ECSS-S-ST-00-01C Rev. 1
11 October 2023

ECSS system

Glossary of terms

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Noordwijk, The Netherlands

Foreword

The ECSS Glossary is part of the series of ECSS Standards intended to be applied together for the management, engineering, product assurance and sustainability in space projects and applications. ECSS is a cooperative effort of the European Space Agency, national space agencies and European industry associations for the purpose of developing and maintaining common standards.

Requirements in ECSS Standards are defined in terms of what shall be accomplished, rather than in terms of how to organize and perform the necessary work. This allows existing organizational structures and methods to be applied where they are effective, and for the structures and methods to evolve as necessary without rewriting the standards.

This document has been prepared by the ECSS Glossary Task Force, reviewed and approved by the ECSS Technical Authority.

Traceability to the previous ECSS Glossary "ECSS-S-ST-00-01C" is ensured through tracked changes and the matrix given in Annex A.

Disclaimer

Published by: ESA Requirements and Standards Section
ESTEC, P.O. Box 299,
2200 AG Noordwijk
The Netherlands

Change log

ECSS-P-001A 19 April 1996	First issue
ECSS-P-001A Rev.1 11 June 1997	First issue, Revision 1
ECSS-P-001B 14 July 2004	Second issue
ECSS-S-ST-00-01C 1 October 2012	Third issue Traceability to the previous ECSS Glossary "ECSS-P-001B" is ensured through the matrix given in Annex A.
ECSS-S-ST-00-01C Rev. 1 11 October 2023	Third issue, Revision 1 Changes to the previous version "ECSS-S-ST-00-01C" (1 October 2012) are marked with Revision tracking. Main changes: • Document updated to implement the dispositions of the ECSS Glossary Task Force. • Traceability matrix to ECSS-P-001B has been removed and replaced by new matrix.

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Figures

1 Scope

This document controls the definition of all common terms used in the European Cooperation for Space Standardization (ECSS) Standards System. Terms specific to a particular ECSS Standard are defined in that standard.

This document does not include the definition of terms used with their common meaning. In this case, the definition from the Oxford English Dictionary applies.

2
Terms, definitions and abbreviated terms

2.1 Terms and definitions

When using the ECSS standards, the following is the order of precedence of documents as the source of definition of terms:

1. the standard in question

2. the present Glossary of terms

3. the Oxford English dictionary.

A term used within a definition, which is defined elsewhere in this document is shown in boldface. A boldface term can be replaced within the definition by its own definition.

A document reference shown after a definition in square brackets, [ ], indicates that this definition is reproduced from the referenced document.

NOTE For example:

> **2.3.17 auditee**
> organization being audited
> [ISO 9000:2005]

All terms and their definitions appear in alphabetic order in clause 2.3 of this Glossary. However, wherever it is considered important to present together a set of terms that are interrelated (i.e. constitute a particular "view"), these terms and their definitions are repeated in standalone sections of this Glossary or in Annexes. For example, clause 2.2 collects together all terms that relate to the breakdown of the overall Space System.

2.2 Space system breakdown

2.2.1 Introduction

ECSS-S-ST-00C defines the highest-level system within a space project – i.e. the one at the mission-level - as the "Space System". The purpose of the present clause is to identify the breakdown of a typical space system and to define a set of standard terms for the constituent levels within the breakdown (see Figure 2-1).

In so doing, it is acknowledged that each distinct domain (i.e. space, ground and launcher) already has its own domain-specific terminology for its internal entities e.g. elements and systems. In the case of the launcher domain, this terminology has been formally defined and agreed at programme-level. It is not the intention to define new terms in this Glossary to supersede those already in universal use. Rather, the intention is to define a standard set of terms for the levels of the space system breakdown and then to show where the domain-specific entities fit into these levels. To this end, Annex B contains examples of entities from the three principal space system segments, mapped to the space system breakdown levels defined below.

The terms are defined in clause 2.2.2 to 2.2.7 and are listed not in alphabetic order but according to the hierarchy defined in Figure 2-1: Space system breakdown below.

- 2.2.2 defines generic terms
- 2.2.3 defines the space system
- 2.2.4 defines terms relating to the space segment
- 2.2.5 defines terms relating to the ground segment
- 2.2.6 defines terms relating to the launch segment
- 2.2.7 defines terms relating to the support segment

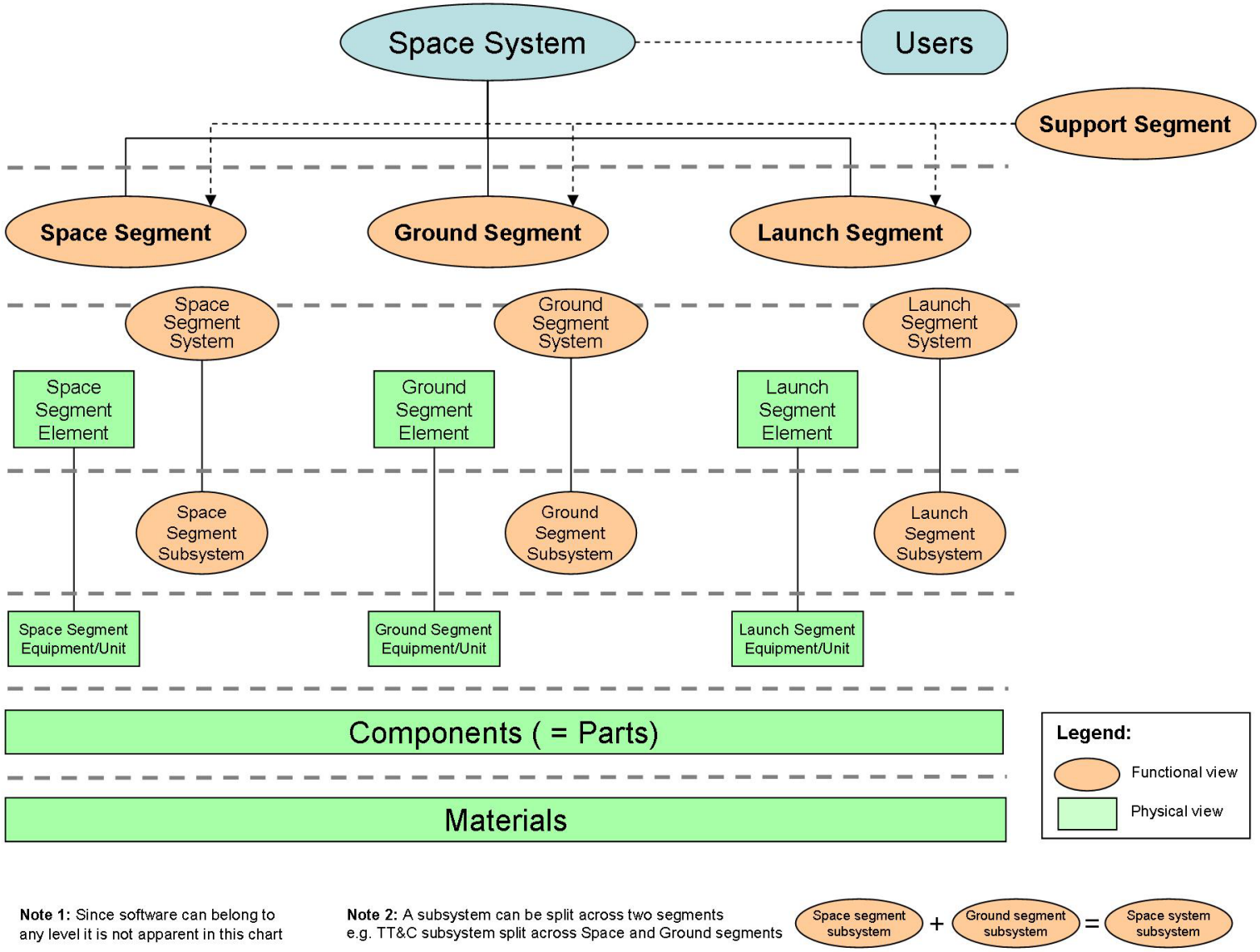


Figure 2-1: Space system breakdown

2.2.2 Definitions for generic terms

system

set of interrelated or interacting **functions** constituted to achieve a specified objective

segment

set of **elements** or combination of **systems** that fulfils a major, self-contained, subset of the **space mission** objectives

Examples are space segment, ground segment, launch segment and support segment.

element

combination of integrated **equipment, components** and **parts**

NOTE An element fulfils a major, self-contained, subset of a segment's objectives.

subsystem

part of a **system** fulfilling one or more of its **functions**

equipment

integrated set of **parts** and **components**

NOTE 1 An equipment accomplishes a specific function.

NOTE 2 An equipment is self-contained and classified as such for the purposes of separate manufacture, procurement, drawings, specification, storage, issue, maintenance or use.

NOTE 3 The term "unit" is synonymous with the term "equipment"

component

set of **materials,** assembled according to defined and controlled **processes,** which cannot be disassembled without destroying its capability and which performs a simple **function** that can be evaluated against expected **performance requirements**

NOTE 1 The term "part" is synonymous.

NOTE 2 The term "part" is preferred when referring to purely mechanical devices.

NOTE 3 The term "component" is preferred for EEE devices.

part

see "component"

material

raw, semi–finished or finished substance (gaseous, liquid, solid) of given characteristics from which processing into a **component** or **part** is undertaken

2.2.3 Definitions for space system

space system

system that contains at least a **space,** a **ground** or a **launch segment**

NOTE Generally a space system is composed of all three segments and is supported by a support segment.

2.2.4 Definitions for space segment

space segment

part of a **space system,** placed in space, to fulfil the **space mission** objectives

space segment system

system within a **space segment**

NOTE Examples are given in Annex B.1.

space segment element

element within a **space segment**

NOTE 1 A space segment element can be composed of several space segment elements, e.g. a spacecraft is composed of instruments, a payload module and a service module.

