INTERNATIONAL STANDARD

ISO 16091

First edition
2002-12-01

Space systems — Integrated logistic support

Systèmes spatiaux — Soutien logistique intégré

Reference number
ISO 16091:2002(E)

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Foreword

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

The main task of technical committees is to prepare International Standards. 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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 16091 was prepared by the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 14, *Space systems and operations*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this document, read "...this European Standard..." to mean "...this International Standard...".

Contents

Foreword

This document EN ISO 16091:2002 has been prepared by CMC, in collaboration with Technical Committee ISO/TC 20 "Aircraft and space vehicles".

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2003, and conflicting national standards shall be withdrawn at the latest by June 2003.

The European Standard EN ISO 16091 was prepared by the European Cooperation for Space Standardization (ECSS) Management Standards Working Group for CEN in close collaboration with ISO Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee, SC 14, *Space systems and operations,* WG 3*, Operations and ground support*.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

The Integrated Logistic Support (ILS) approach is justified in the space context by improvement of current practices in terms of development of material resources and services essential to support operation and maintenance and to control associated operational risks, particularly in terms of utilization cost and availability.

It is also justified by heightening the awareness of all the programmes and project participants of the need for cost-effective preparation, transfer, and management of information needed to operate, maintain, resupply and dispose of a product. This is as well as ensuring the recording of unscheduled events in order to perform essential support analyses.

The ILS approach differs for different types of space programmes or projects and this International Standard permits appropriate tailoring. Consequently, the requirements in this European Standard are applied at management level, with identification of the objectives to be achieved, rather than with methods and techniques to be implemented to achieve these objectives.

These objectives include:

a) the participation of the supportability objectives to the system design;

b) the optimization of the operational and maintenance concepts;

c) the identification of the required logistic support elements;

d) the timely delivery of the logistic support elements;

e) the determination of the system resilience to unscheduled operational events.

Logistic support is not a new activity: its integration into the programme or project is for coordinating, throughout the life cycle, the activities and resources involved in the preparation and optimization of the system and its support elements, aiming at minimum overall life cycle cost, according to the requirements and operational risks.

The advantages and increased efficiency resulting from integrating the logistic support requires that the logistic support functions need to be addressed starting from programme or project definition. It also requires that an integrated approach be established between the design and development of the system and the operational requirements to be fulfilled. This approach is designed to ensure the ability to deliver on time and in proper quantity, material resources and services to deploy, operate, maintain and upgrade the system throughout its utilization phase, within cost requirements, in its operational environment. It also helps to ensure that the capability of the organization and resources dedicated to define, collect, manage and handle the information required to control the logistic support functions throughout the system life cycle from the feasibility phase to the disposal phase are fully developed.

1 Scope

1.1 General

This European Standard describes the set of management requirements needed to identify and provide logistic support, so the customer can operate and maintain a product in its operational environment for the expected lifetime.

These requirements also aim, throughout the product life cycle, at implementing everything pertinent to the control of the risks considered as critical regarding the operational objectives.

The management requirements are applicable to those activities necessary to design, develop, deliver, deploy and manage an organized and structured set of materials and software, services, processes and information dedicated to support the system throughout its life cycle.

This European Standard specifies management, studies, production activities, information management processes and tasks to meet the customer's need for logistic support.

1.2 Tailoring

When viewed from the perspective of a specific programme or project context, the requirements defined in this European Standard should be tailored to match the genuine requirements of a particular profile and circumstances of a programme or project.

NOTE Tailoring is the process by which individual requirements of specifications, standards and related documents are evaluated, and made applicable to a specific programme or project by selection, and in some exceptional cases, modification of existing or addition of new requirements.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

ISO 14300-1, *Space systems – Programme management — Part 1: Management.*

EN 13290-6, *Space project management – General requirements — Part 6: Information/document management.*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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

3.1.1
availability
the ability of an item to be in a state to perform a required function under given conditions at a given instant of time or over a given time interval, assuming that the required external resources are provided

NOTE 1 This ability depends on the combined aspects of the reliability performance, the maintainability performance and the maintenance support performance.

NOTE 2 Required external resources, other than maintenance resources do not affect the availability performance of the item.

NOTE 3 In French, the term “disponibilité” is used to denote both the performance and the measure.

NOTE 4 When referring to the measure for "availability", the preferred term is "instantaneous availability".

NOTE 5 Adapted from IEC 60050:(191,603):1992.

