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Doc 9859

Safety Management Manual

Fourth Edition, 2018



Approved by and published under the authority of the Secretary General

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FOREWORD

This fourth edition of the Safety Management Manual (SMM) supersedes the third edition, published in May 2013, in its entirety. The development of this edition was initiated after the adoption of Amendment 1 to Annex 19 to address the changes introduced by the amendment and to reflect the knowledge and experience gained since the last revision.

To address the needs of the diverse aviation community implementing safety management and a recommendation stemming from the second High-level Safety Conference held in 2015, the Safety Management Implementation (SMI) website (www.icao.int/SMI) has been developed to complement the SMM and serves as a repository for the sharing of best practices. Practical examples, tools, and supporting educational material will be collected, reviewed and posted on the website on an ongoing basis.



This edition is intended to support States in implementing effective State safety programmes (SSP). This includes ensuring that service providers implement safety management systems (SMS) in accordance with the provisions of Annex 19. In order to be consistent with Safety management principles, a concerted effort has been made to focus on the intended outcome of each Standard and Recommended Practice (SARP), purposely avoiding being overly prescriptive. Emphasis has been placed on the importance of each organization tailoring the implementation of safety management to fit their specific environment.

Note 1.— In this manual, the term “organization” is used to refer to both States and service providers.

Note 2.— In this manual, the term “service provider” is used to refer to an aviation industry organization implementing SMS whether on a mandatory or voluntary basis, unlike Annex 19 which uses the term to refer to a very specific list of organizations found in Chapter 3, which excludes international general aviation operators.

The fourth edition is divided into nine chapters which progressively build the reader's understanding of safety management. These chapters can be grouped under the following three themes:

- 1) *Safety management fundamentals* – Chapters 1 to 3 build the reader's understanding of the fundamental principles underpinning safety management.

- 2) *Developing safety intelligence* – Chapters 4 to 7 build on the fundamentals. These chapters comprise four interrelated topics concerned with leveraging safety data and safety information to develop actionable insights which can be used by an organization's leadership to make data-driven decisions, including those related to the most effective and efficient use of resources.
- 3) *Safety management implementation* – Chapters 8 and 9 explain how to apply the concepts from the preceding chapters to institutionalize safety management at the State and service provider level.

Guidance to support sector-specific safety management SARPs found outside of Annex 19 (e.g. flight data analysis programmes) is not addressed in this manual. The *Manual of Aircraft Accident and Incident Investigation* (Doc 9756) contains guidance on the conduct of independent State accident and incident investigations in accordance with Annex 13 — *Aircraft Accident and Incident Investigation*.

ICAO gratefully acknowledges the contributions of the Safety Management Panel (SMP) and the Safety Information Protection Implementation Group (SIP IG) as well as other expert groups and individual experts who provided support, advice and input for this manual. The content was developed over a period of two years and was thereafter submitted for an extensive peer review to collect and take into account comments from the expert community, taking into consideration that the manual is expected to be the overarching guidance for safety management for a wide community.

Comments on this manual, particularly with regard to its application and usefulness, would be appreciated from all States, safety oversight audit missions and ICAO technical cooperation field missions. These will be taken into consideration in the preparation of subsequent editions. Comments should be addressed to:

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GLOSSARY

DEFINITIONS

When the following terms are used in the manual, they have the meanings indicated below.

Note.— Where an asterisk appears beside a term, the term has already been defined as such in Annexes and Procedures for Air Navigation Services (PANS).

Acceptable level of safety performance (ALoSP). The level of safety performance agreed by State authorities to be achieved for the civil aviation system in a State, as defined in its State safety programme, expressed in terms of safety performance targets and safety performance indicators.

Accountable executive. A single, identifiable person having responsibility for the effective and efficient performance of the service provider's SMS.

Change management. A formal process to manage changes within an organization in a systematic manner, so that changes which may impact identified hazards and risk mitigation strategies are accounted for, before the implementation of such changes.

Defences. Specific mitigating actions, preventive controls or recovery measures put in place to prevent the realization of a hazard or its escalation into an undesirable consequence.

Errors. An action or inaction by an operational person that leads to deviations from organizational, or the operational person's, intentions or expectations.

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

Risk mitigation. The process of incorporating defences, preventive controls or recovery measures to lower the severity and/or likelihood of a hazard's projected consequence.

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.

***Safety data.** A defined set of facts or set of safety values collected from various aviation-related sources, which is used to maintain or improve safety.

Note.— Such safety data is collected from proactive or reactive safety-related activities, including but not limited to:

- a) accident or incident investigations;
- b) safety reporting;
- c) continuing airworthiness reporting;
- d) operational performance monitoring;

- e) inspections, audits, surveys; or
- f) safety studies and reviews.

***Safety information.** Safety data processed, organized or analysed in a given context so as to make it useful for safety management purposes.

***Safety management system (SMS).** A systematic approach to managing safety, including the necessary organizational structures, accountability, responsibilities, policies and procedures.

Safety objective. A brief, high-level statement of safety achievement or desired outcome to be accomplished by the State safety programme or service provider's safety management system.

Note.— Safety objectives are developed from the organization's top safety risks and should be taken into consideration during subsequent development of safety performance indicators and targets.

***Safety oversight.** A function performed by a State to ensure that individuals and organizations performing an aviation activity comply with safety-related national laws and regulations.

***Safety performance.** A State's or service provider's safety achievement as defined by its safety performance targets and safety performance indicators.

***Safety performance indicator.** A data-based parameter used for monitoring and assessing safety performance.

***Safety performance target.** The State or service provider's planned or intended target for a safety performance indicator over a given period that aligns with the safety objectives.

***Safety risk.** The predicted probability and severity of the consequences or outcomes of a hazard.

***State safety programme (SSP).** An integrated set of regulations and activities aimed at improving safety.

***Surveillance.** The State activities through which the State proactively verifies through inspections and audits that aviation licence, certificate, authorization or approval holders continue to meet the established requirements and function at the level of competency and safety required by the State.

System. An organized, purposeful structure that consists of interrelated and interdependent elements and components, and related policies, procedures and practices created to carry out a specific activity or solve a problem.

Trigger. An established level or criteria value for a particular safety performance indicator that serves to initiate an action required, (e.g., an evaluation, adjustment or remedial action).

ABBREVIATIONS AND ACRONYMS

ADREP	Accident/incident data reporting
AIA	Accident investigation authority
ALoSP	Acceptable level of safety performance
AOC	Air operator certificate
ATS	Air traffic service(s)
CAA	Civil aviation authority
CVR	Cockpit voice recorder
D3M	Data-driven decision-making
Doc	Document
ERP	Emergency response plan
FDA	Flight data analysis
FDR	Flight data recorder
FMS	Financial management system
FRMS	Fatigue risk management systems
GASP	Global Aviation Safety Plan
ICAO	International Civil Aviation Organization
iSTARS	Integrated Safety Trend Analysis and Reporting System
LOSA	Line operations safety audit
OHSMS	Occupational health and safety management system
OSHE	Occupational safety, health and environment
PIRG	Planning and implementation regional group
QMS	Quality management system
RASG	Regional aviation safety group
RSOO	Regional safety oversight organization
SAG	Safety action group
SARPs	Standards and Recommended Practices
SD	Standard deviation
SDCPS	Safety data collection and processing system
SeMS	Security management system
SMM	Safety management manual
SMP	Safety Management Panel
SMS	Safety management system(s)
SPI	Safety performance indicator
SPT	Safety performance target
SRB	Safety review board
SRBS	Safety risk-based surveillance
SRM	Safety risk management
SSO	State safety oversight
SSP	State safety programme
STDEVP	Population standard deviation
TNA	Training needs analysis
USOAP	Universal Safety Oversight Audit Programme

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PUBLICATIONS

(referred to in this manual)

The following documents are referred to in this manual or may provide additional guidance material.

ICAO DOCUMENTS

Annexes to the Convention on International Civil Aviation

Annex 1 — Personnel Licensing

Annex 6 — Operation of Aircraft

Part I — International Commercial Air Transport — Aeroplanes

Part II — International General Aviation — Aeroplanes

Annex 8 — Airworthiness of Aircraft

Annex 13 — Aircraft Accident and Incident Investigation

Annex 14 — Aerodromes

Volume I — Aerodrome Design and Operations

Annex 18 — The Safe Transport of Dangerous Goods by Air

Annex 19 — Safety Management

PANS

Procedures for Air Navigation Services (PANS) — Aerodromes (Doc 9981)

Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM, Doc 4444)

Manuals

Airport Services Manual (Doc 9137), Part 3 — Wildlife Control and Reduction

Air Traffic Services Planning Manual (Doc 9426)

Airworthiness Manual (Doc 9760)

Aviation Security Manual (Doc 8973 — Restricted)

Global Aviation Safety Plan (GASP) (Doc 10004)

(xi)

Manual of Aircraft Accident and Incident Investigation (Doc 9756)

- Part I — *Organization and Planning*
- Part II — *Procedures and Checklists*
- Part III — *Investigation*
- Part IV — *Reporting*

Manual for the Oversight of Fatigue Management Approaches (Doc 9966)

Manual on Laser Emitters and Flight Safety (Doc 9815)

Manual on Remotely Piloted Aircraft Systems (RPAS) (Doc 10019)

Manual on the Competencies of Civil Aviation Safety Inspectors (Doc 10070)

Manual on the ICAO Bird Strike Information System (IBIS) (Doc 9332)

Manual on Protection of Safety Information (Doc 10053)

- Part I — *Protection of Accident and Incident Investigation Records*

Safety Oversight Manual (Doc 9734)

- Part A — *The Establishment and Management of a State Safety Oversight System*
- Part B — *The Establishment and Management of a Regional Safety Oversight Organization*

Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284)

Chapter 1

INTRODUCTION

1.1 WHAT IS SAFETY MANAGEMENT?

1.1.1 Safety management seeks to proactively mitigate safety risks before they result in aviation accidents and incidents. Through the implementation of safety management, States can manage their safety activities in a more disciplined, integrative and focused manner. Possessing a clear understanding of its role and contribution to safe operations enables a State, and its aviation industry, to prioritize actions to address safety risks and more effectively manage its resources for the optimal benefit of aviation safety.

1.1.2 The effectiveness of a State's safety management activities is strengthened when implemented in a formal and institutionalized way through a State safety programme (SSP) and through safety management systems (SMSs) for its service providers. A State's safety programme, combined with the SMSs of its service providers, systematically addresses safety risks, improves the safety performance of each service provider, and collectively, improves the State's safety performance.

1.1.3 The SSP is developed and maintained by each State as a structured approach to assist in managing its aviation safety performance. The existing aviation safety record is achieved through a traditional compliance-based approach and should continue to be treated as the foundation of the SSP. As such, States should ensure they have effective safety oversight systems in place. More information on the SSP may be found in Chapter 8.