NOTE 2 Examples are given in Annex B.1.

stand-alone space segment element

space segment element that performs its **mission** independently of the rest of the space system

NOTE For example: satellite, rover, lander.

embedded space segment element

space segment element that performs its **mission** as part of another **space segment element**

NOTE For example: platform, module, instrument, payload.

space segment subsystem

subsystem within a **space segment**

NOTE Examples are given in Annex B.1.

space segment equipment

equipment within a **space segment**

NOTE Examples are given in Annex B.1.

2.2.5 Definitions for ground segment

ground segment

part of a **space system,** located on ground, which monitors and controls **space segment element(s)**

NOTE A ground segment is composed of one or more ground segment elements.

ground segment system

system within a **ground segment**

NOTE Examples are given in Annex B.2.

ground segment element

element within a **ground segment**

NOTE 1 A ground segment element can be composed of several ground segment elements, e.g. a ground station network is a ground segment element that can be composed of a set of ground stations and a communication network.

NOTE 2 Examples are given in Annex B.2.

ground segment subsystem

subsystem within a **ground segment**

NOTE Examples are given in Annex B.2.

ground segment equipment

equipment within a **ground segment**

NOTE Examples are given in Annex B.2.

2.2.6 Definitions for launch segment

launch segment

part of a **space system** which is used to transport **space segment element(s)** into space

NOTE 1 A launch segment is composed of a launcher system with it specific launch complex, supported by a launch range.

NOTE 2 A launch segment is composed of the integrated launcher and the facilities needed for manufacturing, testing and delivering launcher elements.

launch segment system

system within a **launch segment**

NOTE Examples are given in Annex B.3

launch segment element

element within a **launch segment**

NOTE 1 A launch segment element can be composed of several launch segment elements, e.g. a launcher is a launch segment element that is composed of several launch segment elements, such as stage, engine and upper part.

NOTE 2 Examples are given in Annex B.3.

launch segment subsystem

subsystem within a **launch segment**

NOTE Examples are given in Annex B.3.

launch segment equipment

equipment within a **launch segment**

NOTE Examples are given in Annex B.3.

2.2.7 Definitions for support segment

support segment

generic infrastructure and services used to support the **development** and operation of **space system elements**

NOTE 1 Examples are ground stations and associated networks, orbit computing facilities, test centres, astronaut centre, launch ranges (e.g. Plestek, Baikonour, Guiana Space Centre).

NOTE 2 Items can be part of other segments during their development and later become part of the support segment when used (e.g. a tracking network).

2.3 Terms and definitions

2.3.1 absorbed dose

energy absorbed locally per unit mass as a result of radiation exposure which is transferred through ionisation, displacement damage and excitation

NOTE 1 It is the sum of the ionising dose and non-ionising dose.

NOTE 2 It is normally represented by *D*, and in accordance with the definition, it can be calculated as the quotient of the energy imparted due to radiation in the matter in a volume element and the mass of the matter in that volume element. It is measured in units of gray, Gy (1 Gy = 1 J · kg^{-1} (= 100 rad)).

NOTE 3 The absorbed dose is the basic physical quantity that measures radiation exposure.

NOTE 4 A portion of the energy absorption can result in damage to the lattice structure of solids through displacement of atoms, and this is commonly referred to as Non-Ionizing Energy Loss (NIEL).

2.3.2 acceptance

act by which the **customer** agrees that the **product** is designed and produced according to its **specifications** and the agreed **deviations** and **waivers**, and it is free of **defects** when delivered by the **supplier**

2.3.3 acceptance process

part of the **verification** process which demonstrates that the **product** meets specified **acceptance margins**

NOTE The term "acceptance" is used as the short form of "customer acceptance".

2.3.4 acceptance margin

increase of the environmental, mechanical, thermal, electrical, EMC, or operational extremes above the worst case levels predicted over the specified **product lifetime** for the purpose of workmanship **verification**

NOTE 1 Margins can include an increase in level or range, an increase in duration or cycles of exposure, as well as any other appropriate increase in severity.

NOTE 2 For thermal acceptance margin refer to ECSS-E-ST-31.

2.3.5 acceptance test level

test level reflecting the maximum level expected to be encountered during the flight **product lifetime** increased by **acceptance margins**

2.3.6 accident

undesired event arising from operation of any **project**-specific item that results in

a. human death or injury,

b. loss of, or damage to, **project** hardware, software or facilities that can then affect the accomplishment of the mission,

c. loss of, or damage to, public or private property, or

d. detrimental effects on the **environment**.

NOTE Accident and mishap are synonymous.

2.3.7 active redundancy

redundancy where all entities are operating and the **system** can continue to operate without downtime or defects despite the loss of one or more entities

2.3.8 actuator

device that transforms an input signal into motion

2.3.9 alert

formal notification to users, informing them of **failures** or problems that can affect more than one user, or can recur in other projects or circumstances, if no preventive actions are taken

NOTE 1 An alert describes the observed failure or problem, its cause, the actions to be taken to correct it and to prevent its recurrence, as well as comments from the manufacturer of the affected product.

NOTE 2 An alert can also be raised when a deficiency in the specified requirements, which can affect the fitness for purpose in the defined application, has been identified.

2.3.10 allowable load

maximum load that can be accommodated in a structural part for a given operating **environment** without rupture, collapse, detrimental deformation or unacceptable crack growth

NOTE Adapted from ISO 14623:2003.

2.3.11 analysis

verification method utilizing techniques and tools to confirm that **verification requirements** have been satisfied

NOTE 1 Examples of techniques and tools are mathematical models, compilation similarity assessments and validation of records.

NOTE 2 Adapted from ISO 10795:2019.

2.3.12 applicable document

document that contains **provisions** which, through reference in the source document, constitute additional **provisions** of the source document

NOTE Adapted from ISO 10795:2019.

2.3.13 approval

formal agreement by a designated management official to use or apply an item or proceed with a proposed course of action

NOTE 1 Approvals must be documented.

NOTE 2 Approval implies that the approving authority has verified that the item conforms to its requirements.

2.3.14 assembly

physically combining **components**, **equipment** or **elements** to form a larger entity

2.3.15 assurance

planned and systematic activities implemented, and demonstrated as needed, to provide adequate confidence that an entity fulfils its **requirements**

2.3.16 audit

systematic, independent and documented **process** for obtaining objective **evidence** and evaluating it objectively to determine the extent to which **audit criteria** are fulfilled

NOTE 1 The fundamental elements of an audit include the determination of the conformance of an object according to a procedure carried out by personnel not being responsible for the object audited.

NOTE 2 An audit can be an internal audit (first party), or an external audit (second party or third party), and it can be a combined audit or a joint audit.

NOTE 3 Internal audits, sometimes called first-party audits, are conducted by, or on behalf of, the organization itself for management review and other internal purposes, and can form the basis for an organization's declaration of conformance. Independence can be demonstrated by the freedom from responsibility for the activity being audited.

NOTE 4 External audits include those generally called second- and third-party audits. Second party audits are conducted by parties having an interest in the organization, such as customers, or by other persons on their behalf. Third-party audits are conducted by external, independent auditing organizations, such as those providing certification/registration of conformance or governmental agencies.

NOTE 5 The terms "conformance" and "conformity" are synonymous. The term "conformance" is recommended in ECSS.

[ISO 9000:2015]

2.3.17 audit criteria

set of policies, **procedures** or **requirements** used as a reference against which objective evidence is compared

[ISO 9000:2015]

2.3.18 audit evidence

records, statements of fact or other information which are relevant to the **audit criteria** and verifiable

[ISO 9000:2015]

2.3.19 auditee

organization being audited

[ISO 9000:2015]

2.3.20 auditor

person with the demonstrated personal attributes and competence to conduct an **audit**

NOTE Adapted from ISO 9000:2005.

2.3.21 availability

ability of an item to be in a state to perform a required **function** under given conditions

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 When referring to the measure for availability, the preferred term is “instantaneous availability”.

NOTE 4 Adapted from IEC 60050.

2.3.22 backward contamination

contamination of the terrestrial biosphere by extra-terrestrial life forms in the course of spaceflight missions

2.3.23 bakeout

activity of increasing the temperature of hardware to accelerate its **outgassing** rates with the intent of reducing the content of molecular contaminants within the hardware

NOTE Bakeout is usually performed in a vacuum environment, but can be done in a controlled atmosphere.

2.3.24 batch

quantity produced at one operation

2.3.25 biodiversity

types of microorganisms, identified with specified assays

2.3.26 blister

delamination in the form of a localized swelling and separation between any of the layers of a lamination base material, or between base material and conductive foil or protective coating

[IEC 60194 (1999-04)][IPC-T-50-M]

2.3.27 bremsstrahlung

high-energy electromagnetic radiation in the X-γ energy range emitted by charged particles slowing down by scattering of atomic nuclei

NOTE 1 The primary particle is ultimately absorbed while the bremsstrahlung can be highly penetrating. In space, the most common source of bremsstrahlung is electron scattering.

NOTE 2 Its energy is continuously distributed down from the energy of the incident particle.

2.3.28 business agreement

legally binding agreement, for the supply of goods or services, between two or more actors in the **customer–supplier** chain

NOTE Business agreements are recorded in a variety of forms, such as:

- Contracts,
- Memoranda of understanding,
- Inter-governmental agreements,
- Inter-agency agreements,
- Partnerships,
- Bartering agreements, and
- Purchase orders.

2.3.29 calibration

determination of the error values of measuring instruments and, if necessary, other metrological properties

NOTE The metrological use of the term “calibration” is often extended to include operations such as adjustments, scale graduation, etc. This use is deprecated.

2.3.30 capability

ability of an organization, **system** or **process** to realize a **product** that will fulfil the **requirements** for that **product**

NOTE Process capability terms in the field of statistics are defined in ISO 3534-2.