3.1.2
configuration
functional and physical characteristics of a product as defined in technical documents and achieved in the product

[ISO 10007:1995]

3.1.3
customer
organization or person that receives a product

EXAMPLE Consumer, client, end-user, retailer, beneficiary and purchaser.

NOTE A customer can be internal or external to the organization.

[EN ISO 9000:2000]

3.1.4
data
information represented in a manner suitable for automatic processing

[IEC 60050:(701,721):1992]

3.1.5
dependability
the collective term used to describe the availability performance and its influencing factors: reliability performance, maintainability performance and maintenance support performance

NOTE Dependability is used only for general descriptions in non-quantitative terms.

[IEC 60050:(191):1992]

3.1.6
document
a medium and the data recorded on it for human use, for example, a report sheet, a book; by extension, any record that has permanence and that can be read by man or machine

NOTE Where reference is intended only to the carrier medium, the term “document medium” should be used.

[IEEE Std 100 - 1988]

3.1.7
down time
the time interval during which an item is in a down state

[IEC 60050: (191):1992]

3.1.8
function
intended effect of a system, subsystem, product or part

NOTE Functions should have a single definite purpose. Function names should have a declarative structure (e.g. “Validate telecommands”), and say “what” is to be done rather than “how”. Good naming allows design components with strong cohesion to be easily derived.

[EN 1325-1:1997]

3.1.9
implementation document
formal response from a supplier to the customer describing how all requirements in the project requirements document will be met at his level, in respect to his own organization

[EN 13701:2001]

3.1.10
industrial organization
the identity, interfaces and responsibilities of all participants in the supplier chain for a project

[EN 13701:2001]

3.1.11
mean time to recovery
the expectation of the time to restoration

[IEC 60050: (191): 1992]

3.1.12
mission analysis
assessment of the mission as a result of the programme or project with exploration of concepts conforming to expressed objectives to be reached - performance, cost, schedule

3.1.13
phase (project phase)
that part of a total project during which activities are performed to attain a designated objective as one of a series of distinct steps in carrying out a project that together constitute the project life cycle

NOTE Adapted from BS 6079:1996.

3.1.14
process
set of interrelated or interacting activities which transforms inputs into outputs

NOTE 1 Inputs to a process are generally outputs of other processes.

NOTE 2 Processes in an organization are generally planned and carried out under controlled conditions to add value.

NOTE 3 A process where the conformity of the resulting product cannot be readily or economically verified is frequently referred to as a “special process”.

[EN ISO 9000:2000]

3.1.15
programme
a coordinated set of activities, not necessarily interdependent, that continue over a period of time and are designed to accomplish broad scientific or technical goals or increased knowledge in a specific subject

EXAMPLE The defence programme; The Apollo programme; Earth observation programme; Manned space and mirogravity programme.

NOTE 1 A programme can comprise several projects.

NOTE 2 A programme can last several years.

NOTE 3 "program" is American Standard English spelling for "programme".

NOTE 4 "program" is British Standard English for 'a series of coded instructions to control the operation of a computer or other machine' – Oxford English Dictionary.

3.1.16
project
a unique set of coordinated activities, with definite starting and finishing points, undertaken by an individual or organization to meet specific objectives within defined schedule, cost and performance parameters

[BS 6079:1996]

3.1.17
project requirements documents
those documents, including all normative references, which establish requirements which are subsequently used to control work or work products

NOTE 1 Examples of project requirements documents include, but are not limited to, standards, management specifications, technical specifications, statements of work and data requirements lists.

NOTE 2 This does not include the contract and associated terms and conditions.

[EN 13701:2001]

3.1.18
resource
any physically or conceptually identifiable entity whose use and state at any time can be unambiguously determined

[IEC 60050: (715): 1992]

3.1.19
safety
state in which the risk of harm (to persons) or damage is limited to an acceptable level

NOTE 1 Safety is one of the aspects of quality.

NOTE 2 The above definition is valid for the purposes of quality standards. The term “safety” is defined differently in ISO/IEC Guide 2.

3.1.20
space element
a product or a set of products intended to be operated in outer space

[EN 13701:2001]

3.1.21
specification
document stating requirements

NOTE A specification can be related to activities (e.g. procedure document, process specification and test specification), or products (e.g. product specification, performance specification and drawing).

[EN ISO 9000:2000]

3.1.22
supplier
organization or person that provides a product

EXAMPLE Producer, distributor, retailer or vendor of a product, or provider of a service or information.

NOTE 1 A supplier can be internal or external to the organization.

