, *Space systems — Programme management — Breakdown of project management structures*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 9000, ISO 10795 and the following 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/

3.1
project
unique process, consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including the constraints of time, cost and resources

3.2
programme
group of *projects* (3.1) managed in a coordinated way to obtain benefits not available from managing them individually

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
IPR	intellectual property rights
LB	log book
LSA	logistic support analysis
PDR	preliminary design review
PSR	pre-shipment review
QR	qualification review
TS	technical specification
WBS	work breakdown structure
WPD	work package description
RAMS	reliability, availability, maintainability and safety

5 Project management specification and plan

5.1 General

The attainment of quality, including requirements to meet cost, schedule and technical performance throughout project execution is the overall goal of management.

Any company involved in a space project shall take into account the requirements stated in a quality management system standard, e.g. ISO 9001:2015.

When a level 0 customer (the first level in the contractual line issuing a contract) intends to make this document a condition of a contract, this customer shall include in the solicitation (request for proposal, invitation to tender, request for quotation, etc.) a dedicated project 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 project requirements shall be maintained. Selection and tailoring of this document is needed at the customer level. Any adaptation of this document shall be based on specific objectives and constraints.

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

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

5.2 Project management specification

Depending on the nature of the project or the project phase, the project 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 regarding this document.

The level 0 customer shall require this document, as tailored, and the appropriate selected clauses of ISO 14300-2, to be used by suppliers as the basis for developing their management plans.

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

5.3 Project management plan

In response to this project management specification, each supplier concerned prepares a project 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 should be made available to their direct customer.

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

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

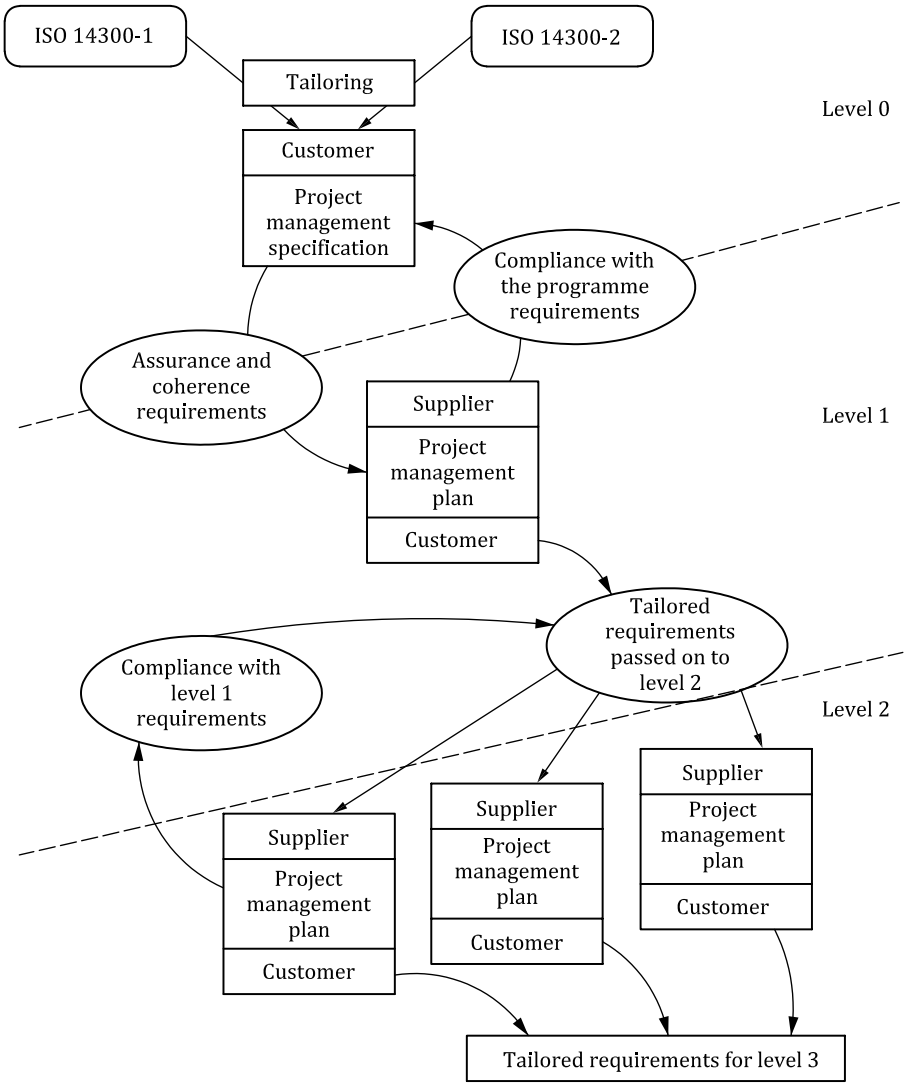


Figure 1 — Establishing project management rules

6 Work breakdown structure (WBS)

6.1 General

The project WBS is the reference system for project management data which:

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

— identifies the responsibilities and authorities of each supplier.

The rules to be observed when producing, modifying and using the project WBS are specified in 6.2 to 6.5 and shall be in accordance with ISO 27026.

6.2 Objectives

The project WBS is the structured and comprehensive breakdown of the whole project. Based on the product tree (see 6.4.3) or the function tree (see 6.4.2), it identifies the tasks and principal resources required to complete products intended to satisfy the expressed requirements.

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

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

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

— on the project budget or not;

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

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

6.3 Responsibility and authority for development

Each supplier shall:

— develop the product tree for their own supplies and limit it to interfaces with their own customer and suppliers;

— express their requirements concerning the establishment of the WBS to their suppliers.

These requirements are associated with the project 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 shall 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 project must 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 sub-functions, independent of the products involved.

It is possible to link tasks to functions at the early stages of the project, 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 shall be consistent with all related work packages and documentation.

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

The product tree shall 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). A WPD is the information associate. 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 project management.

Each added product, function, resource or task shall be given a new identification (reuse 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 are accomplished in compliance with the customers' specifications (modification of clauses, riders, etc.).

7 Project organization

7.1 General

A project organization shall be implemented to ensure consistent project performance and to control project execution and shall be in accordance with ISO 11893.

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

Based on contractual data, this clause is used by the different project suppliers as a definition model and for implementation of the respective organization at each level.

7.2 Principles

The organization to be implemented shall take into account the project phases concerned, the nature of the tasks to be performed and the associated responsibility and authority levels.

The preparation, definition and implementation of the project organization shall be planned in compliance with project phasing (see 8.2).

The choice of the simplest and most effective management project as well as contractual relationships shall be made taking into account the specific project aspects, whether it be a national or an international one.

The person in charge of the definition and implementation of the project organization shall be identified.

The responsibilities and authorities for project management and contracting shall be identified to anticipate contractual and legal incidences.

Each project organization shall be coherent in contractual and technical terms.

If the project is associated with other programmes/projects, responsibilities and authorities regarding interface definition and management shall be specified and considered when implementing the project organization.

7.3 Organizational requirements

7.3.1 General

The project phases requiring an effective implementation of project organization (feasibility, definition, development, production, and utilization) shall be specified. The project change may lead to modifications of the implemented organization during project execution.

When several suppliers jointly play a common role, the responsibilities and authorities of each of them shall be defined. When a supplier simultaneously plays several roles in the same project, they shall be clearly defined and carried out separately. For effectiveness, however, one single authority may supervise them.

Each supplier shall identify and assign the main responsibilities and authorities for the project and implement the internal organization to satisfy the contractual requirements.

Each customer and supplier are bound to play the roles both has been assigned for the duration of the project.