[ISO 9000:2005]

2.3.31 catastrophic

resulting in loss of life, life-threatening, permanently disabling injury or occupational illness, loss of **system**, loss of an interfacing manned flight system, loss of launch site facilities or severe detrimental environmental effects

2.3.32 certification

procedure by which a party gives formal **assurance** that a person or an organization acts, or a **product** is, in compliance with specified **requirements**

NOTE Certification can be carried out by a first, second or third party.

2.3.33 clean area

area under **contamination** control

NOTE Examples of clean areas are cleanrooms, integration tent, gloves box.

2.3.34 cleanliness

level of particulate and molecular **contamination**

2.3.35 cleanliness controlled area

environmentally controlled area, operated as a **cleanroom**, with two pre-filter stages but without the final stage of high-efficiency particulate air filters (or better) used in **cleanrooms**

2.3.36 cleanroom

clean area controlled according to specified levels

NOTE Specified levels are humidity, temperature, particulates number versus size and volume and chemical contamination.

2.3.37 cold redundancy

redundancy where one entity is operating and the others are powered off

2.3.38 collected volatile condensable material

mass that **outgasses** from a material and subsequently condenses on a collector, expressed as a percentage of the initial specimen mass

[ISO 15388:2012]

2.3.39 commandability

provision of adequate control **functions** to configure the on-board **systems** for the execution of nominal mission operations, failure detection, identification, isolation, diagnosis and recovery, and **maintenance** operations

2.3.40 commissioning

verification and **validation** activities conducted after the launch and before the entry into operational service either on the **space segment elements** only or on the overall **system** (including the **ground segment elements**)

2.3.41 common cause failure

failure of multiple items occurring from a single common cause

2.3.42 common mode failure

common cause failure of multiple identical items that fail in the same mode

NOTE 1 Common mode failures are a particular case of common cause failures.

NOTE 2 An example of common mode is the same observed end effect or state in identical items once they failed due to the same cause. For instance, all command receivers in a satellite failed in lock status due to the radiation sensitivity.

2.3.43 component

set of **materials**, assembled according to defined and controlled **processes**, which cannot be disassembled without destroying its capability and which performs a simple **function** that can be evaluated against expected **performance requirements**

NOTE 1 The term "part" is synonymous.

NOTE 2 The term "part" is preferred when referring to purely mechanical devices.

NOTE 3 The term "component" is preferred for EEE devices.

2.3.44 configurable code

code (source code or executable code) that can be tailored by setting values of parameters

NOTE This definition covers in particular classes of configurable code obtained by the following configuration means:

- configuration based on the use of a compilation directive;
- configuration based on the use of a link directive;
- configuration performed through a parameter defined in a configuration file;
- configuration performed through data defined in a database with impact on the actually executable parts of the software (e.g. parameters defining branch structures that result in the non-execution of existing parts of the code).

2.3.45 configuration

interrelated functional and/or physical characteristics of a **product** defined in **configuration documents** subject to **configuration management**

NOTE Adapted from ISO 10007:2003.

2.3.46 configuration baseline

approved **product configuration** information that establishes the characteristics of a **product** or service at a point in time that serves as reference for activities throughout the **life cycle** of the **product** or service

[ISO 9000:2015]

2.3.47 configuration control

coordinated activities for controlling modifications to a **configuration baseline**

NOTE Requests for deviation are also considered modifications to a baseline.

2.3.48 configuration document

document that defines the **requirements** for **function**, **design**, build, production, and **verification** for a **configuration item**

NOTE For space standards, configuration documents can include documents relating to operation and disposal of the configuration item.

2.3.49 configuration identification

coordinated activities to establish rules for **configuration item** selection, **configuration baseline** content definition, and **product** and document identifiers definition

2.3.50 configuration item

aggregation of hardware, software, processed **materials**, services or any of its discrete portions, that is designated for **configuration management** and treated as a single entity in the **configuration management process**

NOTE A configuration item can contain other configuration item(s).

2.3.51 configuration management

activity for establishing and maintaining consistent records of the **performance** parameters of a **product** and its functional and physical attributes compared to **product design** and operational **requirements**

NOTE 1 Configuration management is applied throughout the entire life cycle of the product (i.e. development, production, deployment, operation and disposal).

NOTE 2 Adapted from ISO 10007:2003.

2.3.52 configuration status accounting

formalized recording and reporting of **product** characteristics and **configuration** information, the status of applicable changes and the status of their implementation

NOTE Adapted from ISO 10007:2003.

2.3.53 configuration verification

coordinated activities to determine the **conformance** of the **configuration item** to its **configuration document(s)**

2.3.54 configured item

any level of **product** whose functional or physical characteristics are recorded in a retrievable, consistent manner

2.3.55 conformal coating

thin protective coating which conforms to the shape of the assembly to be coated

2.3.56 conformance

fulfilment of a **requirement**

NOTE The term "conformity" is synonymous, but deprecated in ECSS.

2.3.57 contaminant

undesirable molecular or particulate matter

NOTE This includes microbiological matter.

2.3.58 contamination

introduction of **contaminant** to an item or to the **environment** of interest

2.3.59 contract

legally enforceable **business agreement** in which payment is part of the conditions

2.3.60 corrective action

action to eliminate the cause of a detected **nonconformance** and to prevent recurrence

NOTE 1 There can be more than one cause for a non-conformance.

NOTE 2 Corrective action is taken to prevent recurrence whereas preventive action is taken to prevent occurrence.

NOTE 3 Adapted from ISO 9000:2015.

2.3.61 commercial off-the-shelf

equipment, including hardware and associated software or procedures, that is commercially available from current industry inventory

[ISO 14625:2007]

NOTE In common usage, COTS equipment is understood to not be manufactured, inspected or tested in accordance with military or space standards. COTS equipment is generally cheaper and easier to procure, yet has associated risk in terms of quality and performance in the space environment.

2.3.62 critical

characteristic of a **process**, **process** condition, parameter, **requirement** or item that deserves control and special attention in order to meet the objectives (e.g. of a **mission**) within given constraints

2.3.63 critical item

potential threat to the schedule, cost, **performance** and **quality** of a **project** or programme that is controlled by a specific action plan in order to mitigate emanating **risks** and to prevent undesirable consequences

NOTE Examples of critical items are:

- item not qualified or validated for the application in question (or has caused problems previously which remained unresolved).
- item for which it is difficult to demonstrate design performance.
- item highly sensitive to the conditions under which it is produced or used (e.g. contamination, radiation).
- item having the potential to degrade the quality of the product significantly, and hence the ability of the end-product to accomplish defined mission objectives.
- item for which major difficulties or uncertainties are expected in the procurement, manufacturing, assembly, inspection, test, handling, storage and transportation, that have the potential to lead to a major degradation in the quality of the product.

2.3.64 critical path

chain of activities that determines the earliest completion of the **project**

NOTE As a consequence, any delay of one task belonging to the critical path extends the project duration.

2.3.65 customer

organization or person that receives a **product** as part of a **business agreement**

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

2.3.66 defect

non-fulfilment of a **requirement** related to an intended or specified use

NOTE 1 The distinction between the concepts defect and nonconformance is important as it has legal connotations, particularly those associated with product liability issues. Consequently the term “defect” should be used with extreme caution.

NOTE 2 The intended use as intended by the customer can be affected by the nature of the information, such as

operating or maintenance instructions, provided by the supplier.

2.3.67 delamination

physical separation between two material layers, which are joined in design

NOTE See also "**blister**".

2.3.68 delta qualification

qualification performed on a **product** which has undergone minor **design** modifications or has been qualified to operate in environments different than those specified

2.3.69 dependability

the extent to which the fulfilment of a required **function** can be justifiably trusted

NOTE 1 Its main components are reliability, availability and maintainability.

NOTE 2 Dependability shall be considered in conjunction with safety.

2.3.70 derating

action when designing a **product** to limit the **component** stresses to specified levels that are below their ratings in order to increase its **reliability**

2.3.71 design

set of information, or the process used to generate the set of information, that defines the characteristics of a **product**

2.3.72 development

complete **process** of elaborating a **product** from concept to manufacturing including its **qualification** and final **acceptance**

NOTE Technology development and design production are part of the process (i.e. from phase 0 to phase D).

2.3.73 deviation

departure from the originally specified **requirements** for a **product**, prior to production

NOTE Waiver is an a posteriori decision whereas deviation is an a priori decision with respect to the production phase.

2.3.74 discipline

specific area of expertise within a general subject

NOTE The name of the discipline normally indicates the type of expertise (e.g. in the ECSS system, system engineering, mechanical engineering, software and communications are disciplines within the engineering domain).

2.3.75 discrepancy

departure from expected **performance**

NOTE 1 A discrepancy can be the result of nonconforming hardware or software, or conditions occurring in test set-up. A discrepancy can be momentary, non-repeatable, or permanent.

NOTE 2 Adapted from ISO 10795:2019.

2.3.76 disposal

actions performed by a **spacecraft** or **launch vehicle** orbital stage to permanently reduce its chance of accidental break-up and to achieve its required long-term clearance of the protected regions

NOTE Actions can include removing stored energy and performing post-mission orbital manoeuvres.

[ISO 24113:2019]

2.3.77 effectiveness

extent to which planned activities are realized and planned results are achieved

[ISO 9000:2015]

2.3.78 efficiency

relationship between the result achieved and the resources used

[ISO 9000:2015]

2.3.79 element

combination of integrated **equipment**, **components** and **parts**

NOTE An element fulfils a major, self-contained, subset of a segment's objectives.

2.3.80 emergency

situation where **hazardous events** have occurred with potentially **catastrophic** or **critical** consequences requiring an immediate action

2.3.81 embedded space segment element

space segment element that performs its **mission** as part of another **space segment element**

NOTE For example: platform, module, instrument, payload.