1.1.4 A State shall require that an SMS is developed and maintained by those service providers under its authority, as identified in Annex 19 — *Safety Management*, to continuously improve safety performance by identifying hazards, collecting and analysing data, and continuously assessing and managing safety risks (see paragraph 1.2 for details on SMS applicability). More information on the implementation of SMS may be found in Chapter 9.

1.1.5 The ICAO *Global Aviation Safety Plan* (GASP, Doc 10004) objectives call for States to put in place robust and sustainable safety oversight systems and to progressively evolve these into a more sophisticated means of managing safety performance. These objectives align with ICAO's requirements for the implementation of SSPs by States and SMSs by service providers.

1.1.6 This performance-based approach to safety offers improvements as it focuses on achieving the desired outcome rather than concentrating solely on whether a State is compliant or not. It is important to note, however, that the implementation of a safety performance approach is collaborative as it requires effort on the part of the aviation industry to develop appropriate means to achieve the specified outcomes and, with respect to States, to evaluate each service provider's approach.

1.1.7 BENEFITS OF SAFETY MANAGEMENT

There are many benefits to implementing safety management, some of which include:

- a) *Strengthened safety culture* – An organization's safety culture can be strengthened by making visible the commitment of management and actively involving personnel in the management of safety risk. When management actively endorses safety as a priority, it is typically well-received by personnel and becomes part of normal operations.
- b) *Documented, process-based approach to assure safety* – Establishes a clear and documented approach to achieving safe operations that is understandable by personnel and can be readily explained to others. In addition, clearly defining baseline performance allows controlled changes when continuously improving the safety programme/system, thereby helping the organization optimize resources required to implement change.
- c) *Better understanding of safety-related interfaces and relationships* – The process of documenting and defining safety management interfaces can benefit the organization's understanding of the inter-process relationships, leading to an enhanced understanding of the end-to-end process and exposing opportunities for increased efficiencies.
- d) *Enhanced early detection of safety hazards* – Improves the State/service provider's ability to detect emerging safety issues, which can prevent accidents and incidents through the proactive identification of hazards and management of safety risks.
- e) *Safety data-driven decision-making* – Improves the State/service provider's ability to gather safety data for the purpose of safety analysis. With some strategic thinking to determine what questions need to be answered, the resulting safety information can aid decision makers, in near real-time, to make better-informed, valid decisions. An important aspect of this decision-making is the allocation of resources to areas of greater concern or need.
- f) *Enhanced communication of safety* – Provides a common safety language throughout an organization and industry. A common safety language is a key enabler to the development of a common understanding of the organization's safety goals and accomplishments. In particular, it provides an appreciation for the organization's safety objectives and its safety performance indicators (SPIs) and safety performance targets (SPTs), which provide the direction and motivation for safety. Personnel will be more aware of the organization's performance and the progress being made toward achieving the defined safety objectives, as well as how they contribute to the organization's success. The common safety language enables service providers with multiple aviation businesses to aggregate safety information across organizational entities. It is necessary to support the management of interfaces across the aviation system.
- g) *Evidence that safety is a priority* – Demonstrates how management supports and enables safety, how safety risks are identified and managed, and how safety performance is continually improved, resulting in increased confidence by the aviation community, internal and external to the organization. This also results in personnel who are confident about the organization's safety performance, which can lead to the increased attraction and retention of high calibre staff. It also allows for States and regional safety oversight organizations (RSOOs) to develop confidence in the safety performance of service providers.
- h) *Possible financial savings* – May allow for some service providers to qualify for a discount on their insurance premiums and/or a reduction to their workers' compensation premiums based on their SMS results.

- i) *Improved efficiencies* – Possible reduction in the cost of operations by exposing inefficiencies in existing processes and systems. Integration with other internal or external management systems may also save on additional costs.
- j) *Cost avoidance* – Through the proactive identification of hazards and safety risk management (SRM), the cost incurred due to accidents and incidents can be avoided. In such cases, direct costs may include: injuries; property damage; equipment repairs; and schedule delays. Indirect costs may include: legal action; loss of business and damaged reputation; surplus spares; tools and training; increased insurance premiums; loss of staff productivity; equipment recovery and clean-up; loss of use of equipment leading to short-term replacement equipment; and internal investigations.

1.2 SAFETY MANAGEMENT APPLICABILITY

State safety management responsibilities are outlined in Annex 19, Chapter 3, and include requiring service providers identified in the SARPs to implement SMS. Provisions related to the implementation of SMSs by service providers may be found in Chapter 4 and Appendix 2 of Annex 19.

1.2.1 SMS applicability

1.2.1.1 The assessment to determine the applicability of SMS for Amendment 1 to Annex 19 was based on a set of criteria. These same criteria are expected to be used periodically by ICAO and the Safety Management Panel (SMP) to reassess the need to extend the applicability to other aviation organizations.

Total system safety approach

1.2.1.2 A total system safety approach considers the entire aviation industry as a system. All service providers, and their systems for the management of safety, are considered as sub-systems. This allows a State to consider the interactions, and cause and effect, throughout the whole system. It is often impossible or impractical to build all safety systems in the same way. Therefore, a primary concern for States and service providers is how to best manage the interfaces between dissimilar interacting systems.

1.2.1.3 When reviewing SMS applicability, the link between service providers who already have an SMS requirement under Annex 19 and other organizations conducting an aviation activity was considered. Application of SMS should reduce the risk of safety gaps or overlaps, not increase safety risk through decreased interoperability.

Subcontracting implications

1.2.1.4 For SRM to be effective across service providers it is important to clearly define the responsibilities for the identification of hazards and management of associated safety risks for the entire chain of services within the system, without gaps or overlaps. Where a service provider with an SMS requirement contracts to an organization not subject to SMS, the hazards and safety risks potentially introduced by the contractor are addressed by the SMS of the service provider. This places additional SRM responsibilities on the service provider to ensure they are knowledgeable about the safety risks induced by the activities of their contractor(s). For more information on SRM, see Chapter 2.

Safety risk control through regulations

1.2.1.5 States should assess whether the existing legislation and regulations effectively address the hazards entailed by the activity. It could be that existing requirements provide sufficient safety risk mitigation and imposing a requirement for SMS for those organizations not applicable under Annex 19 may not yield substantial safety benefit.

1.2.2 Extension of discretionary SMS applicability

1.2.2.1 The applicability criteria outlined above may also serve as guidance for States when considering an extension of SMS applicability beyond that defined in Annex 19 or the promotion of voluntary implementation. Application of discretionary SMS applicability should be thoughtfully considered. The decision to extend the SMS applicability to sectors or service providers should take into account the safety risks identified in the State and if the decision is taken, the SMS implementation should be monitored as part of the SSP. Before requiring SMS, States are asked to consider whether:

- a) there are any other viable options for achieving the desired improvement in safety performance; and
- b) sufficient resources are available for the State and industry sector to implement and monitor the SMS. In particular, consideration needs to be given to the possible impact on staffing and the potential challenge of acquiring and integrating the necessary skills and knowledge.

1.2.2.2 Each State should consider the acceptable level of safety performance (ALoSP) across their industry and institute an SMS applicability scheme that is most likely to achieve their State's safety objectives. The SMS applicability scheme applied will likely evolve in continual alignment with the State's ALoSP.

1.2.3 Safety management responsibility

No provision of Annex 19 is intended to transfer to the State the responsibilities of the aviation service provider or operator. States possess many tools to manage safety within their system. As part of its SSP, each State should consider the best options for the oversight of aviation activities that may not fall within current ICAO Annexes or that of new or emerging activities.

1.2.4 Applicability for State-owned or military service providers

1.2.4.1 In some States, the service provider function is provided by the State civil service or military. Some civilian service providers provide contracted services to the military, and some military organizations provide civilian service. Regardless of the arrangement, the service provider for the civilian service in the State should be required to address all the applicable ICAO SARPs, including the Annex 19 SMS requirements without regard to the specific nature of such organization. The State's or service provider's system description should have regard for the functions of these organizations and their relationship to each other. The accountable executive of the service provider, whether civil or military, should be capable of explaining the arrangements and how safety risks are managed. Put simply, service providers should manage safety regardless of the organizational arrangements.

1.2.4.2 Where the State operates as a service provider there should be a clear separation between its functions as the service provider and that of the State regulatory authority. This is accomplished by having clearly defined roles and responsibilities for State authority and service provider personnel to avoid any conflicts of interest.

1.2.5 Occupational safety, health and environment versus aviation safety

Occupational safety, health and environment (OSHE) (also referred as occupational health and safety (OHS) or workplace health and safety (WHS)) is a field concerned with the safety, health, and welfare of people at work. The primary difference between aviation safety management and OSHE systems is the intent. In many States employers have a legal duty to take reasonable care of the health and safety of their employees. The intention of OSHE programmes is to meet the legal and ethical obligations of employers by fostering a safe and healthy work environment. These issues are normally addressed under a different government body from the one that handles aviation matters. As such, Annex 19, Chapter 2, *Applicability*, intentionally focuses on “safety management functions related to, or in direct support of, the safe operation of aircraft”.

1.3 IMPLEMENTING SAFETY MANAGEMENT

1.3.1 Establishing a solid foundation is essential to achieving effective safety management implementation. The following aspects should be addressed as the first steps in implementing SSP or SMS requirements:

- a) *Senior management commitment*: It is essential that senior management of all State aviation agencies is committed to effective safety management implementation.
- b) *Compliance with prescriptive requirements*: The State should ensure that a mature safety oversight system is in place for the licensing, certification, authorization and approval of individuals and organizations performing aviation activities in their State, including qualified technical personnel. Service providers should ensure that they have processes in place to ensure continued compliance with the established prescriptive requirements.
- c) *Enforcement regime*: The State should establish an enforcement policy and frameworks to enable parties to manage and resolve deviations and minor violations.
- d) *Safety information protection*: It is essential that States put in place a protective legal framework to ensure the continued availability of safety data and safety information.

1.3.2 System description

The system description is a summary of the organization's (State or service provider) processes, activities and interfaces that need to be assessed for hazard identification and safety risk assessment that is covered by their safety system. It describes the aviation system, within which the organization functions, and the various entities and authorities involved. It includes interfaces within the organization, as well as interfaces with external organizations that contribute to the safe delivery of services. The system description provides a starting point to implement the SSP/SMS. More information on the system description for States and service providers may be found in Chapters 8 and 9, respectively.