When several external organizations and/or internal departments are involved, the responsibilities and authorities of each of them and their interfaces shall be clearly documented, and the appropriate measures shall be taken to ensure their co-ordination. These measures shall in particular define the nature of the information to be exchanged between customers and suppliers.

7.3.2 Requirements

The roles of the project suppliers shall be explicitly defined and the project organization shall indicate who is in charge of each activity, required by the specific project management specification, i.e.:

— project management;

— contract management;

— cost and schedule control;

— engineering;

— procurement;

— ILS;

— product assurance;

— configuration and documentation management.

The interfaces and relationships with company management should be indicated. The application of the management rules and their effectiveness for the performed or subcontracted project activities shall be verified according to planned and documented audits, analysis of indicators and/or reviews as required by the customer.

7.4 Information and communication

7.4.1 Information circuits

Rules governing the organization of information circuits shall:

— define the list and role of the project customers and suppliers;

— specify the information to be exchanged between customers and suppliers and the schedule of exchanges.

The mode of establishment, of change and application shall be stated.

7.4.2 Communication requirements

The requirements for the communication of information shall include:

— the information to be exchanged between the actors;

— the format and tools for communication;

— the time-scales of the communications;

— prerogatives of the customer including delegation of it to the appropriate organization.

The pre-contractual and contractual relationships should lead to the negotiation of provisions concerning the visibility given to the customer.

7.4.3 Protection of information

The rules concerning patent rights, IPR, levels of confidentiality, external communication and the exploitation of results should be specified by the contract.

7.4.4 Progress reports

For the supplier(s) and customer, the purpose of these reports consists in evaluating the work progress regarding technical, performance, commercial, schedule aspects.

The content and periodicity of these reports shall be contractually defined.

These progress reports and meetings shall permit the communication, at all necessary levels, of information related to progress of the project, in order to take suitable decisions and to follow the implementation of decided actions.

The agenda of progress meetings shall be fixed and accepted by all the parties. Each meeting shall produce a report which specifies the decided actions.

7.4.5 Customer's prerogatives

When this document is made part of an agreement between a customer and a supplier, the agreement should establish the appropriate degree to which the customer will:

— monitor the application of the management requirements by the supplier;

— conduct or participate in audits or reviews of the supplier;

— be informed of the progress made by the supplier in design, manufacturing, inspection, and testing.

The prerogatives needed by the customer in order to accomplish these tasks should be established by provisions of the agreement. These provisions should cover:

— customer visits to the premises of the direct supplier;

— provisions that should be included in the direct supplier's agreements with lower-level suppliers regarding visits of higher-level customers;

— the designation of permanent or non-permanent representatives, resident at the supplier's premises;

— the delegation of all or parts of these prerogatives to national surveillance organizations, or to other specified organizations.

7.4.6 Action items management

Throughout the project activities, the actions resulting from relations with the customer (e.g., meetings, exchange of mail, key events, reviews) and/or those determined by the supplier as part of the application of the management rules shall be controlled. Each action is defined by a form of identification, a clear and unambiguous wording, an applicant, a person responsible for its completion and the corresponding deadlines (fixed date or project event).

The final status shall be formally expressed and accepted by the applicant on presentation of the applicable justifications.

7.4.7 Technical and management indicators

From the start of the project onwards, technical and management indicators, in particular highlighting developments in product quality and the organizational functioning, shall be formally defined, implemented, put to use and updated throughout the project activities. In case of significant unfavourable developments, measures shall be taken according to the analysis of results.

These indicators are defined between the customer and the supplier and shall remain confidential.

8 Project phasing and planning

8.1 General

The objective of project phasing and planning is to minimize the technical, scheduling and economical risk of the project by introducing phases of which the ends are marked by formal milestones. A milestone is a significant event marking the end of a phase of development in the project. By implementing project phasing and planning, the progress of the project can be controlled with respect to cost, schedule and technical requirements.

This objective is achieved by breaking the product life cycle into distinct phases which are interlinked. The objectives and work content of each phase shall be clearly defined.

At the end of each phase, a formal review process should be conducted to assess the development status of the product, in order to release a technical baseline and to interrelate with technical baselines subject to configuration management. The results of this process are formalized by appropriate documentation. The complete review process shall be in accordance with ISO 21349.

The number of phases and their objectives should be defined at the start of the project. They should also be tailored to minimize risks from cost, scheduling and technical problems that can compromise the success of the project.

The composition and content of the phases shall be determined by the level 0 customer using the project management specification based on this document and shall be appended to the contract.

8.2 Project phasing

8.2.1 Principles

The phasing may be broken down into seven phases. The start of a phase coincides with crossing a milestone, at which time a decision is taken by the level 0 customer (or his highest authority) at a given system level. This usually occurs after a specific review assessing the work results of the current phase, the provisions for the next phase and the identified risks.

The crossing of milestones at lower levels shall be decided by the relevant customers, after the relevant reviews.

The purpose of a review is to perform a critical evaluation by a team, including the customer and others not directly involved in the activities and with the aim of helping to:

— assess the validity of the technical elements in relation to the predictions and the contractual requirements;

— enable corrective and/or preventive actions to be carried out in the case of drift or inadequacy;

— mark the transition to the following stage;

— decide to cross the concerned milestone.

8.2.2 Mission analysis phase (phase 0 or pre-phase A)

This phase consists of an initial definition of the mission and of a preliminary assessment of the concepts needed for consideration in the feasibility phase.

This phase results in:

— the identification and the characterization of the mission;

— an initial evaluation of needed performance, risks, requirements, and objectives, e.g. dependability and safety;

— an initial assessment of the manufacturing and operational constraints, including environmental conditions;

— the identification of possible solutions with the associated critical issues, taking into account the lessons learned from current space programmes/projects;

— an initial evaluation of the elements of the project (organization, costs, schedules).

The requirements related to dependability shall be in accordance with ISO 23460. The results of these activities, especially mission definition and/or provisional functional specifications, should be reviewed and summarized in a transition phase 0 to phase A document which serves as the basis of the decision to initiate the feasibility phase.

8.2.3 Feasibility phase (phase A)

8.2.3.1 Objectives

This phase of the project consists of exploring the various possible concepts to meet the defined objectives (performance, costs and schedules).

This phase results in:

a) the function tree being issued;

b) the user's objectives being formally defined in:

   — a reference FS;

   — a preliminary issue of the TS at the system level;

c) the presentation of each concept examined in a pre-design associated with a financial proposal (costs and schedules) for the definition phase;

d) the estimation of technical and manufacturing feasibility and the emphasis on the critical elements of each concept (performance, risks, costs, schedules, technical and support costs).

The result of these activities, especially preliminary system requirements and system definition, should be reviewed and summarized in a transition phase A to phase B document (see 8.2.3.2).

8.2.3.2 Documentation

This phase results in the drafting of a “transition phase A to phase B document” under the responsibility and authority of the level 1 customer.

These documents shall emphasize in particular:

— the feasibility of proposals to meet the anticipated requirements;

— the general description of these proposals, indicating the main elements for each one (performance, costs, schedules, risks) and the one recommended;

— the organization of subsequent phases (structures, resources, etc.) and those elements allowing the start of the definition phase (WBS, costs, schedules, etc.).

8.2.4 Definition phase (phase B)

8.2.4.1 Objectives

This phase consists of selecting one proposal for development among those proposed at the end of the feasibility phase and in specifying the necessary requirements.

This phase starts by crossing the milestone corresponding to the acceptance of phase A results.

