

International Industry Standard

IMPLEMENTING A SAFETY MANAGEMENT SYSTEM IN DESIGN, MANUFACTURING AND MAINTENANCE ORGANIZATIONS



Publishers:



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Record of Revisions

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A	September 17 th , 2018	Initial issue

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1. INTRODUCTION

This Standard is intended to enable the aviation industry to implement a [Safety Management System \(SMS\)](#) consistent with the International Civil Aviation Organization's (ICAO) Annex 19 "Safety Management" Second Edition, Appendix 2, to the convention on International Civil Aviation. It can be used to support demonstration of compliance with applicable SMS requirements from Aviation Authorities or for voluntary SMS implementation.

ICAO Annex 19 establishes Standards and Recommended Practices (SARP) applicable to safety management functions related to, or in direct support of, the safe operation of aircraft.

Annex 19 prescribes that each State must require several organizations under its authority to implement an SMS (e.g., organizations responsible for the type design or manufacture of aircraft, engines or propellers in accordance with Annex 8, approved maintenance organizations providing services to operators of aeroplanes or helicopters engaged in international commercial air transport, in accordance with Annex 6, Part I or Part III, Section II, respectively).

The industry anticipates that each Local Aviation Authority will implement SMS regulations to a potentially wider scope than that defined by ICAO Annex 19.

This Standard has been developed to consider the broadest scope of potential SMS implementation in design, manufacturing and maintenance organizations.

SMS is being introduced for the purpose of continuous improvement in Aviation Safety.

When the term "[Safety](#)" is used in this document, it is defined as the state in which risks associated with aviation activities, related to, or in direct support of the operation of aircraft, are reduced and controlled to an acceptable level.

The main objective of an SMS is to manage safety related to, or in direct support of the safe operation of aircraft through the effective management of safety risks. It is a system designed to continuously improve safety by identifying hazards, collecting and analyzing data and continuously assessing safety risks. An SMS seeks to proactively assess and control risks before they result in aviation accidents and incidents.

SMS can be a complex topic with many aspects to consider, but the defining characteristic of an SMS is that it is a decision making system, based on the collection and analysis of information that encompasses both reactive and proactive measures. It also aims to improve the safety performance of organizations by establishing and fostering a [safety culture](#). Such a safety culture should be present at all levels, and be reflected in an active and visible management commitment as well as by individuals' awareness of their role and influence on safety.

An SMS should not be implemented through an additional management system requirement, superposed onto the existing rules, but should be fully consistent with other existing organization management systems.

Note: The table within Appendix 5 shows the correlation between ICAO Annex 19 Appendix 2, this SMS Standard, IAQG 9100:2016 and IAQG 9110:2016 Standards.

The structure of an SMS has been formalized in ICAO Annex 19 around four components:

1. Safety Policy and Objectives.
2. Safety Risk Management.
3. Safety Assurance.
4. Safety Promotion.

The ICAO Safety Management Manual (SMM, Doc 9859) also mentions SMS as a system that is commensurate with the organization's regulatory obligations and safety goals. This standard recognizes the variability of organizations implementing SMS requirements. It provides guidance with enough flexibility to reflect the size and structure of organizations and the complexity of their activities, products and services. It stresses the interest of keeping the system as simple as possible for its effective and efficient operation.

This standard is meant as guidance for implementing SMS in Design, Manufacturing and Maintenance organizations, and is expected to be usable as Guidance Material (GM) and Acceptable Means of Compliance (AMC) to the corresponding Annex 19 transposition into aviation safety regulations [e.g., in the USA, the Federal Aviation Administration (FAA) has published 14 CFR Part 5; in Europe, the European Aviation Safety Agency (EASA) intends to publish the SMS requirements for Design, Manufacturing and Maintenance organizations in Part 21 and Part 145 (EASA Rulemaking Task 0251)].

This standard can be used as a means for demonstrating compliance with FAA 14 CFR Part 5 under the conditions as specified within the Appendix 4 "Compliance with FAA 14 CFR Part 5".

The Aerospace Industries Association of America (AIA) has issued a National Aerospace Standard (NAS) "Safety Management System Practices for Design and Manufacturing": NAS 9927. Section I has been recognized by the FAA as being consistent with 14 CFR Part 5 and ICAO Annex 19, Appendix 2.

The NAS Standard has been considered as an input for the development of this standard.

SMS requirements may also be applied to military regulations (just as airworthiness certification requirements are used in a military context). The present standard may then be considered as guidance material and an acceptable means of compliance with military regulation.

ICAO Annex 19 introduces the need for a voluntary incident reporting system, using the principles of "[just culture](#)" to encourage individuals to report safety-related information. However, it should not absolve individuals of their normal responsibilities. In a European context, "Just Culture" is also required by EU No 376/2014. This Standard considers "just culture" principles from both Annex 19 and EU No 376/2014.

This standard has been developed by a group of representatives of the aviation design, manufacturing, maintenance (and manufacturers holding a Continuing Airworthiness Management – CAMO - approval) organizations.

2. SCOPE OF THE STANDARD

2.1. Purpose:

This standard provides:

- Detailed guidance to implement SMS requirements,
- Guidelines for interfaces management, including the sharing of safety related information, between organizations with SMS obligations, such as: design, manufacturing, maintenance but also continuing airworthiness management, training organizations and operators) and also the relevant aviation authorities.

It also considers corporate structure and processes to cover some or all elements common across domains (such as: accountability, safety policy, hazards identification and safety risks management principles, safety data collection and assessment, and safety awareness and training).

This standard is intended to provide a means of compliance with civil aviation regulations but could be used for compliance with other regulations (e.g., military regulations) when acceptable to the relevant authorities.

Corporate SMS is not compulsory but could facilitate consistent SMS implementation, in companies holding multiple approvals and/or certificates.

The appendixes attached to this standard provide supplemental/additional guidance and examples for several topics addressed in the core chapters.

2.2. Intended application:

This standard addresses the implementation of the SMS elements within organizations undertaking design, manufacturing or maintenance responsibilities and activities or both as:

- Approved organizations (holding an organization approval, e.g., DOA, POA, AMO/MOA)
- Other organizations (holding a certificate for design or manufacturing or both, e.g., TC, PC, PMA holder), including those from the supply chain (i.e., suppliers).

This standard can be implemented on a voluntary basis by organizations that are not required to implement an SMS.

The extent to which SMS is applied to an organization depends on the organization's approval scope or the applicable system description when organization approval is not required.

Although this standard addresses implementation of the SMS elements within organizations responsible for aircraft, parts and appliance design, manufacturing and maintenance, it can also be used by organizations responsible for aircraft continuing airworthiness management, commercial or non-commercial (private) standard operations, air traffic services, training of crew or maintenance certifying staff or both, and certified aerodrome as a baseline to implement an SMS, when acceptable to the relevant Aviation Authority.

Note: All the supporting reference documentation listed in chapter 3 has been considered while drafting this standard, including EU regulation No 1321/2014 (Part M-CAMO).

3. SUPPORTING REFERENCE DOCUMENTATION

The following documents were considered during the development of this standard:

- ICAO SARPs and the latest ICAO SMP outcomes on SMS Standards [e.g. Annex 19 (2nd edition dated July 2016), Safety Management Manual (Doc 9859 - 3rd edition dated 2013), Annex 13 (11th edition dated 2016)].
- SMICG documentation (e.g. SMS evaluation tool, risk based decision, SMS terminology).
- EC No 216/2008 (for basic safety aspects).
- EU No 376/2014 (for reporting aspects) and ASD Just Culture declaration.
- EASA AMC/GM to Part ORA, Part ORO, Part ATCO AR/OR.

- EASA rulemaking documentation on SMS:
 - o Opinion No 06/2016: Embodiment of safety management system (SMS) requirements into Commission Regulation (EU) No 1321/2014 — SMS in Part-M (RELATED NPA/CRD: 2013-01(A) & 2013-01(B) — RMT.0251 (MDM.055) PHASE I — 11.5.2016).
 - o Opinion No 07/2016: Embodiment of level of involvement requirements into Part-21 (RELATED NPA/CRD 2015-03 — RMT.0262 (MDM.060) — 23.5.2016).
 - o NPA 2013-19 – SMS in Part 66 & Part 147.
- EU No 748/2012 Part 21, EU No 1321/2014 Part 145, Part M associated AMC/GM (SMS requirements pending) and corresponding 14 CFR Parts.
- GAMA/AIA outcomes on SMS for D&M organizations starting with the AIA NAS9927 (1st issue dated May 31, 2016), including the FAA documentation on SMS in other domains.
- Documentation drafted by ASD DOA & POA (SMS) Task Forces.
- International Standards (IAQG 9100:2016 & IAQG 9110:2016).
- ISO/IEC Directives Part 2 – Principles and rules for the structure and drafting of ISO and IEC documents.

4. TERMS AND DEFINITIONS

4.1. Terms

Throughout this standard the following verbal forms differentiate requirements from provisions where a choice exists:

Understanding: Provides explanations and information to assist the user in the interpretation of the requirements contained in ICAO Annex 19 Appendix 2.

Means of compliance: Serves as a means by which the requirements contained in ICAO Annex 19 Appendix 2 can be met.

Can: Denotes a possibility or a capability.

May: Denotes a permission.

Must: Denotes necessary conditions.

Shall: Denotes a requirement. Compliance with is mandatory and no alternative may be applied.

Should: Denotes a recommendation

4.2. Definitions

The following definitions are either based upon those within the reference documents listed in Chapter 3 "Supporting reference documentation" or established by the drafting group of this standard.

Accident

An occurrence associated with the operation of an aircraft which takes place between the times any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, in which:

- a) A person on board or on ground is fatally or seriously injured.
- b) The aircraft sustains damage or structural failure.
- c) The aircraft is missing or is completely inaccessible.

(Source: ICAO Annex 13).

Note: In principle this definition is also valid for Unmanned Aerial Systems (UAS) when their operation takes place between the time they become airborne until they land on the ground or in the water.

Aircraft

Manned or unmanned aerial system (with or without pilot).

(Source: SMS Standard Drafting Group).

Climate of SMS

The perceived value placed on safety in an organization at a particular point in time.

(Source: SMS Standard Drafting Group).

Continuing Airworthiness Management

A process by which a type certificated aircraft is thereafter kept in a condition where it remains airworthy, being compliant with the technical conditions fixed to the issue of the Certificate of Airworthiness and kept in a condition for safe operation (technically fit for flight).

(Source: based on ICAO Document No 9713 – 1998).

Note: Continuing Airworthiness is defined in the European regulation (EC No. 1321/2014 Part M article 2) as follows: All of the processes ensuring that, at any time in its operating life, the aircraft complies with the airworthiness requirements in force and is in a condition for safe operation.

Continued Airworthiness

The post-certification phase of an aircraft's design life, during which the design approval holder has duties to collect data on "failures, malfunctions and defects" (see 21.A.3) to identify potential threats to the continuing airworthiness of the aircraft, and for which phase the design approval holder is required to make available 'instructions for continued airworthiness' to ensure the safe operation and support the development of the operator's maintenance programs.

(Source: based on EU No 748/2012 Part 21 wording).

Note: The activities in respect of failures malfunctions and defects in EU regulation (Part 21.A.3) are referred to as Continued Operational Safety (COS) in US regulation (14 CFR Part 21.3).

Corporate SMS

Corporate governance, structure and processes to cover some or all elements common across domains (such as accountability, safety policy, hazards identification and safety risks management principles, safety data collection and assessment, safety awareness and training).

Corporate SMS is not compulsory but could facilitate consistent SMS implementation in companies holding multiple approvals and/or certificates.

(Source: SMS Standard Drafting Group).

Event

Any anomaly in operating an aviation product or in performing an organization's activity.

(Source: SMS Standard Drafting Group).

Foreseeably

Identification of every conceivable or theoretically possible hazard is neither possible nor desirable; therefore, judgment is required to determine the adequate level of detail in hazard identification. Organizations should exercise due diligence in identifying significant and reasonably foreseeable hazards related to their operations.

(Source: NAS9927).

Note: Regarding product design, the term "foreseeably" is intended to be consistent with its use in airworthiness regulations, policy, and guidance.

Hazard

A condition or an object with the potential to cause or contribute to an aircraft incident or accident.

(Source: ICAO Annex 19).

Incident

An occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation.

(Source: ICAO Annex 13).

Just Culture

A culture where individuals are not punished for actions, omissions or decisions taken by them that are commensurate with their experience and training, but where gross negligence, wilful violations and destructive acts are not tolerated.

(Source: based on EU No 376/2014).

Management System

A framework of policies, processes and procedures used by an organization to ensure that it can fulfil all the tasks required to achieve its objectives.

(Source: based on ISO 9000:2015).

Occurrence

Any safety-related event which endangers or which, if not corrected or addressed, could endanger an aircraft, its occupants or any other person and includes in particular an accident or serious incident (as defined in ICAO Annex 13).

(Source: EU No 376/2014).

Organization

In the scope of this standard, any entity, approved or non-approved, independent of size, performing an activity in design, manufacturing or maintenance of aircraft, propellers, aircraft engines or parts and appliances. ICAO is making use of the term “service provider” for those organizations.

(Source: SMS Standard Drafting Group).

Procedure

A specified way to carry out an activity or a process.

(Source: ISO 9000:2015).

Note: When a procedure is documented, the term “written procedure” or “documented procedure” is frequently used. The document that contains a procedure can be called a “procedure document”.

Process

A set of interrelated or interacting activities which transforms input elements into outputs, respecting constraints, requiring resources, meeting a defined mission, corresponding to a specific purpose adapted to a given environment.

(Source: based on ISO 9000:2015).

Product

A broad term that includes aircraft, aircraft engine, aircraft propeller, aircraft part or appliance or both, their subcomponents (hardware and software) and associated services such as documentation necessary for operation and maintenance (e.g., Instructions for Continued Airworthiness, Aircraft Flight Manual).

(Source: SMS Standard Drafting Group).

Quality escape

Any product released by an internal or external supplier or sub-tier supplier that is subsequently determined to be nonconforming to contract or product specification requirements or both.

(Source: AS/EN/SJAC 9131).

Risk

The combination of predicted severity (criticality) and likelihood (probability) of the potential effect of a hazard.

(Source: NAS9927).

Risk Control

A means to reduce or eliminate the effects of hazards.
(Source: NAS9927).

Risk Mitigation

The process of incorporating defences or preventive controls to lower the severity or likelihood of a hazard's projected consequence or both.
(Source: ICAO Doc. 9859 SMM).

Safety

The state in which risks associated with aviation activities, related to, or in direct support of the operation of aircraft, are reduced and controlled to an acceptable level.
(Source: ICAO Annex 19).

Note: risks of harm to persons or damage to property are to be considered.

Safety Assurance (SA)

Processes within the SMS that function systematically to ensure the performance and effectiveness of safety risk controls and that the organization meets or exceeds its safety objectives through the collection, analysis, and assessment of information.
(Source: NAS9927).

Safety Culture

A set of enduring values, behaviors and attitudes regarding safety management, shared by every member at every level of an organization.

Note: The objective of safety culture is to enhance the organization employees' understanding of their role in safety, to share and promote safety values and to encourage the positive behaviour and mind-set to address any identified safety related questions or concerns in an environment of trust and mutual respect. A strong safety culture goes beyond mere compliance to the rules and regulations (i.e., initial and continuing airworthiness requirements)
(Source: based on ICAO SMM).

Safety data

Data recorded for further use in SMS activities (e.g., events reports, safety risk assessments). Such safety data is collected from proactive or reactive safety-related activities, including but not limited to:

- Accident or incident investigations.
- Safety reporting.
- Continuing airworthiness reporting.
- Product operational performance monitoring.
- Inspections, audits, surveys.
- Safety studies and reviews.

Some Safety data can be used as SMS data.
(Source: based on ICAO Annex 19).

Safety Management System (SMS)

A systematic approach to managing safety, including the necessary organizational structures, accountability, responsibilities, policies and procedures.
(Source: ICAO Annex 19).

SMS data

Data used to ensure SMS performance.

Examples:

- Hazards report register and samples of reports.
- Outputs of risk assessments.
- Safety performance indicators and related charts.
- Record of completed or in-progress safety assessments.
- SMS internal review or audit records.
- Safety promotion records.
- Personnel SMS/safety training records.
- SMS/safety committee meeting minutes.
- SMS implementation plan (during implementation process).

(Source: SMS Standard Drafting Group).

Safety objective

A measurable goal or desirable outcome related to safety.

(Source: NAS9927).

Safety performance

Realized or actual safety accomplishment relative to the organization's safety objectives.

(Source: NAS9927).

Safety policy

An organization's fundamental approach for managing safety that is to be adopted within an organization and further defines the organization management's commitment to safety and overall safety vision.

(Source: SMICG Terminology).

Safety promotion

A combination of training and communication of safety information to support the implementation and operation of an SMS in an organization enhancing its safety culture.

(Source: based on SMICG Terminology).

Safety Risk Management (SRM)

A process within the SMS identifying the hazard, analyzing, assessing and controlling related risks.

(Source: based on SMICG terminology).

System Description

A description of an organizational system including its structure, policies, communications, processes, products and operations to determine the scope and perimeter of the system subject to SRM. This allows the understanding of critical factors or features for the purpose of identifying hazards. It is updated whenever there is a newly introduced element or change to the internal or external situation that could affect safety.

(Source: based on NAS9927).

5. APPLICABLE REQUIREMENTS

This standard is intended to provide a means of compliance with SMS requirements enforced by ICAO Member States and based upon ICAO Annex 19 Appendix 2 (e.g., 14 CFR Part 5).