1.3.3 Interfaces

1.3.3.1 When States and service providers are considering implementing safety management it is important to consider the safety risks induced by interfacing entities. Interfaces can be internal (e.g. between operations and maintenance, or finance, human resources or legal departments), or they can be external (e.g. other State, service providers or contracted services). States and service providers have greater control over any related safety risks when interfaces are identified and managed. Interfaces are defined as part of the system description.

Interface safety impact assessment

1.3.3.2 Once a State or service provider has identified its interfaces, the safety risk posed by each interface is assessed using the organization's existing safety risk assessment processes (see Chapter 2 for details). Based on the safety risks identified, the State or service provider may consider working with other organizations to determine an appropriate safety risk control strategy. Organizations working collaboratively may be able to identify more interface hazards; assessing any related safety risks and determining mutually appropriate controls. Collaboration is highly desirable because the safety risk perception may vary between organizations.

1.3.3.3 It is also important to recognize that each organization involved is responsible for identifying and managing any identified hazards that affect its organization. The criticality of the interface may differ for each organization. Each organization might reasonably apply different safety risk classifications and have different safety risk priorities (in terms of safety performance, resources, time).

Monitoring and management of interfaces

1.3.3.4 States and service providers are responsible for ongoing monitoring and management of their interfaces to ensure the safe provision of services. An effective approach to interface SRM is to establish formal agreements between interfacing organizations with clearly defined monitoring and management responsibilities. Documenting and sharing all interface safety issues, safety reports and lessons learned, as well as safety risks between interfacing organizations will ensure clear understanding. Sharing enables transfer of knowledge and working practices that could improve the safety effectiveness of each organization.

1.3.4 Implementation planning

1.3.4.1 Performing a gap analysis before embarking on the implementation of SSP/SMS will allow an organization to identify the gap between the current organizational structures and processes, and those required for effective SSP or SMS operation. For SSP, it is important to include a review of the Universal Safety Oversight Audit Programme (USOAP) protocol questions which are considered as the foundation of the SSP.

1.3.4.2 The SSP or SMS implementation plan is, as the name implies, a plan for SSP/SMS implementation. It provides a clear description of the resources, tasks and processes required, and an indicative timing and sequencing of key tasks and responsibilities. More information on the implementation of safety management for States and service providers may be found in Chapters 8 and 9, respectively.

Maturity assessment

1.3.4.3 Soon after the key components and elements of the SSP or SMS are implemented, periodic assessments should be conducted to monitor how effectively it is working. As the system matures, the organization should seek assurance that it is operating as intended and is effective at achieving its stated safety objectives and targets. Safety management takes time to mature and the aim should be to maintain or continuously improve the safety performance of the organization.

1.3.5 Size and complexity considerations

1.3.5.1 Each State and each service provider is different. SSPs and SMSs are designed to be tailored to meet the specific needs of each State or service provider. All components and all elements of SSP/SMS are interconnected and interdependent, and necessary to function effectively. It is important that SSP and SMS requirements are not implemented only in a prescriptive manner. The traditional prescriptive requirements are to be complemented with a performance-based approach.

1.3.5.2 The programme/system is designed to deliver the desired outcomes for each organization without undue burden. SSP and SMS, well implemented, are intended to complement and enhance the organization's existing systems and processes. Effective safety management will be achieved through thoughtful planning and implementation, ensuring each requirement is addressed in ways that fit the organization's culture and operating environment. More information on what to consider when implementing SSP/SMS for States and service providers may be found in Chapters 8 and 9, respectively.

1.3.6 Integrating the basic elements

It is important to note that all systems are composed of three basic elements: people; processes; and technology. Safety management is no exception. When establishing or maintaining the different processes, activities and functions, all States and service providers should ensure they have considered the intention of each requirement and, most importantly, how they will work together to enable the organization to meet its safety objectives. Each of these elements of safety management, and the interrelationships, will be covered throughout this manual.

1.4 INTEGRATED RISK MANAGEMENT

1.4.1 The aviation system as a whole comprises many and different functional systems such as finance, environment, safety and security. The latter two are the primary operational domains of the greater aviation system. As concepts they share important features as they are all concerned with the risk of events with consequence of various magnitudes. Nevertheless, they differ in the important element of intent. Security is concerned with malicious, intentional acts to disrupt the performance of a system. Safety focuses on the negative impact to the concerned systems' performance caused by unintended consequences of a combination of factors.

1.4.2 In the operational context, all of the functional systems produce some sort of risk that needs to be appropriately managed to lessen any adverse consequence. Traditionally, each system has developed sector specific risk management frameworks and practices designed to address the distinct characteristics of each system. Most of those risk management practices include comprehensive analysis on intra-system consequences, often referred to as the management of unintended consequences. Another aspect is inter-system consequences resulting from system specific risk management processes. This relates to the fact that an effective risk management strategy of one specific sector can have an adverse impact on another operational sector of aviation. In aviation, the most often emphasized inter-system dependence is the safety/security dilemma. Effective security measures may have negative impacts on safety, and vice versa. Safety and security domains may differ in the element of underlying intent, but they converge in their common goal to protect people and assets (e.g. addressing cyber threats and risks requires coordination across the aviation safety and security domains). In some cases the management of the inherent risk of one may affect the other domain in unforeseen ways, such as in the following examples:

- a) reinforced cockpit doors necessitated due to security risks may have safety implications on the operation of an aircraft;
- b) restrictions on the carriage of personal electronic devices in the cabin may displace the security risk from the cabin to the cargo hold, leading to heightened safety risk; and

- c) change of routes to avoid flying over conflict zones may result in congested air corridors that pose a safety issue.

1.4.3 Successful risk management in aviation should aim for overall risk reduction in the system, including all of the involved functional systems. This process requires the analytical assessment of the whole system at the highest level of the appropriate entity (State, regional organizations, service providers). The assessment and integration of functional system needs and interdependence are referred to as integrated risk management (IRM). IRM focuses on the overall risk reduction of the organization. This is achieved through the quantitative and qualitative analysis of both the inherent risks, and the effectiveness and impact of sector-specific risk management processes. IRM has a system-wide responsibility to coordinate, harmonize and optimize risk management processes with the single goal of risk reduction. IRM cannot replace the operating specific risk managements of the functional systems, and does not intend to delegate additional duties and responsibilities to them. IRM is a distinct high-level concept to leverage the expert advice of sector-specific risk management and provide holistic feedback to achieve the highest level of system performance at a socially acceptable level. More information related to safety risk management, which is within the scope of this manual, may be found in Chapters 2, 8 (for States) and 9 (for service providers).

Note.— The structure and areas of responsibility of the government within the State may affect oversight of each area. For example, the civil aviation authority (CAA) having responsibility for aviation safety, while the environmental protection agency has responsibility for environmental oversight. Each oversight entity may have different requirements and methodologies.

Chapter 2

SAFETY MANAGEMENT FUNDAMENTALS

2.1 THE CONCEPT OF SAFETY AND ITS EVOLUTION

2.1.1 This chapter provides an overview of fundamental safety management concepts and practices. It is important to understand these fundamentals before focusing on the specifics of safety management found in the subsequent chapters.

2.1.2 Within the context of aviation, safety is “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”.

2.1.3 Aviation safety is dynamic. New safety hazards and risks continuously emerge and must be mitigated. As long as safety risks are kept under an appropriate level of control, a system as open and dynamic as aviation can still be kept safe. It is important to note that acceptable safety performance is often defined and influenced by domestic and international norms and culture.

2.1.4 Progress in aviation safety can be described by four approaches, which roughly align with eras of activity. The approaches are listed below and are illustrated in Figure 2-1.

- a) *Technical* — From the early 1900s until the late 1960s, aviation emerged as a form of mass transportation in which identified safety deficiencies were initially related to technical factors and technological failures. The focus of safety endeavours was therefore placed on the investigation and improvement of technical factors (the aircraft, for example). By the 1950s, technological improvements led to a gradual decline in the frequency of accidents, and safety processes were broadened to encompass regulatory compliance and oversight.
- b) *Human factors* — By the early 1970s, the frequency of aviation accidents had significantly declined due to major technological advances and enhancements to safety regulations. Aviation became a safer mode of transportation, and the focus of safety endeavours was extended to include human factors, including such things as the “man/machine interface”. Despite the investment of resources in error mitigation, human factors continue to be cited as a recurring factor in accidents. Human factors tended to focus on the individual, without fully considering the operational and organizational context. It was not until the early 1990s that it was acknowledged that individuals operate in a complex environment that included multiple factors which could affect behaviour.
- c) *Organizational* — During the mid-1990s, safety began to be viewed from a systemic perspective and began encompassing organizational factors as well as human and technical factors. The notion of an “organizational accident” was introduced. This perspective considered the impact of such things as organizational culture and policies on the effectiveness of safety risk controls. Additionally, routine safety data collection and analysis using reactive and proactive methodologies enabled organizations to monitor known safety risks and detect emerging safety trends. These enhancements provided the learning and foundation which lead to the current safety management approach.

- d) *Total system* — From the beginning of the 21st century, many States and service providers had embraced the safety approaches of the past and evolved to a higher level of safety maturity. They have begun implementing SSP or SMSs and are reaping the safety benefits. However, safety systems to date have focused largely on individual safety performance and local control, with minimal regard for the wider context of the total aviation system. This has led to growing recognition of the complexity of the aviation system and the different organizations that all play a part in aviation safety. There are many examples of accidents and incidents showing that the interfaces between organizations have contributed to negative outcomes.