NOTE 2 In a contractual situation a supplier is sometimes called "contractor".

[EN ISO 9000:2000]

3.1.23
support elements
hardware and software products, together with the necessary human resources, which are essential to enable the system to achieve its required performance from delivery to disposal

NOTE Some items, during different phases of the project, can start as part of the system and later, modified as necessary, become support elements.

EXAMPLE Electrical ground support equipment.

3.1.24
system
set of interdependent elements constituted to achieve a given objective by performing a specified function

NOTE The system is considered to be separated from the environment and other external systems by an imaginary surface, which cuts the links between them and the considered system. Through these links, the system is affected by the environment, is acted upon by external systems or acts itself on the environment or the external systems.

[IEC 60050: (351): 1992]

3.1.25
task
a specific piece of work to be done

[EN 13701:2001]

3.1.26
work breakdown structure
hierarchical representation of the activities and resources necessary to complete a project

[EN 13701:2001]

3.1.27
work package
a group of related tasks that are defined at the lowest level within a work breakdown structure

[EN 13701:2001]

3.2 Abbreviated terms

The following abbreviated terms are defined and used within this European Standard.

Abbreviation	Meaning
BITE	built-in test equipment
ECSS	European Cooperation for Space Standardization
ILS	integrated logistic support

LSA	logistic support analysis
OEM	original equipment manufacturer
PHST	packaging, handling, storage and transport
WBS	work breakdown structure

4 Fundamentals of integrated logistic support

4.1 Project context

The following aspects shall be considered:

a) Logistic support shall be provided throughout the utilization phase and requires, especially throughout the early phases of the programme or project, the management of specific activities of design and development (called logistic activities), in close relation with the other activities, such as dependability and safety.

b) Integrated logistic support (ILS) activities shall be part of the programme or project activities and integrated into its phasing and planning, in order to ensure their consideration in the development of the system. These activities shall be adapted depending on the programme or project organizational and technical effort to address the identified critical items.

c) In particular, the design activities shall lead to a concurrent definition of the system and its associated support elements. The definition shall be based on initial operational and maintenance concepts, in order to integrate the customer's requirements. This definition shall be set up as soon as possible, in order to ensure self-consistency.

d) The management of logistic activities is therefore integrated into the programme or project management requirements: the present standard takes into consideration the existence of a set of space standards and complements it by developing the ILS requirements.

e) The management of logistic activities throughout the system life cycle shall clearly demonstrate:

   1) that the dependability and safety criteria are taken into account within the product operational environment of use;

   2) the suitability, coherence and continuity of the logistic support;

   3) the ability to control the risks specific to the performance of operation and maintenance tasks.

f) One of the main aspects of the operational objective is to ensure and maintain the product performances through its utilization phase into its environment of use and up to its disposal. The purpose of the logistic support elements is to maintain the technical and availability performance levels and to optimize the life cycle cost while respecting safety requirements.

g) The programme or project team can apply the life cycle cost concept when trading off development costs versus later utilization phase support and disposal costs.

h) The requirements specified herein shall be included as appropriate in the customer's project requirements document and responded to by the supplier in his implementation documents.

4.2 ILS main concepts

4.2.1 Integration concept

Integrating the logistic support into a programme or project is achieved by considering the following aspects:

a) integrating the customer's requirements into the design of the system and its support elements;

b) integrating the logistic support activities into the programme or project management organization;

c) integrating the logistic support elements requirements together.

EXAMPLE The maintenance documentation shall describe the maintenance actions identified in the maintenance plan.

4.2.2 Availability, supportability and human factors

a) The operational availability concept assumes that the required external resources (including both maintenance and other resources) are provided in the system's intended operational environment.

b) Resources that are provided by the support system in order to maintain the system in an operational state, under actual conditions of use and expected economic requirements, give supportability.

c) The operational availability is derived both from the dependability and safety characteristics and from the supportability characteristics.

d) Human factors influence both support ability and the system supportability characteristics directly.

NOTE The system operational availability can at best be as good as the system intrinsic availability, which is driven by basic engineering characteristics such as reliability, maintainability and testability.