6. UNDERSTANDING AND MEANS OF COMPLIANCE WITH SMS REQUIREMENTS

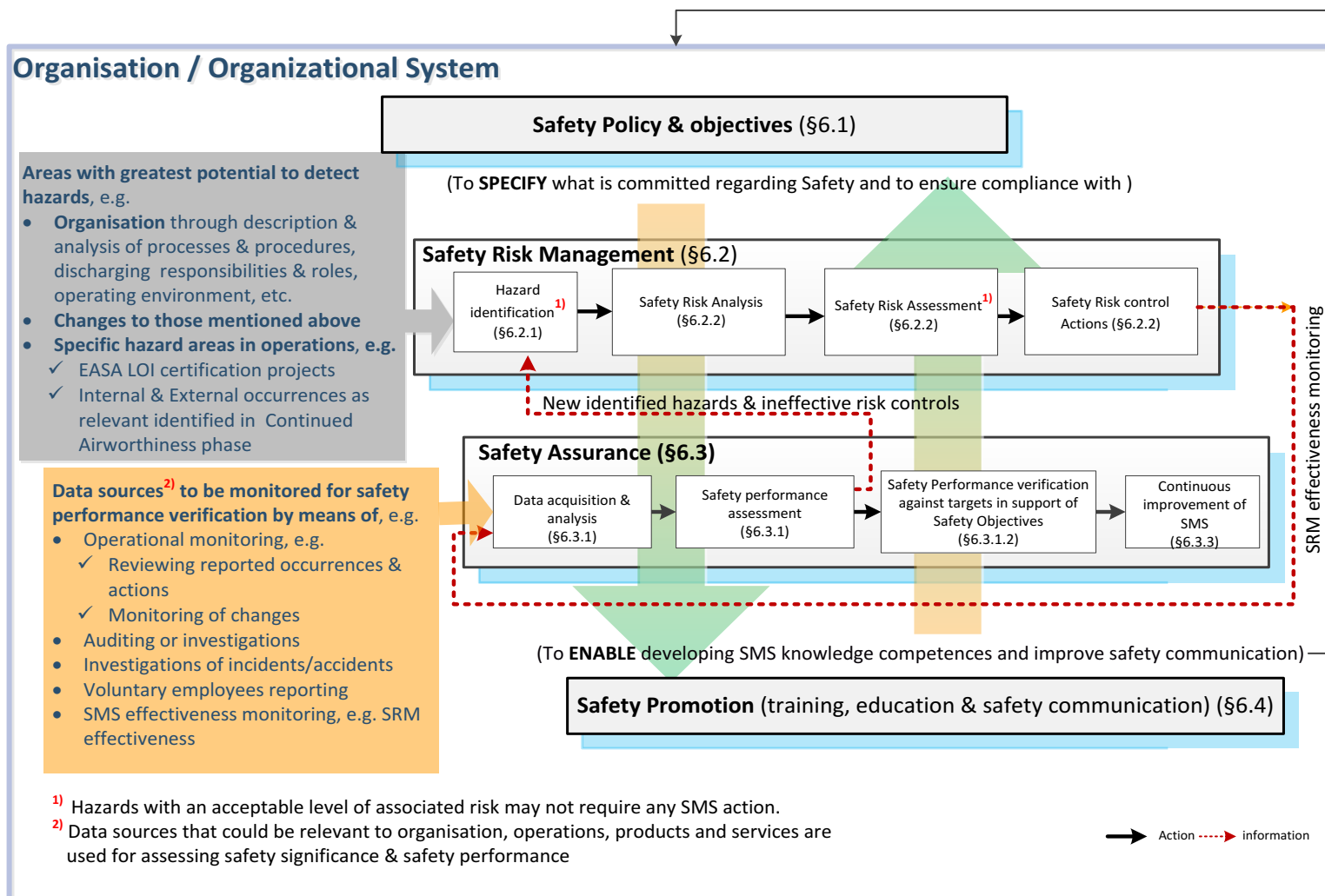
This chapter provides guidance to further understand the ICAO Annex 19 framework for the implementation and maintenance of an SMS.

The framework comprises four components and twelve elements forming the minimum requirements as follows:

1. Safety policy and objectives
 - 1.1 Management commitment.
 - 1.2 Safety accountability and responsibilities.
 - 1.3 Appointment of key safety personnel.
 - 1.4 Coordination of emergency response planning.
 - 1.5 SMS documentation.
2. Safety risk management
 - 2.1 Hazard identification.
 - 2.2 Safety risk assessment and mitigation.
3. Safety assurance
 - 3.1 Safety performance monitoring and measurement.
 - 3.2 The management of change.
 - 3.3 Continuous improvement of the SMS.
4. Safety promotion
 - 4.1 Training and education.
 - 4.2 Safety communication.

Figure 1 provides an overview of the ICAO Annex 19 SMS components and the interactions among them, with a specific focus on [Safety Risk Management](#) and [Safety Assurance](#).

Figure 1: SMS Overview and Interactions between SMS Components



The components and elements shown in Figure 1 and the related paragraphs and references are further described in this chapter.

Continuous improvement of SMS is based on safety performance monitoring and measurement which are further detailed in sections 6.3.1 and 6.3.3.

The structure of this chapter is as follows:

- Within grey blocks: SMS Standards and Recommended Practices from ICAO Annex 19 Appendix 2 for each SMS component and element.
- Underneath each grey block: Guidance for further understanding of each SMS component and element and for associated means of compliance.

Note: Parts of the Annex 19 requirements may not need any additional "understanding" statement. The broad traceability to Annex 19 requirements is provided in chapter 6 with the 12 elements. However, line to line traceability is not enforced.

6.1 Safety Policy and Objectives



6.1.1 Management commitment

ICAO Annex 19 Second Edition (July 2016) - Appendix 2

1.1 Management commitment

1.1.1 The service provider shall define its safety policy in accordance with international and national requirements. The safety policy shall:

- reflect organizational commitment regarding safety; including the promotion of a positive safety culture;
- include a clear statement about the provision of the necessary resources for the implementation of the safety policy;

- c) include safety reporting procedures;
- d) clearly indicate which types of behaviours are unacceptable related to the service provider's aviation activities and include the circumstances under which disciplinary action would not apply;
- e) be signed by the accountable executive of the organization;
- f) be communicated, with visible endorsement, throughout the organization; and
- g) be periodically reviewed to ensure it remains relevant and appropriate to the service provider.

1.1.2 Taking due account of its safety policy, the service provider shall define safety objectives. The safety objectives shall:

- a) form the basis for safety performance monitoring and measurement as required by 3.1.2;
- b) reflect the service provider's commitment to maintain or continuously improve the overall effectiveness of the SMS;
- c) be communicated throughout the organization; and
- d) be periodically reviewed to ensure they remain relevant and appropriate to the service provider.

Note: Guidance on setting safety objectives is provided in the Safety Management Manual (SMM) (Doc 9859).

6.1.1.1 Safety policy

Understanding

The organization's [Safety Policy](#) forms the foundation of its SMS. Safety should be identified as a top priority and value for the organization.

The safety policy defines the organization objectives, assigns responsibilities, and sets standards. The safety policy should describe in broad terms the vision of the organization for safety management; how it intends to deal with safety related topics; and how it will create and foster a [safety culture](#) at all levels in the organizational structure, with active and visible commitment.

Considering each above mentioned ICAO Annex 19 Appendix 2 requirement, it means that the safety policy:

- a) Conveys management's commitment to the safety performance of the organization toward its employees.
- b) Addresses the provision of material, human and financial resources sufficient to perform the planned activities of the SMS.
- c) Includes (but may not be limited to) safety reporting procedures relative to product safety, including [continued airworthiness](#) data collection and reporting of fleet events, as well as internal organization reporting of safety issues and risks, such as voluntary employee reporting.

d) Includes the establishment of a "[Just Culture](#)" policy. Individuals are not punished for actions, omissions or erroneous decisions that are commensurate with their experience, training and internal procedures. However, gross negligence, wilful violations and destructive acts are not tolerated. For organizations subject to EU regulations, this definition (from EU No 376/2014) is considered minimum but sufficient for this objective. Other organizations may consider this definition when establishing policies for behaviours that are unacceptable and the circumstances under which disciplinary action would not apply.

While a reporting system is a necessary part of an SMS, organizations may adapt their confidential employee reporting system, depending on the maturity level of their [safety culture](#).

e) Is signed by the Safety Accountable Executive as the organization's safety champion.

f) Is visible to all levels, from a positive viewpoint. Safety policy should be promoted to all employees with the active involvement of top and middle management. The purpose is to foster a [Safety Culture](#) within the organization.

g) Is reviewed periodically to check its validity and relevance to the actual safety performance of the organization. Continuous improvement of the SMS can lead to revisions of the safety policy to adapt safety priorities and objectives.

Means of Compliance

The safety policy is a high level document stating principles and broad objectives. It should be kept simple and to the point, with details of the organization and SMS processes and procedures being described in a separate Safety Management System manual (SMS manual), or equivalent document. The safety policy could be a standalone document or integrated into existing [management system](#) documentation (e.g. a design organization handbook).

Safety should be highlighted as a primary responsibility of all managers with a strong and clear commitment to fulfil relevant legal requirements and applicable standards.

For b) and e) above, depending on the structure and governance of the organization, final decisions on allocation of resources may be made at various levels. The Safety Accountable Executive (as defined in the ICAO SMM) may be appointed by the Senior Executive (e.g., the CEO) for all safety activities and be responsible for the allocation and management of resources for these activities. If the Safety Accountable Executive does not have this responsibility, the highest level of management must show their commitment. The person(s) making final decisions on resources allocated to the SMS must jointly sign the safety policy alongside the Safety Accountable Executive or use another method that shows a joint commitment.

For c) and d) above, European legislation ("Occurrence Reporting" rule EC 376/2014 and related Guidance Material) provides a detailed legal framework to the "[Just Culture](#)" topic. A case by case assessment of behaviours may be necessary. Accordingly, the safety policy statement should be made with proper consideration of the applicable local company rules.

For f) above, the safety policy document needs to be communicated throughout the organization. It should provide a high level of information, be convincing and easy to understand.

An example of a safety policy statement is proposed in Appendix 3 "SMS Manual/Documentation".

6.1.1.2 Safety Objectives

Understanding

[Safety objectives](#) should support the safety policy. There are several possible objectives that differ in scope and timescale.

Safety objectives are established to continuously improve the safety of aircraft operations and the organization performance with regards to product safety. These safety objectives should be meaningful to the organization, and thus adapted to the type of business and to the volume of safety data collected.

Other objectives are related to the development and performance of the organization itself.

Safety objectives should be sufficiently detailed to ensure their fulfilment can be demonstrated, as far as possible using a measurement mechanism (qualitative or quantitative). The purpose of safety performance monitoring is to appropriately assess the achievement of the organization's safety objectives (see §6.3 "Safety Assurance" for further details).

Safety objectives should be meaningful, realistic and proportionate to the organization and to the maturity of its SMS.

Means of Compliance

a) The organization should define safety objectives reflecting the in-service safety performance of its products/parts/appliances (e.g., based on the analyses performed through the [Continued Airworthiness](#) process) as well as objectives related to the function of the SMS itself. These objectives should include monitoring correct deployment of the SMS, measurement of its activity, and allocation of appropriate means and staff competencies. These safety objectives should reflect the identified improvement in safety, based on the current situation. They should be defined as Specific, Measurable, Achievable, Relevant and Time-bound (SMART).

Safety objectives may consider the management of interfaces within the organization as well as with other organizations

The safety objectives may be presented as a standalone document to constitute the organization's safety performance dashboard, which can also be used to report the safety performance results (an example of safety performance dashboard is given in Appendix 3).

b) The establishment of objectives should be to drive the continuous improvement of the organizations safety performance. It may be appropriate to set strategic (long term) and tactical (short to medium term) goals and objectives to enable periodic reviews and performance assessment.

c) During the process of communicating the safety policy and associated objectives to the whole organization, care should be taken to describe the flow-down of general organization-level objectives in relation to "local" safety objectives. These local objectives aim to show the contribution to safety for an individual/group of employees. Each employee should be aware of the potential consequences of his/her actions and behaviour and of its positive contribution to the SMS through the understanding of the safety objectives.

d) The SMS should include a periodic review of safety objectives, for example on a yearly basis, or at a frequency adapted to the organization's specificities, changes and safety achievements. This review should be aligned with the issuance of the safety performance results in terms of achieving the objectives.

6.1.2 Safety Accountability and Responsibilities

ICAO Annex 19 Second Edition (July 2016) - Appendix 2

1.2 Safety accountability and responsibilities

The service provider shall:

- a) identify the accountable executive who, irrespective of other functions, is accountable to the organization for the implementation and maintenance of an effective SMS;
- b) clearly define lines of safety accountability throughout the organization, including a direct accountability for safety on the part of senior management;
- c) identify the responsibilities of all members of management, irrespective of other functions, as well as of employees, with respect to the safety performance of the organization;
- d) document and communicate safety accountability, responsibilities and authorities throughout the organization; and
- e) define the levels of management with authority to make decisions regarding safety risk tolerability.

Understanding

The “Safety Accountable Executive” or “Safety Accountable Manager” is a person accountable (having ultimate responsibility) for the SMS within the organization. This person’s authority and responsibilities may include, but are not limited to:

- a) Provision and allocate human, technical, financial or other resources necessary for the effective and efficient performance of SMS.
- b) Direct responsibility for the conduct of the organization’s affairs.
- c) Final authority over operations under the certificate/approval of the organization.
- d) Establish and promote the safety policy.
- e) Establish the organization’s safety objectives and safety targets.
- f) Acts as the organization’s safety champion.
- g) Final responsibility for the resolution of all safety issues.
- h) Establish and maintain the organization’s competence to learn from the analysis of data collected through its safety reporting system.

Safety accountability defines the obligation of the responsible person to demonstrate the satisfactory execution of his/her safety responsibilities.

Safety responsibility can be delegated (i.e., cascaded down) within the scope of the defined job responsibilities, provided such delegation is documented.

To ensure the necessary safety awareness and commitment of all personnel involved in safety related tasks, the safety accountability and responsibilities in the organization should be clearly and comprehensively defined, documented, and communicated throughout the organization.

When identifying responsibilities of management staff and employees, organizations should consider which employees are included in safety related tasks and activities.

Means of Compliance

For efficiency, each company holding multiple certificates/organization approvals may organize the accountabilities through different schemes according to each company's complexity, needs and constraints. Such a scheme would be acceptable provided each certificate/organization approval holder meets the requirements for safety accountabilities.

Examples of schemes include, but are not limited to:

- One Safety Accountable Manager for each organization (e.g. design, manufacturing or maintenance).
- A single Safety Accountable Manager at an appropriate management level to cover the overall SMS of the company.

6.1.3 Appointment of Key Safety Personnel

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1.3 Appointment of key safety personnel

The service provider shall appoint a safety manager who is responsible for the implementation and maintenance of the SMS.

Note: Depending on the size of the service provider and the complexity of its aviation products or services, the responsibilities for the implementation and maintenance of the SMS may be assigned to one or more persons, fulfilling the role of safety manager, as their sole function or combined with other duties, provided these do not result in any conflicts of interest.

Means of Compliance

The allocation of SMS management responsibilities is at the discretion of the organization.

This includes the appointment of personnel directly responsible to the Safety Accountable Executive for providing guidance, direction and support for the planning, implementation and operation of the organization's SMS. This could be their sole function, acting as dedicated safety manager(s), or combined with other duties provided those duties do not result in any conflicts of interest.

In small/simple organizations, these responsibilities could also be undertaken by the Safety Accountable Executive.

The organization is responsible for:

- Ensuring that the SMS operates as defined and is effective.
- Collecting and analysing safety information in a timely manner.
- Administering safety-related surveys.
- Monitoring and evaluating the results of corrective actions.
- Ensuring that risk assessments are conducted when applicable;
- Monitoring safety concerns reported within the aviation community that could affect the organization or its products/services.
- Ensuring safety-related information, including organizational goals and objectives, are made available to all personnel through established communication processes.
- Providing periodic reports on safety performance.

6.1.4 Coordination of Emergency Response Planning

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1.4 Coordination of emergency response planning

The service provider required to establish and maintain an emergency response plan for accidents and incidents in aircraft operations and other aviation emergencies shall ensure that the emergency response plan is properly coordinated with the emergency response plans of those organizations it must interface with during the provision of its products and services.

Understanding

An Emergency Response Plan (ERP) documents the actions to be taken by all responsible personnel during emergencies. The purpose of an ERP is to ensure that there is an orderly and efficient transition to and from emergency operations, including assignment of emergency responsibilities and delegation of authority.

Authorization for action by key personnel is also contained in the plan, as well as the means to coordinate efforts necessary to cope with the emergency.

The overall objective is the safe continuation of operations.

Establishing an ERP is not required by ICAO Annex 19; therefore, unless required by other applicable regulation, ERP coordination does not apply to design, manufacturing and maintenance organizations.

However, establishing an ERP is considered as a good practice, in design, manufacturing and maintenance organizations when the organization is performing flight operations under special permits to fly. Such organizations may then also need to coordinate relevant activities with organizations required to have an ERP.

A similar artefact or method may also be used when a significant disruption (unrelated to the safety of flight operations) occurs to the organization itself, to ensure business continuity and crisis management.

Note 1: The AIA Standard NAS9927 states that the ERP as mentioned in 14CFR Part 5 does not apply for voluntary implementation of SMS in US Design & Manufacturing organizations.

Note 2: A voluntary ERP should not be subject to auditing by authorities in the context of this standard.

With regards to safety of products, provisions for emergency responses which may be identified under different titles in different organizations (e.g., crisis management rules, crisis response policy, accident response plan), are being implemented by organizations to comply with [continued airworthiness](#) requirements (e.g. Part 21.A.3). These activities should be coordinated on an ad hoc basis with all involved parties in case of an accident or serious incident.

Means of Compliance

Establishing an ERP is not required by ICAO Annex 19; therefore, unless required by other applicable regulation, ERP coordination does not apply to design, manufacturing and maintenance organizations.

6.1.5 SMS Documentation

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1.5 SMS documentation

1.5.1 The service provider shall develop and maintain an SMS manual that describes its:

- a) safety policy and objectives;
- b) SMS requirements;
- c) SMS processes and procedures; and;
- d) accountability, responsibilities and authorities for SMS processes and procedures.

1.5.2 The service provider shall develop and maintain SMS operational records as part of its SMS documentation.

Note: Depending on the size of the service provider and the complexity of its aviation products or services, the SMS manual and SMS operational records may be in the form of stand-alone documents or may be integrated with other organizational documents (or documentation) maintained by the service provider.