2.3.82 end item

product that is deliverable under a **business agreement**

2.3.83 engineering model

flight representative **model** in terms of form, fit and **function** used for functional and **failure** effect **verification**

NOTE 1 The engineering model is usually not equipped with high reliability parts or full redundancy.

NOTE 2 The engineering model is also used for final validation of test facilities, GSE and associated procedures.

NOTE 3 More detailed information on the build standard and the use of this model is given in ECSS-E-HB-10-02.

2.3.84 engineering qualification model

model, which fully reflects the **design** of the **flight model** except for the parts standard, used for functional **performance** and **EMC verification** and possibly for **qualification**

NOTE 1 Military grade or lower-level parts can be used instead of high reliability parts, provided they are procured from the same manufacturer with the same packaging.

NOTE 2 Functional performance qualification includes verification of procedures for failure detection, isolation and recovery and for redundancy management.

NOTE 3 The engineering qualification model can also be used for environmental testing if the customer accepts the risk, in which case the qualification model rules apply.

NOTE 4 More detailed information on the build standard and the use of this model is given in ECSS-E-HB-10-02.

2.3.85 environment

natural conditions and induced conditions that constrain the **design** definitions or operations of a **product**

NOTE 1 Examples of natural conditions are weather, climate, ocean conditions, terrain, vegetation, dust, light and radiation.

NOTE 2 Examples of induced conditions are electromagnetic interference, heat, vibration, pollution and contamination.

2.3.86 equipment

integrated set of **parts** and **components**

NOTE 1 An equipment accomplishes a specific function.

NOTE 2 An equipment is self-contained and classified as such for the purposes of separate manufacture, procurement, drawings, specification, storage, issue, maintenance or use.

NOTE 3 The term "unit" is synonymous with the term "equipment".

2.3.87 fail safe

design property of a system, **subsystem**, or **component** which prevents its **failures**from resulting in **catastrophic** or **critical** consequences (i.e. remain safe after one failure)

NOTE Adapted from ISO 26871:2020.

2.3.88 failure

the event resulting in an item being no longer able to perform its required **function**

NOTE "Failure" is an event, as distinguished from "fault" which is a state.

2.3.89 failure mode

mechanism through which a **failure** occurs

NOTE 1 For example,. short-circuit, open-circuit, fracture, or excessive wear.

NOTE 2 This term is equivalent to the term “fault mode” in IEC Multilingual Dictionary: 2001 edition.

2.3.90 failure tolerance

attribute of an item that makes it able to perform a required **function** in the presence of certain given sub-item **failures**

2.3.91 fastener

device used to physically secure hardware **components** and **parts** in place

NOTE These include, but are not limited to, bolts, nuts, screws, pins and rivets.

[ISO 7176-19:2022]

2.3.92 fault

state of an item characterized by inability to perform as required

NOTE 1 A fault can be the result of a failure of the item itself or can exist without prior failure.

NOTE 2 A fault can generate a failure.

2.3.93 fault tolerance

attribute of an item that makes it able to perform a required **function** in the presence of certain given sub-item **faults**

2.3.94 firmware

hardware that contains a computer program or data that cannot be changed in its user **environment**

NOTE The computer program and data contained in firmware are classified as software; the circuitry containing the computer program and data is classified as hardware.

2.3.95 flight model

end **product** that is intended for flight

NOTE 1 The flight model is subjected to formal functional and environmental acceptance testing.

NOTE 2 More detailed information on the build standard and the use of this model is given in ECSS-E-HB-10-02.

2.3.96 flight operations

all activities related to the planning, execution and evaluation of the control of the **space segment** when in orbit

2.3.97 flight spare

spare **flight model** that could be used in place of the **flight model**

NOTE 1 Exceptionally, a refurbished qualification model can be used as a flight spare.

NOTE 2 More detailed information on the build standard and the use of this model is given in ECSS-E-HB-10-02.

2.3.98 fluence

time-integrated **flux**

2.3.99 flux

number of particles passing through a given area in a specified time

[ISO 23038:2018]

2.3.100 forward contamination

contamination of celestial bodies other than the Earth by terrestrial life forms in the course of spaceflight missions

2.3.101 function

intended effect of a **product**

2.3.102 function tree

hierarchical breakdown of a **function** into successive levels of **function**

2.3.103 functional analysis

process that describes completely the **functions** and their relationships, which are systematically characterised, classified and evaluated

2.3.104 ground segment

part of a **space system**, located on ground, which monitors and controls **space segment element(s)**

NOTE A ground segment is composed of one or more ground segment elements.

2.3.105 ground segment element

element within a **ground segment**

NOTE 1 A ground segment element can be composed of several ground segment elements, e.g. a ground station network is a ground segment element that can be composed of a set of ground stations and a communication network.

NOTE 2 Examples are given in Annex B.2.

2.3.106 ground segment equipment

equipment within a **ground segment**

NOTE Examples are given in Annex B.2.

2.3.107 ground segment subsystem

subsystem within a **ground segment**

NOTE Examples are given in Annex B.2.

2.3.108 ground segment system

system within a **ground segment**

NOTE Examples are given in Annex B.2.

2.3.109 ground support equipment

non flight **product** (hardware/software) used on ground to assemble, integrate, **test**, transport, access, handle, maintain, measure, calibrate, verify, protect or service a flight **product** (hardware/software)

2.3.110 handbook

non-**normative** document providing background information, orientation, advice or recommendations related to one specific **discipline** or to a specific technique, technology, **process** or activity

2.3.111 hardware-software interaction analysis

analysis to verify that the software is specified to react to hardware failures as required

2.3.112 hazard

existing or potential condition that can result in an accident

NOTE 1 This condition can be associated with the design, manufacturing, operation or environment.

NOTE 2 Hazards are not events but potential threats to safety.

2.3.113 hazard analysis

systematic and iterative process of the identification, classification and reduction of **hazards**

2.3.114 hazard control

preventive or mitigation measure, associated to a **hazard** scenario, which is introduced into the **system design**, production and operation to avoid the events or the consequences of the events

2.3.115 hazardous event

accident resulting from a **hazard**

2.3.116 hot redundancy

redundancy where all entities are powered on with only one operating

2.3.117 human factors

model of observed human physical and psycho-physiological behaviour in relation to **environment** and **product**

2.3.118 hydrogen embrittlement

mechanical and environmental process that results from the initial presence or absorption of excessive amounts of hydrogen in metals

NOTE Usually it occurs in combination with residual or applied tensile stresses.

2.3.119 implementation document

formal response from the **supplier** to the **customer**'s **Project Requirements Document** describing how all **requirements** will be met

2.3.120 incident

unexpected event that might be, or could lead to, an operational interruption, disruption, loss, **emergency**, crisis or **accident**

NOTE Incidents are recorded for further assessment.

2.3.121 informative

providing non-**normative** information intended to assist the understanding or use of **requirements**

2.3.122 inhibit

design feature that prevents a **function** from undesirable execution

NOTE Can be software or hardware.

2.3.123 inspection

determination of **conformance** to specified requirements

NOTE Adapted from ISO 9000:2015.

2.3.124 integration

functionally combining lower-level functional entities (hardware or software) so they operate together to constitute a higher-level functional entity

NOTE Assembly is a pre-requisite for integration.

2.3.125 interchangeability

ability of a **product** to be used in place of another to fulfil the same **requirements**

2.3.126 interface control document

specification that describes the characteristics that must be controlled at the boundaries between **systems**, **subsystems** and other elements

[ISO 10795:2019]

NOTE The ICD DRD is Annex B of ECSS-E-ST-10-24C.

2.3.127 interface definition document

document defining the **design** of one interface end

NOTE The IDD DRD is Annex C of E-ST-10-24C.

2.3.128 launch base

composed of **launch range** and **launch complexes**

2.3.129 launch campaign

launch activities which include:

- Launcher preparation and final integration
- Payload processing and integration on the launcher
- Launch Operations until lift-off, including Flight Data Gathering

2.3.130 launch complex

facilities necessary to carry out the final **integration** of the **launcher** elements, of the payload into the launcher, as well as the **launch operations**

NOTE A Launch System is associated with its specific Launch Complex, which can include facilities shared with other Launch Systems (e.g.: Lox plant at CSG).

2.3.131 launch operations

all launch related activities taking place after completion of the activities necessary to deliver a fully integrated **launcher** up to reception of post flight data

2.3.132 launch range

systems, facilities and means, required to provide the necessary service and support for carrying out a **launch campaign**, including operations after lift-off and Flight Data Gathering, and to ensure safety and security of persons, assets and protection of the **environment**

NOTE The Launch Range includes in particular the CNES/CSG technical centre, the payload Preparation Facilities as well as the downrange stations for launcher tracking and flight data acquisition.

2.3.133 launch segment

part of a **space system** which is used to transport **space segment element(s)** into space

NOTE 1 A launch segment is composed of a launcher system with it specific launch complex, supported by a launch range.

NOTE 2 A launch segment is composed of the integrated launcher and the facilities needed for manufacturing, testing and delivering launcher elements.

2.3.134 launch segment element

element within a **launch segment**

NOTE 1 A launch segment element can be composed of several launch segment elements, e.g. a launcher is a launch segment element that is composed of several launch segment elements, such as stage, engine and upper part.

NOTE 2 Examples are given in Annex B.3.

2.3.135 launch segment equipment

equipment within a **launch segment**

NOTE Examples are given in Annex B.3.

2.3.136 launch segment subsystem

subsystem within a **launch segment**

NOTE Examples are given in Annex B.3.

2.3.137 launch segment system

system within a **launch segment**

NOTE Examples are given in Annex B.3

2.3.138 launch service

activities required to conclude a launch service contract and to place a **payload** in the orbit, at the time, and under the **payload environment** conditions required by the **customer**

NOTE Launch Service activities cover in particular: Commercialisation, Mission analysis, Procurement of a fully integrated launcher, Procurement of flight programme(s), Procurement of launcher adaptations to meet specific mission requirements, Payload processing and integration on the launcher, Launch Operations including Flight Data Gathering, Launch Range Operations, Post Flight Analysis.