4.2.3 Life cycle cost and operational risk

a) The life cycle cost concept addresses the acquisition, the operation and maintenance cost, and the disposal cost of the system.

b) Whatever the area being considered, the achievement of objectives and the guarantee of performances imply operational risks:

   1) inherent risks linked to the system;

   2) extrinsic risks linked to the system and to the technological, natural and human environment.

c) The ILS process includes the management of these risks as part of the overall risk management. From the life cycle cost analysis, the ILS assists the trade-off between the dependability and safety analyses and the selection of an optimized solution for the system. The general synopsis shown in Figure 1 illustrates the complementary nature of the two processes.

d) ILS is also involved in addressing human factors, through analyses of operation and maintenance tasks. These analyses are notably based on operability (in particular the man/machine interfaces and ergonomics), maintenance ability (e.g. qualification, skills, task duration, workload) and environment (e.g. noise, environmental conditions, organization) criteria.

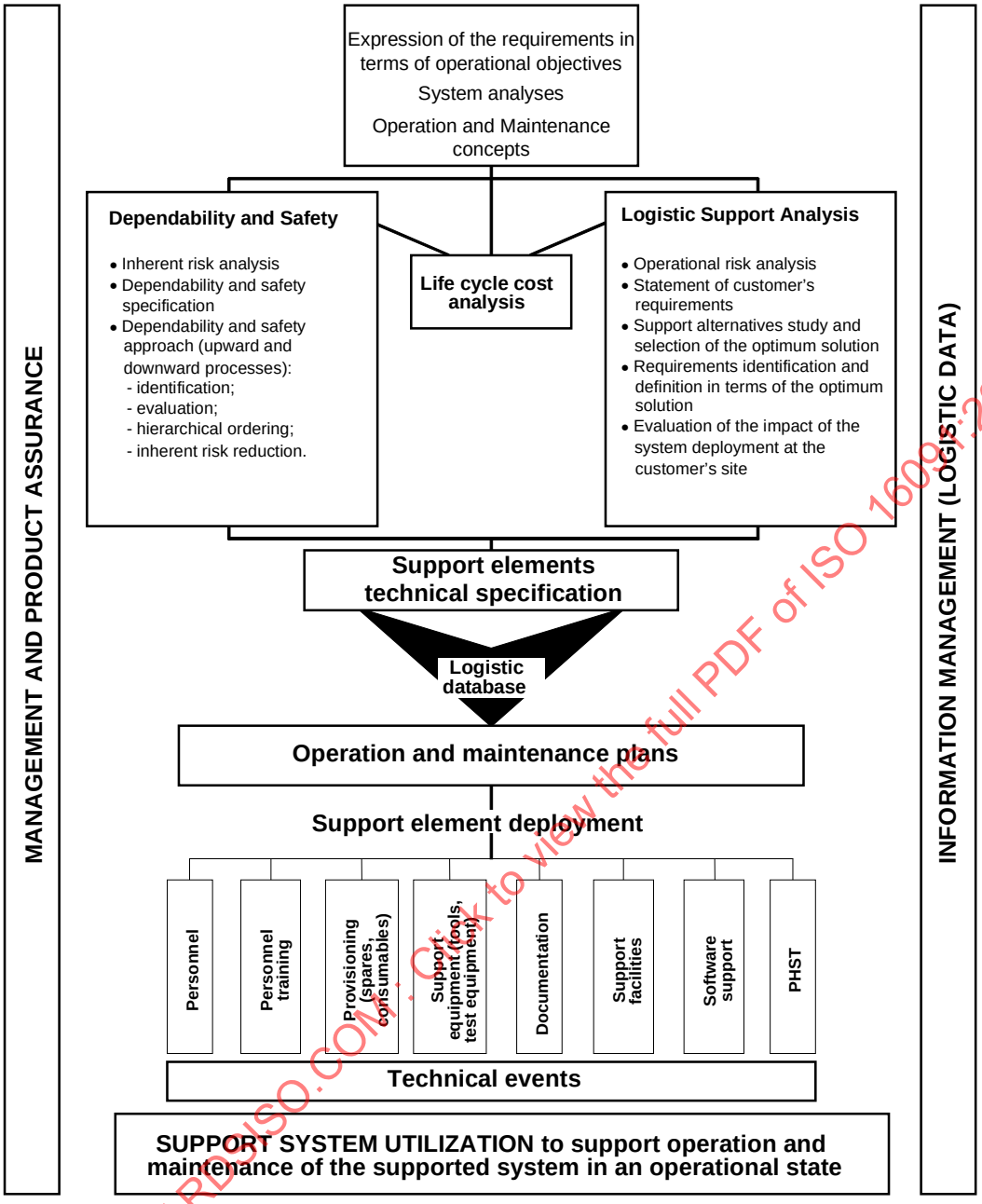

Figure 1 — Integrated logistic support overview

5 Management requirements for ILS

5.1 General

In this International Standard, in order to facilitate reading and traceability, the requirements are listed according to numbered topics. Each numbered requirement is composed of a general wording followed by an explanatory text attached to the general requirement and an expected output.