Understanding

The extent of SMS documentation can differ from one organization to another due to:

- Size of the organization and type of activities.
- Complexity of processes and their interactions.

Each organization should ensure the adequate control and maintenance of these documents.

They should be reviewed periodically and updated as needed (e.g., on a yearly basis).

a) Safety Policy and Safety Objectives

Safety policy as understood in section 6.1.1 determines the safety objectives. The objectives must be practical, achievable, regularly reviewed and reassessed, and communicated to the staff.

The safety policy and safety objectives should be documented and may be independent documents or be included in the SMS manual.

b) SMS Requirements

As part of the SMS documentation, a list of all SMS requirements applicable to the organization, both internal (e.g., organization, corporate) and external (e.g. authorities, customers) should be documented.

c) SMS Processes and Procedures

Processes and procedures should include the steps and methods that will be used to meet applicable requirements and to achieve the expected outputs.

The structure and format of the documented processes and procedures, and their method of recording (hard copy or digital media or both) should be defined by the organization.

d) Accountability, Responsibilities and Authorities for SMS Processes and Procedures

Documentation should identify which top manager is accountable for the SMS, and identify the responsibilities and authorities of key stakeholders with respect to the safety performance of the organization.

Responsibility, authority and interrelationships may be indicated by such means as organization charts, flow charts or job descriptions or both (not limited to top managers or key stakeholders).

e) SMS Manual

The SMS documentation may include a top-level document (SMS Manual or similar), which describes the organization's SMS implementation of the four components and twelve elements described in this chapter.

The SMS Manual may be a standalone document or it can be embedded within an existing organization description document (e.g. manufacturing organization exposition/manual). Where details of the organization's SMS processes are already addressed in existing documents, appropriate cross referencing to such documents is sufficient.

Means of Compliance

The manner and format of documentation is at the discretion of the organization. It may be embedded within existing documentation of any other management system implemented by the organization.

Examples of SMS documentation are provided in Appendix 3 (e.g. SMS Manual, Safety Policy).

6.2 Safety Risk Management

The aim of [Safety Risk Management](#) (SRM) is to prevent the occurrence of serious incidents or accidents. To that end, SRM identifies hazards, analyses, assesses and controls safety risks.

For organizations which do not hold an organization approval (e.g., DOA, POA, MOA); a [System description](#) is a prerequisite for SRM application (hazard identification, safety risks assessment and mitigation). Some other national authority's approvals (e.g., FAA ODA) do not include a definition of the organization holding the approval; therefore a system description is required to provide an overview of the organization covered by the application of SRM.

At all levels, the organization should define actions to maintain safety risks at an acceptable level.

6.2.1 Hazard Identification

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2.1 Hazard identification

2.1.1 The service provider shall develop and maintain a process to identify hazards associated with its aviation products or services.

2.1.2 Hazard identification shall be based on a combination of reactive and proactive methods.

Understanding

[Hazard](#) identification enables identifying “safety issues” or “threats” (referred to as a hazard) that require application of an SRM and Safety Assurance (SA). This allows the organization to allocate safety management resources to sources of potential significant safety risk, and avoid devoting resources to lower or insignificant risk.

Hazards can originate from technical, environmental, human and organizational factors.

With regard to design, certification, manufacturing, in-service and maintenance activities, hazards are the conditions that could [foreseeably](#) lead to a noncompliant or nonconforming product that, if not addressed, could rise to an unacceptable level of risk.

Means of Compliance

Hazard identification consists of:

- Analyzing the high risk areas of the organization activities or organization changes.
- Analyzing data from both internal and external sources (e.g. [continued airworthiness](#) data, operators’ feedback, subcontractors’ information, hazards identified by Authorities or data from voluntary reporting).

Hazards can be identified based on data from events that have occurred (reactive methods) or in anticipation of potential events that could lead to an unacceptable risk (proactive methods).

Organizations should have established and documented methodologies and processes for monitoring reported events and occurrences such as the following:

- For manufacturing or maintenance activities or both:
 - o FOD (Foreign Object Damage).
 - o Any work performed not in accordance with approved data.
 - o Any deviation of a tool detected during calibration.
- For continued airworthiness activities:
 - o In service events (e.g., failures, malfunctions, or defects).
 - o Quality escapes.
 - o Flight test events.
 - o Supplier notices of escapement.
 - o Noncompliance’s related to product certificates or approvals.

Any of these types of events or occurrences could be used to identify aviation safety hazards.

To enhance Hazard identification, the organization should implement a voluntary employee reporting system, based on the Just Culture policy defined and deployed by the organization.
See § 6.1.1.1.

See Appendix 1 for “Best Practices for Hazard Identification”.

6.2.2 Safety Risk Assessment and Mitigation

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2.2 Safety risk assessment and mitigation

The service provider shall develop and maintain a process that ensures analysis, assessment and control of the safety risks associated with identified hazards.

Note: The process may include predictive methods of safety data analysis.

Understanding

SRM requires the analysis of safety risks to determine the severity and likelihood associated with identified hazards. Various guidance/methods (see Means of Compliance below) are available for analyzing risk.

Safety risk must be assessed to determine its acceptability. An appropriate quantitative or qualitative method can be used. Aspects to consider in the assessment may include technical, processes, human behaviours and organizational (including interface management).

Product risk assessment is necessary. A large part of it may already be controlled in the frame of compliance with other regulations such as the following:

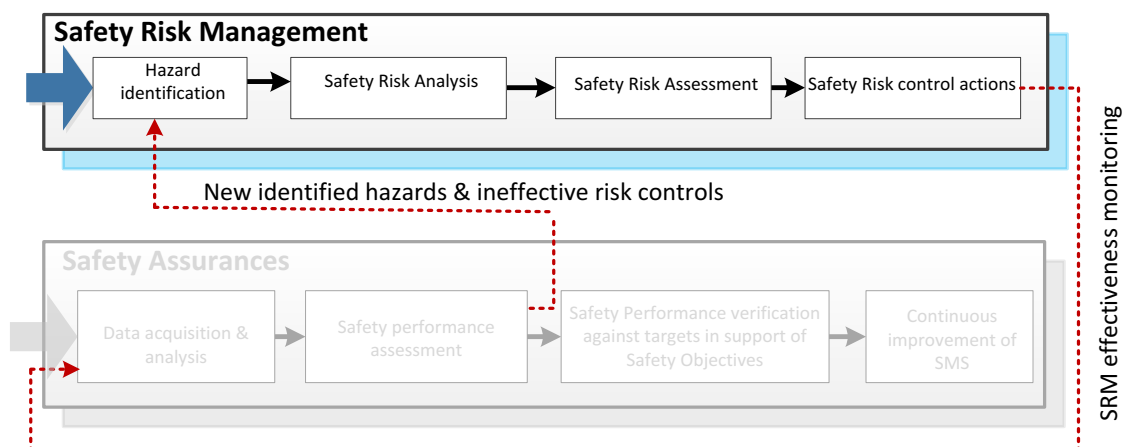
- During design and certification, compliance with existing certification procedural and airworthiness regulations, defines an acceptable safety risk.
- During manufacturing, a product's conformity to its approved design and conditions for safe operation are already defined by Part 21 requirements. The associated manufacturing and conformity attestation processes are an acceptable way to achieve an acceptable level of safety risk. For example, conditions such as assembly variations or a need to repair damaged parts or assemblies may arise during manufacturing. In such a situation, the manufacturing organization, in coordination with the design organization, may use approved processes that address these situations to ensure the product conforms to its approved design and is in a condition for safe operation.
- During the [continued airworthiness](#) phase (including in-service and maintenance), safety risk acceptability is defined by the continued airworthiness for in service products. Safety risk acceptability during the continued airworthiness phase should be based on consideration of the applicable airworthiness standards and the assurance that no unsafe condition exists. A product in an unsafe condition implies unacceptable safety risk and requires appropriate [safety risk management](#).

The product risk assessment should be completed with systemic risk assessment in the aim to also address human and organizational aspects.

Risk assessment and mitigation should include the following activities:

1. [System description](#).
2. Hazard and consequence identification.
3. Estimation of the severity and likelihood of the consequences of the hazard occurring.
4. Evaluation of the risk and associated decision making.
5. [Risk mitigation](#) and safety action(s).
6. Claims, arguments and evidence that the safety action(s) have been met and documented in a safety case.

Figure 2: SRM steps



Note: Fig 2 is highlighting part of the process for illustrative purposes, as does Fig. 3.

Means of Compliance

It is up to the organization to select the methods and tools to be implemented for the purpose of Safety Risk Management.

Engineering judgement/qualitative assessment should be considered as minimum acceptable means to identify and assess safety risks.

Various methods, techniques and tools can be used for hazard identification and risk assessment. Whatever the selected method, the risk assessment should always focus on impacts on product safety in operation:

- Risk assessment techniques (source ISO 31010):
 - ✓ Brainstorming.
 - ✓ Checklist.
 - ✓ Root cause analysis.
 - ✓ Failure Mode and Effects Analysis (FMEA).
 - ✓ Fault Tree Analysis (FTA).
 - ✓ Decision tree.
 - ✓ Bow tie analysis.
 - ✓ Monte Carlo simulation.
 - ✓ Consequence/likelihood matrix.

- European Risk Classification Scheme (ERCS) (source: being published as linked to EU 2015/1018 regulation).
- Safety Risk Assessment matrix (source CS/FARxx.1309).
- Airline Risk Management Solutions (ARMS).
- Risk analysis methods at product level (source: SAE ARP4761):
 - ✓ Functional Hazard Assessment (FHA).
 - ✓ Preliminary System Safety Assessment (PSSA).
 - ✓ System Safety Assessment (SSA).
 - ✓ Dependence diagrams.
 - ✓ Markov Analysis.
 - ✓ Zonal Safety Analysis (ZSA).
 - ✓ Common Cause Analysis (CCA).

Note: It is neither possible nor desirable to perform safety risk assessments for all changes. Only changes that potentially have a substantive impact on safety or the management of safety are subject to SRM (cf. §6.3.2 Management of Changes) or both.

Examples of situations where SRM should be applied by different types of organizations are listed in Appendix 1 “Best practices for SRM”.

Organizations implementing a process for [continued airworthiness](#) already have the main foundations for collecting, analyzing and mitigating risks related to the product.

This process which includes failure, malfunction and defects collection, risk analysis and actions to maintain product airworthiness is a major contributor to SRM and an input to the safety assurance process, as described in §6.3.1.. [Continued airworthiness](#) also includes contributions from all involved stakeholders, such as design, manufacturing and maintenance organizations.

Continued airworthiness activities should be complemented with proactive safety risk management (product safety enhancement beyond continued airworthiness duties).

Indeed, the continued airworthiness data/information are also key source data for proactive risk assessment for products in operation.

6.3 Safety Assurance



Safety Assurance (SA) relies on the following activities:

- Safety performance monitoring and measurement.
- Process for the management of changes.
- Continuous improvement of the SMS.

SA should be achieved by monitoring the activities of the SMS. Thus, SA requires monitoring, gathering and analyzing of data and assessment of the performance.

Safety performance measurement (see Annex 19 Appendix 2 Requirement 3.1) is best understood as an assessment of the capability to manage risk. It is a determination of the processes' success in managing risk and the resulting effectiveness of the implemented risk controls, from both a product and organizational perspective.

SA also requires a process for managing changes (see Annex 19 Appendix 2 Requirement 3.2) that monitors for substantive changes in the operating environment whether planned or unplanned, self-induced or as a result of external influences, to ensure the changes will not lead to unacceptable risk. Substantive changes to the SMS also need an assessment to measure that the SMS performance is not degraded.

SA is also used to identify areas for, and to drive the continuous improvement of the SMS processes (see Annex 19 Appendix 2 Requirement 3.3).

SA is an iterative process where performance requirements will evolve with the SMS maturity (see chapter 8 "SMS Implementation Plan").

The SMS should be designed such that ineffective controls, new hazards, or potential hazards identified by the safety performance assessment are fed back to the SRM process for hazard identification, risk analysis, risk assessment, and risk control.

How to perform data acquisition?

Acquiring safety data and SMS data in the context of safety performance monitoring and measurement is a main input to check the level of achievement of the SMS versus safety objectives and to continuously improve the SMS. The means for data acquisition should be identified and used by safety assurance. This can rely on already implemented means, such as the collection system used for [Continued Airworthiness](#) when mandated by the applicable regulations, or the monitoring of the organization operations for malfunctions, defects, and [quality escapes](#) that could result in unacceptable aviation safety risk. The data acquisition process should include data collected in the context of the monitoring of suppliers.

For data acquisition, the following should be established:

- Interfaces with the operators of the products and services of the organization.
- Interfaces with customers and suppliers, in particular to encourage the exchange of safety data.
- Interfaces with Authorities.
- Channels to collect internal information.

Data can be:

- Quantitative: Used to identify and provide a clearer picture of the 'area' being measured. Statistical measures are generally used for this effort.
- Qualitative: Data sources such as employee safety reports and in-depth causal analyses in accident reports are generally qualitative. This approach is valuable for hazard identification.

Examples of data related to products:

- Number of events reported to the organization (from internal or external sources or both).
- Number of occurrences reported to Authorities.
- Number of recurrent occurrences.
- Number of [quality escapes](#) on products, rated for criticality with regards to safety.
- Number of Foreign Object Damage (FOD) (e.g., material left in aircraft, engine, debris falling into open systems).
- Number of incorrect or incomplete data within the instructions for continued airworthiness
- Number of installation errors (e.g., equipment/part not installed, wrong orientation, incomplete installation).
- Number servicing errors (e.g., not enough/too much fluid, access not closed, system/equipment not deactivated/reactivated).
- Number of current Airworthiness Directives (AD) affecting the Organization's product(s).
- Number of Service Bulletins issued to achieve safety objectives defined for the products.
- Mean Time Between Failures (MTBF).
- Mean Time Between Unscheduled Removals (MTBUR).

Examples of data related to the organization's performance:

- Status of ongoing initiatives contributing to safety objectives.
- Status of risk mitigation actions.
- Attendance at SMS reviews.
- Number of employees trained to safety topics.
- Limitations from Authorities due to suspension or revocation of privilege/delegation).
- Level of Involvement (LOI) of the Aviation Authority in the product certification (i.e., level of involvement related to the criticality of the new design and the performance of the design organization).
- On-time response to safety related findings (e.g., internal audits; Authority's audits).
- Resources or competences management (e.g. key safety positions fulfilment such as safety management staff, certification staff in design or certifying staff in manufacturing or maintenance or both).
- Factors related to the operational environment (e.g., ambient noise and vibration, temperature, lighting and the availability of protective equipment and clothing).
- Lead time to issue mitigations or corrective measures in the [Continued Airworthiness](#) process or both.
- Identified deficiencies in interface management.

The aforementioned examples of collected data need to be processed or analyzed or both to set up relevant performance indicators as further detailed in section 6.3.1 Means of Compliance.

The organization is required to collect data to support Safety Assurance. This might include, but is not limited to: automatic data reports, a mandatory event reporting system, systematic reviews or audits, or a voluntary employee reporting system or both, based on the Just Culture policy (refer to section 6.1.1.1 d and 6.2.1) and may be one of the means for acquiring data. All employees should be aware of the systems being used that are appropriate to their duties and where systems are available to enable the anonymous reporting of data (e.g., potential hazards and, if available, proposed solutions or safety improvements).

In Europe, regulation (EU) No 376/2014 and associated guidance material provide details on the requirements related to voluntary employee reporting.

6.3.1 Safety Performance Monitoring and Measurement

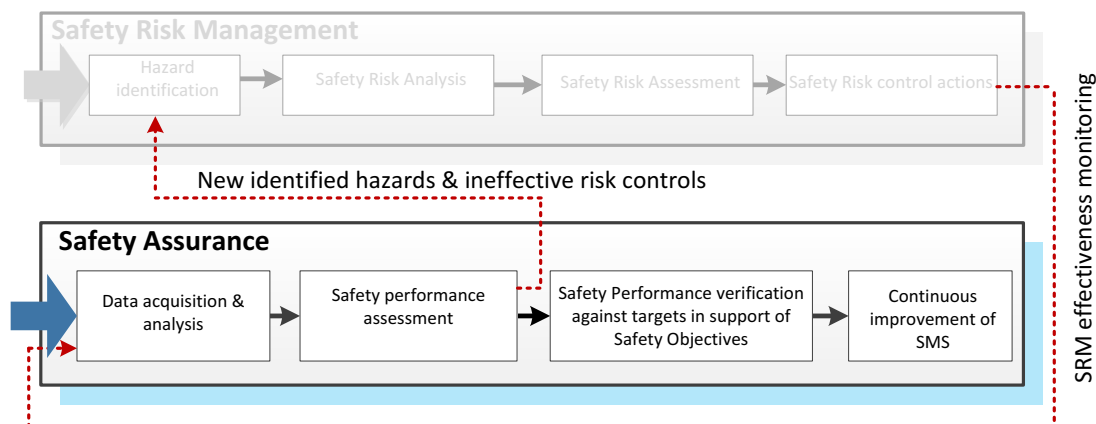
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3.1 Safety performance monitoring and measurement

3.1.1 The service provider shall develop and maintain the means to verify the safety performance of the organization and to validate the effectiveness of safety risk controls.

Note: An internal audit process is one means to monitor compliance with safety regulations, the foundation upon which SMS is built, and assess the effectiveness of these safety risk controls and the SMS. Guidance on the scope of the internal audit process is contained in the Safety Management Manual (SMM) (Doc 9859).

3.1.2 The service provider's safety performance shall be verified in reference to the safety performance indicators and safety performance targets of the SMS in support of the organization's safety objectives.

Understanding**Figure 3: Safety Assurance steps**

The intent of an organization's SMS is to achieve a successful SRM. The SRM process cannot be open-loop; thus, the SA process should include means to monitor the performance of the SMS, both in its functionality (SMS operation) and in the effectiveness of the risk controls it produces (product safety).

The organization is expected to perform an evaluation on how the SMS is performing versus the organization's safety objectives. The organization is expected to develop and maintain appropriate safety-related performance indicators.