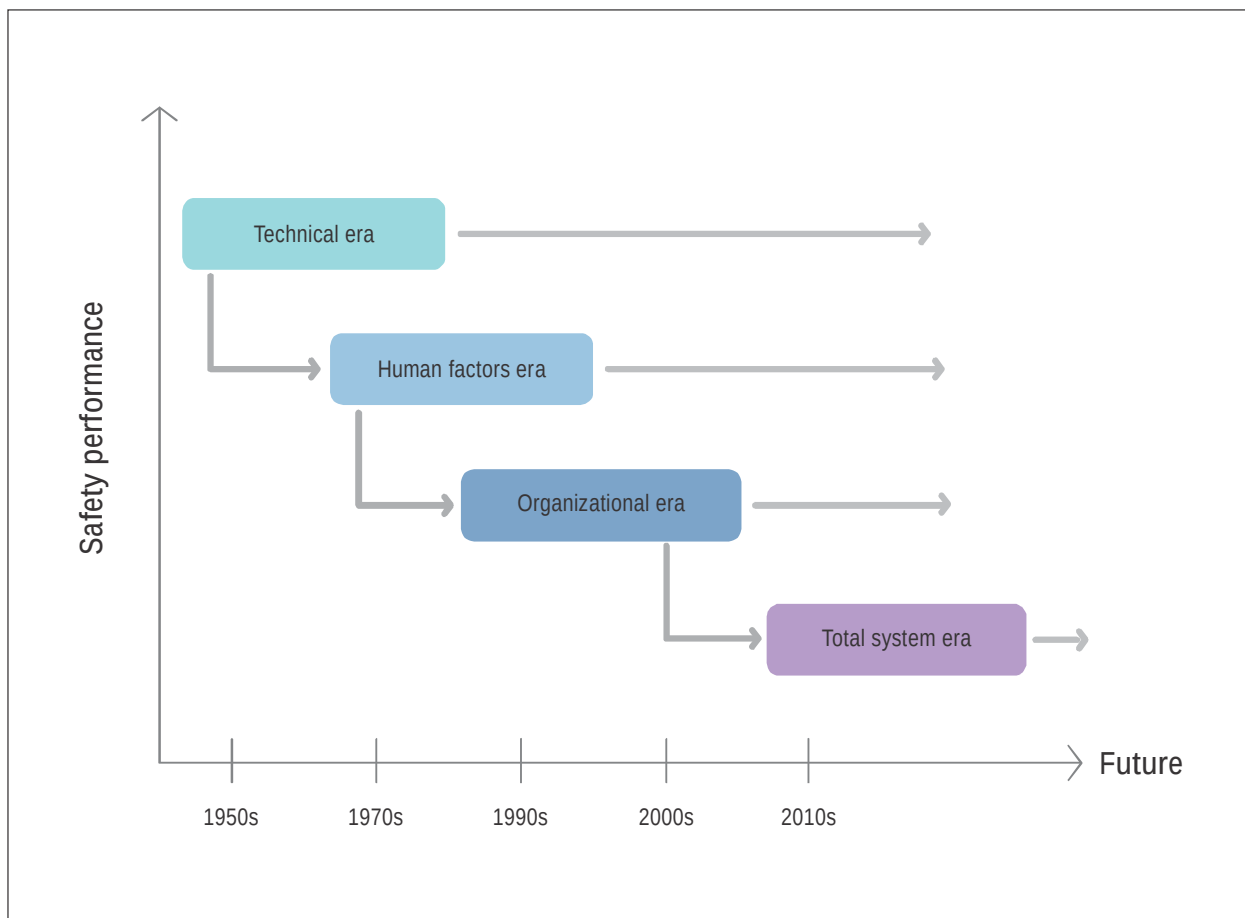


Figure 2-1. The evolution of safety

2.1.5 The steady, compounding evolution of safety has led States and service providers to a point where they are giving serious consideration to the interactions and interfaces between the components of the system: people, processes, and technologies. This has led to a greater appreciation for the positive role people play in the system. Safety benefits from collaboration between service providers, and between service providers and States. This perspective has nurtured multiple collaborative initiatives between service providers and an appreciation of the benefits of collaboration when addressing safety issues. The ICAO Runway Safety Programme is a good example.

2.1.6 For the collaborative total system approach to flourish, the interfaces and interactions between the organizations (including States) need to be well understood and managed. States are also beginning to recognize the role the total aviation system approach can play in their SSP development. For example, it helps to manage safety risks which cut across multiple aviation activities.

2.2 HUMANS IN THE SYSTEM

2.2.1 How people think about their responsibilities towards safety and how they interact with others to perform their tasks at work significantly affects their organization's safety performance. Managing safety needs to address how people contribute, both positively and negatively, to organizational safety. Human factors is about: understanding the ways in which people interact with the world, their capabilities and limitations, and influencing human activity to improve the way people do their work. As a result, the consideration of human factors is an integral part of safety management, necessary to understand, identify and mitigate risks as well as to optimize the human contributions to organizational safety.

2.2.2 The following are key ways in which safety management processes consider human factors:

- a) senior management commitment to creating a working environment that optimizes human performance and encourages personnel to actively engage in and contribute to the organization's safety management processes;
- b) responsibilities of personnel with respect to safety management are clarified to ensure common understanding and expectations;
- c) personnel are provided with information by the organization that:
 - 1) describes the expected behaviours in respect to the organizational processes and procedures;
 - 2) describes what actions will be taken by the organization in response to individual behaviours;
- d) human resourcing levels are monitored and adjusted to ensure there are enough individuals to meet operational demands;
- e) policies, processes and procedures are established to encourage safety reporting;
- f) safety data and safety information are analysed to allow consideration of those risks related to variable human performance and human limitations, with particular attention to any associated organizational and operational factors;
- g) policies, processes and procedures are developed that are clear, concise and workable, with the aim of:

- 1) optimizing human performance;
 - 2) preventing inadvertent errors;
 - 3) reducing the unwanted consequences of variable human performance; the effectiveness of these are continually monitored during normal operations;
- h) ongoing monitoring of normal operations includes assessment of whether processes and procedures are followed and, when they are not followed, investigations are carried out to determine the cause;
 - i) safety investigations include the assessment of contributing human factors, examining not only behaviours but reasons for such behaviours (context), with the understanding that in most cases people are doing their best to get the job done;
 - j) management of change process includes consideration of the evolving tasks and roles of the human in the system;
 - k) personnel are trained to ensure they are competent to perform their duties, the effectiveness of training is reviewed and training programmes are adapted to meet changing needs.

2.2.3 The effectiveness of safety management depends largely on the degree of senior support and management commitment to create a working environment that optimizes human performance and encourages personnel to actively engage in and contribute to the organization's safety management processes.

2.2.4 To address the way that the organization influences human performance there must be senior level support to implement effective safety management. This includes management commitment to create the right working environment and the right safety culture to address human factors. This will also influence the attitudes and behaviours of everyone in the organization. More information on safety culture can be found in Chapter 3.

2.2.5 A number of models have been created to support the assessment of human factors on safety performance. The SHELL Model is well known and useful to illustrate the impact and interaction of the different system components on the human, and emphasizes the need to consider human factors as an integrated part of SRM.

2.2.6 Figure 2-2 illustrates the relationship between the human (at the centre of the model) and workplace components. The SHELL Model contains four satellite components:

- a) Software (S): procedures, training, support, etc.;
- b) Hardware (H): machines and equipment;
- c) Environment (E): the working environment in which the rest of the L-H-S system must function; and
- d) Liveware (L): other humans in the workplace.



Figure 2-2. SHELL Model

2.2.7 *Liveware*. The critical focus of the model is the humans at the front line of operations, and depicted in the centre of the model. However, of all the dimensions in the model, this is the one which is least predictable and most susceptible to the effects of internal (hunger, fatigue, motivation, etc.) and external (temperature, light, noise, etc.) influences. Although humans are remarkably adaptable, they are subject to considerable variations in performance. Humans are not standardized to the same degree as hardware, so the edges of this block are not simple and straight. The effects of irregularities at the interfaces between the various SHELL blocks and the central Liveware block should be understood to avoid tensions that may compromise human performance. The jagged edges of the modules represent the imperfect coupling of each module. This is useful in visualizing the following interfaces between the various components of the aviation system:

- a) *Liveware-Hardware (L-H)*. The L-H interface refers to the relationship between the human and the physical attributes of equipment, machines and facilities. This considers the ergonomics of operating the equipment by personnel, how safety information is displayed and how switches and operating levers are labelled and operated so they are logical and intuitive to operate.
- b) *Liveware-Software (L-S)*. The L-S interface is the relationship between the human and the supporting systems found in the workplace, e.g. regulations, manuals, checklists, publications, processes and procedures, and computer software. It includes such issues as the recency of experience, accuracy, format and presentation, vocabulary, clarity and the use of symbols. L-S considers the processes and procedures - how easy they are to follow and understand.

- c) *Liveware-Liveware (L-L)*. The L-L interface is the relationship and interaction between people in their work environment. Some of these interactions are within the organization (colleagues, supervisors, managers), many are between individuals from different organizations with different roles (air traffic controllers with pilots, pilots with engineers etc.). It considers the importance of communication and interpersonal skills, as well as group dynamics, in determining human performance. The advent of crew resource management and its extension to air traffic services (ATS) and maintenance operations has enabled organizations to consider team performance in the management of errors. Also within the scope of this interface are staff/management relationships and organizational culture.
- d) *Liveware-Environment (L-E)*. This interface involves the relationship between the human and the physical environment. This includes things such as temperature, ambient light, noise, vibration and air quality. It also considers the externally environmental factors, such as weather, infrastructure and terrain.

2.3 ACCIDENT CAUSATION

2.3.1 The “Swiss-Cheese” (or Reason) Model, developed by Professor James Reason and well known to the aviation industry, illustrates that accidents involve successive breaches of multiple defences. These breaches can be triggered by a number of enabling factors such as equipment failures or operational errors. The Swiss-Cheese Model contends that complex systems such as aviation are extremely well defended by layers of defences (otherwise known as “barriers”). A single-point failure is rarely consequential. Breaches in safety defences can be a delayed consequence of decisions made at the higher levels of the organization, which may remain dormant until their effects or damaging potential are activated by certain operating conditions (known as latent conditions). Under such specific circumstances, human failures (or “active failures”) at the operational level act to breach the final layers of safety defence. The Reason Model proposes that all accidents include a combination of both active failures and latent conditions.

2.3.2 Active failures are actions or inactions, including errors and rule-breaking, that have an immediate adverse effect. They are viewed, with the benefit of hindsight, as unsafe acts. Active failures are associated with front-line personnel (pilots, air traffic controllers, aircraft maintenance engineers, etc.) and may result in a harmful outcome.

2.3.3 Latent conditions can exist in the system well before a damaging outcome. The consequences of latent conditions may remain dormant for a long time. Initially, these latent conditions are not perceived as harmful, but under certain conditions may become clear when the operational level defences are breached. People far removed in time and space from the event can create these conditions. Latent conditions in the system may include those created by the safety culture; equipment choices or procedural design; conflicting organizational goals; defective organizational systems; or management decisions.

2.3.4 The “organizational accident” paradigm assists by identifying these latent conditions on a system-wide basis, rather than through localized efforts, to minimize active failures by individuals. Importantly, latent conditions, when created, had good intentions. Organizational decision makers are often balancing finite resources, and potentially conflicting priorities and costs. The decisions taken by decision makers, made on a daily basis in large organizations, might, in particular circumstances, unintentionally lead to a damaging outcome.

2.3.5 Figure 2-3 illustrates how the Swiss-Cheese Model assists in understanding the interplay of organizational and managerial factors in accident causation. Multiple defensive layers are built into the aviation system to protect against variations in human performance or decisions at all levels of the organization. But each layer typically has weaknesses, depicted by the holes in the slices of “Swiss cheese”. Sometimes all of the weaknesses align (represented by the aligned holes) leading to a breach that penetrates all defensive barriers and may result in a catastrophic outcome. The Swiss-Cheese Model represents how latent conditions are ever present within the system and can manifest through local trigger factors.