5.2 Control of logistic activities

5.2.1 Objectives and requirements

The overall programme or project requirements shall clearly state the objectives and requirements in terms of operational availability, life cycle cost and delivery of the system in its operational environment of use up to and including its disposal.

AIM Ensure that all the operational environment requirements are identified.

EXPECTED OUTPUT Elements of the project requirements document covering operational availability, project life cycle cost, schedule and product operating environment.

5.2.2 Control of risks

The requirement to control the operational risks related to the system shall be included in the overall programme or project requirements.

AIM Achieve a balance between the ILS risks and the overall programme or project risks.

EXPECTED OUTPUT An overall approach to risk management.

5.2.3 Concurrent development

The support elements shall be developed concurrently with the system.

AIM Define the support elements early enough, so that:

a) the design and technical solutions selected for the support elements are consistent with the system definition (design integration concept);

b) the various identified support elements are actually usable in the operational environment of use, and work together (support elements integration concept);

c) the customer gets the support elements when required (customer's requirement integration concept).

EXPECTED OUTPUT Timely availability of the support elements.

5.2.4 Validation

The support elements shall be validated as part of the overall project verification process.

NOTE This validation should be enhanced through use of feedback data (lessons learned).

AIM Ensure early enough the ability of the system supportability characteristics to meet the logistic support requirements.

EXPECTED OUTPUT Validated support elements.

5.2.5 Customer participation

The customer should participate in the definition and validation of the support elements.

AIM Ensure that throughout the development phase the system and support elements design conforms to the customer's requirements in terms of logistic support.

EXPECTED OUTPUT Agreed support elements design.

5.2.6 Integration and synchronization

The logistic support activities, project management, project phasing and planning shall be synchronized.

AIM Synchronized activities.

EXPECTED OUTPUT Synchronized planning for the overall project.

5.2.7 Work breakdown structure

The logistic activities shall be associated with project work breakdown structure (WBS) and shall be clearly identifiable (see ISO 14300-1).

AIM To ensure or establish:

a) a consistent and focussed identification and management of ILS activities;

b) roles, responsibilities and authority related to the logistic function;

c) conditions enabling roles and responsibilities to be undertaken in a dynamic and interactive way throughout the project and especially in early phases A, B and C (see ISO 14300-1);

d) close first-level customer/supplier communication between the various levels of the project organization.

EXPECTED OUTPUT Project WBS containing ILS work packages.

5.2.8 Appropriate phasing

The logistic support activity management in the project shall develop and be implemented at a level commensurate with the project phase. The project phasing implies consideration of the logistic activities according to three management responsibility categories:

a) the logistic support management from definition of requirements to acquisition phases (A, B, C, D), including:

1) ILS management (control of the logistic activities during the system acquisition);

2) Logistic support analysis (LSA) management (control of the studies aimed at logistic support specification and validation);

3) support elements management (control of the acquisition of specified support elements).

b) the operation and maintenance (O&M) logistic support management - phase E (control of the support elements use);

c) the logistic information management (applicable throughout the project life cycle).

AIM Consideration of the correct requirements at the appropriate phase of the project.

EXPECTED OUTPUT Balanced definition of ILS activities throughout the project phases.

5.3 Logistic support

5.3.1 Customer summary

a) The customer shall summarize the logistic support requirements in the project requirements documents.

b) The system or project requirements document should include:

1) a summary of the project objectives to be achieved;

2) the delivery, operation and maintenance concepts;

3) the requirement for integrating the logistic support into the project.

AIM Identify any customer's logistic support requirement in the project requirements documents.

EXPECTED OUTPUT Corresponding elements in the project requirements documents.

5.3.2 Supplier response

a) The supplier shall respond to the customer's logistic support requirements with appropriate elements of his implementation approach.

b) These elements should include:

1) identification of the logistic activities, the organization and the resources implemented to perform the logistic activities, as reflected in the project work breakdown structures;

2) phasing and planning of the logistic activities.

c) The supplier shall provide a description of the methods to be implemented and the links with the other plans, in particular the support elements development plans, the configuration management implementation document, the dependability, safety, and quality plans.

d) Depending on the project size, objectives and requirements, the response may be split into separate plans.

AIM Appropriate response to the ILS requirements.

EXPECTED OUTPUT Elements of the implementation documents.