Means of Compliance

The acquisition of data to be analyzed, as outlined in section 6.3, is performed according to previously established criteria which should be commensurate to the products' diversity, complexity and criticality and to the organization itself. Regardless of which part of the organization is in charge of processing the collected data and implementing corrective actions, the data should be reported to the SA function for the purpose of assessing the safety performance.

Safety Performance Indicators (SPIs) should be simple, measurable and reliable. SPIs should include a mix of outcome indicators (e.g., accident rates) and process indicators (e.g., validation of safety critical processes, record keeping). Safety performance assessment results can be used in two ways:

- To measure the effectiveness of [risk mitigation](#) measures by comparing SPIs to targets set in the safety objectives statement.
- To identify potentially new hazards resulting from ineffective mitigations, to be studied in SRM.

How to measure safety?

SMS deals with aviation safety (i.e., deaths or injuries to passengers and crew on board, or deaths and injuries to people overflown or on the ground around the aircraft, or damage to aircraft and environment).

Due to multiple contributors in the chain of circumstances leading to a safety event (e.g., aircraft manufacturer, operators, maintenance organizations, training organization with each one playing their part in safety), data collected for processing by the organization's SMS is by nature partial and limited.

Safety performance monitoring may need to consider potential precursors and weak signals (events which could potentially lead to accidents/incidents but didn't) due to factors such as the declining number of accidents and small number of actual recognizable safety events being offset by the continuing growth in the number of flights.

How to build indicators

SRM is the SMS tool for studying potential events. SRM produces an assessment of criticality relative to the safety of the events being processed. An SPI cannot be a simple raw number of incidents being processed, it should include an assessment aspect reflecting the criticality. The results may be expressed in ratios, averages, rates or trends.

One recognized issue is the time needed for observing the effects of mitigating measures, again due to the low probabilities of actual events occurring. An indicator will need to reflect a rather long observation time (e.g. rolling averages over five years), which makes it inconvenient for short term management of the SMS.

Typical Safety Performance Indicators

Each organization will need to define the category of events to be considered for data collection and analysis and the criteria for assessment, depending on its own activity (e.g., in-service events on aircraft/equipment for design organizations or [quality escapes](#) for manufacturing or maintenance organizations).

It may be useful to monitor some SPIs against the number of movements (e.g., flights, flight hours, flight cycles).

Accidents and Incidents

The number of actual accidents and serious incidents constitute a basic safety indicator. Rolling averages over 5 to 10 years are expected to be adequate.

Monitoring the application (taking into account acceptable reaction times relative to criticality) of relevant safety recommendations from national safety investigation bodies may also constitute a safety indicator (e.g., implementation time, adherence to plan)

It may also be of interest to acquire industry wide statistics to compare the organization's operation with similar companies conducting the same types of activities.

Fleet Events

The term "Fleet Events" is used to describe what is reported from the operation of aircraft (or products present on these aircraft) of interest to the organization. [Continued Airworthiness](#) activities for Type Certificate Holders (TCH) fall into this category. The SMS's SRM process should classify the criticality of events. Each organization may set up categories (based on technical, organizational or criticality parameters or both) and link event data to one or several categories. Ratios of number of events (by category) to flight activity (e.g., flight hours, flight cycles) may produce SPI. Trends may be established for each category and are expected to show improvements.

Organizations should identify conditions (e.g. new aircraft types or equipment or both entering into service) which could adversely impact the observed trends while not constituting an actual degradation.

The time needed to process an event (possibly with thresholds) may constitute an indicator, but is more suitable as an SMS organization operation indicator.

Climate of SMS

A qualitative assessment by people with sound experience in the organization's SMS management may be considered as a valid SPI (e.g., for an assessment of organization's [safety culture](#) implementation level).

Voluntary Reporting

Voluntary reporting may identify opportunities for improvement, as well as being an indicator of a good safety culture. Encouraging staff to report every perceived hazard allows the organization to deal with identified issues ("if it is not reported it cannot get fixed"). Multiple voluntary reports are not necessarily a sign of a poorly functioning organization but rather a sign of a mature safety culture. The number of voluntary reports may be used as an SPI.

Typical SMS operations indicators

The monitoring of the operational performance of the SMS (SMS operation) may require an adaptation of the indicators to the actual implementation state of the SMS. Indicators may also be tailored to the specific environment of the organization.

During the SMS implementation phases (see chapter 8 "SMS Implementation Plan"); indicators may be specific to measure the progress of the ramp up of SMS activities. Examples of such indicators are:

- Key safety personal nomination status.
- Deployment and communication of policy and objectives: How many people (percentage) of the organization have been reached?
- How many people are trained on SMS?
- How many documents for the SMS have been prepared?
- Availability and maturity of IT tools needed for SMS (e.g., computers and servers).

Generally, the quantitative and qualitative requirements on the aforementioned examples should be included in the implementation plan to allow regular measurement and statusing of achievements on the implementation roadmap.

Having reached a certain maturity of the SMS, the acquired SMS data and safety data may provide evidence about the operations of the SMS. The data can be evaluated with statistical methods showing ratios, averages, rates or trends. Examples of such additional indicators are:

- A positive trend (decrease) in the number of events in the fleet or with the products over a reasonable period (*the period should be related to the amount of events in order to achieve statistical significance*).
- A positive trend (increase) in the number of voluntary reports in the organization (this will show adherence to SMS principles).
- The processing time of incidents or mitigation actions or both (this could be split into the definitions/investigations phase and the actual implementation phase of related actions).
- The number of confirmed hazards input to the SRM.

The above indicators reflect the maturity of the SMS and could be combined into an SMS Maturity Matrix to summarize and map the operational performance, and then used for communication (see Appendix 2 "Example of SMS Maturity Assessment Method").

Need for additional measurement

Auditing and other investigative means, either internal or external, contribute to the monitoring of the safety performance, adequacy and compliance of processes and procedures to ensure they are being followed and properly executed.

Monitoring SMS operations is a useful complementary technique for day-to-day safety assessment, considering that a well-performing system will produce consistent results.

Internal and external audits contribute to the validation of the assessment processes (and possibly the data collection). These audits are expected to go beyond compliance and to address effectiveness. These audits are not tools for establishing safety indicators, but are expected to generate "SMS data" for understanding and assessing the system operations.

As one of the monitoring means, audits could cover topics related to the:

- Organization (including discharge of responsibilities, knowledge resource management, documentation, means and tools) and the deployment and maturity of the safety culture.
- SPI, representing the effectiveness of the risk mitigations and controls in the context of the SRM.
- Effectiveness of the operational processes, such as the:
 - ✓ Design and development process (including certification).
 - ✓ Manufacturing process.
 - ✓ Maintenance and repair process.
 - ✓ Continued airworthiness process (e.g., product malfunction, failure or defect collection or both, reporting, analysis or correction or both).

When the organization holds an organization approval, such audits should be coordinated and accounted by the compliance monitoring function required by such approval.

In non-approved organizations, the audits should be performed in the context of the organization management system with necessary adaptations of the audit program.

How to communicate Safety Performance measurement

A safety performance dashboard may be used to show the measured safety performance of the organization.

The safety performance dashboard could contain targets, indicators, qualitative assessments or trends for both the product safety performance and the SMS organization's operational performance. The content and frequency of updates of the dashboard should be adapted to the maturity of the organization's safety culture, to the safety performance results and to the complexity of the organization (see example of safety performance dashboard template within Appendix 3 "Example of SMS Manual/Documentation").

The performance indicators are intended to measure the progress against the safety objectives defined by the organization. They should be subject to recurrent reviews to ensure their continued relevance.

6.3.2 The Management of Change

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3.2 The management of change

The service provider shall develop and maintain a process to identify changes which may affect the level of safety risk associated with its aviation products or services and to identify and manage the safety risks that may arise from those changes.

Understanding

Aviation organizations experience changes due to expansion or contraction as well as modifications to existing management systems which may affect the level of safety risk associated with its products or services. Hazards may inadvertently be introduced whenever change occurs. In addition, change may affect the effectiveness of existing safety risk controls.

If an organization elects to use new or unestablished methods and processes, or to substantively revise existing ones, it should develop and use hazard identification processes to identify new or existing conditions that could foreseeably lead to unacceptable risk.

It is neither possible nor desirable to implement a safety risk assessment process for all changes to the system. Only changes that potentially have a substantive impact on safety are subject to the SRM process.

The safety performance assessment includes the evaluation of significant changes.

The management of safety risks resulting from changes should consider the following:

- Criticality of systems and activities, including impact on external organizations.
- Stability of systems and operational environments.
- Past performance (What data and information is available that can be used to help in the analysis of the change?).

Note: Refer to ICAO SMM §2.8.2 for additional details.

Note: Consideration should be given not only to the risks associated with the change but also the temporary transitional risks when implementing the change.

Note: "change" in the context of ICAO Annex 19 should be understood as a change to the system (e.g. organization, responsibilities, processes) and its associated operating environment and not directly to the product. Changes to the product are already controlled via other regulatory requirements (e.g. Part 21), including acceptance of such changes by certificate/approval holders when initiated by suppliers.

Means of Compliance

Even though each organization is unique, a number of features of the operational environment are common or similar among organizations. Thus, there are typical changes that could have a potentially substantive impact on safety management.

An organization's description is necessary to determine the scope of SMS applicability, and the changes to which it could be subjected.

Examples of typical changes include:

- Changes to the organization:
 - Change in ownership.
 - Relocation.
 - Opening a new facility.
 - Change in the scope of work.
 - Introduction of a new technology (e.g., machine, inspection).
 - Change in the organization (work sharing either internally between facilities or externally with partners/suppliers).
 - Change in the parts of the organization that contribute directly to airworthiness or conformity.
 - Change to the quality assurance or independent monitoring principles.
 - Change of supplier(s).
- Changes to responsibilities:
 - Change of the Safety Accountable Manager and/or associated reporting lines.
 - Change of head of the organization (Accountable Manager).
 - Change of responsibilities affecting airworthiness and/or [continued airworthiness](#).
- Changes to the principles of procedures related to:
 - Type certification.
 - Classification of changes and repairs as major or minor.
 - The approval of changes and repairs.
 - The approval of minor changes to the Aircraft Flight Manual (AFM).
 - [Continued airworthiness](#).
 - Configuration control.
 - Quality management system.
 - The acceptance of tasks undertaken by partners or suppliers.
 - Substantive new manufacturing processes.
 - Manufacturing planning.
 - New or modified privileges for approved organizations.
- Changes to resources:
 - Substantial reduction in the number, qualifications and/or experience of staff.
 - Substantial increase in the number of staff.
- Changes in the intended use of the product (e.g., where new usage of the product is out of the qualified/certified design limitations).

Approved organizations should consider significant changes as defined within the applicable regulation.

Management of change could rely on the support from tools or methods (e.g. 8D, PPS, 5M, PFMEA) documented within some Industry standards.

Availability of subject matter experts: It is important that key stakeholders are available and involved in the management of changes. This may include individuals from external organizations.

6.3.3 Continuous Improvement of the SMS

ICAO Annex 19 Second Edition (July 2016) - Appendix 2

3.3 Continuous improvement of the SMS

The service provider shall monitor and assess its SMS processes to maintain or continuously improve the overall effectiveness of the SMS.

Understanding

SMS continuous improvement is a gradual and continual process that focuses on increasing the effectiveness and efficiency of an organization to fulfill its safety policy and objectives.

Continuous improvement should enhance performance with action plans that are based on safety performance monitoring and measurement (refer to section 6.3.1).

Means of Compliance

The organization should consider the results of the safety performance measurements when defining continuous improvement actions for the SMS.

Based on the safety data collected in accordance with section 6.3, the organization should ensure:

- Analysis of data at the organizational level is done to establish an action plan, with the stakeholders in charge of the actions' implementation. The action plan should address the root causes of the failures or malfunctions at the system level where safety performance has not reached the expected level.
- Improvement actions are implemented.
- Best practices and lessons learned are considered to improve the SMS. Furthermore, these best practices should be disseminated across the organization through safety promotion activities (refer to section 6.4).

In the context of continuous improvement, SMS reviews with members of the organization's management (as defined in section 6.1.1.1) should be organized with a frequency and format commensurate to the level of risks and the complexity of the organization. The outcomes of the SMS review should be provided as inputs to the SRM.

Note: SMS review can be part of a "management review" as defined in management system standards. Depending on the organization, specific SMS review could be implemented as an input to an upper-level management review.

6.4 Safety Promotion



Safety promotion starts with the strategy to develop a safety culture within the organization. Safety culture enables continuous improvement in safety performance.

A safety promotion strategy should address the training, education and communication of safety information to support the implementation and operation of the SMS.

6.4.1 Training and Education

ICAO Annex 19 Second Edition (July 2016) - Appendix 2

4.1 Training and education

4.1.1 The service provider shall develop and maintain a safety training programme that ensures that personnel are trained and competent to perform their SMS duties.

4.1.2 The scope of the safety training programme shall be appropriate to each individual's involvement in the SMS.

Understanding

The purpose of training is to acquire a proficiency level in targeted skills and competencies.

The organization should define and maintain a safety training program. Safety training should be tailored to the organization's employees, as appropriate for the competencies required by each job function. The organization should identify the population targeted for safety training. This includes employees whose activities may impact product or service safety in addition to those in charge of the SMS. Role-based safety training should ensure that employees:

- Are competent to perform their duties and responsibilities relevant to the operation and performance of the SMS.
- Understand how their activity could impact safety.
- Know what means, tools and resources are available for SMS operation.

Means of Compliance

The organization should define a safety training program to meet the safety policy objectives.

This program should cover at a minimum, the scope, content, methods of delivery (e.g., classroom training, e-learning, notifications, on the job training) and frequency of training that best meet the organization's needs considering the size, scope, required competencies, and complexity of the organization.

The safety training program should be periodically reviewed to ensure it meets the objectives.

The training should be specific to the organization's SMS and operations and should be delivered in accordance with competency needs.

At a minimum, safety training should provide personnel with the knowledge required to report information that could lead to safety issues and an understanding of their reporting responsibility. The organization should maintain a record of all safety training provided to each individual subject to the training program. Such records should be retained according to the organization's data retention policy and applicable regulatory requirements.

6.4.2 Safety Communication

ICAO Annex 19 Second Edition (July 2016) - Appendix 2

4.2 Safety communication

The service provider shall develop and maintain a formal means for safety communication that:

- a) ensures personnel are aware of the SMS to a degree commensurate with their positions;
- b) conveys safety-critical information;
- c) explains why particular actions are taken to improve safety; and
- d) explains why safety procedures are introduced or changed.

Understanding

The organization should establish communication channels for safety matters that ensure that all relevant personnel are aware of the safety policies, processes, and tools. Communication with personnel also should provide relevant up-to-date information about safety objectives, safety management activities and safety critical information. The content of the communication and the way in which the information is delivered should be adjusted to cover the targeted population of the organization.

Means of Compliance

Communication is essential to build a positive [safety culture](#) through hazard reporting or sharing of safety information. In particular, the organization should communicate its safety objectives and the status of their achievement.

Communication about new or revised documented information related to safety should ensure a proper dissemination and better understanding within the organization.

In addition “Lesson Learned” on events (including incidents and accidents) and associated recommendations that are related to the organization’s products or services should also be communicated In order to improve the SMS.

Effective communication involves adjusting the content of the communication and the way in which the information is delivered to match the target employee’s role in the organization. The communication should be simple and concise so that it is easily understood and taken into account. The organization may extend safety communication, as appropriate, to external key stakeholders (e.g., customers, suppliers).

The communication of safety information, including safety policy and objectives can be delivered as:

- Text (e.g., newsletter, email).
- Visual media (e.g. posters, short videos).
- Crew or team briefings.
- Intranet websites.
- Other means as appropriate depending on the size and complexity of the organization.

Safety communications may be retained as part of SMS data.

7. INTERFACES BETWEEN ORGANIZATIONS

This chapter addresses the interfaces between organizations as mentioned in Annex 19 Appendix 2

ICAO Annex 19 Second Edition (July 2016) - Appendix 2

Note 2: The service provider's interfaces with other organizations can make a significant contribution to the safety of its products or services. Guidance on interface management as it relates to SMS is provided in the Safety Management Manual (SMM) (Doc 9859).

7.1 Interface principles

In the context of an SMS, interface management should encompass the four components (safety policy and objectives, SRM, SA and safety promotion).

The interfaces between organizations can be expressed:

Internally within one company/group/legal entity:

- Each organization holding its own SMS (e.g., SMS in design organization, SMS in manufacturing organization).
- Each organization holding its own SMS supported by a [Corporate SMS](#) approach (refer to §7.2).
- One single corporate SMS across multiple organizations (e.g., SMS covering both design and manufacturing organizations with a single accountable executive).

Externally with separate companies/legal entities:

- Having implemented an SMS (e.g., operators, manufacturing organization, maintenance organization).
- Not having implemented an SMS (e.g., engineering services suppliers, manufacturing suppliers).

Note: The system description of an organization with an SMS implemented should capture the interfaces with other organizations to ensure the flow down of requirements to external providers. The interface with other organizations that have their own SMS implemented also should be considered. Regardless, the system description should be adapted to the size of the organization. For instance, it is impossible to make a detailed system description that covers all SMS interfaces for a large manufacturer dealing with hundreds of suppliers, customers, etc.

Externally with Aviation Authorities (AAs):

- As required by applicable regulation.
- Taking into account that all data coming from SRM and SA are not necessarily subject to reporting to the AAs.

Note: Authorities may receive from other channels (operators, other authorities, various entities under their jurisdiction) valuable information related to the safety of a product or they may have access to generic safety data (e.g. recommendations from official investigation bodies). These may be potential sources of information for the organization.

Safety policies and objectives may be shared between interfacing organizations to ensure consistent SMS approaches.

Safety risks in one organization may impact other organizations through the potential consequences of the risks or the management of their mitigation. A good practice is to establish a reporting system about such risks between the interfacing organizations.

Risks that are shared between interfacing organizations should be reported among those organizations and acknowledged by each organization based on an agreed risk assessment scheme. For organizations within one company, the risk and related information sharing and the common mitigation actions may be organized by means of a common risk management tool which could also provide the agreed risk assessment scheme. For external relations (e.g., suppliers), risks may be mitigated through agreed reporting, acknowledgement and management practices.