2.3.6 It is important to recognize that some of the defences, or breaches, can be influenced by an interfacing organization. It is therefore vitally important that service providers assess and manage these interfaces.

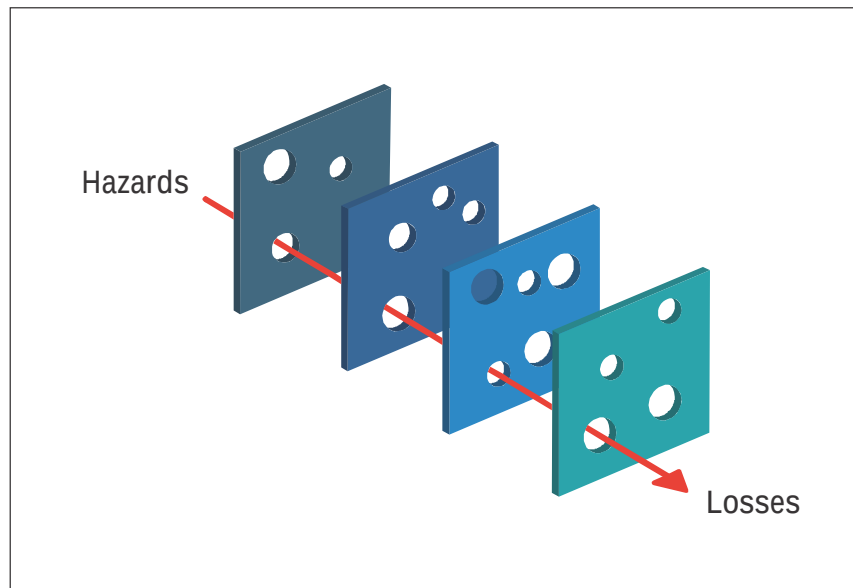


Figure 2-3. Concept of accident causation

2.3.7 “Swiss–Cheese” applications for safety management

2.3.7.1 The “Swiss-Cheese” Model can be used as an analysis guide by both States and service providers by looking past the individuals involved in an incident or identified hazard, into the organizational circumstances which may have allowed the situation to manifest. It can be applied during SRM, safety surveillance, internal auditing, change management and safety investigation. In each case, the model can be used to consider which of the organization's defences are effective, which can or have been breached, and where the system could benefit from additional defences. Once identified, any weaknesses in the defences can be reinforced against future accidents and incidents.

2.3.7.2 In practice, the event will breach the defences in the direction of the arrow (hazards to losses) as displayed in the rendering of Figure 2-3. The assessments of the situation will be conducted in the opposite direction, in this case losses to hazard. Actual aviation accidents will usually include a degree of additional complexity. There are more sophisticated models which can help States and service providers to understand how and why accidents happen.

2.3.8 Practical drift

2.3.8.1 Scott A. Snook's theory of practical drift is used to understand how performance of any system “drifts away” from its original design. Tasks, procedures, and equipment are often initially designed and planned in a theoretical environment, under ideal conditions, with an implicit assumption that nearly everything can be predicted and controlled, and where everything functions as expected. This is usually based on three fundamental assumptions that the:

- a) technology needed to achieve the system production goals is available;
- b) personnel are trained, competent and motivated to properly operate the technology as intended; and
- c) policy and procedures will dictate system and human behaviour.

These assumptions underlie the baseline (or ideal) system performance, which can be graphically presented as a straight line from the start of operational deployment as shown in Figure 2-4.

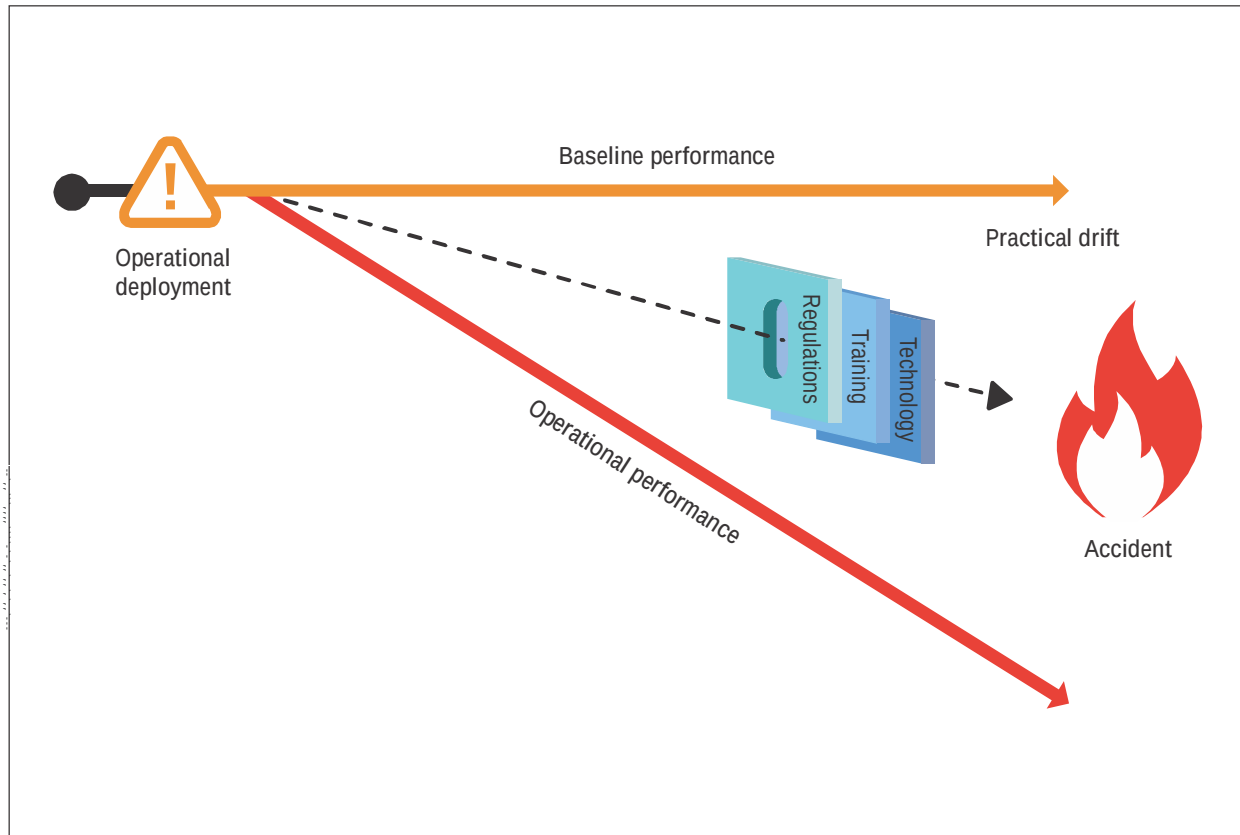


Figure 2-4. Concept of practical drift

2.3.8.2 Once operationally deployed, the system should ideally perform as designed, following baseline performance (orange line) most of the time. In reality, the operational performance often differs from the assumed baseline performance as a consequence of real-life operations in a complex, ever-changing and usually demanding environment (red line). Since the drift is a consequence of daily practice, it is referred to as a “practical drift”. The term “drift” is used in this context as the gradual departure from an intended course due to external influences.

2.3.8.3 Snook contests that practical drift is inevitable in any system, no matter how careful and well thought out its design. Some of the reasons for the practical drift include:

- a) technology that does not operate as predicted;
- b) procedures that cannot be executed as planned under certain operational conditions;
- c) changes to the system, including the additional components;
- d) interactions with other systems;
- e) safety culture;

- f) adequacy (or inadequacy) of resources (e.g. support equipment);
- g) learning from successes and failures to improve operations, and so forth.

2.3.8.4 In reality people will generally make the system work on a daily basis despite the system's shortcomings, applying local adaptations (or workarounds) and personal strategies. These workarounds may bypass the protection of existing safety risk controls and defences.

2.3.8.5 Safety assurance activities such as audits, observations and monitoring of SPIs can help to expose activities that are "practically drifting". Analysing the safety information to find out why the drift is happening helps to mitigate the safety risks. The closer to the beginning of the operational deployment that practical drift is identified, the easier it is for the organization to intervene. More information on safety assurance for States and service providers may be found in Chapters 8 and 9, respectively.

2.4 MANAGEMENT DILEMMA

2.4.1 In any organization engaged in the delivery of services, production/profitability and safety risks are linked. An organization must maintain profitability to stay in business by balancing output with acceptable safety risks (and the costs involved in implementing safety risk controls). Typical safety risk controls include technology, training, processes and procedures. For the State, the safety risk controls are similar, i.e. training of personnel, the appropriate use of technology, effective oversight and the internal processes and procedures supporting oversight. Implementing safety risk controls comes at a price – money, time, resources – and the aim of safety risk controls is usually to improving safety performance, not production performance. However, some investments in "protection" can also improve "production" by reducing accidents and incidents and thereby their associated costs.

2.4.2 The safety space is a metaphor for the zone where an organization balances desired production/profitability while maintaining required safety protection through safety risk controls. For example, a service provider may wish to invest in new equipment. The new equipment may simultaneously provide the necessary efficiency improvements as well as improved reliability and safety performance. Such decision-making involves an assessment of both the benefits to the organization as well as the safety risks involved. The allocation of excessive resources to safety risk controls may result in the activity becoming unprofitable, thus jeopardizing the viability of the organization.

2.4.3 On the other hand, excess allocation of resources for production at the expense of protection can have an impact on the product or service and can ultimately lead to an accident. It is therefore essential that a safety boundary be defined that provides early warning that an unbalanced allocation of resources exists, or is developing. Organizations use financial management systems to recognize when they are getting too close to bankruptcy and apply the same logic and tools used by safety management to monitor their safety performance. This enables the organization to operate profitably and safely within the safety space. Figure 2-5 illustrates the boundaries of an organization's safety space. Organizations need to continuously monitor and manage their safety space as safety risks and external influences change over time.

2.4.4 The need to balance profitability and safety (or production and protection) has become a readily understood and accepted requirement from a service provider perspective. This balance is equally applicable to the State's management of safety, given the requirement to balance resources required for State protective functions that include certification and surveillance.