This phase results in:

— the comparison of performance and risks (regarding technical/cost/schedule aspects) of the technical solutions previously selected to be studied;

— the establishment of the TS at the system level;

— the establishment of the TS at the next, more detailed, level and whenever possible in compliance with the function tree as inputs to all specifications;

— the evaluation of the dependability and the safety characteristics;

— the choice of the proposal for development, in particular taking into account the financial aspects of the proposal;

— the issue of the transition phase B to phase C document.

The result of these activities, especially system TS, the frame of the system, the associated lower TSs and the development plan (see 8.2.4.2.3), should be reviewed (PDR) and summarized in a transition phase B to phase C document (see 8.2.4.2).

The TSs shall be in accordance with ISO 21351.

8.2.4.2 Documentation

8.2.4.2.1 General

The following documents, written under the responsibility and authority of the level 1 customer, shall be compiled with the TS and the documents drafted by the supplier:

— the management plan and the development plan;

— the WBS (see Clause 6);

— the first-level TS and, whenever possible, the associated technical clauses;

— the preliminary DF and the justification for it.

8.2.4.2.2 Transition phase B to phase C documents

These documents in particular emphasize:

a) the necessary requirements listed in the TS. This TS shall be compared with anticipated requirements. The purpose of this comparison is to verify that there is no incoherence between anticipated requirements, defined by the user in the reference FS, and the technical and contractual requirements expressed in the TS;

b) the proposed design of the solution, which has been sufficiently examined in compliance with the requirements. This design is, in general, described in a preliminary DF and defines the architecture of the main components. This design shall facilitate the identification of the various critical points in the product development and manufacturing;

c) the organization of the development phase with:

   — the organization of the project,

   — the schedule for completion, including key events,

   — the methods allowing the various identified risks to be kept under control;

d) the justification of the estimated cost of the development phase.

8.2.4.2.3 Development plan

At the end of phase B, the development plan shall be drafted by the level 1 customer, considering the requirements of his customer and with the elements of his own suppliers. Phase A and B activities are iterative and tend to clarify progressively requirements, thus making possible solutions more evident. This development plan shall describe the phasing rationale used to carry out the development of the products satisfactorily under his responsibility and authority, and in particular:

— the task sequence of the project;

— the mandatory steps (key events);

— the significant stages in development progress and of the design verification (document issue, manufacturing of models, tests, reviews, etc.).

When approved by the level 0 customer, it becomes the document for management and follow-up of the work. If there are several level 1 suppliers, then arrangements should be made to ensure the consolidation and coherency at level 0.

8.2.5 Development (phase C) and production (phase D) phases

8.2.5.1 Merger of phases C and D

Phases C and D may be merged into one unique C/D phase if the project leads to the manufacturing of a single-flight unit or of a very small quantity of product.

The choice shall be determined by the level 0 customer.

8.2.5.2 Integrated C/D phase

This project phase consists of making a detailed study of the solution selected upon completion of the definition phase and subsequently manufacturing qualification model(s) and flight model(s). The purpose of this phase is to obtain a qualified design of the deliverable products required for system operation and support.

This integrated phase starts by crossing the PDR milestone and corresponds to the acceptance of transition phase B to phase C documents issued during the previous phase.

This phase shall include, as a minimum, the tasks necessary to complete the designed state of the system and of each of its components (CDR).

Based on the verifications made during this phase and during qualification tests, the qualification process shall show that this design meets the specified requirements (QR).

Product design qualification and flight model acceptance complete the C/D phase.

The pre-shipment review authorizes the shipment of the product after checking its conformity with respect to the project objectives (performance, configuration and waivers) and the operational status of the system.

8.2.5.3 Separate development (phase C) and production (phase D) phases

8.2.5.3.1 Development phase (phase C)

This project phase consists of making a detailed study of the proposal selected upon completion of the definition phase. The purpose of this phase is to obtain a qualified design for the mass production of deliverable products required for system operation and support.

Phase C starts by crossing the PDR milestone and corresponds to the acceptance of the transition phase B to phase C documents issued during the previous phase.

This phase shall include, as a minimum, the tasks necessary to complete the designed state of the system and of each of its components (CDRs).

During this development phase, the "production plan" is established by the supplier and gives the general manufacturing schedule at the highest level of the WBS. It includes the elements provided by its own suppliers. The manufacturing plan shall be issued under the responsibility and authority of the level 1 customer and once issued, marks the start of the following phase.

The production plan defines a production cycle of one element which is to be used as a reference. Consequently, any risks due to disturbances on the standard production line can be established.

This plan outlines the mass production scheme (see 9.3) and specifies the key events, as follows, that may be selected for stages of payment and follow-up scheduling:

— manufacturing preparation;

— procurement;

— start of manufacturing;

— technical evaluations prior to acceptance tests;

— final acceptance.

The qualification process started during the development phase shall be based on verification made throughout the development phase as well as qualification tests. Results from the qualification process shall demonstrate that the product design meets the specified requirements and that it can be produced.

Qualification of the product design (QR) marks the end of the development phase (phase C).

8.2.5.3.2 Production phase (phase D)

This phase consists of manufacturing and delivering to the user the production ordered in compliance with the designed stage of the product.

It starts with the milestone crossing corresponding to the acceptance of the "production plan" issued during the previous phase.

Two processes may be identified within this production phase: the series production process and the acceptance process for each finished product after a performance check by a pre-shipment review. This pre-shipment review authorizes the shipment of the product after checking its conformity with respect to the project objectives (performance, configuration and waivers) and the operational status of the system.

For scheduling reasons, some procurements may be started prior to the production phase.

8.2.6 Utilization phase (phase E)

During this phase, the system and the resources required to fulfil its operational mission are put into service, used and supported.

The acknowledgement by the system user of its fitness for use conditions the beginning of its operational life.

8.2.7 Disposal phase (phase F)

This phase consists of the preparation and completion, in a co-ordinated way and in conformity with the applicable rules, of the complete or partial discontinuance of system operation and dismantling of the products and associated resources.

This phase starts with a decision of complete or partial disposal and may lead to establishing a historical record and an analysis of the project (performances upon completion, life cycle cost, statistics, etc.).

The dismantled products can be destroyed, stored, transformed or assigned to another utilization within the framework of other programmes/projects.

8.3 Product stages — Associated processes and documents

8.3.1 General

The set of successive product stages is usually called the product "life cycle". The different product stages, in relation to the phases of the project, are indicated in Figure 2.

For a given intermediate level, the transition from the specified stage to the designed stage is a complex process or a number of processes progressively incorporating the design formulated at the lower level. The transition from a given stage to the following one is achieved by applying one or several processes as shown in Figure 3.

The different product stages are described in 8.3.2 to 8.3.6 and illustrated in Figure 2.

These stages shall be identified and recorded in the documentation system specified in Clause 12.

As soon as a given product stage is attained, the CM procedure shall be implemented in accordance with Clause 10.

8.3.2 Functional stage

This product stage defines and implements the service functions expected from the product.

This stage originates following the customer's request and is expressed in an FS or any other similar document.

The purpose of the FS, drafted under the customer's responsibility and authority, consists of expressing the customer's requirements in terms of the service functions expected from the product. Both the constraints of utilization and flexibility in the various phases shall also be explicitly expressed in this document.

The FS shall be drafted progressively and justified in respect to the initial customer request based on results from studies performed during the process of determining requirements.

The FS and its associated justifications are to be managed in accordance with the customer's in-house procedure.

The functional stage is completed once the FS is issued. The FS becomes the reference FS at the end of phase A.

8.3.3 Specified stage

This product stage is initiated once the reference FS or the TS of the higher level is established. It consists of processes for establishing a preliminary design and in further defining requirements. The results shall be recorded in the TS.