2.3.139 launch system

system comprising the **launcher system** and the **launch complex**

2.3.140 launch vehicle

vehicle designed to transport **payloads** to space

NOTE The term “launcher” is synonymous.

2.3.141 launcher element

building block of a **launcher**

2.3.142 launcher production facilities

launcher element manufacturing facilities and testing facilities

NOTE 1 The term production facilities is used as shorthand.

NOTE 2 The launcher element manufacturing facilities include the test facilities specific to the launcher elements' manufacturing.

2.3.143 launcher system

fully integrated **launcher** and the needed facilities for manufacturing, testing and delivering the **launcher elements**

NOTE "Fully integrated launcher" means the integrated launcher, including payload, and ready to be launched i.e. all launch control lights on green.

2.3.144 life cycle

all phases in the life of a **product** from needs identification through **disposal**

2.3.145 life profile

conditions to which a **product** is chronologically submitted from its manufacturing to its **disposal**

2.3.146 lifetime

period, or number of cycles, over which a **product** is required to perform according to its **specification**

2.3.147 linear energy transfer

energy deposited by a charged particle passing through a substance and locally absorbed per unit length of path

NOTE 1 It is measured in joules per metre. Other dimensions are $keV \cdot \mu m^{-1}$, $J \cdot m^2 \cdot kg^{-1}$, $MeV \cdot cm^2 \cdot g^{-1}$, $MeV \cdot cm^2 \cdot mg^{-1}$.

NOTE 2 Adapted from ISO 15856:2010.

2.3.148 lot

batch or portion of a **batch**

2.3.149 maintainability

ease of performing **maintenance** on a **product**

NOTE Maintainability can be expressed as the probability that a maintenance action on a product can be carried out within a defined time interval, using stated procedures and resources.

2.3.150 maintenance

actions needed to retain a **product** in, or restore it to, a state in which it can perform its required **function**

NOTE Actions include tuning, control, inspection, repair, replacement or redesign.

2.3.151 major nonconformance

nonconformance which can have an impact on the customer's **requirements** in the following areas and cases:

- safety of people or equipment,
- operational, functional or any technical requirements imposed by the business agreement,
- reliability, maintainability, availability,
- lifetime,
- functional or dimensional interchangeability,
- interfaces with hardware or software regulated by different business agreements,
- changes to or deviations from approved qualification or acceptance test procedures,
- project specific items which are proposed to be scrapped.

2.3.152 material

raw, semi–finished or finished substance (gaseous, liquid, solid) of given characteristics from which processing into a **component** or **part** is undertaken

2.3.153 maximum expected operating pressure

highest pressure that a **product** is expected to experience during its **mission** life and retain its functionality, in association with its applicable operating environments

NOTE 1 The maximum expected operating pressure corresponds to limit loads.

NOTE 2 The maximum expected operating pressure includes effects of temperature and acceleration on pressure, maximum relief pressure, maximum regulator pressure and effects of failures within the system or its components. The effect of pressure transient is assessed for each component of the system and used to define its MEOP.

NOTE 3 The maximum expected operating pressure includes effects of failures of an external system (e.g. spacecraft), as specified by the customer ,on systems (e.g. propulsion) or components.

NOTE 4 The maximum expected operating pressure does not include testing factors, which are included in ECSS-E-ST-32-02 and ECSS-E-ST-10-03.

NOTE 5 Adapted from ISO 10785:2011

2.3.154 minor nonconformance

nonconformance which by definition cannot be classified as major

NOTE For example, the following EEE discrepancies after delivery from the manufacturer can be classified as minor:

- random failures, where no risk for a lot-related reliability or quality problem exists;
- if the form, fit or function are not affected;
- minor inconsistencies in the accompanying documentation.

2.3.155 mission

set of tasks, duties or **functions** to be accomplished by an **element**

2.3.156 mission statement

document expressing the set of collected needs

NOTE The mission statement is a document established by the customer, which reflects the users needs, and is used as input to Phase 0 of a space system project.

2.3.157 model

physical or abstract representation used for calculations, predictions or further assessment

NOTE Model can also be used to identify particular instances of the product e.g. flight model.

2.3.158 multipaction

resonant back and forth flow of secondary electrons in a vacuum between two surfaces separated by a distance such that the electron transit time is an odd integral multiple of one half the period of the alternating voltage impressed on the surface

NOTE The effects of multipaction can be loss of output power up to reaching the multipaction breakdown voltage leading to the generation of spark.

2.3.159 non-volatile residue

soluble or suspended material and insoluble particulate matter remaining after temperature-controlled evaporation of a volatile liquid

2.3.160 nonconformance

non-fulfilment of a **requirement**

NOTE The term “nonconformity” is synonymous but deprecated.

2.3.161 normative

providing **requirements** for activities or their results

NOTE 1 A “normative document” covers documents such as standards, technical specifications, codes of practice and regulations.

NOTE 2 A “normative reference" incorporates requirements from a cited publication into a normative document.

2.3.162 offgassing

gaseous release from a material under atmospheric or near-atmospheric pressure

NOTE Examples are manned and biological missions.

2.3.163 off-the-shelf

procured from the market, even if not developed for space application

2.3.164 outage

state of a **product** being unable to perform its required **function**

2.3.165 outgassing

gaseous release from a **material** in vacuum conditions

2.3.166 part

see "**component**"

2.3.167 particle

unit of solid or liquid matter with observable size in a defined range

NOTE 1 Various methods for defining particle size are used and are dependant upon the measurement technique, for example between 0,1 μm and 1000 μm.

NOTE 2 For the manual method the apparent maximum linear dimension of a particle in the plane of observation as observed with instruments such as optical, electron, or atomic force microscopes is the particle size.

NOTE 3 For the automatic method, the equivalent diameter of a particle detected by automatic instrumentation is the particle size.

NOTE 4 The equivalent diameter is the diameter of a reference sphere having known properties and producing the same response in the sensing instrument as the particle being measured.

2.3.168 payload

set of **space segment elements**

NOTE 1 A spacecraft payload is a set of instruments or equipment which performs the user mission.

NOTE 2 A launcher payload is a set of space segment elements carried into space in accordance with agreed position, time and environmental conditions.

2.3.169 performance

quantifiable characteristics of a **function**

2.3.170 planetary protection

policy and the technical implementations to prevent **forward** and **backward contamination**

2.3.171 preventive action

action to eliminate the cause of a potential **nonconformance** or other undesirable potential situation

NOTE 1 There can be more than one cause for a potential non-conformance.

NOTE 2 Preventive action is taken to prevent occurrence whereas corrective action is taken to prevent recurrence.

2.3.172 procedure

specified way to carry out an activity or **process**

NOTE Procedures can be documented or not.

[ISO 9000:2015]

2.3.173 process

set of interrelated or interacting activities which transform inputs into outputs

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

2.3.174 product

result of a **process**

NOTE 1 There are four generic product categories:

- services
- software
- hardware
- processed materials.

NOTE 2 Adapted from ISO 9000:2005.

2.3.175 product assurance

discipline devoted to the study, planning and implementation of activities intended to assure that the **design**, controls, methods and techniques in a **project** result in a satisfactory degree of **quality** in a **product**

2.3.176 product tree

hierarchical representation of the **product** into successive levels of detail

2.3.177 project

set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific **requirements**, including constraints of time, cost and resources

2.3.178 project requirements document

documented information including technical and programmatic **requirements**, as well as political, commercial, and industrial constraints

2.3.179 protoflight

approach based on a single model to be flown after it has been subjected to a qualification and acceptance test campaign

NOTE The protoflight approach can be applied at each level of decomposition of space system.

2.3.180 provision

expression in the content of a **normative** document, that takes the form of a statement, an instruction, a recommendation or a **requirement**

NOTE These types of provision are distinguished by the form of wording they employ, e.g. instructions are expressed in the imperative mood, recommendations by the use of the auxiliary "should" and requirements by the use of the auxiliary "shall".

[EN 45020:2006]

2.3.181 qualification

that part of **verification** which demonstrates that the **product** meets specified **qualification margins**

NOTE This can apply to personnel, products, manufacturing and assembly processes.

2.3.182 qualification margin

increase in severity of the environmental, mechanical, electrical, EMC, or operational extreme levels expected to be encountered during the specified **product lifetime** for the purpose of **design** margin demonstration

NOTE 1 This margin can include an increase in level, an extension of range, an increase in duration or cycles of exposure, as well as any other appropriate increase in severity.

NOTE 2 This definition is not applicable for thermal aspects. Refer to ECSS-E-ST-31 for "qualification margin". For temperatures, the qualification margin is the difference between the upper or lower qualification temperature and the upper or lower acceptance temperature (for operating and non - operating mode).

2.3.183 qualification model

model, which fully reflects all aspects of the **flight model design**, used for complete functional and environmental **qualification testing**

NOTE 1 A qualification model is only necessary for newly-designed hardware or when a delta qualification is performed for adaptation to the project.

NOTE 2 The qualification model is not intended to be used for flight, since it is overtested.

NOTE 3 More detailed information on the build standard and the use of this model is given in ECSS-E-HB-10-02.

2.3.184 qualification test level

test level reflecting the maximum level expected to be encountered during the flight **product lifetime** increased by **qualification margins**, or **qualification margins** on top of **acceptance margins** for thermal testing

2.3.185 quality

degree to which a set of characteristics of a **product** or **process** fulfils **requirements**

NOTE Adapted from ISO 9000:2015.