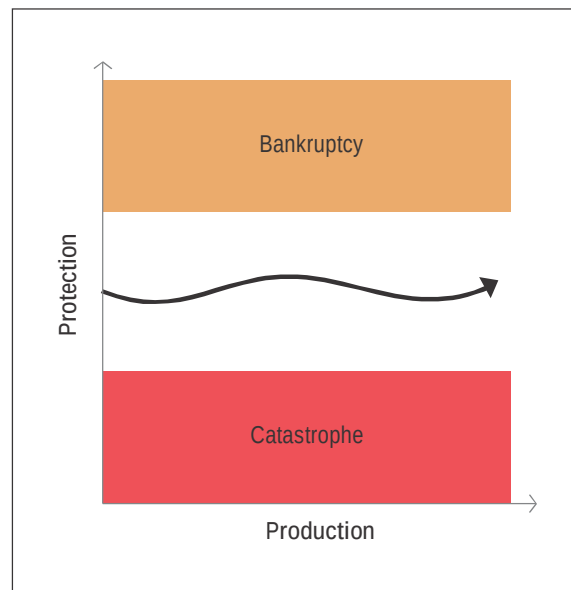


Figure 2-5. Concept of a safety space

2.5 SAFETY RISK MANAGEMENT

Safety Risk Management (SRM) is a key component of safety management and includes hazard identification, safety risk assessment, safety risk mitigation and risk acceptance. SRM is a continuous activity because the aviation system is constantly changing, new hazards can be introduced and some hazards and associated safety risks may change over time. In addition, the effectiveness of implemented safety risk mitigation strategies must be monitored to determine if further action is required.

2.5.1 Introduction to hazards

2.5.1.1 In aviation, a hazard can be considered as a dormant potential for harm which is present in one form or another within the system or its environment. This potential for harm may appear in different forms, for example: as a natural condition (e.g. terrain) or technical status (e.g. runway markings).

2.5.1.2 Hazards are an inevitable part of aviation activities, however, their manifestation and possible adverse consequences can be addressed through mitigation strategies which aim to contain the potential for the hazard to result in an unsafe condition. Aviation can coexist with hazards so long as they are controlled. Hazard identification is the first step in the SRM process. It precedes a safety risk assessment and requires a clear understanding of hazards and their related consequences.

2.5.2 Understanding hazards and their consequences

2.5.2.1 Hazard identification focuses on conditions or objects that could cause or contribute to the unsafe operation of aircraft or aviation safety-related equipment, products and services (guidance on distinguishing hazards that are directly pertinent to aviation safety from other general/industrial hazards is addressed in subsequent paragraphs).

2.5.2.2 Consider, for example, a fifteen-knot wind. Fifteen-knots of wind is not necessarily a hazardous condition. In fact, a fifteen-knot wind blowing directly down the runway improves aircraft take-off and landing performance. But if the fifteen-knot wind is blowing across the runway, a crosswind condition is created which may be hazardous to operations. This is due to its potential to contribute to aircraft instability. The reduction in control could lead to an occurrence, such as a lateral runway excursion.

2.5.2.3 It is not uncommon for people to confuse hazards with their consequences. A consequence is an outcome that can be triggered by a hazard. For example, a runway excursion (overrun) is a potential consequence related to the hazard of a contaminated runway. By clearly defining the hazard first, one can more readily identify possible consequences.

2.5.2.4 In the crosswind example above, an immediate outcome of the hazard could be loss of lateral control followed by a consequent runway excursion. The ultimate consequence could be an accident. The damaging potential of a hazard can materialize through one or many consequences. It is important that safety risk assessments identify all of the possible consequences. The most extreme consequence - loss of human life - should be differentiated from those that involve lesser consequences, such as: aircraft incidents; increased flight crew workload; or passenger discomfort. The description of the consequences will inform the risk assessment and subsequent development and implementation of mitigations through prioritization and allocation of resources. Detailed and thorough hazard identification will lead to more accurate assessment of safety risks.

Hazard identification and prioritization

2.5.2.5 Hazards exist at all levels in the organization and are detectable through many sources including reporting systems, inspections, audits, brainstorming sessions and expert judgement. The goal is to proactively identify hazards before they lead to accidents, incidents or other safety-related occurrences. An important mechanism for proactive hazard identification is a voluntary safety reporting system. Additional guidance on voluntary safety reporting systems can be found in Chapter 5. Information collected through such reporting systems may be supplemented by observations or findings recorded during routine site inspections or organizational audits.

2.5.2.6 Hazards can also be identified in the review or study of internal and external investigation reports. A consideration of hazards when reviewing accident or incident investigation reports is a good way to enhance the organization's hazard identification system. This is particularly important when the organization's safety culture is not yet mature enough to support effective voluntary safety reporting, or in small organizations with limited events or reports. An important source of specific hazards linked to operations and activities is from external sources such as ICAO, trade associations or other international bodies.

2.5.2.7 Hazard identification may also consider hazards that are generated outside of the organization and hazards that are outside the direct control of the organization, such as extreme weather or volcanic ash. Hazards related to emerging safety risks are also an important way for organizations to prepare for situations that may eventually occur.

2.5.2.8 The following should be considered when identifying hazards:

- a) system description;
- b) design factors, including equipment and task design;
- c) human performance limitations (e.g. physiological, psychological, physical and cognitive);
- d) procedures and operating practices, including documentation and checklists, and their validation under actual operating conditions;
- e) communication factors, including media, terminology and language;

- f) organizational factors, such as those related to the recruitment, training and retention of personnel, compatibility of production and safety goals, allocation of resources, operating pressures and corporate safety culture;
- g) factors related to the operational environment (e.g. weather, ambient noise and vibration, temperature and lighting);
- h) regulatory oversight factors, including the applicability and enforceability of regulations, and the certification of equipment, personnel and procedures;
- i) performance monitoring systems that can detect practical drift, operational deviations or a deterioration of product reliability;
- j) human-machine interface factors; and
- k) factors related to the SSP/SMS interfaces with other organizations.

Occupational safety health and environment hazards

2.5.2.9 Safety risks associated with compound hazards that simultaneously impact aviation safety as well as OSHE may be managed through separate (parallel) risk mitigation processes to address the separate aviation and OSHE consequences, respectively. Alternatively, an integrated aviation and OSHE risk mitigation system may be used to address compound hazards. An example of a compound hazard is a lightning strike on an aircraft at an airport transit gate. This hazard may be deemed by an OSHE inspector to be a “workplace hazard” (ground personnel/workplace safety). To an aviation safety inspector, it is also an aviation hazard with risk of damage to the aircraft and a risk to passenger safety. It is important to consider both the OSHE and aviation safety consequences of such compound hazards, since they are not always the same. The purpose and focus of preventive controls for OSHE and aviation safety consequences may differ.

Hazard identification methodologies

2.5.2.10 The two main methodologies for identifying hazards are:

- a) *Reactive*. This methodology involves analysis of past outcomes or events. Hazards are identified through investigation of safety occurrences. Incidents and accidents are an indication of system deficiencies and therefore can be used to determine which hazard(s) contributed to the event.
- b) *Proactive*. This methodology involves collecting safety data of lower consequence events or process performance and analysing the safety information or frequency of occurrence to determine if a hazard could lead to an accident or incident. The safety information for proactive hazard identification primarily comes from flight data analysis (FDA) programmes, safety reporting systems and the safety assurance function.

2.5.2.11 Hazards can also be identified through safety data analysis which identifies adverse trends and makes predictions about emerging hazards, etc.

Hazards related to SMS interfaces with external organizations

2.5.2.12 Organizations should also identify hazards related to their safety management interfaces. This should, where possible, be carried out as a joint exercise with the interfacing organizations. The hazard identification should consider the operational environment and the various organizational capabilities (people, processes, technologies) which could contribute to the safe delivery of the service or product's availability, functionality or performance.

2.5.2.13 As an example, an aircraft turnaround involves many organizations and operational personnel all working in and around the aircraft. There are likely to be hazards related to the interfaces between operational personnel, their equipment and the coordination of the turnaround activity.

2.5.3 Safety risk probability

2.5.3.1 Safety risk probability is the likelihood that a safety consequence or outcome will occur. It is important to envisage a variety of scenarios so that all potential consequences can be considered. The following questions can assist in the determination of probability:

- a) Is there a history of occurrences similar to the one under consideration, or is this an isolated occurrence?
- b) What other equipment or components of the same type might have similar issues?
- c) What is the number of personnel following, or subject to, the procedures in question?
- d) What is the exposure of the hazard under consideration? For example, during what percentage of the operation is the equipment or activity in use?

2.5.3.2 Taking into consideration any factors that might underlie these questions will help when assessing the probability of the hazard consequences in any foreseeable scenario.

2.5.3.3 An occurrence is considered foreseeable if any reasonable person could have expected the kind of occurrence to have happened under the same circumstances. Identification of every conceivable or theoretically possible hazard is not possible. Therefore, good judgment is required to determine an appropriate level of detail in hazard identification. Service providers should exercise due diligence when identifying significant and reasonably foreseeable hazards related to their product or service.

Note.— Regarding product design, the term “foreseeable” is intended to be consistent with its use in airworthiness regulations, policy, and guidance.

2.5.3.4 Table 1 presents a typical safety risk probability classification table. It includes five categories to denote the probability related to an unsafe event or condition, the description of each category, and an assignment of a value to each category. This example uses qualitative terms; quantitative terms could be defined to provide a more accurate assessment. This will depend on the availability of appropriate safety data and the sophistication of the organization and operation.

Table 1. Safety risk probability table

<i>Likelihood</i>	<i>Meaning</i>	<i>Value</i>
Frequent	Likely to occur many times (has occurred frequently)	5
Occasional	Likely to occur sometimes (has occurred infrequently)	4
Remote	Unlikely to occur, but possible (has occurred rarely)	3
Improbable	Very unlikely to occur (not known to have occurred)	2
Extremely improbable	Almost inconceivable that the event will occur	1

Note.— This is an example only. The level of detail and complexity of tables and matrices should be adapted to the particular needs and complexities of each organization. It should also be noted that organizations might include both qualitative and quantitative criteria.

2.5.4 Safety risk severity

2.5.4.1 Once the probability assessment has been completed, the next step is to assess the severity, taking into account the potential consequences related to the hazard. Safety risk severity is defined as the extent of harm that might reasonably be expected to occur as a consequence or outcome of the identified hazard. The severity classification should consider:

- a) fatalities or serious injury which would occur as a result of:
 - 1) being in the aircraft;
 - 2) having direct contact with any part of the aircraft, including parts which have become detached from the aircraft; or
 - 3) having direct exposure to jet blast; and
- b) damage:
 - 1) damage or structural failure sustained by the aircraft which:
 - i) adversely affects the structural strength, performance or flight characteristics of the aircraft;
 - ii) would normally require major repair or replacement of the affected component;
 - 2) damage sustained by ATS or aerodrome equipment which:
 - i) adversely affects the management of aircraft separation; or
 - ii) adversely affects landing capability.

2.5.4.2 The severity assessment should consider all possible consequences related to a hazard, taking into account the worst foreseeable situation. Table 2 presents a typical safety risk severity table. It includes five categories to denote the level of severity, the description of each category, and the assignment of a value to each category. As with the safety risk probability table, this table is an example only.