The purpose of the TS drafted under the customer's responsibility and authority is to define requirements in terms compatible with the reference FS or the TS of the higher level and to describe

the selected concept, taking into account the performance, cost and schedule requirements. It shall therefore express:

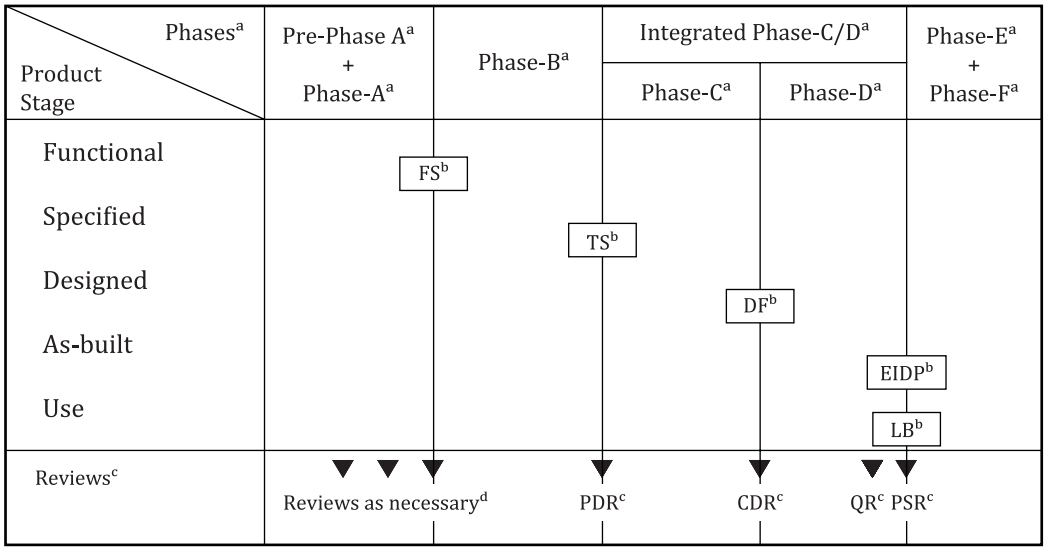
— the functional requirements associated with the various features of the projects planned, taking into account environmental conditions;

— the dependability and safety requirements;

— the requirements concerning interfaces;

— the requirements concerning design and production (prescribed or prohibited proposals, standards, etc.);

— the requirements concerning qualification and acceptance related to the verifications to be provided by the supplier.



a Mission analysis phase (Pre-phase A)
Feasibility phase (Phase A)
Definition phase (Phase B)
Development phase (Phase C)
Production phase (Phase D)
Utilization phase (Phase E)
Disposal phase (Phase F)

b FS functional specification
TS technical specification
DF design data file
EIDP end item data package
LB log book

c PDR preliminary design review
CDR critical design review
QR qualification review
PSR pre-shipment review

d Review such as:
mission definition;
system requirement;
system definition

Figure 2 — Relationships between project phases and product stages

Results of the studies and tests performed when issuing the TS shall make it possible to compare the TS with the reference FS or the TS of the higher level.

The corresponding documents shall be compiled in a justification file of the TS.

The reference specified stage is achieved by the approval of the TS which takes into account the concept selected for development.

8.3.4 Designed stage

8.3.4.1 General

This stage is initiated once a set of data can be established to fully identify the design of the product for manufacturing, inspection, use and support processes. It is expressed in the DF drafted by the supplier. The designed stage is established once the DF is approved after qualification (qualified DF).

8.3.4.2 Design data file

The DF shall show the levels corresponding to the requirements associated with operation, maintenance and logistics, and in particular identify:

— all supply items;

— all elements separable in use and/or deliverable as spares;

— the regrouping of products based on elements defined separately;

— the specific designs adapted to specific situations (situations concerning packaging, storing, delivery, standard or specific utilization, etc.) as well as changes allowing a switch from one situation to another.

8.3.4.3 Design justification data file

The purpose of the design justification data file is to make a synthesis of all the verifications proving that the designed state of the product satisfies the requirements of the TS. It should be drafted progressively under the supplier's responsibility and authority during the processes of design and qualification.

The design justification plan, drafted on the basis of the TS, shall constitute the framework of the design justification data file and shall explain how each TS requirement is to be verified. This plan should be part of the development strategy of the project.

8.3.4.4 Qualification process

The qualification process is concluded with a verification that:

— the design satisfies the specified requirements (design justification data file);

— the design can be produced in accordance with the scheduled quantities and rates of production;

— the products complying with this design will be fit for the specified use.

NOTE The verification that the design can be produced can then be integrated in the design justification data file or can constitute a separate document.

The DF approved at the end of the qualification process and completed by the production master file constitutes the point of entry of the production process. From this DF, the following shall be finalized:

— the tasks concerning the production and acceptance processes by the application of the production master file;

— the analyses and support tasks with the drafting of user documentation.

8.3.4.5 Production master file

The purpose of the production master file is to manufacture units of the product in conformity with the DF. It shall contain:

— the part lists and process sheets;

— the list of specific or non-specific tools;

— the purchase documents (procurement and manufacturing cycle);

— the inspection procedures and records;

— more generally, all necessary data for production.

8.3.4.6 User documentation file

The purpose of a user documentation file is to define the input data for the implementation conditions of the product's living state within the operational process, so as to develop later on:

— the operational documentation;

— the maintenance documentation;

— the procurement documentation;

— the training documentation concerning users, maintenance people and suppliers.

8.3.5 As-built stage

This stage corresponds to each product finished and ready for delivery to the user. It is initiated through the qualified DF.

The implementation of the manufacturing process completes this stage.

This process leads to, for each of the deliverable products, the implementation of the acceptance process.

The configuration of each deliverable product is given by its EIDP where the information specific to the current approved configuration (baseline configuration plus accepted changes) of the product and the approved waivers shall be recorded. The EIDP also includes the result of the acceptance and other data as requested by the customer.

The product and its accompanying documentation shall be transmitted to the customer for the ownership transfer in conformity with the customers' requirements and the acceptance requirements specified in the DF.

8.3.6 Use stage

This stage corresponds to each of the various units of the product put into service, operated and supported by the user.

The use stage shall be recorded in the logbook from the operational process onwards through to disposal, under the user's responsibility and authority.

9 Cost and schedule management

9.1 General

The objective of cost and schedule management is to provide a collective system of organized processes and actions in support of project management aimed at establishing the optimum use of human

resources, facilities materials and funds in order to achieve the successful completion of the space project within its established goals:

— cost targets;

— timely completion;

— technical performance.

To this end, costs and tasks shall be planned and actively controlled, identifying those critical situations that can possibly lead to adverse impacts on the project cost and schedule, together with the proposed recovery actions.

The work to be performed for every space project shall be planned and controlled on the basis of the WBS to a level of detail commensurable with the achieved design maturity and adequate to the project phase for which cost and tasks are planned.

Cost data specified in the contract shall serve as a reference for cost control agreed between the supplier and the customer.

Schedule planning and control are implemented by establishing and maintaining a schedule of project activities in which external inputs and task outputs are linked and project milestones are identified.

9.2 Cost management

9.2.1 Principles

The supplier shall perform cost management functions according to the customers' requirements as follows:

— cost estimate and calculation of costs at completion;

— evaluation adjustment;

— analysis of financial proposals made by its own suppliers;

— negotiation, formal expression and identification of technical or time-linked key events leading to payment;

— record and follow-up of actual costs and comparison with estimates;

— deviation identification;

— the possibility, at the level of key-events, of correlation of the technical and physical progress with the corresponding costs and times;

— the application of risk management processes to performance, costs and schedules;

— assessment of related consequences;

— taking or proposing corrective measures.