Safety risks can result from interactions between organizations (e.g., due to gaps or overlap of interactions) or lack of interface management (e.g., absence of monitoring).

Safety assurance activities should focus first on data exchanges necessary for [continued airworthiness](#) which are subject to regulatory requirements (e.g., Part 21, EU 376/2014). These exchanges are usually governed by contractual requirements.

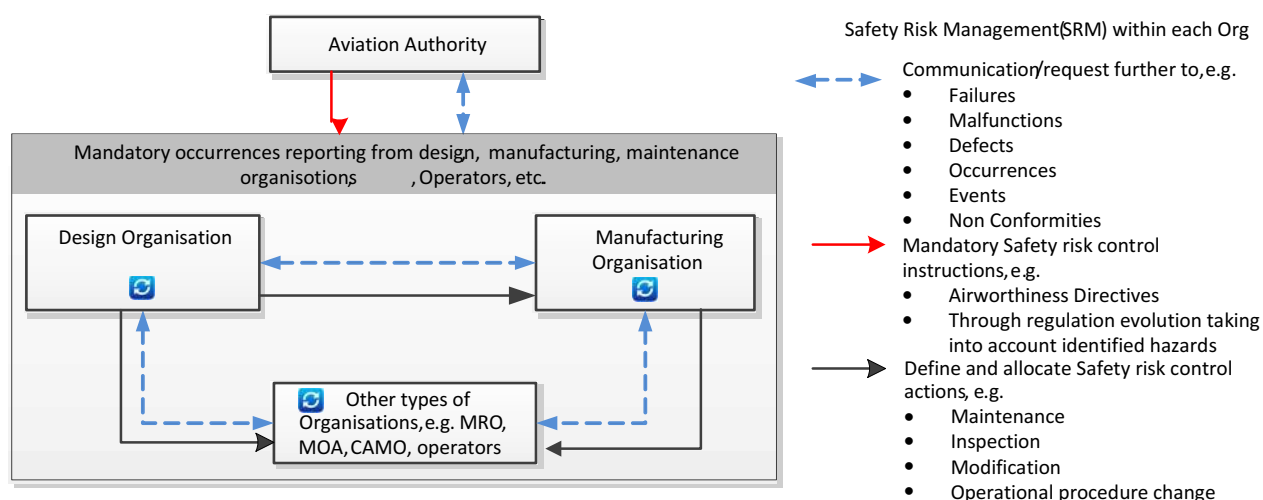
Safety performance could be accounted for during the assessment of suppliers (for initial qualification or continuous monitoring). Exchange and management of safety or SMS data exceeding the needs for [continued airworthiness](#) should be agreed between organizations and documented. This should prevent excessive system interaction between organizations (e.g., an operator in the context of its own SMS requesting to audit a TC holder's SMS).

The level and details of data exchanges should be adapted and commensurate to the complexity and safety risks of the products, services and interfacing organizations. It also should be adapted to the maturity of each organization with regards to safety management.

Safety promotion principles and priorities may be shared between interfacing organizations to ensure consistent SMS approaches (e.g., regular sharing of safety policies, top safety objectives and risks, best practices).

When applicable, maintenance organizations should define how their subcontractors working under their own Quality Management System will contribute to SMS activities. The contractual obligations should be set-up and assessed to ensure full subcontractor agreement.

Figure 4
Example of Safety Data Flow and Associated Communication
Between Organizations for Occurrences Management



An organization is not required to justify hazard identification and decide risk control actions beyond its obligations in order to avoid interfering situations.

Interface management between organizations is relevant to any management system (e.g., Safety Management System, Quality Management System, Environmental Management System, Design Assurance System).

7.2 Interface documentation

When relevant, the interface between organizations for safety management should be documented and maintained.

This documentation should consider the following objectives:

- Support the understanding of the organization's boundaries and their interactions.
- Clarify how the organizations (with or without implemented SMS) are interfacing.
- Address the management of relevant safety issues/items.

Examples of documentation for SMS interface provisions (such provisions could be the subject of dedicated documents or part of a broader documentation suite):

- Organization's handbook or exposition.
- Contract.
- Organization interface document.
- General policy statement.
- Arrangement.
- Quality assurance plan.
- Common applicable procedures when different organizations are within the same company or group.

This documentation can contain the following elements for the interfacing topics and activities:

- Organization and responsibilities (e.g., rights and duties to report issues, defects or occurrences, accountabilities and ownership for hazard identification and risk control, clear identification of interfacing focal points).
- Processes and deliverables descriptions (directly or indirectly through cross-reference to procedures).
- Criteria for reporting safety issues, noncompliance findings, nonconformities and occurrences. These criteria should focus on early communication of safety occurrences and potential safety issues (e.g., changes to the design, manufacturing, maintenance or operation of a product, part or appliance),
- Agreed means for timely safety issue reporting between organizations.
- Periodic reviews of the interface.

7.3 Corporate SMS approach

An organization may elect to set up a "[corporate SMS](#)" when the company holds more than one SMS (e.g., SMS in a design organization and SMS in a manufacturing organization).

A corporate SMS may help streamline the SMS implementation by providing a consistent approach over some or all of the four SMS components across the organizations. A corporate SMS may ensure:

- Safety policies and objectives have consistent definition, implementation and continuous improvement through the organizations.
- Safety risks are managed consistently across interfaced organizations (e.g., defining a common safety risk methodology, defining criteria of management of top safety risks).
- Safety assurance activities are managed consistently (e.g., monitoring trends, implementing investigations on systemic issues across the organizations, change management).
- Safety promotion defines and ensures shared principles, priorities, lessons learned and best practices between organizations (e.g., top safety objectives/risks) via corporate events and awareness/training sessions.

A corporate SMS manual could describe the overall and common organization's SMS implementation over the 4 components and 12 elements of the SMS as defined per ICAO Annex 19 Appendix 2.

A corporate SMS is not compulsory and it will be necessary to show how each of the service provider activities (e.g., design, manufacturing or maintenance) meet the SMS requirements. Organizations may have to account for the oversight of different service provider activities to different overseeing authorities.

8. SMS IMPLEMENTATION PLAN

8.1 General

The purpose of this chapter is to assist the organization with SMS implementation. It describes the main principles to implement a robust SMS, by means of an incremental (step-by-step or phased) approach covering the four SMS components. The proposed phased approach recognizes that implementation of a fully mature SMS is a multiyear process. The intent is to allow a smooth implementation of SMS, taking into account the complexity of the organization and maturity of its management system while ensuring the implementation remains flexible.

This guidance should help any approved or non-approved organization to implement an SMS that is compliant with applicable SMS regulation either on a mandatory or voluntary basis.

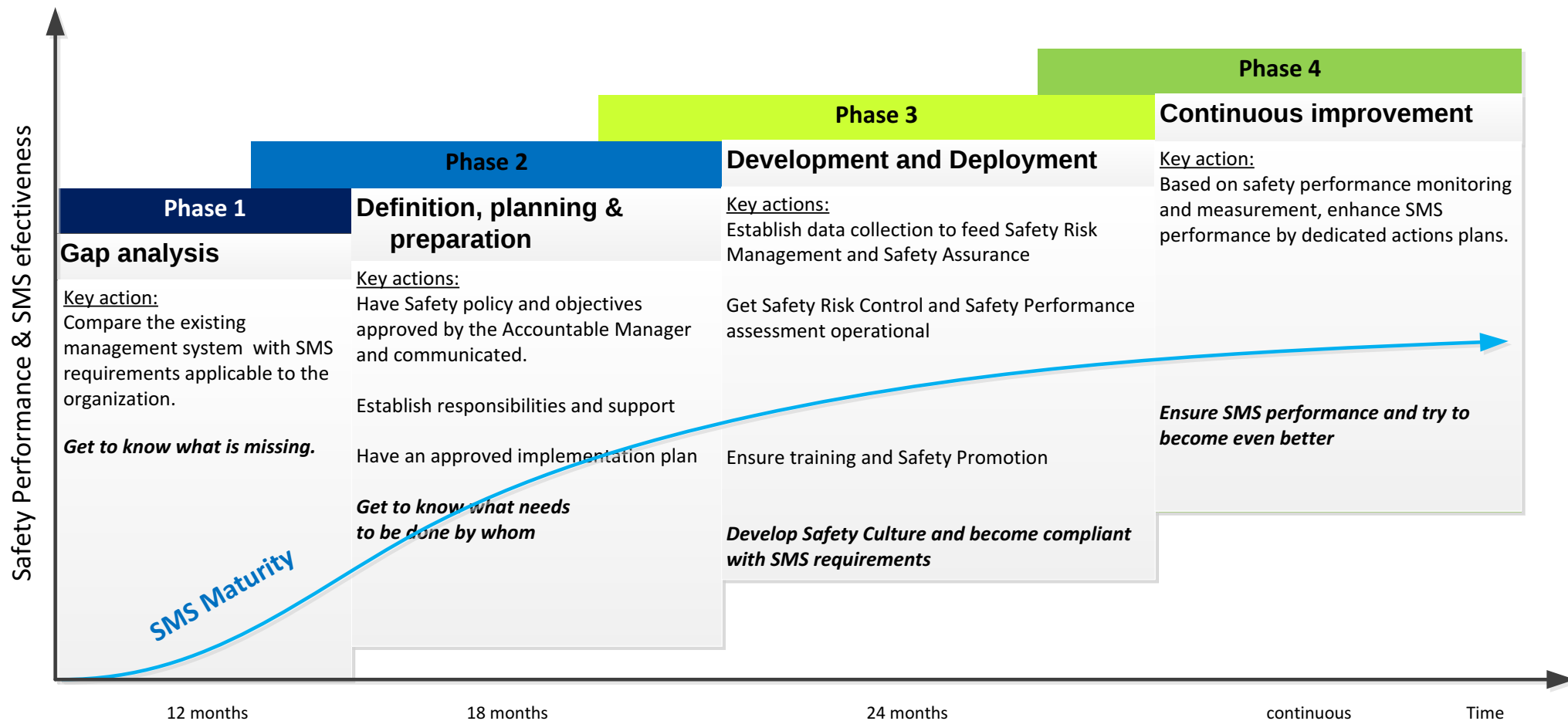
An SMS should cover the items described in chapter 6.

The following ICAO and Aviation Authority guidance may assist when implementing an SMS:

- ICAO Doc 9859 Safety Management Manual Chapter 5 Table 5.2.
- SMICG guidance ‘SMS for small organizations’ appendix 1.
- FAA Design and Manufacturing SMS pilot project guide.

Figure 5 shows the SMS overall implementation context (topics, phases, key actions and timelines).

Figure 5: SMS Overall Implementation Journey



Depending on the SMS element, phases may not sequential but rather concurrent.

Depending on the original maturity of the organization with regards to safety management (based on the gap analysis outputs), the SMS full implementation may last several years. Means and tools to ease the enhancement of a safety culture have to be used continuously and from the very beginning of the implementation plan.

Appendix 2 “Example of SMS maturity assessment method” proposes some guidance for an organization to self-assess the maturity of its SMS along its implementation process.

8.2 Implementation Plan

The following three actions should be considered, prior to developing the implementation plan:

1. Identify the safety accountable manager (refer to section 6.1.2).

Subject to variations in each organization, the safety accountable manager is expected to have:

- Full authority for human resources and financial issues.
- Direct responsibility for the conduct of the organization's affairs.
- Final responsibility for all safety issues.

2. Identify the person or the team in the organization responsible for developing the implementation plan.

3. Nominate the safety manager. The Safety Manager should deploy the SMS implementation plan on behalf of the safety accountable manager in addition to his/her operational functions (refer to section 6.1.3).

The development of the SMS implementation plan could be considered as an improvement project of the organization [management system](#). Project management methods/tools (e.g., Life Cycle Business Improvement Project - LBIP) could help the organization to frame and run SMS implementation plan.

Phase 1 – Gap analysis

This phase is fundamental to define an efficient and effective SMS implementation plan.

As the first step of Phase 1, the perimeter of the SMS (system description) needs to be clarified. Further to the review of the SMS requirements applicable to the organization versus the existing management system, the gap analysis will help identify what is already in place within the organization and what is missing.

Organizations granted approvals or delegations or both from their Aviation Authority (e.g., DOA, POA, AMO/MOA, ODA) should find that a large part of the SMS requirements are already fulfilled through the compliance with the organizational approval requirements.

Phase 1 should be considered as completed when the gap analysis is achieved.

From the outputs of the gap analysis and considering what is missing in its management system to fulfil the needs of SMS, the organization should consider going through all or part of the following phases:

- Phase 2 Definition, planning & deployment preparation.
- Phase 3 Deployment.
- Phase 4 Continuous improvement.

Phase 2 – Definition, planning & preparation

This phase should be considered as completed when the following items are accomplished:

- Safety objectives defined and approved by the safety accountable manager.
- Safety policy signed by the AM and communicated within the organization.
- SMS governance structure in place with safety responsibilities established.
- Personnel who will support SMS implementation plan deployment identified, nominated and aware on the SMS basics and objectives.
- SMS implementation plan approved.

The SMS implementation plan should:

- Address identified gaps resulting from phase 1, by defining actions and responsibilities.
- Include timelines and milestones.
- Address coordination with interfacing organizations as defined in chapter 7, where applicable.
- Be approved by the Safety Accountable Manager.
- Be reviewed regularly and updated as necessary.

Phase 3 – Development and Deployment

This phase should be considered as completed when all the actions defined in the implementation plan (Phase 2) are achieved and the deployed SMS is demonstrated compliant to this standard.

As part of the deployment, the following subjects should be defined, documented and operative. They can be considered in a sequence adapted to the organization priorities as defined in the implementation plan:

- Data collection system, starting with the reporting mechanism (including data sources, methods and means for gathering and filtering, etc.).
- Hazard identification process.
- Safety risk assessment & mitigation processes:
 - ✓ The organization will be, at least ready to perform safety analyses based on information obtained through the reporting system.
 - ✓ SRM training scheme.
- Safety assurance:
 - ✓ Safety performance monitoring and measurement.
 - ✓ Changes management.
- Safety promotion:
 - ✓ Safety communication, taking into account that upper and middle management staff is the driving force of an effective SMS.
 - ✓ Awareness/ training scheme for all personnel as appropriate.
- SMS documentation.
- SMS readiness assessment:
 - ✓ Deployed SMS is assessed against the implementation plan. This assessment could be performed using assessment method as proposed in Appendix 2 “*Example of SMS maturity assessment method*”.
 - ✓ As applicable, a declaration of compliance could be issued to support acceptance by Aviation Authority.

Phase 4 – Continuous improvement

With finalization of Phase 3 the organization should have all required SMS components/elements operative.

Implementing continuous improvement initiatives is key to manage new hazards or threats associated to the continuous evolutions of the global aviation system with the aim to maintain the highest level of aviation safety. Such initiatives should be subject to a continuous improvement action plan (refer to section 6.3.3 “Continuous improvement of the SMS”).

Appendix 1 - Best practices for Safety Risk Management (SRM)

1. Purpose

The purpose of this appendix is to introduce some best practices for Safety Risk Management but is not to further detail the examples of methods, techniques and tools cross-referenced in Chapter 6 of this Standard, e.g.

- Examples of risk assessment techniques (source ISO 31010):
 - ✓ Brainstorming.
 - ✓ Checklist.
 - ✓ Root cause analysis.
 - ✓ Failure mode and effects analysis (FMEA).
 - ✓ Fault tree analysis.
 - ✓ Decision tree.
 - ✓ Bow tie analysis.
 - ✓ Monte Carlo simulation,
 - ✓ Consequence/probability matrix.
- Examples of risk analysis at product level (source ARP4761):
 - ✓ Functional Hazard Assessment.
 - ✓ Preliminary System Safety Assessment.
 - ✓ System Safety Assessment.
 - ✓ Dependence Diagrams.
 - ✓ Markov Analysis.
 - ✓ Zonal Safety Analysis.
 - ✓ Common Cause Analysis.

2. Scope for Safety Risk Management (SRM)

SRM should cover the following areas:

- System Description - to establish the framework for hazard Identification.
- Hazard Identification - to identify hazards according to a method.
- Safety Risk identification - to identify safety risks associated to identified hazards.
- Safety Risk Analysis - to determine the severity and likelihood of a risk associated to identified hazard(s).
- Safety Risk Assessment - from the risk analysis outcomes, to determine if a risk is unacceptable according to defined criteria.
- Safety Risk Control - to eliminate, reduce or mitigate a safety risk through action(s) to be defined when the risk is unacceptable.

Examples of situations where SRM should be applied by different types of organizations:

- Organizations not holding an approval or certificate.
Non-approved organizations should apply safety risk management to the following:
 - ✓ Implementation of new systems.
 - ✓ Significant revision of existing systems.
 - ✓ Development of operational procedures.
 - ✓ Identification of hazards or ineffective risk controls through the safety assurance processes.
- DOA organizations:
 - ✓ Significant changes in design assurance system in accordance with 21.A.247.

- ✓ Identification of hazards or ineffective risk controls through the safety assurance processes.
- ✓ Product certification with typical hazardous areas (refer to 21.B.100, i.e. EASA LOI):
 - The novel or unusual features of the certification project, including operational, organizational and knowledge management aspects.
 - The criticality of the design or technology and the related safety and environmental risks, including those identified on similar designs.
 - The performance and experience of the design organization in the domain concerned.
- ODA organizations:
Cf. AIA Standard NAS9927, sections 1.3.3 & 2.9.
- POA organizations:
 - ✓ Significant changes in manufacturing organization in accordance with 21.A.147 should trigger SRM (e.g. change in products, organization structure, facilities, personnel, documentation, processes, tools).
 - ✓ Identification of hazards or ineffective risk controls through the safety assurance process.
- AMO/MOA organizations:
 - ✓ Significant changes in maintenance organization in accordance with 145.A.85 should trigger SRM (e.g. change in products, organization structure, facilities, personnel, documentation, processes, tools),
 - ✓ Identification of hazards or ineffective risk controls through the safety assurance process.