Table 2. Example safety risk severity table

<i>Severity</i>	<i>Meaning</i>	<i>Value</i>
Catastrophic	- Aircraft / equipment destroyed - Multiple deaths	A
Hazardous	- A large reduction in safety margins, physical distress or a workload such that operational personnel cannot be relied upon to perform their tasks accurately or completely - Serious injury - Major equipment damage	B
Major	- A significant reduction in safety margins, a reduction in the ability of operational personnel to cope with adverse operating conditions as a result of an increase in workload or as a result of conditions impairing their efficiency - Serious incident - Injury to persons	C
Minor	- Nuisance - Operating limitations - Use of emergency procedures - Minor incident	D
Negligible	Few consequences	E

2.5.5 Safety risk tolerability

2.5.5.1 The safety risk index rating is created by combining the results of the probability and severity scores. In the example above, it is an alphanumeric designator. The respective severity/probability combinations are presented in the safety risk assessment matrix in Table 3. The safety risk assessment matrix is used to determine safety risk tolerability. Consider, for example, a situation where the safety risk probability has been assessed as Occasional (4), and the safety risk severity has been assessed as Hazardous (B), resulting in a safety risk index of (4B).

Table 3. Example safety risk matrix

Safety Risk		Severity				
Probability		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

Note.— In determining the safety risk tolerability, the quality and reliability of the data used for the hazard identification and safety risk probability should be taken into consideration.

2.5.5.2 The index obtained from the safety risk assessment matrix should then be exported to a safety risk tolerability table that describes — in a narrative form — the tolerability criteria for the particular organization. Table 4 presents an example of a safety risk tolerability table. Using the example above, the criterion for safety risk assessed as 4B falls in the “intolerable” category. In this case, the safety risk index of the consequence is unacceptable. The organization should therefore take risk control action to reduce:

- the organization's exposure to the particular risk, i.e., reduce the probability component of the risk to an acceptable level;
- the severity of consequences related to the hazard, i.e., reduce the severity component of the risk to an acceptable level; or
- both the severity and probability so that the risk is managed to an acceptable level.

2.5.5.3 Safety risks are conceptually assessed as acceptable, tolerable or intolerable. Safety risks assessed as initially falling in the intolerable region are unacceptable under any circumstances. The probability and/or severity of the consequences of the hazards are of such a magnitude, and the damaging potential of the hazard poses such a threat to safety, that mitigation action is required or activities are stopped.

Table 4. Example of safety risk tolerability

<i>Safety Risk Index Range</i>	<i>Safety Risk Description</i>	<i>Recommended Action</i>
5A, 5B, 5C, 4A, 4B, 3A	INTOLERABLE	Take immediate action to mitigate the risk or stop the activity. Perform priority safety risk mitigation to ensure additional or enhanced preventative controls are in place to bring down the safety risk index to tolerable.
5D, 5E, 4C, 4D, 4E, 3B, 3C, 3D, 2A, 2B, 2C, 1A	TOLERABLE	Can be tolerated based on the safety risk mitigation. It may require management decision to accept the risk.
3E, 2D, 2E, 1B, 1C, 1D, 1E	ACCEPTABLE	Acceptable as is. No further safety risk mitigation required.

2.5.6 Assessing human factors related risks

2.5.6.1 The consideration of human factors has particular importance in SRM as people can be both a source and a solution of safety risks by:

- a) contributing to an accident or incident through variable performance due to human limitations;
- b) anticipating and taking appropriate actions to avoid a hazardous situation: and
- c) solving problems, making decisions and taking actions to mitigate risks.

2.5.6.2 It is therefore important to involve people with appropriate human factors expertise in the identification, assessment and mitigation of risks.

2.5.6.3 SRM requires all aspects of safety risk to be addressed, including those related to humans. Assessing the risks associated with human performance is more complex than risk factors associated with technology and environment since:

- a) human performance is highly variable, with a wide range of interacting influences internal and external to the individual. Many of the effects of the interaction between these influences are difficult, or impossible to predict; and
- b) the consequences of variable human performance will differ according to the task being performed and the context.

2.5.6.4 This complicates how the probability and the severity of the risk is determined. Therefore, human factors expertise is valuable in the identification and assessment of safety risks. (The management of fatigue using SMS processes is addressed in the *Manual for the Oversight of Fatigue Management Approaches* (Doc 9966)).

2.5.7 Safety risk mitigation strategies

2.5.7.1 Safety risk mitigation is often referred to as a safety risk control. Safety risks should be managed to an acceptable level by mitigating the safety risk through the application of appropriate safety risk controls. This should be balanced against the time, cost and difficulty of taking action to reduce or eliminate the safety risk. The level of safety risk can be lowered by reducing the severity of the potential consequences, reducing the likelihood of occurrence or by reducing exposure to that safety risk. It is easier and more common to reduce the likelihood than it is to reduce the severity.

2.5.7.2 Safety risk mitigations are actions that often result in changes to operating procedures, equipment or infrastructure. Safety risk mitigation strategies fall into three categories:

- a) *Avoidance*: The operation or activity is cancelled or avoided because the safety risk exceeds the benefits of continuing the activity, thereby eliminating the safety risk entirely.
- b) *Reduction*: The frequency of the operation or activity is reduced, or action is taken to reduce the magnitude of the consequences of the safety risk.
- c) *Segregation*: Action is taken to isolate the effects of the consequences of the safety risk or build in redundancy to protect against them.

2.5.7.3 The consideration of human factors is an integral part of identifying effective mitigations because humans are required to apply, or contribute to, the mitigation or corrective actions. For example, mitigations may include the use of processes or procedures. Without input from those who will be using these in “real world” situations and/or individuals with human factors expertise, the processes or procedures developed may not be fit for their purpose and result in unintended consequences. Further, human performance limitations should be considered as part of any safety risk mitigation, building in error capturing strategies to address human performance variability. Ultimately, this important human factors perspective results in more comprehensive and effective mitigations.

2.5.7.4 A safety risk mitigation strategy may involve one of the approaches described above or may include multiple approaches. It is important to consider the full range of possible control measures to find an optimal solution. The effectiveness of each alternative strategy must be evaluated before a decision is made. Each proposed safety risk mitigation alternative should be examined from the following perspectives:

- a) *Effectiveness*. The extent to which the alternatives reduce or eliminate the safety risks. Effectiveness can be determined in terms of the technical, training and regulatory defences that can reduce or eliminate safety risks.
- b) *Cost/benefit*. The extent to which the perceived benefits of the mitigation outweighs the costs.
- c) *Practicality*. The extent to which mitigation can be implemented and how appropriate it is in terms of available technology, financial and administrative resources, legislation, political will, operational realities, etc.
- d) *Acceptability*. The extent to which the alternative is acceptable to those people that will be expected to apply it.

- e) *Enforceability*. The extent to which compliance with new rules, regulations or operating procedures can be monitored.
- f) *Durability*. The extent to which the mitigation will be sustainable and effective.
- g) *Residual safety risks*. The degree of safety risk that remains subsequent to the implementation of the initial mitigation and which may necessitate additional safety risk control measures.
- h) *Unintended consequences*. The introduction of new hazards and related safety risks associated with the implementation of any mitigation alternative.
- i) *Time*. Time required for the implementation of the safety risk mitigation alternative.

2.5.7.5 Corrective action should take into account any existing defences and their (in)ability to achieve an acceptable level of safety risk. This may result in a review of previous safety risk assessments that may have been impacted by the corrective action. Safety risk mitigations and controls will need to be verified/audited to ensure that they are effective. Another way to monitor the effectiveness of mitigations is through the use of SPIs. See Chapter 4 for more information on safety performance management and SPIs.

2.5.8 Safety risk management documentation

2.5.8.1 Safety risk management activities should be documented, including any assumptions underlying the probability and severity assessment, decisions made, and any safety risk mitigation actions taken. This may be done using a spread sheet or table. Some organizations may use a database or other software where large amounts of safety data and safety information can be stored and analysed.

2.5.8.2 Maintaining a register of identified hazards minimizes the likelihood that the organization will lose sight of its known hazards. When hazards are identified, they can be compared with the known hazards in the register to see if the hazard has already been registered, and what action(s) were taken to mitigate it. Hazard registers are usually in a table format and typically include: the hazard, potential consequences, assessment of associated risks, identification date, hazard category, short description, when or where it applies, who identified it and what measure have been put in place to mitigate the risks.

2.5.8.3 Safety risk decision-making tools and processes can be used to improve the repeatability and justification of decisions taken by organizational safety decision makers. An example of a safety risk decision aid is provided below in Figure 2-6.

2.5.9 Cost-benefit analysis

Cost-benefit or cost-effectiveness analysis is normally carried out during the safety risk mitigation activities. It is commonly associated with business management, such as a regulatory impact assessment or project management processes. However, there may be situations where a safety risk assessment may have a significant financial impact. In such situations, a supplementary cost-benefit analysis or cost-effectiveness process to support the safety risk assessment may be warranted. This will ensure cost-effectiveness analysis or justification of recommended safety risk control actions has been taken into consideration, with the associated financial implications.