2.3.186 quality assurance

part of **quality** management focused on providing confidence that **quality requirements** will be fulfilled

[ISO 9000:2015]

2.3.187 quality control

part of **quality** management focused on fulfilling **quality requirements**

[ISO 9000:2015]

2.3.188 redundancy

existence of more than one means for performing a given **function** with the intention of increasing reliability

NOTE See also definitions for “active redundancy”, “hot redundancy” and “cold redundancy”.

2.3.189 reliability

ability of an item to perform a required **function** under given conditions for a given time interval

NOTE 1 It is generally assumed that the item is in a state to perform this required function at the beginning of the time interval.

NOTE 2 Generally, reliability performance is quantified using appropriate measures. In some applications these measures include an expression of reliability performance as a probability, which is also called reliability.

2.3.190 relifing

product assurance activity for the extension of the expiry datecode of a EEE **component** which is intended to be used for space application

2.3.191 repair

action on a nonconforming **product** or service to make it acceptable for the intended use

NOTE 1 A successful repair of a nonconforming product or service does not necessarily make the product or service conform to the requirements. It can be that in conjunction with a repair a waiver is required.

NOTE 2 Repair includes remedial action taken on a previously conforming product or service to restore it for use, for example as part of maintenance..

NOTE 3 Repair can affect or change parts of the nonconforming product or service.

NOTE 4 Repair leads to a configuration item change.

NOTE 5 Adapted from ISO 9000:2015.

2.3.192 requirement

documented demand to be complied with

2.3.193 residual risk

risk remaining after implementation of **risk** reduction measures

[ISO 17666:2016]

2.3.194 review

determination of the suitability, adequacy or effectiveness of a **product** or process to achieve established objectives

NOTE 1 Review can also include the determination of efficiency.

NOTE 2 This is often performed at specific milestones as a dedicated activity. Examples are: critical design review, preliminary design review, and system requirements review.

NOTE 3 Adapted from ISO 9000:2015.

2.3.195 rework

action on a nonconforming **product** or service to make it conform to the **requirements**

NOTE 1 Rework can affect or change parts of the nonconforming product or service.

NOTE 2 Rework does not lead to a configuration item change.

NOTE 3 Adapted from ISO 9000:2015.

2.3.196 risk

undesirable situation or circumstance that has both a likelihood of occurring and a potential negative consequence on a **project**

NOTE 1 Risks are inherent to any project, and can arise at any time during the project life cycle.

NOTE 2 Predictability and control of events facilitate risk reduction.

NOTE 3 The terms "risk assessment", "risk mitigation" and "risk control" are in common use in ECSS.

NOTE 4 Adapted from ISO 17666:2003.

2.3.197 safe life

required period during which a structural item, even containing the largest undetected flaw, is shown by **analysis** or **testing** not to fail catastrophically under the expected service load and environment

NOTE Safe life is also referred as damage tolerance life or fatigue life.

[ISO 10786:2011]

2.3.198 safe mode

configuration of a **spacecraft** in which it can remain safely without **ground segment** intervention for a specified period

NOTE 1 Safe mode is also commonly known as "survival mode".

NOTE 2 In safe mode, typically all non-essential on-board units or subsystems are powered off, either to conserve power or to avoid interference with other subsystems, and the spacecraft can be (automatically) oriented to a particular attitude with respect to the sun.

2.3.199 safety

state where an acceptable level of **risk** is not exceeded

NOTE Risk relates to:

- fatality,
- injury or occupational illness,
- damage to launcher hardware or launch site facilities,

- damage to an element of an interfacing manned flight system,
- the main functions of a flight system itself,
- pollution of the environment, atmosphere or outer space, and
- damage to public or private property.

2.3.200 safety critical

resulting in temporarily disabling but not life threatening injury, temporary occupational illness, major detrimental environmental effects, major damage to public or private properties, major damage to interfacing flight **systems** or major damage to ground facilities

NOTE The term "critical" is used as shorthand for "safety critical" in the safety context.

2.3.201 safety critical function

function that, if lost or degraded, or as a result of incorrect or inadvertent operation, can result in **catastrophic** or **critical** consequences

2.3.202 safing

action of containment or control of **emergency** and warning situations, or placing a **system** (or part thereof), in a predetermined safe condition

2.3.203 scrap

action on a nonconforming **product** to preclude its originally intended use

NOTE 1 The scrapped product is not recoverable by rework or repair for technical or economic reasons. As a consequence, it will be recycled or destroyed.

NOTE 2 A service is scrapped by being discontinued.

2.3.204 security

state where an acceptable level of **risk** arising from malevolent action is not exceeded

2.3.205 segment

set of **elements** or combination of **systems** that fulfils a major, self-contained, subset of the **space mission** objectives

NOTE Examples are space segment, ground segment, launch segment and support segment.

2.3.206 service life

interval beginning with the last item **inspection** or flaw screening proof test after manufacturing, and ending with completion of its specified life

2.3.207 severity

classification of a **failure** or undesired event according to the magnitude of its possible consequences

2.3.208 shop traveller

document recording the complete production process, including **repairs**, malfunction of equipment, **inspections**, and reference to produced samples

2.3.209 single point failure

part of a **product** that, if it fails, will result in the unrecoverable **failure** of that **product**

2.3.210 software integration testing

testing in which software **components**, hardware **components**, or both are combined and tested to evaluate the interaction between them

[IEEE 610.12:1990]

2.3.211 solar array

assembly of **solar panels** on a supporting structure with associated hardware

NOTE The associated hardware includes mounting features, cables and, in the case of a deployable solar array, a deployment mechanism.

2.3.212 solar cell assembly

solar cell together with interconnector, coverglass and, if used, by-pass diode

2.3.213 solar panel

interconnected **solar cell assemblies** mounted on a substrate

2.3.214 space debris

objects of human origin in Earth orbit or re-entering the Earth's atmosphere, including fragments and elements thereof, that no longer serve a useful purpose

NOTE 1 Spacecraft in reserve or standby modes awaiting possible reactivation are considered to serve a useful purpose.

NOTE 2 The term "orbital debris" is synonymous, but deprecated.

NOTE 3 Adapted from ISO 24113:2019.

2.3.215 space mission

user-defined needs to be achieved by a **space system**

2.3.216 space programme

set of related space **projects** managed in a coordinated way to contribute to an overall objective

2.3.217 space segment

part of a **space system**, placed in space, to fulfil the **space mission** objectives

2.3.218 space segment element

element within a **space segment**

NOTE 1 A space segment element can be composed of several space segment elements, e.g. a spacecraft is composed of instruments, a payload module and a service module.

NOTE 2 Examples are given in Annex B.1.

2.3.219 space segment equipment

equipment within a **space segment**

NOTE Examples are given in Annex B.1.

2.3.220 space segment subsystem

subsystem within a **space segment**

NOTE Examples are given in Annex B.1.

2.3.221 space segment system

system within a **space segment**

NOTE Examples are given in Annex B.1.

2.3.222 space system

system that contains at least a **space**, a **ground** or a **launch segment**

NOTE Generally a space system is composed of all three segments and is supported by a support segment.

2.3.223 spacecraft

manned or unmanned vehicle designed to orbit or travel in space

NOTE A spacecraft is a space segment element.

2.3.224 special process

process where the **quality** cannot be completely ensured by **inspection** of the resulting product only

2.3.225 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).

[ISO 9000:2005]

2.3.226 stand-alone space segment element

space segment element that performs its **mission** independently of the rest of the space system

NOTE For example: satellite, rover, lander.

2.3.227 standard

normative document for use in invitations to tender and **business agreements** for implementing space related activities

NOTE 1 A standard states verifiable requirements, supported by the minimum descriptive text necessary to understand their context. Each requirement has a unique identification, allowing full traceability and easy verification of compliance.

NOTE 2 A standard is established by consensus amongst all ECSS stakeholders.

NOTE 3 Other Standards Development Organisations (SDOs) use a different definition.

2.3.228 statement of work

contractual document that describes and plans deliverables and activities required to complete a **project**

NOTE The statement of work is issued by the customer at the start of a project for implementation by the supplier.

2.3.229 stress-corrosion

combined action of sustained tensile stress and corrosion that can lead to premature failure of **materials**

2.3.230 structural model

structurally representative **model** of the **flight model** used for **qualification** of the structural **design** and for correlation with structural mathematical **models**

NOTE 1 The system structural model usually consists of a representative structure, with structural dummies of the flight equipment, and also includes representative mechanical parts of other subsystems (e.g. mechanisms and solar panels).

NOTE 2 The system structural model is also used for final validation of test facilities, GSE, and associated procedures.

NOTE 3 More detailed information on the build standard and the use of this model is given in ECSS-E-HB-10-02.

2.3.231 subsystem

part of a **system** fulfilling one or more of its **functions**

2.3.232 supplier

organization or person that provides a **product** as part of a **business agreement**

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

2.3.233 support segment

generic infrastructure and services used to support the **development** and operation of **space system elements**

NOTE 1 Examples are ground stations and associated networks, orbit computing facilities, test centres, astronaut centre, launch ranges (e.g. Plestek, Baikonour, Guiana Space Centre).

NOTE 2 Items can be part of other segments during their development and later become part of the support segment when used (e.g. a tracking network).

2.3.234 support system

see "**support segment**"

NOTE The term "support system" is deprecated.

2.3.235 system

set of interrelated or interacting **functions** constituted to achieve a specified objective

2.3.236 tailoring

process by which **standards** are made applicable to a specific **project** by selection of existing **requirements**, with or without modification, or addition of new ones

2.3.237 technical memorandum

non-**normative** document providing useful information to the space community on a specific subject

NOTE Technical Memoranda are prepared to record and present data which are not the subject for a standard or for a handbook or not yet mature enough to be published as standard or handbook.