In this context, contractual requirements for a given phase imply a follow-up of expenses related to that phase in progress and preparation of subsequent phases regarding economic aspects, e.g. development cost, recurring cost, life cycle cost.

Contractually, cost monitoring by the customer and cost reporting to the customer are usually applicable only for cost-plus contracts, and not for fixed-price contracts.

9.2.2 Optimization

The level 1 customer (or his representative) shall provide the economic data required for optimization (elements of life cycle cost, schedules, performance) of the system with the support elements.

Furthermore, each supplier shall provide the economic data needed to optimize the supplied products to its own suppliers.

9.2.3 Cost estimates

For each proposal considered, an estimate and a cost proposal shall be made by the supplier indicating development, recurring production and operational costs. Key cost factors shall be specified.

These costs shall be broken down according to the known WBS for each work package of the WBS and the types of expenses (engineering, purchases, etc.) specified in the contract or invitation to tender.

These costs should be estimated for all resources that will be charged to the project, including labour, equipment, materials, subcontractors, travels and any other costs.

Each customer shall take into account all costs so as to obtain the global cost of the system.

9.2.4 Cost monitoring

The costs adjusted after negotiation at the end of the previous phase shall be taken into account and the change of the estimated costs for the following phases, especially within the framework of the CM, shall be permanently monitored.

The costs shall be monitored by means of a schedule of commitments and an expense schedule until completion of the contract and by revision meetings concerning these schedules. The periodicity of these meetings shall be fixed by the contract.

Revision of the possible expense schedule shall be based on the tasks remaining to be completed at the date of the revision. The economic conditions of this revision shall be contractually specified.

Expenses shall be apportioned by the supplier according to the accounting plan applicable in the supplier's organization and according to contract work units.

The revised expense schedule shall point out the deviations at the revision date and at project completion due to:

— technical changes approved at revision date;

— cost updating and/or revision formula;

— other causes.

A report appended to the revised expense schedule shall:

— present new measures taken to reduce costs, considering actual progress with respect to the work schedule;

— identify the source of deviations and the actions to be taken to reduce possible over-costs related to these deviations.

9.3 Schedule management

9.3.1 Principles

Schedule management aims at:

— evaluating the time required to perform different tasks and highlighting aspects that can be critical (tasks, resources);

— sequencing tasks, at all levels, in a structured and coherent way;

— supplying to the different levels of the organization the applicable data about the work progress (to the higher levels in the form of reporting, to the lower levels in the form of contract changes);

— detecting and pointing out the critical paths and especially situations likely to cause delays before leading to serious problems and affecting the project target schedule;

— allowing a rapid response in the event of a problem;

— studying and presenting the consequences of planned technical changes to the project schedule;

— identifying and monitoring the project key events, mainly those leading to payment, and the ordering dates of the different project phases;

— preventing, as far as possible, or minimizing delays with respect to the agreed contractual schedule.

9.3.2 Task sequencing

9.3.2.1 General

For each element of the WBS, task sequencing should be produced and integrated in compliance with the chosen breakdown.

9.3.2.2 Work schedule

Each supplier responsible for an element of the WBS shall develop a work schedule and shall ensure that the schedules issued by its own suppliers are consistent; the supplier shall ensure that the breakdown and the target schedule fixed by its customer are met.

9.3.2.3 Key events

The supplier shall identify key events, i.e. events considered as representative of the project's progress. These events shall be selected for:

— their start/finish character regarding outstanding tasks;

— their interface nature;

— their criticality (technical, economic, delay-related risks, etc.);

— their contractual aspect (event leading to payment).

Closure criteria shall be established for each key event.

9.3.3 Deviation analysis — Trend analysis

9.3.3.1 Deviation analysis

This analysis shall point out:

— the causes (traceability);

— the side effects on the general work schedule (schedule delays or anticipation);

— the changes concerning critical paths and associated risks;

— the basic elements allowing the determination of corrective actions;

— the measures proposed or taken to optimize cost, schedule and performance.

9.3.3.2 Trend analysis

Based on the data transmitted by its own suppliers, the supplier should conduct a trend analysis on reported deviations and variations in data concerning an event as well as assess any possible repercussions on the general schedule for project completion.

These analyses should briefly point out the most critical elements and, if possible, include suggestions for preventive actions.

9.3.3.3 Synthesis of work progress data

The supplier should periodically analyse all schedule data from its own suppliers and may report on the progress of the contractual tasks.

The report to be provided to the customer should include:

— identification of tasks that are critical or sub-critical;

— comparison between the actual situation and objectives;

— trend analysis of identified key events.

This report forms part of the progress reports mentioned in 7.4.

9.4 Evaluation after completion

At the end of the project or phase, an “evaluation after completion” should be produced. This evaluation should in particular compile the effective costs and schedules at completion and the main causes of observed changes compared with the initial estimates. The supplier should specify as soon as possible the means implemented to record relevant information throughout the project.

10 Configuration management

10.1 General

This clause defines the CM requirements. Configuration management shall be in accordance with ISO 21886 and ISO 10007 which are applicable to space systems.

10.2 Configuration management planning

Effective configuration management planning coordinates configuration management activities in a specific context over the product life cycle. The output of configuration management planning is the configuration management plan.

The configuration management plan shall describe the organization, the resources and the methods set up by the suppliers to satisfy the laid down objectives and shall fulfil the configuration requirements expressed by the customer.

This plan shall be part of the management plan. It shall describe:

— how to accomplish configuration management (showing the policies and methods for the implementation of configuration management);

— how to achieve and maintain consistency between the product definition, the product configuration, and the configuration records throughout the applicable phases of the life cycle.

10.3 Configuration identification

10.3.1 Product tree and selection of configuration items

The product tree depicts the breakdown of the product into successive levels of detail down to the CIs necessary to deliver the required functions.

The product tree should describe the relationship and the position of CIs in the system architecture.

Configuration items should be selected using the guidance criteria. The criteria used to select the CIs under customer control and the associated baseline reviews shall be negotiated between customers and suppliers and identified in management requirements and plans.

10.3.2 Documentation of configuration items

All the necessary functional and physical characteristics of a CI, including interfaces, shall be contained in the documents described in 8.2. These are normally categorized as configuration documents.

10.3.3 Establishment of configuration baselines

Configuration baselines should be developed upon formal agreement following Clause 8 and used as starting points for the formal control of a configuration.

10.4 Configuration status accounting

Configuration status accounting provides visibility of the current approved configuration, traceability of changes to configuration baselines, and comparison with the configuration at completion.

10.5 Configuration control

10.5.1 General

Configuration control is applicable at the CI level. Any change, deviation or waiver applicable to a component shall be addressed to the next higher CI.

10.5.2 Configuration baselines

The configuration identification is established and maintained through four distinct increasing levels of detail, each one used for a specific configuration baseline:

— during phase B, the functional baseline (functional state) expresses the overall performances, interfaces and requirements, laid down by the customer;

— after a PDR, at the end of phase B, the development baseline consists of the TSs (specified stage), issued by the supplier of the product, and the lower-level CIs;

— during phase C, after CDR, the baseline consists of the TS and DF status (designed stage), issued by the supplier for the product, and the corresponding documents for lower-level CIs;

— after qualification, the production baseline (use stage) identifies the released detailed design for production and operation. It includes all the documents necessary to manufacture, assemble, test, accept and operate the product.