5.3.3 Strategy

a) The supplier, in response to the project requirements documents, shall develop strategies for ILS and logistic activities throughout all the phases of the project.

b) All the analyses, including those conducted during phases A and B, shall address ILS, in particular the objectives and the functions to be performed by the system, in its initial operational and maintenance concepts. The operational concept addresses the operational environment in which the system is deployed and used. The maintenance concept addresses the repair policy and the maintenance organization levels.

AIM Continuous evolution of the ILS strategy throughout the project life cycle.

EXPECTED OUTPUT ILS elements in the supplier implementation documents.

5.4 Reports

5.4.1 Overall project report

The supplier shall periodically report to the customer on the status of the logistic support tasks within the context of the overall project.

AIM An integrated approach to project reporting.

EXPECTED OUTPUT Project progress reports that include ILS aspects.

5.4.2 Project review report

The supplier shall submit the status of the logistic support tasks during the project reviews.

AIM An integrated approach to project review.

EXPECTED OUTPUT Project reviews that include ILS aspects.

5.4.3 Lessons learned report

The supplier shall include an element covering logistic support within the context of the overall project in the project lessons learned report.

AIM An integrated view of the lessons learned during the project.

EXPECTED OUTPUT An element of the project lessons learned report covering logistic support.

6 Management requirements for logistic support analysis

6.1 Control of logistic analyses

The first-level supplier shall define a strategy for the implementation of logistic support analysis (LSA). The strategy can cover:

a) management tasks for preparing, managing and coordinating the LSA activities;

b) tasks for integrating the customer's requirements into the logistic support activities;

c) tasks aimed at analysing the ability of the system design to be supported;

d) tasks aimed at studying the support alternatives and selecting the optimum solution;

e) tasks aimed at identifying and defining the requirements in terms of support elements;

f) validation tasks aimed at ensuring that the deployed support elements are conformant to the support requirements.

AIM Tailor the logistic support analysis effort as early as possible in the project phasing to achieve the best method of meeting the requirements.

EXPECTED OUTPUT An implementation document element defining the strategy for LSA throughout the project. Its implementation is supported by means of LSA documentation.

6.2 Study and validation of support requirements

6.2.1 General

The following requirements relate to the identification of the logistic support requirements of the system mission and the comparative analyses of the required input data.

The study activities are aimed at defining the requirements in terms of logistic support, in order to identify all the data required for the development of the support elements. These studies are called logistic support analysis (LSA).

The LSA consists of a set of selected tasks iteratively implemented throughout the project, the main part being implemented during phases B, C and D.

Figure 2 illustrates the sequence of the groups of tasks for phases B and C. At the end of phase C, the LSA process leads to establishing the applicable operation and maintenance plan and the support elements technical specification.