2.3.238 test

measurement of **product** characteristics, **performance** or **functions** under representative **environments**

2.3.239 thermal balance test

test conducted under steady state conditions to correlate and adjust the thermal mathematical **model** and verify the thermal **design**

2.3.240 thermal model

thermally representative **model** of the **flight model** used for **verification** of the thermal **design** and for correlation with thermal mathematical **models**

NOTE 1 The system thermal model usually consists of a representative structure, with thermal dummies of the flight equipment, and also includes representative thermal parts of other subsystems.

NOTE 2 More detailed information on the build standard and the use of this model is given in ECSS-E-HB-10-02.

2.3.241 thermal vacuum test

test conducted in vacuum under predefined temperature conditions to demonstrate the capability of the test item to operate according to **requirements**

NOTE Temperature conditions can be expressed as temperature level, gradient, difference, and variation.

2.3.242 third party

person or body that is recognized as being independent of the parties involved, as concerns the issue in question

NOTE Parties involved are usually supplier (“first party”) and purchaser (“second party”).

[EN 45020:1998]

2.3.243 traceability

ability to track the history, location or application by means of documented records

NOTE When considering a product, traceability can relate to:

- the origin of materials and parts,
- the processing history, or
- the distribution and location of the product after delivery.

2.3.244 unit

see "**equipment**"

NOTE The term “equipment” is strongly recommended for use in the ECSS system.

2.3.245 validation

process which demonstrates that the **product** is able to accomplish its intended use in the intended operational **environment**

NOTE 1 The status of the product following validation is “validated”.

NOTE 2 Verification is a pre-requisite for validation.

2.3.246 verification

process which demonstrates through the provision of objective evidence that the **product** is designed and produced according to its **specifications** and the agreed **deviations** and **waivers**, and is free of **defects**

NOTE 1 A waiver can arise as an output of the verification process.

NOTE 2 Verification can be accomplished by one or more of the following methods: analysis (including similarity), test, inspection, review of design.

NOTE 3 The status of the product following verification is “verified”.

2.3.247 visibly clean

absence of surface contamination when examined with a specific light source, angle of incidence and viewing distance using normal or magnified vision

2.3.248 waiver

authorised departure from the originally specified **requirements** for a **product**, during or after production

NOTE 1 Deviation is an a priori decision whereas waiver is an a posteriori decision with respect to the production phase.

NOTE 2 The term "concession" is synonymous and can be used for materials as per ECSS-Q-ST-70.

2.3.249 work breakdown structure

hierarchical representation of the activities necessary to complete a **project**

2.3.250 work package

group of related tasks that are defined down to the lowest level within a **work breakdown structure**

2.4 Abbreviated terms

Abbreviation	Meaning
A/D	analogue-to-digital
ABM	apogee boost motor
AC	alternating current
ADC	analogue-to-digital converter
AIT	assembly, integration and test
AIV	assembly, integration and verification
AOCS	attitude and orbit control subsystem
APS	active pixel sensor
AQL	acceptance quality level
AR	acceptance review
ASIC	application specific integrated circuit
ASTM	American Society for Testing and Materials
ATOX	atomic oxygen
AWG	American wire gauge
BOL	beginning-of-life
CAD	computer aided design
CCB	configuration control board
CCD	charge coupled device
CCSDS	Consultative Committee for Space Data Systems
CDR	critical design review
CIDL	configuration item data list
CIL	critical items list
CoG	centre of gravity
CoM	centre of mass
COTS	commercial off-the-shelf
CRR	commissioning result review
CVCM	collected volatile condensable material
DC	direct current
DDF	design definition file
DDR	detailed design review
DJF	design justification file
DML	declared materials list
DMPL	declared mechanical parts list
DPL	declared processes list

Abbreviation	Meaning
DRB	delivery review board
DRD	document requirements definition
DRL	document requirements list
ECLS	environmental control and life support
ECSS	European Cooperation for Space Standardization
EED	electro-explosive device
EEE	electrical, electronic and electromechanical
EGSE	electrical ground support equipment
EIDP	end item data package
ELR	end-of-life review
EM	engineering model
EMC	electromagnetic compatibility
EMI	electromagnetic interference
EN	European Standard
EOL	end-of-life
ESA	European Space Agency
ESCC	European Space Components Coordination
ESD	electrostatic discharge
FDIR	failure detection isolation and recovery
FM	flight model
FMEA	failure modes and effects analysis
FMECA	failure modes, effects and criticality analysis
FOS	factor of safety
FRR	flight readiness review
FTA	fault tree analysis
GEO	geostationary orbit
GS	ground segment
GSE	ground support equipment
HMI	human-machine interface
HSIA	hardware-software interaction analysis
HW	hardware
ICD	interface control document
ILS	integrated logistic support
IRD	interface requirements document
ISO	International Organization for Standardization
ISS	International Space Station

Abbreviation	Meaning
I/F	interface
I/O	input/output
LEO	low Earth orbit
LEOP	launch and early orbit phase
LRR	launch readiness review
MCR	mission close-out review
MDD	mission description document
MDP	maximum design pressure
MDR	mission definition review
MEOP	maximum expected operating pressure
MGSE	mechanical ground support equipment
MIP	mandatory inspection point
MLI	multi-layer insulation
MMIC	monolithic microwave integrated circuit
MOI	moment of inertia
NASA	National Aeronautics and Space Administration
NCR	nonconformance report
NDI	non-destructive inspection
NDT	non-destructive test
NRB	nonconformance review board
N/A	not applicable
OBDH	on-board data handling
ORR	operational readiness review
OTS	off-the-shelf
PA	product assurance
PCB	printed circuit board
PDR	preliminary design review
PFM	protoflight model
PID	process identification document
PMP	parts, materials and processes
PRR	preliminary requirements review
PTR	post test review
QA	quality assurance
QM	qualification model
QR	qualification review
RAMS	reliability, availability, maintainability and safety

Abbreviation	Meaning
RB	requirements baseline
RF	radio frequency
RFA	request for approval
RFD	request for deviation
RFW	request for waiver
RH	relative humidity
RID	review item discrepancy
ROD	review of design
r.m.s.	root-mean-square
SCC	stress-corrosion cracking
SEE	single event effect
SEP	system engineering plan
SRR	system requirements review
STM	structural-thermal model
SVT	system validation test
S/C	spacecraft
SW	software
TC	telecommand
TCS	thermal control subsystem
TM	telemetry
TM/TC	telemetry/telecommand
TML	total mass loss
TRB	test review board
TRL	technology readiness level
TRR	test readiness review
TS	technical specification
TT&C	telemetry, tracking and command
UTC	coordinated universal time
UV	ultraviolet
VCD	verification control document
VP	verification plan
WBS	work breakdown structure

Annex A
Traceability with respect to ECSS-S-ST-00-01C

Deleted terms (terms that appeared in ECSS-S-ST-00-01C but do not appear in the current document) are listed below. The terms marked with an asterisk (*) are still accepted as synonyms for ECSS terms, but their use in ECSS is discouraged.

Terms deleted with respect to the previous issue of the glossary (ECSS-S-ST-00-01C):

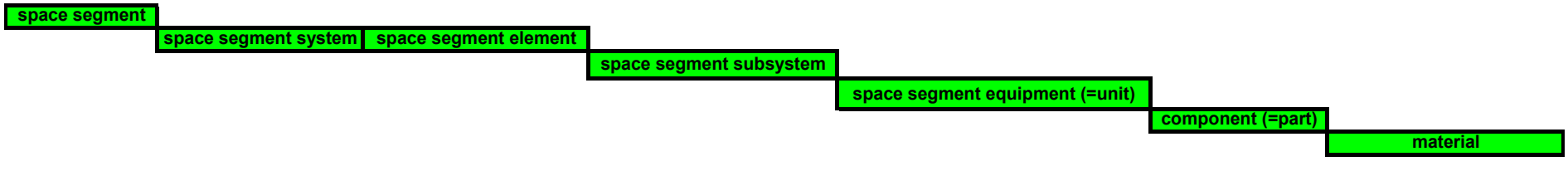
anomaly
black box
composite
baseline
conformity*
flammability
interface
launcher*
launcher stage
nonconformity*
orbital debris*
protoflight model
solar cell
structural-thermal model
thermal ambient test
toxic
uncertainty
upper part [A5]
upper stage [A5]

Annex B
Segment trees

This annex includes example for the terms defined in paragraph 2.1 and Figure 2-1: Space system breakdown:

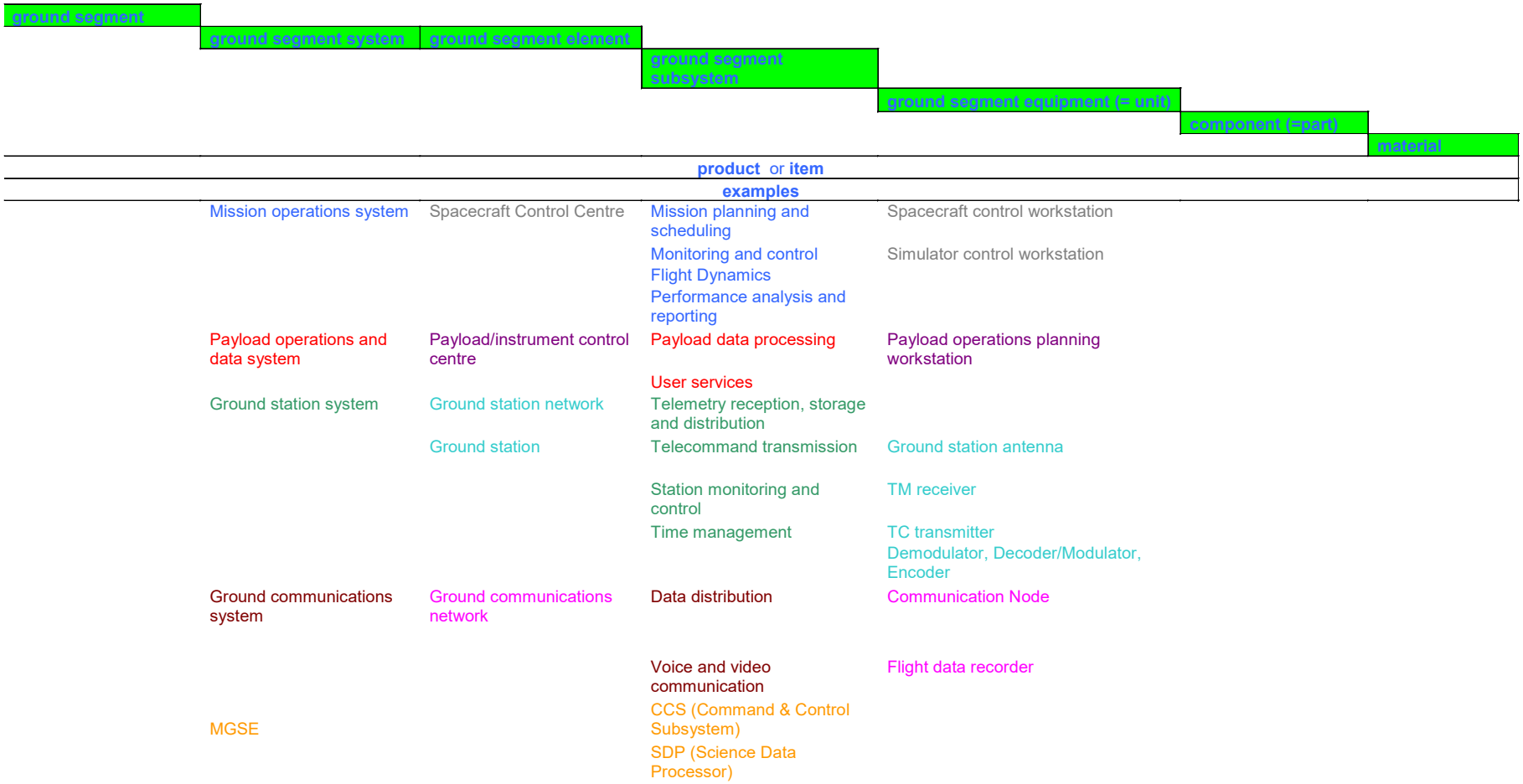
- Space segment
- Ground segment
- Launch segment
- Support segment

B.1 Space segment



product or item					
examples					
Data Relay Satellite System	spacecraft (physical view)	power	electronic unit (e.g. DHU, PCSU, PDU, ICU)	ASIC	Alumiunium
Navigation Satellite System	satellite (physical view)	propulsion	thruster	hybrid	to be taken from Q60 & Q70
spacecraft (functional view)	payload	data handling	valve	integrated circuit	
satellite (functional view)	platform	thermal	battery	heat-pipe	
	instrument	structure	reflector	MLI	
	orbiter	AOCS	mechanism (when fully assembled)	structural panel	
	lander	Tm&Tc	vessel/tank	optical array	
	bay	optical	mirror/lenses/filters (assembly)	pyro components	
	module	RF	solar array (assembly)	PCB	
		communication	antenna (assembly)	mirror	
			focal plane assembly	solar cell	
			telescope (assembly)	insert	
			solar panel (equipped)	resistor	
			pressure vessels	diode	
			optical bench	transistor	
			RF filters	capacitor	
			LNA	thermistor	
			IMUX/OMUX	heater	
			OMT	propulsion fluidic	
			feeds	ball bearing	
			LHP (loop heat pipe)		
			CPL (capillary pumped loop)		

B.2 Ground segment



B.3 Launch segment

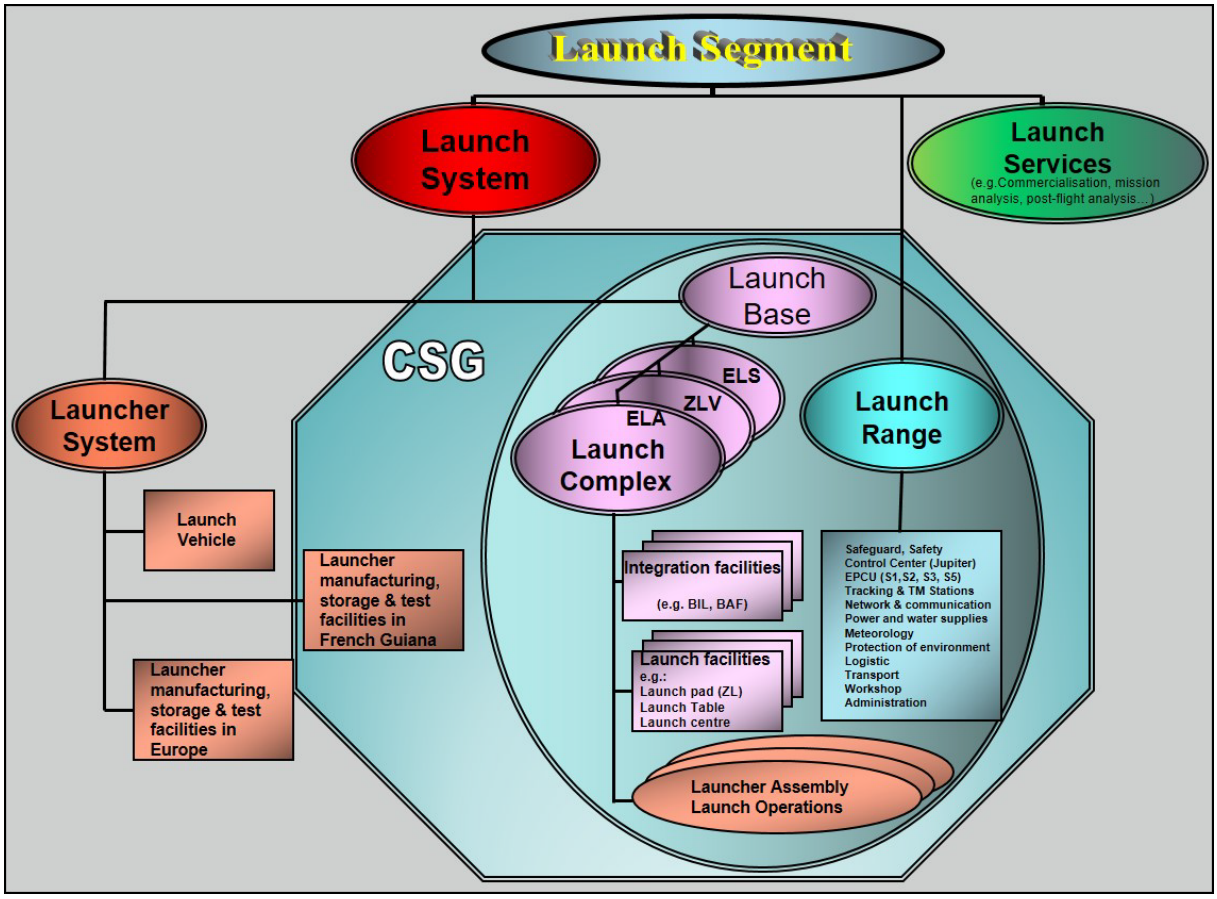


Figure B-1: Schematic Launch Segment

B.4 Support segment

Systems		Elements
Examples		
Data Relay Satellite System		Data Relay Satellite
Navigation Satellite System		ISS
Concurrent Design Facility (CDF)		Astronaut training centre
Generic Flight Dynamics system (e.g. ORATOS)		Ground Statin Network Control Centre
		Main Control room
LEOP Ground Station Network		Briefing Room
Deep Space Ground Station Network		Test Centre
		MGSE
		TGSE
		FGSE
		Launch range

Annex C
Launch segment-specific terms

The following terms are specific to the launcher domain and are cross-referenced from clause 2.3.

launch base

composed of **launch range** and **launch complexes**

launch campaign

launch activities which include:

- Launcher preparation and final integration
- Payload processing and integration on the launcher
- Launch Operations until lift-off, including Flight Data Gathering

launch complex

facilities necessary to carry out the final integration of **the** launcher elements, of the payload into the **launcher, as** well as the **launch operations**

NOTE A Launch System is associated with its specific Launch Complex, which can include facilities shared with other Launch Systems (e.g.: Lox plant at CSG).

launch operations

all launch related activities taking place after completion of the activities necessary to deliver a fully integrated **launcher** up to reception of post flight data

launch range

systems, facilities and means, required to provide the **necessary service** and support for carrying out a launch campaign, including operations after lift-off **and Flight** Data Gathering, and to ensure safety and security of persons, assets and protection **of** the **environment**

NOTE The Launch Range includes in particular the CNES/CSG technical centre, the payload Preparation Facilities as well as the downrange stations for launcher tracking and flight data acquisition.

launch service

activities required to conclude a launch service contract and to place a **payload** in the orbit, at the time, and under the **payload environment** conditions required by the **customer**

NOTE Launch Service activities cover in particular: Commercialisation, Mission analysis, Procurement of a fully integrated launcher, Procurement of flight programme(s), Procurement of launcher adaptations to meet specific mission requirements, Payload processing and integration on the launcher, Launch Operations including Flight Data Gathering, Launch Range Operations, Post Flight Analysis.

launch system

system comprising the launcher system **and** the launch **complex**

launch vehicle

vehicle designed to transport **payloads** to space

NOTE The term "launcher" is synonymous.

launcher element

building block of a **launcher**

launcher production facilities

launcher element manufacturing facilities and testing facilities

NOTE 1 The term production facilities is used as shorthand.

NOTE 2 The launcher element manufacturing facilities include the test facilities specific to the launcher elements' manufacturing.

launcher system

fully integrated **launcher** and the needed facilities for manufacturing, testing and delivering the **launcher elements**

NOTE "Fully integrated launcher" means the integrated launcher, including payload, and ready to be launched i.e. all launch control lights on green.

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