During operations, the configuration is identified by the incorporation of the approved changes (use stage).

10.5.3 Configuration control board

A CCB should exist in any organization with design responsibility and authority. “CCB” is also referred to as “dispositioning authority” (ISO 10007 and ISO 21886).

10.6 Change control

10.6.1 Change classification

Any proposed change should be put into two classes.

— Class 1: changes which have an impact on the contractual and/or technical requirements specified by the customer. These changes should be submitted to the customer for review and approval before implementation (CCB at customer level).

— Class 2: changes which are outside the class 1 definition but are necessary for the supplier to meet for contractual and/or technical requirements and provisions. Class 2 changes may be implemented after the supplier's CCB approval.

10.6.2 Change approval

After the change has been evaluated, the CCB should review the documented evaluations and decide upon classification, and approval or disapproval of the change.

The change procedure should identify the CCB responsibility and authority and mode of operation.

The authority for approval/disapproval may vary depending on the change classification.

All proposed changes should be reviewed and considered through the CCB structure until they reach the CCB with the appropriate authority for final decision.

10.7 Configuration status controlling

Configuration status controlling is the process of continually taking stock of the configuration status of the product.

10.8 Configuration audit

The effectiveness of the configuration management system is measured by audits to verify the proper application of configuration management requirements during the life cycle of the product as specified by the customer.

11 Integrated logistics support

11.1 Objectives

The overall objective of the ILS is to ensure the satisfaction of needs in terms of logistic support throughout the system life cycle.

The ILS covers the definition of the set of support elements being delivered as well as implemented, which aims at maintaining:

— the technical and availability performance of the system;

— the integration of the logistic support activities into the project activities;

— the deployment of such activities throughout the system life cycle.

In order to achieve the planned results, the ILS management shall aim at the following objectives:

a) ensure that the requirements related to ILS are specified in the general project requirements (FS, TS);

b) ensure that these requirements are taken into account in due time:

   — in the design of the system so as to optimize and maintain its efficiency,

   — in the support elements design so as to meet the requirements and needs of the user,

   — in the optimization of the system and/or support elements and the system performance, cost, and schedule;

c) ensure the global coherence of the support and the availability of all support elements to the users in due time as well as their effective usability;

d) verify, by tests and evaluations, that the support elements are appropriate to meet the specified requirements.

Regular communication between all levels of the project organization shall be maintained.

11.2 Scheduling aspects

ILS applies from the start of the project onwards. Consequently, the design of the different support elements shall be made in very close liaison and simultaneously with the design of the system, and with the cooperation of all customers and suppliers intervening at any moment of the system's life cycle. This implies that a certain number of tasks are to be carried out from the feasibility phase onwards.

When this requirement becomes contractual after the start of the feasibility phase, these tasks shall have been carried out. If not, measures shall be taken to bring the ILS plan up to date with the project execution as quickly as possible.

The ILS tasks can be divided into three groups:

— application of the LSA so as to optimize the logistics support;

— design, development and maintenance of support elements;

— follow-up of the system in service.

11.3 ILS management

11.3.1 ILS integration into the project

The close integration of ILS in the project, in conformity with its denomination, implies that:

— the requirements relating to the support are associated with the system;

— the ILS tasks are defined with the WBS.

11.3.2 Communication

Each customer and supplier shall take the necessary measures (meetings, reports, memos, etc.) in order to implement regular and effective communication between themselves, their suppliers and their own customer so as to ensure the exchange of information between interested parties, i.e. designers, manufacturers and users of the system. The customer shall also encourage the exchange of information between their supplier's ILS experts.

Such communication shall relate to the progress of ILS tasks, the change in the ILS plan (including addenda or improvement proposals), the exchange of information relating to the logistics support, etc.

Furthermore, each customer and supplier shall draft and keep an updated “logistics” plan concerning the follow-up of actions, schedule and costs, and shall send the customer the contractually specified elements in this plan.

11.3.3 Design, development and maintenance of support elements

The determination of the support elements and their specifications are a result of LSA. The tasks of detailed design, completion and support of these elements to be developed within the project shall be contractually defined.

11.3.4 Follow-up of the system in service

On the basis of the information supplied by the analysis system of the test results and the technical events, as well as the available logistical data, each supplier shall carry out the analyses needed to define or propose corrective or preventive actions related to the support and intended to maintain or improve the quality of this support.

11.3.5 ILS organization

Both customers and suppliers should implement an appropriate organization for ILS activity.

The organization is intended to implement and/or to be able to implement the means allowing ILS tasks to be controlled to meet the specified objectives.

12 Documentation and information management

12.1 Objective

The purpose of this clause is to specify the requirements concerning documentation and information management, allowing documents to be drafted, identified, submitted, authorized, circulated and classified.

12.2 Application conditions

Documentation and information management and its implementation system shall facilitate the execution of the project. The requirements placed upon the information system shall prevent suppliers from making unnecessary changes to established in-house systems.

Except for reasons of national or commercial security, information/documentation management systems shall be open to all project users, who are to determine and define their own access needs.

Authority and responsibility for information content, input and retrieval shall be placed uniquely and at the lowest possible level in the project organization to avoid non-value-adding intermediate interventions.

12.3 List of documents to be produced

Each supplier should issue a provisional list of the documents needed, which should be kept updated accordingly with the progress of the activities.

This list should include both the contractually required documents and those needed by the supplier but not specifically covered by the requirements of the contract.

This record, with respect to the products and activities under the supplier's responsibility and authority should indicate:

— the type of document;

— its title;

— its identifier (see 12.6);

— its estimated date of publication;

— whether submission is required or not and its type (acceptance or approval) (see 12.8);

— whether the document is a required document (deliverable), available for consultation or not available (supplier's internal document).

The estimated date of publication is defined with respect to the phasing (see Clause 8) and the supplier's activity schedule.

12.4 List of applicable and reference documents

Each supplier shall issue and keep updated, with respect to the progress of the activities, a status of the documents applicable and referenced for its activities.

12.5 Master list of documents

Each supplier shall issue and keep updated with respect to the progress of the activities a list of the contractually required documents.

This record, based on the estimated list defined in 12.3, shall provide the following complementary information:

— the issues and the revision numbers (see 12.6) and the dates of publication;

— the document status at the date of publication, i.e. in preparation, draft, authorized, accepted or approved (see 12.8);

— the references of the comments for submitted documents.

This progress record indicates all successive document issues and revisions.

12.6 Document identification

A unique identification shall be assigned to each document.

This identification may be contractually specified for the required documents or be at the supplier's initiative.

The identification shall at least include the name of the issuing supplier and a unique sequence number per document.

The information on the first page or heading shall allow a link to be assured between the product tree, the activities or function tree (see Clause 6), and the configuration (see Clause 10).

The identification shall include an issue or revision number characterizing the changes in the documents.

Each document shall include a status of its changes recorded for each change, i.e. the successive numbers, dates of publication, the parts modified with respect to the previous issue or revision (if necessary, by means of a page index), origins of changes (if necessary, in conformity with the CM; see Clause 10) and, if the documents are submitted, the acceptance or approval references.

Changes with respect to the previous issue or revision shall be adequately indicated in the document.

Furthermore, it is important that the user of a document be able to verify its completeness.

The first pages or headings of the documents shall clearly specify their status with respect to the required authorizations (see 12.8) as follows:

— draft submitted for acceptance or approval;

— accepted or approved;

— authorized.

12.7 Drafting of documents

The authorized languages for the documentation to be exchanged (required documentation) are contractually specified.

If necessary, translations into the official project languages shall be made in conformity with translation guidelines or recognized references.