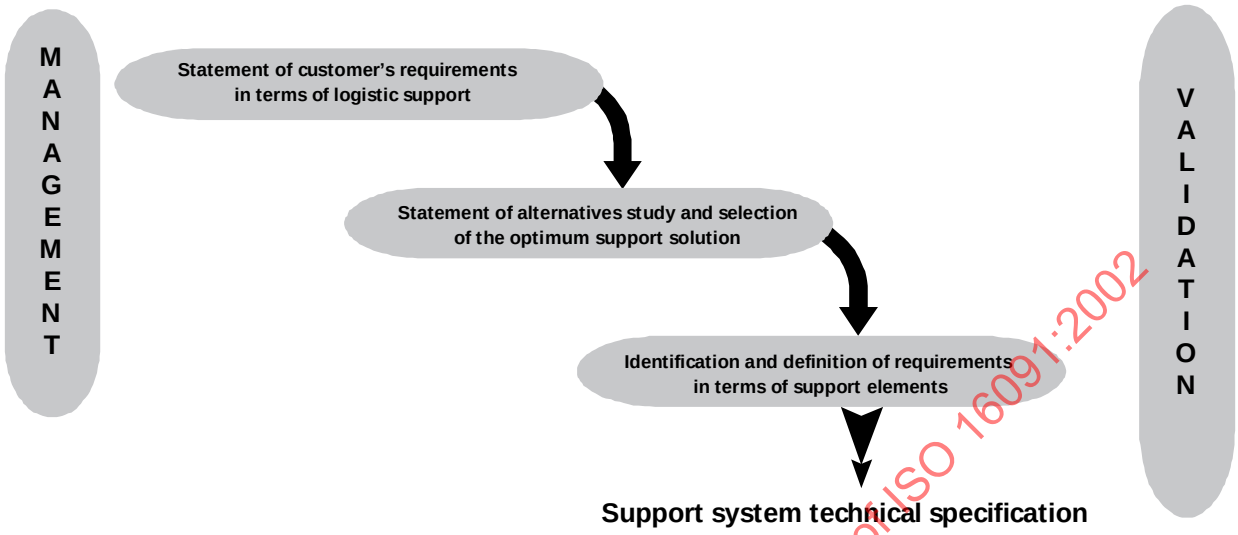

Figure 2 — Sequence of the groups of tasks during phases B and C

6.2.2 Identification of logistic support elements

a) The first-level supplier shall perform an analysis to identify the functional requirements in terms of logistic support related to the system mission (e.g. Quality function deployment for logistic support).

b) The first-level supplier shall perform a detailed analysis of the mission and utilization profiles based on the mission analysis and system analyses. The first-level supplier identifies and documents the manner, location and time of utilization of the system and highlights the support functions, the support ability criteria and the levels of these criteria. For each criterion, the list of critical points or unacceptable risks from the operational viewpoint shall be established.

c) All this information enables the first-level supplier to select and define the support ability criteria, in relation with the first-level customer. This information is updated according to the modifications of the system mission, and its operational environment of use. This information should be baselined during phase B.

AIM Complete identification of logistic support elements based upon the system functional requirements.

EXPECTED OUTPUT Complete identification of logistic support elements.

6.2.3 Assessment of resources

The supplier shall assess the customer's existing logistic resources in order to identify which, if any of those existing logistic resources can be used to support the system being developed. The supplier shall make recommendations identifying which, if any of the existing logistic resources should be utilized to support the system being developed. By expressing the system design recommendations after an analysis of the customer's existing logistic resources, which can improve efficiency and cost, the use of specific elements that require adapted operation or maintenance are avoided as far as possible.

AIM Take into account existing customer's resources that can have an impact on the logistic support solutions.

EXPECTED OUTPUT Optimized support elements, which maximizes the use of existing resources.

6.2.4 Technology impact

a) The supplier shall identify and evaluate the impact of new technologies used for the system and support elements definition.

b) The consequences of these new technologies on the system definition, in terms of potential improvements or new requirements on the various support elements, shall be identified. These consequences shall be analysed insofar as they affect the support elements cost or performances.

AIM Reduce system risks deriving from the use of new technologies.

EXPECTED OUTPUT New technology impact evaluation document.

6.2.5 Evaluation of alternatives

For each design option of the system, the first-level supplier shall define the potential logistic support alternatives, evaluate each alternative, then compare them (sensitivity analysis) and identify the most efficient solution to meet the operational requirements.

These tasks facilitate the identification of the best solution to be submitted in order to realize the system: the solution to be selected is the one leading to the best trade-off between cost, support ability performances and schedule.

The evaluation can cover such aspects as:

a) level of repair analysis;

b) reliability-centred maintenance analysis;

c) technical and availability performances to be maintained;

d) operation and maintenance concepts based on the dependability and safety analysis.

AIM Selection of the optimum "system/logistic support option" association.

6.2.6 Test, evaluation and validation

System acceptance procedures shall include provisions for the logistic support acceptance. The acceptance can cover such aspects as:

a) support elements efficiency;

b) availability characteristics;

c) logistic support data quality.

AIM Applying acceptance procedures to the logistic support provisions.

EXPECTED OUTPUT An accepted system and accepted support elements.

6.3 Requirements for LSA reports

The requirements are identical with those in 5.4.

7 Management requirements for support elements

7.1 General

The objective of the following requirements is to determine the logistic resources required to perform the identified operation and maintenance tasks.

7.2 Control of support element activities

The support element activities shall be organized in a manner agreed by the customer and the supplier.

AIM Consistent approach to management of all project disciplines.

EXPECTED OUTPUT Integrated approach to managing the project.

7.3 Support element definition and development

7.3.1 Operation and maintenance task identification

a) The supplier shall define the support elements required to support the system in its environment of use. For each task, the following should be defined:

   1) an overview and a reminder of:

      i) nature and type of the task;

      ii) frequency (or periodicity);

      iii) allotted duration for the task.