3. Best practices for hazard Identification

Hazard identification enables identifying “safety issues” or “threats” (referred to as hazards) that require application of SRM and SA. This allows the organization to allocate safety management resources to sources of potential significant safety risk, and avoid devoting resources to lower or insignificant risk.

N°	Best practices for hazard identification
1	Avoid trying to identify every conceivable or theoretically possible hazard. This is neither possible nor desirable. Judgment is required to determine the adequate level of detail in hazard identification. Due diligence should be exercised in identifying significant and reasonably foreseeable hazards related to the organization operations.
2	Focus on the areas having the greater potential to introduce hazards that may lead to unacceptable safety risk, e.g.,: • Accident scenarios (e.g., from investigations) if not yet covered by existing continued airworthiness process. • Human and organizational factors (e.g., activity which may lead to unacceptable risks and affect the safety of products or services). • Business decisions and processes changes (e.g., significant change in the principles of a processor in the organization structure or both). • Interface with other organizations (e.g., manufacturing subcontractor of critical parts). • Novelty, criticality or complexity or both in product design, manufacturing or maintenance (e.g., introduction of additive manufacturing, inspection of composite structure).
3	Identify hazard from review/analysis of available safety data, e.g.,:

N°	Best practices for hazard identification
	• Safety reports/publications (e.g., reports from ICAO, Authorities, operators, associations). • Audit reports. • Safety surveys. • Investigations (e.g. in the frame of continued airworthiness). • Safety analysis in the frame of safety enhancement initiatives. • (Refer to definition of safety data in chapter 4 “Terms & Definitions”).
4	Do not mix hazards with triggering/contributing factors to keep a reasonable number of confirmed hazards necessary to be considered for risk assessment based on the complexity of the organization and/or product.
5	Group hazards in categories, e.g.,: Systemic hazards: • <i>Organizational: management, resources, documentation, procedures.</i> • <i>Human: limitations of the person which in the system has the potential for causing harm, fatigue, stress.</i> Operational hazards: • <i>Technical: design.</i> • <i>Product operation.</i> Environmental hazards: • <i>Regulation, finance & budget, facilities, climate change.</i>
6	Do not mix hazard with its foreseeable consequences. A hazard is not subject to severity or likelihood classification, but its associated safety risk is.
7	Consider that, depending on their nature, categorization and identification scenario: • Not all identified hazards must result in SMS action (i.e. safety risk analysis and risk control actions). • Several hazards can result in combined SMS actions (see Figure A-1 and Figure A-2).
8	Consider that several hazards are already subject to systematic risk assessment and risk mitigation in the frame of product certification or continued airworthiness or both and may not need further SMS activities at product level, e.g.,: • “Hazard” taken into account in product design assessment through failure conditions for compliance demonstration with the type-certification basis. • “Hazard” identified in existing Continued Airworthiness process with risk assessment/corrective actions (e.g. AD) at product level. Nevertheless, systemic risk assessments can be relevant (e.g., about organization, design, manufacturing or maintenance processes, tools, competencies). If other risk assessments are used, check (where applicable) that the resulting hazards, risks and severities identified by these methods are consistent with the existing levels retained during certification, and resolve discrepancies.
9	Consider identifying hazards in an incremental manner from initial SMS implementation up to SMS fully operative.
10	Consider reviewing hazards in a continuous improvement loop.

Figure A-1: Hazard Identification – Example from SMICG: “Hazard Taxonomy Examples”



Figure A-1 shows that multiple hazards (safety issues/threats) can produce safety risk(s) with final unwanted consequence as shown in Figure A-2.

Figure A-2: Multiple “Hazards” produce safety risk(s)

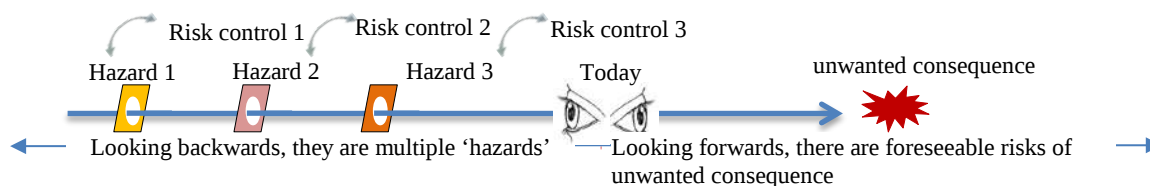


Figure A-3: Single hazard with multiple triggering factors to produce safety risk(s)

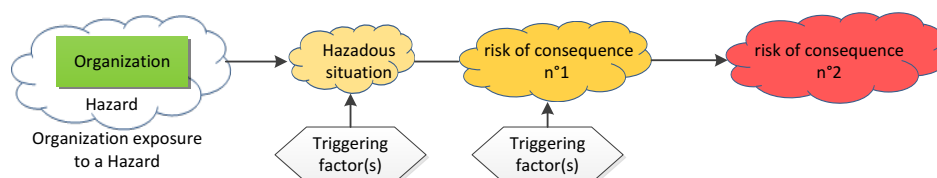


Figure A-3 shows that single hazard combining triggering factor(s) can produce unwanted consequence(s).

4. Safety Risk Assessment & Control

Safety risk should be identified using the most appropriate methods, techniques and/or tools as mentioned in Chapter 6 of this standard.

When identified, safety risk should be analyzed to determine its severity and likelihood. Qualitative analysis and engineering judgment are acceptable when there is no or not enough quantitative data available.

Safety risk assessment uses the outcomes of risk analysis to determine the acceptability of risk according to defined criteria.

When a safety risk is unacceptable, safety risk control action(s) should be defined and implemented.

Figure A-4: Safety risk analysis, assessment and control



Various safety risk assessment matrixes can be used.

A generic safety risk assessment matrix is shown in Figure A-5 with customized examples in Figure A-6, A-7 and A-8.

Figure A-5: Generic Safety risk assessment matrix

Risk probability	Risk Severity				
	5 (high)	4	3	2	1 (low)
5 (high)	Unacceptable risks area with risk control actions				
4					
3			Risks area under monitoring for actions if necessary		
2					
1(low)					Acceptable risks area without risk control actions

Figure A-6: Safety risk assessment matrix from ICAO Doc. 9859 (SMM)*Note: For detailed understanding of this matrix, refer to ICAO Doc. 9859*

Risk probability	Risk severity				
	Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent 5	5A	5B	5C	5D	5E
Occasional 4	4A	4B	4C	4D	4E
Remote 3	3A	3B	3C	3D	3E
Improbable 2	2A	2B	2C	2D	2E
Extremely improbable 1	1A	1B	1C	1D	1E

Figure A-7: Safety risk assessment matrix from AIA Standard NAS 9927*Note: For detailed understanding of this matrix, refer to NAS 9927*

RISK ASSESSMENT MATRIX				
SEVERITY PROBABILITY	Catastrophic (1)	Critical (2)	Marginal (3)	Negligible (4)
Frequent (A)	High	High	Serious	Medium
Probable (B)	High	High	Serious	Medium
Occasional (C)	High	Serious	Medium	Low
Remote (D)	Serious	Medium	Medium	Low
Improbable (E)	Medium	Medium	Medium	Low
Eliminated (F)	Eliminated			

Figure A-8: Safety risk assessment matrix with acceptability information from SMICG document: “SMS for small organizations”*Note: For detailed understanding of this matrix, refer to SMICG document “SMS for small organizations”*

		Likelihood		
		Unlikely (1)	Possible (2)	Likely (3)
Severity	Fatal Accident (5)	REVIEW (5)	UNACCEPTABLE (10)	UNACCEPTABLE (15)
	Serious Incident (3)	REVIEW (3)	REVIEW (6)	UNACCEPTABLE (9)
	Negligible (1)	ACCEPTABLE (1)	ACCEPTABLE (2)	REVIEW (3)

The format for a safety risk assessment matrix can be customized by each organization depending on the complexity of its activities and existing practices.

N°	Best practices for safety risk assessment & control
1	Risk analysis and risk assessment should only be carried out for confirmed hazards that need further SMS actions (refer to paragraph 3 in this Appendix).
2	Unacceptable risk should be subject to risk control action(s) to eliminate, reduce or mitigate the risk.
3	Risk control actions should be monitored with feedback at least to the following: • Relevant operational managers impacted by the safety risks. • Relevant safety management staff to monitor the effectiveness of risk control.
4	Risk analysis in terms of severity and likelihood should be reviewed if ineffective risk control has been detected.
5	Risk assessment should be regularly reviewed to ensure that the identified risk control actions are still appropriate.
6	Risk control actions could be a combination of short-term actions and long-term actions: • The long-term safety risk control actions may not be known until or can only be determined when the short-term risk control is implemented. • One intermediate safety risk control action can be useful before a more severe risk occurs.
7	Safety risk acceptability criteria should be reviewed based on: • Feedback from the risk control determination. • Safety performance measurement and monitoring.
8	Evidence and rationale for decisions on safety risk assessment (risk level) and controls (actions) should be recorded.

Appendix 2 – Example of SMS Maturity Assessment Method

1. Background and Purpose

This appendix provides guidance and proposes a method for the maturity assessment of SMS during initial implementation and continuous improvement.

It is to be used by the organization as a self-assessment but could be considered as well by Aviation Authorities to evaluate the organization's SMS maturity.

Note: Within this method, the column "What to look for (examples of evidence)" is a simplified description of the means of compliance/evidence with SMS requirements. The core text and other appendixes of this Standard remain the basis for assessment of SMS maturity.

This guidance:

- Is based on SMS evaluation tool originally developed by the SMICG.
- Relies on a set of criteria¹ and evidences to help determine the overall maturity of an SMS with regard to the 12 elements of the SMS Framework as captured through this Standard and resulting from ICAO Annex 19.
- Considers the SMS maturity improvement journey from Present, to Operating, to Effective.

¹*Note: Within this document, "criteria" means the checking points/questions recorded in the columns "Present", "Operating" and "Effective". "What to look for" means the evidence.*

2. Definitions

Maturity levels

The maturity levels can be defined as follows:

Level: Present

This level of maturity means there is evidence that the item (referred to in the "criteria") is defined and documented.

Note: When this level is achieved, the SMS is considered suitable.

Level: Operating

This level of maturity means there is evidence that the item (referred to in the "criteria") is implemented with outcomes/deliverables.

Level: Effective

This level of maturity means there is evidence that the item (referred to in the "criteria") is effective and achieves the desired outcomes.

Evidence: Documentation, reports, records of interviews and discussions. While completion of "Present" maturity level is based upon available procedural documentation, completion of "Operating" and "Effective" maturity levels is based upon the consistent application of documented processes to produce and assess facts, figures and records.

3. Using the Method

This method can be used for the first time to complete the Gap analysis as mentioned in Chapter 8. This Gap analysis and the resulting implementation plan are the main inputs to the next maturity assessment(s) of the SMS.

The method can be used as is or can be customized by each organization depending on its size, structure and activities.

For each SMS element, a series of 'criteria for compliance and performance' is listed followed by evidence (i.e., 'what to look for'). Each criterion should be reviewed to determine whether it is at the present, operating or effective maturity level so that the overall maturity of the SMS element can be evaluated, taking into consideration the other inter-related elements (e.g., *"The safety policy shall be communicated, with visible endorsement, throughout the organization"*). This requirement can be declared at the operating level under the conditions that a safety accountable manager is nominated and briefed about SMS and safety policy is defined and promoted. These aspects are subject to other items within this assessment tool (such as §1.2 "Safety accountabilities and responsibilities, §4.2 "Safety communication").

Once all criteria for each SMS element have been assessed, an engineering judgment can be recorded in "summary comments" block, with regard to the overall level of maturity of such SMS element.

Reaching one maturity level for the overall SMS does not mean that each SMS element is at the same maturity level (e.g., some SMS elements can be at the "Present" level, some others at the "Operating" level and a few at the "Effective" level. In this state, the overall SMS maturity can be considered to be at the "Operating" level).

A person using this method should be conversant in the following:

- Safety Management Systems based on the ICAO SMS Framework.
- Management System evaluation principles and techniques.
- Safety Risk Management and Safety Assurance principles.

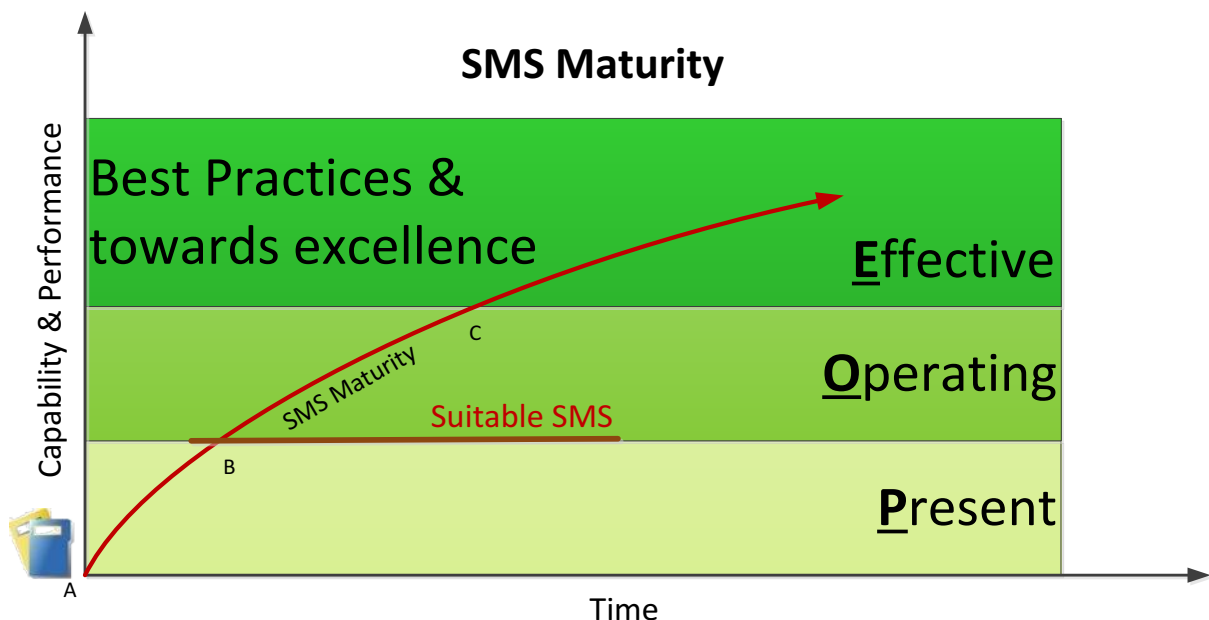
Note: Statements highlighted in grey color in the Table (2nd column) are not taken from ICAO Annex 19, but from other sources (e.g. EU 376/2014) which may be necessary for SMS evaluation. These are areas that may be customized if the organization is not subject to the requirements of these other sources.

4. SMS Journey

For most organizations, SMS implementation will take time. It can take several years to reach the “Effective” maturity level. Figure B-1 shows the different levels of SMS maturity.

Each organization can always strive toward excellence as part of their SMS continuous improvement. This method can support the assessment of best practices toward excellence keeping in mind that the ultimate goal of SMS is to proactively enhance safety beyond the minimum required for compliance with airworthiness rules.

Figure B-1



A: Start SMS development.

B: SMS is documented and suitable.

C: SMS becomes effective, achieving the desired outcomes.

Assessment Coversheet

ASSESSMENT RECOMMENDATIONS AND REMARKS

Recommendations and remarks:

Organization's compliance with applicable regulation

☐

Yes

☐

No

OVERALL EFFECTIVENESS OF THE SMS AND ACHIEVEMENT/PERFORMANCE CONCLUSION

1 SAFETY POLICY AND OBJECTIVES**1.1 MANAGEMENT COMMITMENT**

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (examples of evidence)
1.1.1	The service provider shall define its safety policy in accordance with international and national requirements. The safety policy shall: e) be signed by the accountable executive of the organization g) be periodically reviewed to ensure it remains relevant and appropriate to the service provider	6.1.1.1	There is a safety policy that includes a commitment to continuous improvement, observes all applicable legal requirements, standards and considers best practice signed by the Safety Accountable Manager.	The safety policy is reviewed periodically to ensure it remains relevant to the organization.	The Safety Accountable Manager has a clear understanding of the system operation in order to master the relevancy of the safety policy.	Talk to Safety Accountable Manager to evaluate his/her involvement in revision of safety policy. Confirm it meets applicable Regulations.
1.1.2	The safety policy shall b) include a clear statement about the provision of the necessary resources for the implementation of the safety policy	6.1.1.1	The safety policy includes a statement to provide appropriate resources.	The organization is assessing the resources being provided to deliver a safe service and taking action to address any shortfalls.	The organization is reviewing and taking action to address any forecasted shortfalls in resources.	Review available resources including personnel, equipment and financial; There are competent personnel; Review targeted manpower vs actual manpower.
1.1.3	The safety policy shall be f) communicated, with visible endorsement, throughout the organization	6.1.1.1	There is a means in place for the communication of the safety policy.	The safety policy is communicated to all personnel (including relevant temporary contract staff).	People across the organization are aware about the policy and can describe their obligations and contributions in respect of the safety policy	Review how safety policy is communicated and safety policy is clearly visible; Question managers and staff regarding knowledge of the safety policy including voluntary reporting system.