When computerized systems are used to ensure the exchange and mutual processing of documents between the different partners, the requirements concerning the exchange of data shall be defined in the corresponding clause of the management specification.

12.8 Document authorization

12.8.1 General rules

The issuer's authorization shall be given by one (or several) competent authority(ies). For documents estimated important by the issuer, this authorization shall be backed up by an independent internal verification.

Contractual and/or project authorization shall be given within a submission phase according to the requirements of 12.8.2.

The authorization to use the documents shall be formally expressed by the issuer, based on the internal verifications carried out and/or the decisions announced at the end of the submission phases.

12.8.2 Submission phases

These phases shall be contractually specified.

The submission requirements should define:

— the types of documents concerned;

— the nature of submissions (for acceptance, for approval);

— the partners of the project organization who are to be systematically consulted as well as their respective roles and authorities;

— the modes of document transmission;

— the decision-making process based on comments as well as the procedures for notifying the issuer of such decisions;

— the time periods for document updating made with respect to comments;

— the procedures of traceability for comments with the documentation of the follow-up decisions;

— the mode for identifying the documentation made in consequence to follow-up decisions.

12.8.3 Document changes

Regarding the methods for ensuring the control of document changes, the following should be taken into account:

— the users involved in the verifications or submissions should be informed of the origin of the changes and the justifications for proposed updating;

— the holders and users of documents undergoing changes should be informed of the situation within the timeframe of the activity schedule;

— the decisions to cease the applicability of documents should be announced to all holders who shall then take the necessary measures to forbid their use.

12.9 Availability of documentation

12.9.1 General

The documentation methods shall consider the confidentiality requirements concerning certain information.

12.9.2 Classification, filing and storage

The documents and information supports should be the subject of a classification in order to ensure the access and physical protection of documentation.

The filing of documents or information should be performed by identified documentation centres or (internal or external) bodies.

The documents and information should be stored in suitable locations, zones, premises, furniture and devices to ensure:

— material preservation against environmental risks (bad weather, flooding, fires, heat, cold, insects, rodents, fungus, electromagnetic radiation, etc.);

— the most effective protection against aggressions and/or infringements (assaults, piracies, listening-in, interception, etc.);

— timelessness of documents and information in the case of entire or partial loss.

The modes and duration of document and data storage shall be contractually specified. Each supplier should define the filing period of his own documents.

12.9.3 Confidentiality

When necessary, special methods to guarantee the confidentiality of the documents and information may be implemented.

These methods require:

— the list of confidential information and the definition of the appropriate confidentiality levels;

— the list and the entitlement of the personnel directly involved in use, transmission and forwarding;

— the implementation of procedures and resources for duplication, classification, transmission, preservation and protection according to the confidentiality levels;

— the implementation of declassification procedures;

— if necessary, development of measures of preliminary evaluation and continuous verification of compliance with the confidentiality requirements.

These methods apply to all information supports (electronic, electromagnetic, computerized, paper, drafts, machine ribbons, punch tapes, etc.), to the use of transmission resources and to forwarding procedures until the destruction of the support or the declassification of the information.

The particular rules and procedures concerning confidentiality may be specified:

— either by reference to existing rules; or

— directly in the project requirements.

13 Risk management

13.1 General

This clause defines the risk management requirements. The risk management requirements shall be in accordance with ISO 17666 which are applicable to space systems.

The RAMS plan describes the organization, the resources and the methods set up by the suppliers to satisfy the laid down objectives and fulfils the requirements expressed by the customer. This plan shall be part of the management plan.

Although the financial consequences arising from failures to execute a contract fall mainly on the first-level supplier, some project risks are inevitably shared between the customer and the supplier. Negotiation of the contractual requirements, including the dedicated project management specification, defines the supplier's specific role, responsibilities and authorities over the portion of their project. However, both the customer and the supplier remain at risk regarding the decisions of each supplier throughout the project. Accordingly, each supplier shall implement, throughout the project, a risk management system concerning the products and/or processes under her or his responsibility and authority.

All areas of the project shall be covered including technical, programming (funding, customer concerns, political, etc.), cost (contract performance and unit cost) and scheduling performance.

Each supplier shall identify undesirable events related to project risks and assess each for:

— the impact of their possible consequences;

— the probability of their occurrence.

Actions to capitalize on opportunities and to eliminate or reduce risks judged unacceptable shall be defined and implemented.

The supplier shall issue, keep updated and periodically transmit a record of the unacceptable risks (critical items), ongoing or accomplished risk reduction measures and their progress status to the customer, when required. This record shall be based on their own evaluations and on the records of their suppliers.

When the criticality is not confirmed or when the implementation of actions is carried out, a decision regarding closure shall be taken upon agreement by the customer and shall be recorded for traceability.

Each supplier shall describe the process that is used to identify, assess and reduce unacceptable risks and to monitor and/or report the status of the various risk management action plans on the basis of Figure 3, which describes the general process, in its management plan.