   2) the quantified resources requirements, regarding the logistics in terms of:

      i) support equipment (e.g. tools, test equipment);

      ii) packaging, handling, storage and transport (PHST);

      iii) personnel skills and manpower;

      iv) training;

      v) software support;

      vi) support facilities;

      vii) provisioning of spares and consumables;

      viii) documentation material (operation, maintenance, reprovisioning data and procedures);

      ix) technical events data feedback.

b) A synthesis of logistic requirements per support element shall then be performed. This synthesis should be presented as a part of the operation and maintenance plan.

AIM All the identified operational and maintenance tasks are fully supported from a logistics standpoint.

EXPECTED OUTPUT Identification of the operation and maintenance tasks and the corresponding support elements.

7.3.2 Customer defined location

The first-level supplier shall assess the impact of deploying the system at the customer-defined location(s). The aim of the analysis is verification of the adequacy of available logistic resources selected for the support and establishing, when necessary, the modifications to be applied to these resources, so that they can effectively be used.

EXAMPLE PHST, support facilities, test equipment, personnel workload and availability.

AIM Ensure a trouble-free delivery, installation and resupply of the logistic support elements at the defined location.

EXPECTED OUTPUT An impact assessment based upon the system customer defined location.

7.3.3 Prediction of consumption

a) The supplier shall predict, for the system, the rate of consumption of spares, consumables and other support elements and shall make recommendations to ensure continuity of resupply. This task facilitates the availability of the required logistic resources throughout the system utilization phase and before the industrial production phases out.

b) The customer shall provide the predicted system usage rate or operational requirement to the supplier as required information for the supplier's rate of consumption analysis.

AIM Define the scope of logistic support.

EXPECTED OUTPUT Effective implementation of logistic support.

7.3.4 Support

The supplier shall establish the actions required to maintain the supportability performance in spite of the changes that affect the system, its support elements and their environment. This task enables the taking of appropriate steps in accordance, for instance, with the customer's socio-economic changes, some industrial skill unavailability, product obsolescence and market fluctuations.

AIM Contribute to operational risk management within support activities.

EXPECTED OUTPUT Logistic support contribution to risk management as part of project implementation documents.

7.3.5 Unexpected operational events

The supplier shall analyse all the unexpected operational events to determine their cause.

AIM Improve resilience of the system.

EXPECTED OUTPUT Unexpected event analysis and proposal for improvement actions.

7.4 Management of the production of support elements

7.4.1 General

The objective of the support elements production tasks is to achieve the delivery of hardware and software, services and data conforming to the support elements requirements.

The purpose is to develop the specified support elements, insuring that they are available when they are required by the system. The coordinated delivery of the system and the associated support elements enables the global acceptance of the system in its as-built configuration.

The delivery can be performed in several steps: an initial delivery composed of the required elements at the system deployment and a recurring delivery composed of replenishment of logistic resources, including human resources, to ensure the support continuity throughout the utilization phase.

The production tasks are carried out under general management procedures.

EXAMPLE Statement of work, plans, acceptance or financial resources.

In the following subclauses, requirements are detailed for appropriate planning activities resulting in named plans. The requirements are to action and document the planning; this may be individual plans, combined plans or a single document if all of the detailed requirements are addressed.

EXAMPLE Provision of one overall plan instead of one plan per logistic support element.

Configuration management shall be properly integrated into the logistic support activities. Strong attention shall be paid to the conformance of the logistic support element configuration to the "as-built" reference of the system.

7.4.2 Re-use of equipment

Prior to acquisition, the supplier shall assess the desirability and feasibility of having equipment capable of being used during both the development and utilization phases. This opportunity shall be taken into account only if the resources fit the support ability requirements.

EXAMPLE Development tooling and test equipment.

AIM Maximize the re-use of existing or development equipment.

EXPECTED OUTPUT All re-usable existing or development equipment identified.

7.4.3 Provisioning plan

a) The supplier shall establish a provisioning plan that identifies initial and recurring spares, repair parts and consumables.

b) The provisioning plan shall address:

   1) the designation, including the original equipment manufacturer (OEM) identification and the OEM part number, and quantity of hardware items to stock for each maintenance level and use location;

   2) the acquisition procedures;

EXAMPLE Orders, allotted time or quality survey.

   3) the production means.

AIM Ensure reliable provisioning.

EXPECTED OUTPUT Provisioning plan as part of the implementation document.

7.4.4 Support equipment acquisition plan

a) The supplier shall establish a support equipment acquisition plan that shall include a recommended maintenance concept for the support equipment to be acquired.

b) The supplier shall specifically consider the built-in test equipment (BITE), the special support equipment developed for the system and the common support equipment.

AIM Ensure timely acquisition of the support equipment.