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (examples of evidence)
	See 2.1.2 for c) include safety reporting procedures					
1.1.4	a) The safety policy shall reflect organizational commitment regarding safety, including the promotion of a positive safety culture	6.1.1.1	The management commitment to safety is documented within the safety policy.	The Safety Accountable Manager and the senior management team are promoting their commitment to the safety policy through active and visible participation in the safety management system (safety communication, safety performance reviews).	Decision making, actions and behaviours reflect a positive safety culture and there is safety leadership that demonstrates commitment to the safety policy.	All Managers are familiar with the key elements of the safety policy; Evidence of senior management participation in safety meetings, training, conferences, etc.; Feedback from safety culture surveys; Relationship building with Aviation Authority and other stakeholders (feedback, trust).
1.1.5	The safety policy shall d) clearly indicate which types of behaviors are unacceptable related to the service provider's aviation activities and include the circumstances under which disciplinary action would not apply.	6.1.1.1	A Just Culture Policy and principles have been defined that clearly identifies acceptable and unacceptable behaviours in order to promote a Just Culture.	There is evidence of the Just Culture policy and supporting principles being applied and promoted to staff.	The Just Culture policy is applied in a fair and consistent manner and people trust the policy. There is evidence that the line between acceptable and unacceptable behaviour has been determined in consultation with staff and staff representatives.	Evidence of when the just culture principles have been applied following an event; Evidence of interventions from safety investigations addressing organizational issues rather than focusing only on the individual; Review the metrics of the voluntary reporting scheme, e.g. - The number of aviation safety reports appropriate to the activities [Safety Reports include the reporter's own errors and events they are involved in (events where no-one was watching)]; - Feedback on just culture from staff safety culture surveys; Talk to staff to check they are aware of the just culture policy and principles and if they use the

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (examples of evidence)
						provisions of just culture (e.g. Voluntary reporting)
1.1.6	Taking due account of its safety policy, the service provider shall define safety objectives. The safety objectives shall: a) form the basis for safety performance monitoring and measurement as required by 3.1.2 b) reflect the service provider's commitment to maintain or continuously improve the overall effectiveness of the SMS c) be communicated throughout the organization d) be periodically reviewed to ensure they remain relevant and appropriate to the service provider.	6.1.1.2	Safety objectives have been established that are consistent with the safety policy and there is a means to communicate them throughout the organization.	Safety Objectives are relevant to the organization, communicated throughout the organization and are being regularly reviewed	Achievement of the Safety Objectives is being monitored by senior management and action taken as necessary to ensure they are being met.	Check that objectives are defined Assess how safety objectives are communicated throughout the organization; Check that achievement criteria for safety objectives are defined Check that safety objectives are being measured to monitor achievement through SPIs.

SUMMARY COMMENTS

1.2 SAFETY ACCOUNTABILITY AND RESPONSIBILITIES

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (examples of evidence)
1.2.1	a) identify the accountable executive who, irrespective of other functions, is accountable on behalf of the organization, for the implementation and maintenance of an effective SMS	6.1.2	A Safety Accountable Manager has been appointed with full responsibility and ultimate accountability for the SMS.	The Safety Accountable Manager ensures that the SMS is properly resourced, implemented and maintained and has the authority to take any necessary action in the event of an unacceptable level of safety risk.	The Safety Accountable Manager ensures that the performance of the SMS is being monitored, reviewed and improved.	Evidence that the Safety Accountable Manager has the authority to provide sufficient resources for relevant safety improvements; Evidence of decision making on risk acceptability; Check that SMS activities are carried out as planned in a timely manner and the SMS is sufficiently resourced (key staff experience and competences, funding)

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (examples of evidence)
1.2.2	b) clearly define lines of safety accountability throughout the organization, including a direct accountability for safety on the part of senior management, c) identify the responsibilities of all members of management, irrespective of other functions, as well as of employees, with respect to the safety performance of the organization d) document and communicate safety accountability, responsibilities, and authorities throughout the organization, e) define the levels of management with authority to make decisions regarding safety risk tolerability.	6.1.2	The safety accountability, authorities and responsibilities are clearly defined and documented.	Everyone in the organization is aware of and fulfil their safety responsibilities, authorities and accountabilities and encouraged to contribute to the SMS.	The Safety Accountable Manager and the senior management team knows the risks faced by the organization and associated risk mitigations. Safety management system principles exist throughout the organization so that safety is part of the everyday language.	Question Managers and staff regarding their roles and responsibilities; Confirm senior managers are aware of the organization's safety performance and its most significant risks; Evidence of managers having safety related performance targets; Look for active participation of the management team in the SMS; Evidence of appropriate risk mitigation, action and ownership; Levels of Management authorised to make decisions on risk acceptance are defined; Acceptance of risk is aligned with authorisations.

SUMMARY COMMENTS

1.3 APPOINTMENT OF KEY PERSONNEL

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (evidence)
1.3.1	The service provider shall appoint a safety manager who is responsible for the implementation and maintenance of the SMS. <i>Note: Depending on the size of the service provider and the complexity of its aviation products or services, the responsibilities for the implementation and maintenance of the SMS may be assigned to one or more persons as their sole function or combined with other duties, provided these do not result in any</i>	6.1.3	A competent Safety manager who is responsible for the implementation and maintenance of the SMS has been appointed with a direct reporting line to the Safety Accountable Manager.	The safety manager has implemented and is maintaining the SMS. The safety manager is in regular communication with the Safety Accountable Manager and escalates safety issues when appropriate.	The safety manager is competent to manage the SMS and identifying improvements in a timely manner. There is a close working relationship with the Safety Accountable Manager and the Safety Manager is considered a trusted advisor and given appropriate status in the organization.	Review Safety Manager's role including credibility and status (i.e. empowerment); Appropriate safety training received; Evidence of maintained competency; Review how the Safety Manager gets access to internal and external safety information; Review how the Safety Manager communicates and engages with operational staff and senior management; Review Safety Manager workload / allocated time to fulfil role; Check there are sufficient resources supporting SMS activities such as safety investigation, analysis, auditing, safety meeting attendance and promotion; Review of safety report action and closure timescales; Interviews with Safety Accountable Manager and Safety manager.

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (evidence)
	<i>conflicts of interest.</i>					
1.3.3	<i>For complex organizations</i>	6.1.3	The organization has established appropriate safety committees(s) that discuss and address safety risks and compliance issues and includes the Safety Accountable Manager and the heads of functional areas.	There is evidence of Meetings taking place in accordance with the Terms of Reference detailing the attendance and frequency of meetings. The Safety committees monitor the effectiveness of the SMS and compliance monitoring function by reviewing there are sufficient resources, actions are being monitored and appropriate safety objectives and SPIs have been established.	Safety committees include nominated key stakeholders. The outcomes of the meetings are documented and communicated and any actions are agreed, taken and followed up in a timely manner. The safety objectives and associated SPIs are reviewed and actioned as appropriate.	Review safety committee and meeting structure and terms of reference for each committee / meeting; Review meeting attendance levels; Review meeting records and actions; outcomes are communicated to the appropriate level within the organization; Evidence of safety objectives, safety performance and compliance being reviewed and discussed at meetings; Senior Management is aware of the most significant risks faced by the organization and the overall safety performance of the organization.

SUMMARY COMMENTS

1.4 CO-ORDINATION OF EMERGENCY RESPONSE PLANNING

Note: The ERP coordination does not apply to Design, Manufacturing and Maintenance Organizations according to the Standard.

To be noted that the Standard NAS9927 states that the ERP as mentioned in 14CFR Part 5 does not apply for voluntary implementation of SMS in US D&M organizations. If an ERP exists, following criteria can be used for its maturity assessment.

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (evidence)
1.4	The service provider required to establish and maintain an emergency response plan for accidents and incidents in aircraft operations and other aviation emergencies shall ensure that the emergency response plan is properly coordinated with the emergency response plans of those organizations it must interface with during the provision of its products and services.	6.1.4	An appropriate emergency response plan (ERP) has been developed and distributed that defines the procedures, roles, responsibilities and actions of the various organizations and key personnel.	The ERP is reviewed and tested to make sure it remains up to date. Key personnel have easy access to the relevant parts of the ERP at any time. There is evidence of coordination with other organizations as appropriate.	The results of the ERP review and testing are assessed and actioned to improve its effectiveness.	Review emergency response plan; Review how co-ordination with other organizations is planned; Review how ERP is distributed and where copies are held; Talk to key personnel and check they have access to the ERP; Different types of foreseeable emergencies have been considered; Review when ERP was last reviewed and tested and any actions taken as a result.

SUMMARY COMMENTS

1.5 SMS DOCUMENTATION

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (evidence)
1.5.1	The service provider shall develop and maintain an SMS manual that describes its: a) safety policy and objectives b) SMS requirements c) SMS processes and procedures d) accountability, responsibilities and authorities for SMS processes and procedures <i>Note.— Depending on the size of the service provider and the complexity of its aviation products or services, the SMS manual and SMS documentation may be in the form of stand-alone documents or may be integrated with other organizational documents (or</i>	6.1.5 App. 3	The SMS documentation includes the policies and processes that describe the organization's safety management system and processes.	SMS documentation is consistent with other internal management systems and is representative of the actual processes in place. Changes to the SMS documentation are managed. Everyone has easy access to, familiar with the relevant parts of the SMS documentation.	SMS Documentation is proactively reviewed for improvement by relevant stakeholders.	Review the SMS Documentation and amendment procedures; Check for cross references to other documents and procedures; Check availability of SMS documentation to all relevant staff; Check staff know where to find safety related documentation including procedures appropriate to their role.

	<i>documentation) maintained by the service provider.</i>					
1.5.2	The service provider shall develop and maintain SMS operational records as part of its SMS documentation.	6.1.5	The SMS documentation defines the SMS outputs and which records of SMS activities will be stored.	SMS activities are appropriately stored and found to be complete and consistent with appropriate data protection and control.	SMS records are routinely used as inputs for safety management related tasks and continuous improvement of the SMS	Review the supporting SMS data (hazard logs, meeting minutes, safety performance reports, risk assessments, etc.); Check how safety records are stored and version controlled; Data protection and confidentiality rules have been defined and are consistently applied; Check appropriate staff are aware of the records control processes and procedures.

SUMMARY COMMENTS

2 SAFETY RISK MANAGEMENT

2.1 HAZARD IDENTIFICATION

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (evidence)
2.1.1	The service provider shall develop and maintain a process to identify hazards associated with its aviation products or services.	6.2.1	There is a process that defines how reactive and proactive hazard identification is gathered from multiple sources (internal and external).	The hazards are identified and documented. Technical, Environmental, Human and Organizational Factors related hazards are being considered.	The organization has a register of the hazards (Technical, Environmental, Human and Organizational Factors related) that is maintained and reviewed to ensure it remains up to date. It is continuously and proactively identifying hazards related to its activities and operational environment and involves all key personnel and appropriate stakeholders. Hazards are assessed in a systematic and timely manner	Review how hazards are identified, analysed and recorded; Consider various kinds of hazards such as described in section 6.2.1 and appendix 1, section 3 of this Standard.
2.1.2	Hazard identification shall be based on a combination of reactive and proactive methods.	6.2.1 App. 1-3				Review what internal and external sources of hazards are considered such as: Safety reports / audits / safety surveys / investigations / inspections / brainstorming / Management of Change activities / Commercial and other external influences etc.; <i>(In Europe, hazards identified from occurrences are processed in compliance with EU 376/2014 Article 4 and 5).</i>
2.1.3	<i>Regulation 376/2014 and Annex 19 safety reporting procedures 1.1.1 (c)</i>	6.2.1	There is a confidential reporting system to capture mandatory occurrences and voluntary reports that includes a feedback system. Responsibilities have been defined as required by 376/2014 The process identifies how reports are actioned and timescales specified.	The reporting system is simple to use, being used and accessible to all personnel. There is feedback to the reporter of any actions taken (or not taken) and, where appropriate, to all other relevant staff in the organization. Reports are evaluated, processed, analysed and stored.	There is a healthy reporting system based on the volume of reporting and the quality of reports received. Safety reports are acted on in a timely manner Personnel express confidence and trust in the organizations reporting policy and process. The reporting system is being used to make better management decision making and continuous improvement	Review the reporting system for access and ease of use; Check Staff trust the reporting system are familiar with it and know what should be reported; Review how data protection and confidentiality is achieved; Evidence of feedback to reporter, the organization and third parties; Assess volume and quality of reports including self-reporting; Review report closure rates;

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (evidence)
				People are aware and fulfil their responsibilities in respect of the reporting system Reports are processed within the defined timescales.	The reporting system is available for third parties to report (partners, suppliers, contractors).	Check availability of provisions to contracted organizations and customers to make reports; The system supports analysis and follow-up Confirm responsibilities with regards to occurrence analysis, storage and follow-up clearly defined; Check relevant staff are aware of which occurrences should be mandatory; Assess how Senior management engage with the outputs of the reporting system.

SUMMARY COMMENTS

2.2 RISK ASSESSMENT AND MITIGATION

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (evidence)
2.2	The service provider shall develop and maintain a process that ensures analysis, assessment and control of the safety	6.2.2 App. 1-4	There is a process for the analysis and assessment of safety risks.	Risk analysis and assessments are carried out in a consistent manner based on the defined process.	Risk analysis and assessments are reviewed for consistency and to identify improvements in the processes. Risk assessments are regularly reviewed to ensure they remain current.	Review risk classification scheme and procedures; Severity and likelihood criteria defined (or alternative methodology described); Sample an identified hazard and how it is processed and documented;

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (evidence)
	risks associated with identified hazards. <i>Note: The process may include predictive methods of safety data analysis.</i>					Review what triggers a risk assessment Check any assumptions made and whether they are reviewed; Review how issues are classified (e.g. qualitative assessment) when there is insufficient quantitative data available.
		6.2.2	The level of risk the organization is willing to accept is defined.	The defined risk acceptability is being applied.	Risk acceptability criteria are used routinely and applied in management decision making processes and are regularly reviewed.	Process defines who can accept what level of risk; Risk register is being reviewed and monitored by the appropriate safety committee(s); Evidence of risk acceptability being routinely applied in decision making processes.
		6.2.2	The organization has a documented process to decide and apply the appropriate risk controls.	Appropriate risk controls are being applied to reduce the risk to an acceptable level including timelines and allocation of responsibilities. Human and organizational Factors are considered as part of the development of risk controls	Appropriate Risk controls are practical and sustainable and applied in a timely manner and do not create additional risks. Risk Controls take into consideration Human and organizational Factors (beyond airworthiness compliance).	Risk controls consider human and organizational factors; Evidence of risk controls being actioned and follow up; Aggregate risk is being considered; Look at whether the risk controls have reduced the residual risk; Risk controls clearly identified; Review the use of risk controls that rely solely on human intervention.

SUMMARY COMMENTS

3 SAFETY ASSURANCE**3.1 SAFETY PERFORMANCE MONITORING AND MEASUREMENT**

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (evidence)
3.1.1	The service provider shall develop and maintain the means to verify the safety performance of the organization and to validate the effectiveness of safety risk controls. <i>Note: An internal audit process is one means to assess the effectiveness of safety risk controls. Guidance on the scope of the internal audit process is contained in the Safety Management Manual (SMM) (Doc 9859).</i>	6.3.1	There is a documented process to assess whether the appropriate risk controls are applied and effective.	Appropriate Risk controls are being verified to assess whether they are applied and effective. Information from safety assurance and compliance monitoring activities feeds back into the safety risk management process;	Appropriate Risk controls are assessed and actions taken to ensure they are effective and delivering a safe service. The reasons for ineffectiveness of risk controls are investigated.	Evidence of risk controls being assessed for effectiveness (e.g. audits, surveys, reviews). Evidence of risk controls applied by contracted organizations / third parties being assessed; Review where risk controls have been changed as a result of the assessment.
3.1.2	The service provider's safety performance shall be verified in reference to the safety	6.3.1	There is a documented process on how the safety performance of the organization will be measured including safety performance indicators and	The safety performance of the organization is being measured and the SPIs are being continuously monitored and analysed for trends.	SPIs are demonstrating the safety performance of the organization and the effectiveness of risk controls based on reliable data.	Evidence that SPIs are based on reliable sources of data; Evidence of when Safety performance indicators were last reviewed;

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (evidence)
	performance indicators and safety performance targets of the SMS in support of the organization's safety objectives.		targets linked to the organization's safety objectives.		SPIs are reviewed and regularly updated to ensure they remain relevant. Where the SPIs indicate a risk control not being effective appropriate action is taken.	The defined SPIs and targets are appropriate to the organization's activities, risks and safety objectives; Review whether any action has been taken when an SPI is indicating a negative trend (reflecting a risk control or an inappropriate SPI); Evidence that results of safety performance monitoring are discussed at senior management level; Evidence of feedback provided to the Safety Accountable manager.

SUMMARY COMMENTS

3.2 THE MANAGEMENT OF CHANGE

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (evidence)
3.2	The service provider shall develop and maintain a process to identify changes which may affect the level of safety risk associated with its aviation products	6.3.2	The organization has documented a management of change process to identify whether changes have an impact on safety and to manage any identified risks in accordance with existing	The management of change process is being used. It includes hazard identification and risk assessments with appropriate risk controls being put in place before the decision to make the change is taken.	The Management of change process is used for all safety related changes including Organizational and Human Factors issues and considers the accumulation of multiple changes. It is initiated in a planned, timely and consistent manner and	Key stakeholders are involved in the process; Review what triggers the process Review recent changes that have been through the risk assessment process; Change is authorised by appropriate person;

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (evidence)
	or services and to identify and manage the safety risks that may arise from those changes.		safety risk management processes.	Organizational and Human Factors issues have been considered and being addressed as part of the process for management of change.	includes follow up action that the change was implemented safely.	Transitional risks are being identified and managed; Review follow up actions such as whether any assumptions made have been validated; Review whether there is an impact on previous risk assessments and existing hazards; Review whether consideration is given to the accumulative effect of multiple changes; Review that business related changes have considered safety risks (organizational restructuring, downsizing, IT projects, etc.) Evidence of organizational and HF issues being addressed during changes; Review impact of change on training and competencies.

SUMMARY COMMENTS

3.3 CONTINUOUS IMPROVEMENT OF THE SMS

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (evidence)
3.3	The service provider shall monitor and assess its SMS processes to maintain or continuously improve the overall effectiveness of the SMS.	6.3.3 App. 2	There is a documented process to monitor and review the effectiveness of the SMS using the available data and information.	There is evidence of the SMS being periodically reviewed to support the assessment of its effectiveness and appropriate action being taken.	The assessment of SMS effectiveness uses multiple sources of information including the safety data analysis that supports decisions for continuous improvements.	What information and safety data is used for management decision making for continuous improvement; Evidence of: • Lessons learnt being incorporated into SMS and operational processes; • Best practice being sought and embraced; • Surveys and assessments of organizational culture being carried out and acted upon; • Data being analysed and results shared with Safety accountable manager / Safety Committees. Evidence of follow up actions; Feedback from external occurrences, investigation reports, safety meetings, hazard reports, audits, safety data analysis all contribute towards continuous improvement of the SMS.