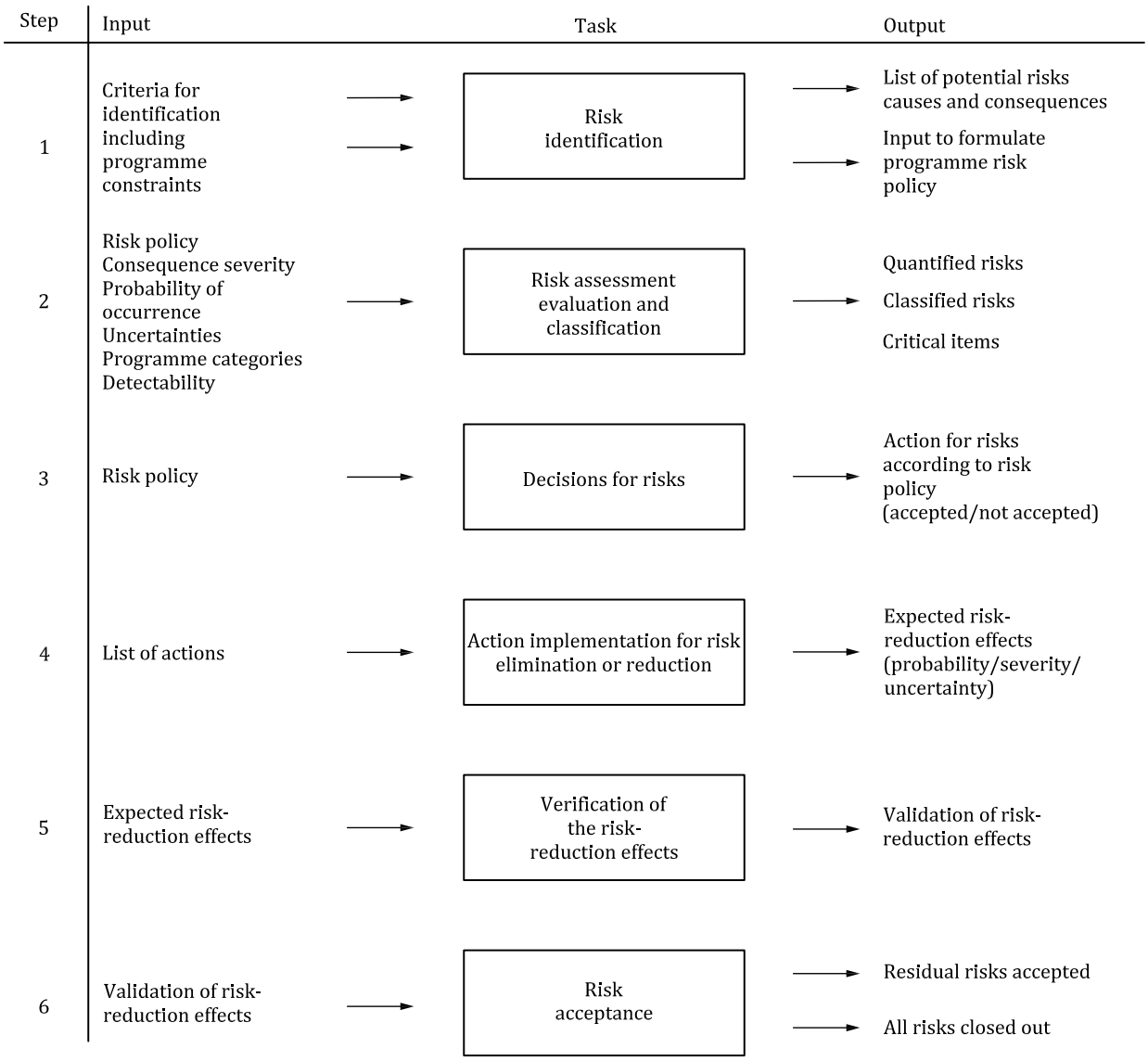


Figure 3 — Risk management process

13.2 Critical items control

All critical items shall be subjected to a specific control procedure.

The critical item list shall contain the applicable actions and schedule provisions in order to fulfil the general development objectives and to solve the outstanding difficulties in view of qualification of the design.

The critical item list shall be presented to all reviews of the project. The approval of the critical item processing is under the control of the customer.

14 Project closure

14.1 General

A programme closure can be scheduled or unscheduled, both undertaken in a controlled manner.

14.2 Scheduled project closure

A project should be closed after all project outputs have been delivered according to project targets and the project results have been accepted by the customer.

This implies that the following activities should be performed:

— review original project goals, check the fulfilment of project objectives, validate compliance of the results to customer requests, measure the benefits, and compare them with original expectations;

— establish a lessons-learned basis for future projects, avoiding repeating errors already made, the project leader must ensure that a record of the project is organized, i.e. a description of the main events, decisions and their rationale, etc.;

— disband the team (the project leader is responsible for this);

— release the infrastructure and equipment (the project leader is responsible for this);

— acceptance of project results, confirmation that all resources are disbanded, the project leader is discharged and formally declares the project closure.

14.3 Unscheduled closure of the project

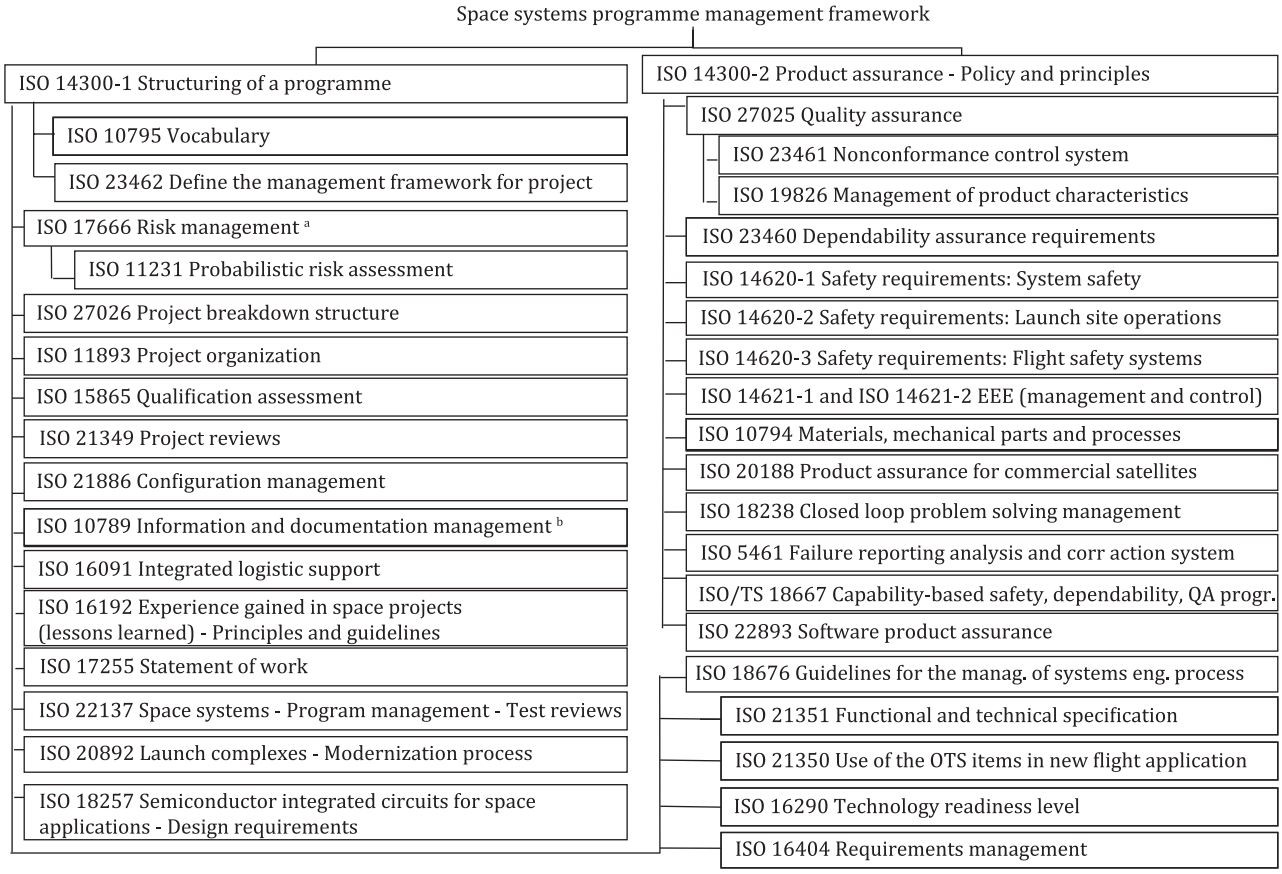
Reasons for an unscheduled closure of the project can be external factors (e.g. market change) as well as internal factors (change of strategy, etc.). In addition, it can occur that the project fails at a previously defined critical milestone.

The unscheduled closure of a project should follow the procedure defined for scheduled closure wherever possible. In all cases, the achievements and quantitative and statistical data should be documented. This also implies the capture of gained knowledge in the lessons learned process which shall be in accordance with ISO 16192.

Annex A
(informative)

Management framework for space systems standards

Figure A.1 presents the management framework for space systems standards.



[a] See Clause 13.

[b] See Clause 12.

Figure A.1 — Standards framework for space systems programme management

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[1] ISO 9001:2015, *Quality management systems — Requirements*

[2] ISO 23462, *Space systems — Guidelines to define the management framework for a space project*

[3] ISO 10789, *Space systems — Programme management — Information and documentation management*

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[5] ISO 11231, *Space systems — Probabilistic risk assessment (PRA)*

[6] ISO 14620-1, *Space systems — Safety requirements — Part 1: System safety*

[7] ISO 14621-1, *Space systems — Electrical, electronic and electromechanical (EEE) parts — Part 1: Parts management*

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[9] ISO 15865, *Space systems — Qualification assessment*

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[13] ISO 18676, *Space systems — Guidelines for the management of systems engineering*

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[15] ISO 23461, *Space systems — Programme management — Non-conformance control system*

[16] ISO 27025, *Space systems — Programme management — Quality assurance requirements*

ICS 49.140

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