SUMMARY COMMENTS

4 SAFETY PROMOTION

4.1 TRAINING AND EDUCATION

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (evidence)
4.1.1	The service provider shall develop and maintain a safety training programme that ensures that personnel are trained and competent to perform their SMS duties.	6.4.1	There is a training programme for SMS defined that includes initial and recurrent training. The training covers individual safety duties (including roles, responsibilities and accountabilities) and how the organization's SMS operates.	The SMS training programme is delivering appropriate training to the different staff in the organization and being delivered.	SMS Training is evaluated for all aspects (learning objectives, content, teaching methods and styles, tests) and is linked to the competency assessment. Training is routinely reviewed to take into consideration feedback from different sources.	Review the SMS training programme including course content and delivery method; Check training records against the training programme; Training considers feedback from external occurrences, investigation reports, safety meetings, hazard reports, audits, safety data analysis, training course evaluations, etc. Review how training is assessed for new staff and changes in position; Review training evaluation records; Does the training include human and organizational factors? Ask relevant staff about their own understanding of their role in the organization's SMS and their safety duties
4.1.2	The scope of the safety training programme shall be appropriate to each individual's involvement in the SMS.	6.4.1				

SUMMARY COMMENTS

4.2 SAFETY COMMUNICATION

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (evidence)
4.2	The service provider shall develop and maintain a formal means for safety communication that: a) ensures personnel are aware of the SMS to a degree commensurate with their positions; b) conveys safety-critical information; c) explains why particular safety actions are taken; and d) explains why safety procedures are introduced or changed. <i>See also EU 376/2014 (Article 13(3))</i>	6.4.2	There is a process to determine what safety information (including critical) needs to be communicated and how it is communicated throughout the organization to all personnel as relevant.	Safety information (including critical) is being identified and communicated throughout the organization to all personnel as relevant.	The organization analyses and communicates safety information (including critical) effectively including to contracted organizations (suppliers and customers), through a variety of methods as appropriate to maximise it is being understood. Safety communication is assessed to determine how it is being used and understood and to improve it where appropriate.	Review the sources of information used for safety communication; Review the methods used to communicate safety information, e.g. meetings, presentations, emails, website access, newsletters, bulletins, posters etc.; Assess whether the means of communication is appropriate; Is the means for safety communication being reviewed for effectiveness and material used to update relevant training; Significant events, changes and investigation outcomes are being communicated; Check accessibility to safety information Ask staff about any recent safety communication; Review whether information from occurrences is communicated to all relevant personnel (internal and external).

SUMMARY COMMENTS

Additional aspects to be considered

5.1 Interface Management

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (evidence)
	<i>Appendix 2 Note 2. The service provider's interfaces with other organizations can have a significant contribution to the safety of its products or services. Guidance on interface management as it relates to SMS is provided in the Safety Management</i>	7.1 7.2	The organization has identified and documented the relevant internal and external interfaces and the nature of such interfaces (safety information/data, best practises to be shared).	The organization is managing the interfaces through hazard identification and risk management as agreed by both parties. There is assurance activity to assess risk mitigations being delivered by external organizations.	The organization has a good understanding of interface management and there is evidence that interface risks are being identified and acted upon. Interfacing organizations are sharing safety information and take actions when needed.	Review how interfaces have been documented. It may be included in a system description ; Evidence that: • Safety critical issues, areas and associated hazards are identified; • Safety occurrences are being reported and addressed; • Risk controls actions are applied and regularly reviewed; • Interfaces are reviewed periodically. The organization's SMS covers hazard identification for the external services and activities and internal interfaces;

	ICAO Annex 19 text	Standard section	Present	Operating	Effective	What to look for (evidence)
	<i>Manual (SMM) (Doc 9859).</i>					Training and safety promotion sessions are organised with relevant external organizations; External organizations participate in SMS activities and share safety information.

SUMMARY COMMENTS

Appendix 3 – Example of SMS Manual/Documentation

This appendix should be considered in conjunction with the section 6.1.5 – SMS Documentation.

When SMS documentation is subject to a standalone document (SMS Manual) which would be usually the case for a small or medium organization, it could be structured as the example proposed below (acknowledging that each organization may adapt its documentation to suit their own needs).

0. Document purpose

The manual describes how Safety Management System (SMS) is implemented within the organization, to comply with external and internal SMS requirements.

1. Document control

Manual Preparation:

The Safety Manager prepares this manual with the assistance of the impacted services.

Approvals:

The manual is approved by the Safety Manager and the Safety Accountable Manager.

By signing, the Safety Accountable Manager validates the compliance of this manual with all requirements, and ensures the organization is in line with its content.

Manual changes:

It is recommended that the manual is reviewed at a minimum once a year to remain up to date further to changes in requirements or in company SMS.

The Safety Manager is in charge to revise the manual accordingly.

The change approval circuit is the same as that for the initial approval.

Release, record and archiving:

After approval, the manual is released to all staff covered by SMS, and remains available while it is applicable.

It is recorded within a secured file, and all versions are archived.

2. SMS requirements

The following SMS requirements are applicable to the organization:

Refer to all requirement documents and sections that require an SMS or SMS element(s) (from Authorities, customers, corporate and organization).

3. Scope and integration of the safety management system

The following activities are covered by the organization SMS:

List organization activities that have an impact of the safety of the services or products supplied by the organization.

The following functions are covered by the organization SMS:

List services, departments, directions that have an impact of the safety of the services or products supplied by the organization.

The organization SMS interface with the following external SMS:

List external SMS (customers, suppliers, partners...) with reference to the interface documentation which describe SMS interface activities (contract, specification, plan, interface document...).

4. Safety policy

Safety is a top priority for the company.

Our safety objective is that our operations do not induce aircraft accident or serious incident.

All of us should be aware of the potential safety dangers associated to our activity.

All means should be implemented to reach the highest possible safety level of the products or services we are providing.

In this aspect, it is our individual responsibility to report voluntarily and without delay all information on events of a nature to affect safety of these products or services.

In order to favour communication without fear, the company undertakes not to take any disciplinary measures against anyone who has spontaneously and without delay reported any breach of the rules and procedures that he or she has committed that could have an impact in terms of safety.

The organization commits to investigate and take appropriate actions on any event reported internally.

Whatever our function within the company, each of us must commit to this process of continuous research of the highest level of safety.

Signed
(insert name)
(insert date)

5. Safety objectives

Considering the safety policy as described in chapter 4 of the manual, the following safety objectives are targets that we should reach:

List main objectives defined by the organization to improve the product or service safety

6. Safety accountabilities and key personnel

SMS accountability is assigned to

SMS management is assigned to

SMS reporting is achieved by

7. Hazard identification and risk assessment

All safety events, issues, or hazards should be reported to *(insert name or function)* by e-mail *(insert e-mail address)*, telephone *(insert telephone number)* or verbally.

He or she documents all of them in the Hazard Log *(reference log file)* and assess to determine what the issue is, what could happen as a result, what actions need to be taken (if any) and by whom to manage the risk.

This Hazard Log is reviewed and updated monthly and shared with the organization's management.

When an issue or failure is identified or detected, *(insert name or function)* documents a risk analysis based on the following risk assessment method in a timely manner *(to be completed, Risk = criticality X occurrence likelihood, FMEA, PFMEA, ishikawa ladder ...)*.

When the safety risk is confirmed, the organization implements a resolution plan in proposing palliative/corrective solution(s) in a timely manner.

8. Emergency Response Plan and remedial actions

Reminder for the SMS Standard reader: As stated in this SMS standard (section 1 § 1.4 Coordination of emergency response planning) this Emergency Response Plan is not required but an Emergency Response Plan is considered as a good practice that could be implemented on voluntary basis in design, manufacturing and other organization that could use this standard. The following is an example that could be used and amended by the organization.

In order to respond to an Emergency situation the organization had voluntarily put in place an ERP Team that is: *(to be completed by the organization)*.

In anticipation of such situation: the rules by which the organization enter in an emergency management are the following: *(to be completed by the organization)*.

In such situation the process to be applied is as follow: *(to be completed by the organization)*

1. ERP Team to meet in a short notice (place, means, response time, etc.).
2. ERP Team to evaluate the Emergency of the situation.
3. Define immediate actions:
 - a. Considers a reinforcement of the ERP Team as appropriate.
4. Prepare communication (Customer, Authorities, Medias...) as appropriate:
 - a. Designate the communication responsible for the organization.
 - b. Define the rules for communications.
5. Prepare following short, mid, and long term plans, actions and means sized to the issue to recover normal situation.

9. Safety performance monitoring and measurement

The safety performance measurement and monitoring will review how all safety events, issues, or hazards collected are managed. For this *(insert name or function)* defines the appropriate key safety indicators (e.g. *risk resolution time, number of recommendation implemented, promotion actions performed, trainings returns, process or product change review ...*). Key safety parameter measurement and review are organized every six months *(to be scaled according to the organization activities and product nature)*

Figure C-1: Example of safety performance dashboard

SMS Operational Performance					Status DD.MM/YYYY
Performance Indicator	Objective	Actual	Status	Trend	Recovery Action
Nomination of Key Personnel	All by end of 2021 (12 positions identified)	5	😊	↗️	NA
Communication on department level	Amber 10% below target line	28 of 30	😐	↘️	Planning & Commitment by departments
SMS Training deployment	Amber 10% below target line	58 of 85	😞	➡️	Solve budget Problem with TNG department
# of safety hazards by voluntary reporting	No consecutive decrease for more than 2 month	Stable	😊	➡️	Remind organization
# of new open risks vs # of mitigated risks (monthly)	Red 40%, Amber 35%	36%	😐	↗️	Observe trend
Authority audits: # of open Corrective Action Requests vs total #	Amber > 0%, Red > 10%	12%	😞	↘️	Get authority approval on dedicated CAR
SMS Product Safety Performance					Status DD.MM/YYYY
Performance Indicator	Objective	Actual	Status	Trend	Recovery Action
# of incidents per 100 kFH with root cause within organization	> 10% of all incidents last 12 month rolling	36%	😊	↗️	NA
Average time to put risk mitigation action in place after confirmation of safety impact (significant consequence)	Green < 2 month, Amber < 3 month	1.8	😊	↘️	Communication to departments to reverse trend
Average time to put risk mitigation action in place after confirmation of safety impact (non-significant consequence)	Green < 4 month, Amber < 6 month	5,5	😐	↗️	Observe Trend
New products Entry into Service (12month) - # of incidents above product range (average)	Amber > 0%, Red > 10%	Product X 12%	😞	↗️	Observe Trend

10. Management of changes

Changes (on product, process or organization) are reviewed by *(insert name or function)* while keeping in mind the safety impact of the change. The Safety Risk Assessment (refer to §7) could be the appropriate tool to evaluate the impact of such change on safety.

11. Safety promotion, training and communication

Safety and SMS training or awareness is provided every two years to all stakeholders in safety management.

Any safety critical information that needs to be distributed will be sent by e-mail to all our stakeholders and posted on the company display panels. All staff is expected to review the panels and read any new safety articles.

These activities are managed by *(insert name or function)*.

12. Continuous improvement and SMS audit

Each year, the Safety Accountable Manager and Safety Manager meet to review company SMS performances. Due actions are implemented to ensure system continuous improvement.

The SMS is audited at least once every 3 years.

The generic agenda of SMS reviews covers:

- Review of safety performance results (safety performance dashboard), as defined in § 3.1.
- Main changes in the SMS driven by internal or external requirements.
- Status of the SRM for identified top level risks.
- Effectiveness of the safety risk controls.
- New hazards and risks identified by the SRM since last review.
- Good practices identified and recorded.
- Action plan for the improvement of the safety performance, including allocation of resources and identification of action leaders.
- Review of policy and objectives; update as needed.

13. SMS records management

Records of all documents mentioned in this manual are retained by *(insert name or function)*.

Appendix 4 – Compliance with FAA 14 CFR Part 5

This appendix provides the additional FAA requirements to be met when using this SMS Standard for demonstrating compliance with 14 CFR part 5.

Although Chapter 6 of this standard provides a means of compliance with ICAO Annex 19 (second Edition) Appendix 2, to use it for voluntary compliance of design, manufacturing and maintenance organizations with 14 CFR part 5, the following specific requirements must be met:

- Describe the system to identify the scope of the SMS as per 14 CFR part 5.51 (Safety Risk Management-Applicability) & 5.53 (Safety Risk Management-System analysis and hazard identification).
- Manage the SMS records as per part 5.97 (SMS documentation and Recordkeeping).
- Implement Safety performance monitoring and measurement process as per 14 CFR part 5.71 (Safety performance monitoring and measurement) & 5.73 (safety performance assessment).

Appendix 5 – Correlation between ICAO Annex 19 app. 2, SMS Standard, IAQG 9100:2016 & IAQG 9110:2016

A full Safety Management System (SMS) as defined in ICAO (International Civil Aviation Organization) Annex 19 Appendix 2 is not required by QMS (Quality Management System) Standards IAQG 9100-series (1), but the introduction of Product Safety in these QMS standards contributes to the SMS approach.

Within these IAQG 9100-series, the scope of Product Safety requirements is limited to the most appropriate areas of the standards so as to be applicable to all stakeholders. Requirements remain high level to allow bridging existing regulatory requirements from Aviation Authorities.

Note:

IAQG 9100 - Quality Management Systems - Requirements for Aviation, Space and Defence Organizations

IAQG 9110 - Quality Management Systems - Requirements for Aviation Maintenance Organizations

The following table shows the correlation between ICAO Annex 19 App. 2, the present SMS Standard, IAQG 9100:2016 and IAQG 9110:2016

ICAO Annex 19 app.2	SMS Standard	IAQG 9100:2016	IAQG 9110:2016
1. Safety policy and objectives 1.1 Management commitment 1.2 Safety accountability and responsibilities 1.3 Appointment of key safety personnel 1.4 Coordination of emergency response planning 1.5 SMS documentation	6. UNDERSTANDING & MEANS OF COMPLIANCE WITH SMS REQUIREMENTS 6.1 Safety Policy and Objectives 6.1.1 Management commitment 6.1.2 Safety Accountability and Responsibilities 6.1.3 Appointment of Key Safety Personnel 6.1.4 Coordination of Emergency Response Planning 6.1.5 SMS Documentation 7. INTERFACES BETWEEN ORGANIZATIONS	8.1 Operational planning and control	5.1.1 Leadership and commitment – General 5.2.3 Establishing and communicating the safety policy 7.5 Documented information 8.1 Operational planning and control
2. Safety risk management 2.1 Hazard identification 2.2 Safety risk assessment and mitigation	6. UNDERSTANDING & MEANS OF COMPLIANCE WITH SMS REQUIREMENTS 6.2 Safety Risk Management 6.2.1 Hazard Identification 6.2.2 Safety Risk Assessment and Mitigation 7. INTERFACES BETWEEN ORGANIZATIONS	8.1.3 Product safety	8.1.3 Product safety
3. Safety assurance 3.1 Safety performance monitoring and measurement 3.2 The management of change 3.3 Continuous improvement of the SMS	6. UNDERSTANDING & MEANS OF COMPLIANCE WITH SMS REQUIREMENTS 6.3 Safety Assurance 6.3.1 Safety Performance Monitoring and Measurement 6.3.2 The Management of Change 6.3.3 Continuous Improvement of the SMS	8.1.3 Product safety	6.3 Planning of changes 8.1.3 Product safety 9.1.1 Monitoring, measurement, analysis and evaluation - General 9.1.2 Customer satisfaction 9.1.3 Analysis and evaluation 9.3. Management review 10.1 Improvement - General

	7. INTERFACES BETWEEN ORGANIZATIONS		
4. Safety promotion 4.1 Training and education 4.2 Safety communication	6. UNDERSTANDING & MEANS OF COMPLIANCE WITH SMS REQUIREMENTS 6.4 Safety Promotion 6.4.1 Training and Education 6.4.2 Safety Communication 7. INTERFACES BETWEEN ORGANIZATIONS	7.3 Awareness 8.1.3 Product safety 8.4.3 Information for external providers	7.3 Awareness 7.4 Communication 8.1.3 Product safety 8.4.1 Control of externally provided processes, products and services - General 8.4.3 Information for external providers

Appendix 6 – Acronyms

AIA	Aerospace Industries Association
AIAB	Associação das Indústrias Aeroespaciais do Brasil
AIAC	Aerospace Industries Association of Canada
AMO	Approved Maintenance Organization
AO	Approved Organization
AOC	Air Operator Certificate
ASD	AeroSpace & Defence Industries Association of Europe
ATM	Air Traffic Management
ATO	Approved Training Organization
ATS	Air Transport System
BMS	Business Management System
CAA	Civil Aviation Authority
CAMO	Continuing Airworthiness Management Organization
CEO	Chief Executive Officer
DO	Design Organization
DOA	Design Organization Approval
ERP	Emergency Response Plan
EU	European Union
FAA	Federal Aviation Administration
GAMA	General Aviation Manufacturers Association
HF	Human Factors
Ho	Head of
ICAO	International Civil Aviation Organization
KPI	Key Performance Indicator
LOI	Level of Involvement
MO	Maintenance Organization
MOA	Maintenance Organization Approval
MRO	Maintenance and Repair Organization
MTO	Maintenance Training Organization
N/A	Not Applicable
NAA	National Aviation Authority
NAS	National Aerospace Standard
NPA	Notices of Proposed Amendment
OCC	OCCurrence
PO	Production Organization
POA	Production Organization Approval
QMS	Quality Management System
RO	Reported Occurrence
SA	Safety Assurance
SARPs	Standards And Recommended Practices (ICAO)
SMART	Specific, measurable, achievable, realistic, time bound
SMICG	Safety Management International Collaboration Group
SMM	Safety Management Manual
SMS	Safety Management System
SOPs	Standard Operating Procedures

SPI	Safety Performance Indicator
SRM	Safety Risk Management
ToR	Terms of Reference
UE	Unsafe/Unwanted Event
WG	Working Group