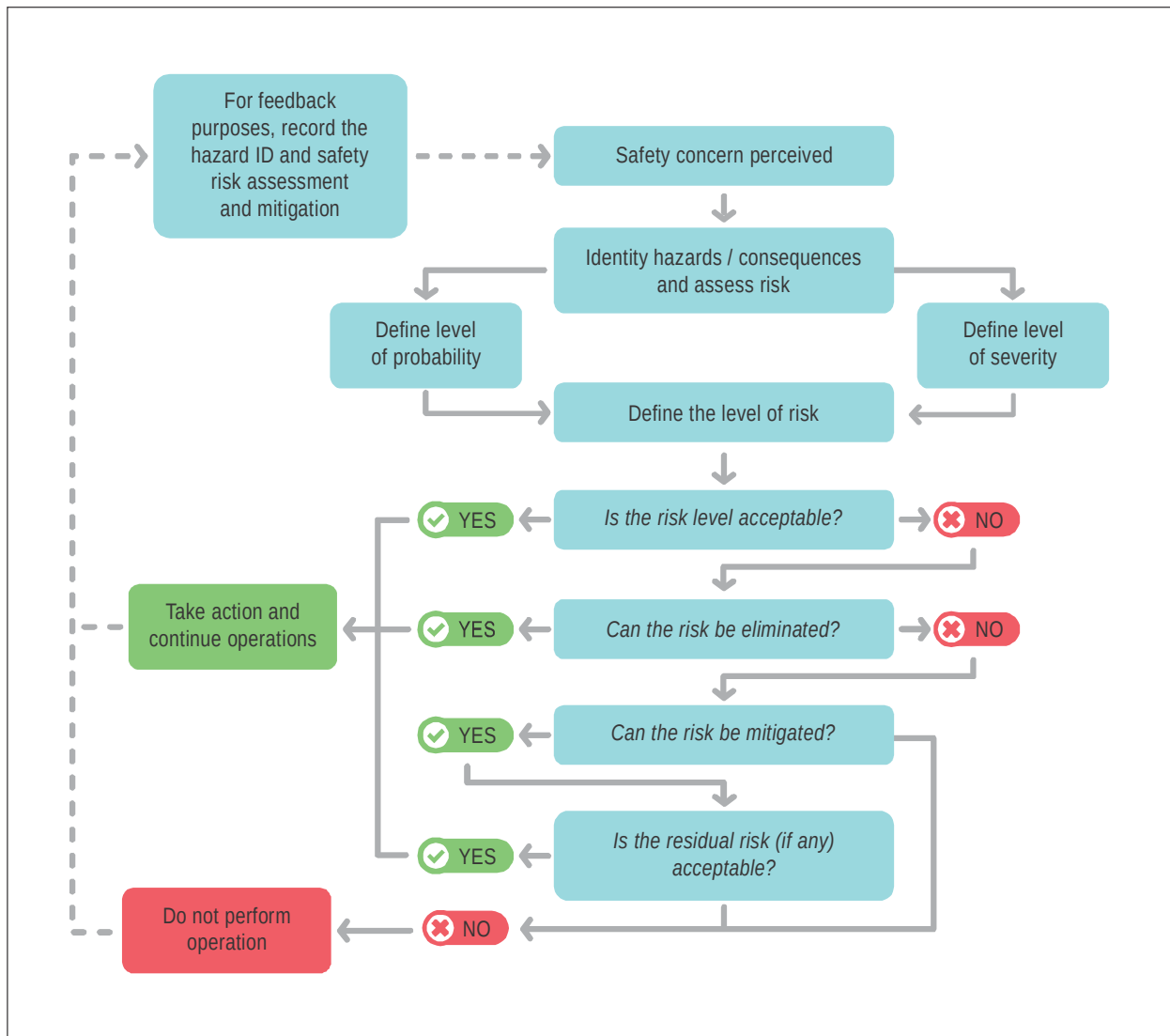


Figure 2-6. Safety risk management decision aid

Chapter 3

SAFETY CULTURE

3.1 INTRODUCTION

3.1.1 A safety culture is the natural consequence of having humans in the aviation system. Safety culture has been described as “how people behave in relation to safety and risk when no one is watching”. It is an expression of how safety is perceived, valued and prioritized by management and employees in an organization, and is reflected in the extent to which individuals and groups are:

- a) aware of the risks and known hazards faced by the organization and its activities;
- b) continuously behaving to preserve and enhance safety;
- c) able to access the resources required for safe operations;
- d) willing and able to adapt when facing safety issues;
- e) willing to communicate safety issues; and
- f) consistently assessing the safety related behaviours throughout the organization.

3.1.2 Annex 19 requires that both States and service providers promote a positive safety culture with the aim of fostering effective safety management implementation through the SSP/SMS. This chapter provides guidance on the promotion of a positive safety culture.

3.2 SAFETY CULTURE AND SAFETY MANAGEMENT

3.2.1 Whether an organization realizes it or not, it will have a number of different “safety cultures” that reflect group-level attitudes and behaviours. No two organizations are identical, and even within the same organization, different groups may have various ways of thinking about safety, talking about safety and acting on safety issues. This variation may be appropriate for different activities.

3.2.2 How safety values are incorporated into practices by management and personnel directly affects how key elements of the SSP and SMS are established and maintained. As a consequence, safety culture has a direct impact on safety performance. If someone believes that safety is not that important then workarounds, cutting corners, or making unsafe decisions or judgements may be the result, especially when the risk is perceived as low and there is no apparent consequence or danger. The safety culture of an organization therefore significantly influences how their SSP or SMS develops and how effective it becomes. Safety culture is arguably the single most important influence on the management of safety. If an organization has instituted all the safety management requirements but does not have a positive safety culture, it is likely to underperform.

3.2.3 When the organization has a positive safety culture, and this is visibly supported by upper- and middle-management, front-line personnel tend to feel a sense of shared responsibilities towards achieving the organization's safety objectives. Effective safety management also supports efforts to drive towards an increasingly positive safety culture by increasing the visibility of management's support and improving active involvement of personnel in managing safety risk.

3.2.4 A positive safety culture relies on a high degree of trust and respect between personnel and management. Time and effort are needed to build a positive safety culture, which can be easily damaged by management decisions and actions, or inactions. Continuous effort and reinforcement are needed. When leadership actively endorses safe practices, it becomes the normal way of doing things. The ideal situation is a fully implemented and effective SSP/SMS and a positive safety culture. Hence, an organization's safety culture is often seen as a reflection of the maturity of its SSP/SMS. Effective safety management empowers a positive safety culture and a positive safety culture empowers effective safety management.

3.2.5 Safety culture and its influence on safety reporting

3.2.5.1 SSPs and SMSs are sustained by safety data and safety information that is necessary to address existing and potential safety deficiencies and hazards, including safety issues identified by personnel. The success of a reporting system depends entirely on the continuous flow of information from, and feedback to, organizations and individuals. The protection of safety data, safety information and related sources is essential to ensure continued availability of information. For example, in voluntary safety reporting systems, this may be realized through a system that is confidential, and not used for purposes other than maintaining or improving safety. The benefits are twofold. Often personnel are the closest to safety hazards, so a voluntary reporting system enables them to actively identify these hazards and suggest workable solutions. At the same time, the regulator or management is able to gather important safety information and build trust with the organizations or operational personnel who are reporting the information. For more information about the protection of safety data and safety information refer to Chapter 7.

3.2.5.2 Whether organizations or individuals are willing to report their experiences and errors is largely dependent on the perceived benefits and disadvantages associated with reporting. Safety reporting systems may be anonymous or confidential. In general, in an anonymous reporting system a reporter does not provide their identity. In this case there is no opportunity for further clarification of the report's contents, or the ability to provide feedback. In a confidential reporting system, any identifying information about the reporter is known only to a designated custodian. If organizations and individuals who report safety issues are protected and treated in a fair and consistent manner, they are more likely to divulge such information and work with the regulator or management to effectively manage the associated safety risk(s).

3.2.5.3 States are expected to adopt laws to adhere to the provisions outlined in Annex 19 for the protection of safety data, safety information and related sources. In the case of a voluntary reporting system, confidentiality should be ensured and the reporting system operated in accordance with safety protection laws. Further, organizations need to have an appropriate disciplinary policy, which is accessible to all and widely understood. A disciplinary policy should clearly indicate what behaviours are considered unacceptable and how the organization will respond in such cases. The disciplinary policy needs to be applied fairly, reasonably and consistently. Finally, organizations and individuals are more likely to report their experiences and errors in an environment where they will not be judged or treated unfairly by their peers or their employer.

3.2.5.4 Overall, organizations and individuals must believe they will be supported when reporting in the interest of safety. This includes organizational and personal errors and mistakes. An increase in confidential reports and a decrease in anonymous reports is usually indicative of the organization's progress towards a positive safety culture.

3.2.6 Safety culture and cultural diversity

3.2.6.1 National culture differentiates the characteristics of particular nations, including the role of the individual within society, the manner in which authority is distributed, and national priorities with respect to resources, accountabilities, morality, objectives and legal systems.

3.2.6.2 From a safety management perspective, national culture influences organizational culture and plays a large part in determining the nature and scope of regulatory enforcement policies, including the relationship between regulatory authority personnel and industry personnel, and the extent to which safety information is protected. These, in turn, impact on peoples' willingness to report safety issues.

3.2.6.3 The majority of organizations today employ people from multiple cultural backgrounds, which may be defined by their nationality, ethnicity, religion, and/or gender. Aviation operations and safety rely on effective interaction between different professional groups, each with its own professional culture. Hence, the organization's safety culture may also be significantly affected by the variety of cultural backgrounds of the members of its workforce.

3.2.6.4 Managing safety within the aviation system therefore requires interaction with, and management of, culturally diverse personnel. However, when implementing safety management, managers should be capable of moulding their culturally-diverse workforce into effective teams. Eliminating differences in safety risk perceptions that may derive from different cultural interpretations and enhancing other safety-related aspects, such as communication, leadership styles and interaction between supervisors and subordinates is key. The degree of success will depend on management's ability to promote a common understanding of safety and each individual's role in its effectiveness. Regardless of an individual's cultural background, effective safety management relies on a shared safety culture, with everyone in the organization understanding how they are expected to behave in relation to safety and risk "even when no one is watching".

3.2.7 Safety culture and organizational change

Safety management requires that organizations manage the safety risks associated with organizational and operational changes. Staff concerns about workload, job security and access to training are associated with significant change in organizations and can have a negative impact on safety culture. The degree to which staff feel involved in the development of change and understand their role in the process will also influence the safety culture.

3.3 DEVELOPING A POSITIVE SAFETY CULTURE

3.3.1 A positive safety culture has the following features:

- a) managers and employees, individually and collectively, want to make decisions and take actions that promote safety;
- b) individuals and groups continually critique their behaviours and processes and welcome the critique of others searching for opportunities to change and improve as their environment changes;
- c) management and staff share a common awareness of the hazards and risks faced by the organization and its activities, and the need to manage risks;
- d) individuals act and make decisions according to a common belief that safety is part of the way they do business;
- e) individuals value being informed, and informing others, about safety;

- f) individuals trust their colleagues and managers with information about their experiences, and the reporting of errors and mistakes is encouraged to improve how things are done in the future.

3.3.2 Actions by management and employees can help drive their safety culture to be more positive. Table 5 provides examples of the types of management and employee actions that will enable or disable a positive safety culture in an organization. Organizations should focus on providing enablers and removing any disablers to promote and achieve a positive safety culture.

Table 5. Examples of actions that will enable or disable a positive safety culture

<i>Element</i>	<i>General Description</i>	<i>Enablers</i>	<i>Disablers</i>
Commitment to safety			
	Commitment to safety reflects the extent to which senior management within the organization have a positive attitude towards safety and recognizes its importance. Senior management should be genuinely committed to achieving and maintaining a high level of safety and give employees motivation and the means to do so also.	• Management leads safety culture and is actively motivating its employees to care for safety, not only by talking but by acting as role models • Management provides resources for a range of safety related tasks (e.g. training) • Continuous safety management oversight and governance is established	• Management is actively demonstrating that profit, cost reduction and efficiency come first • Investments to improve safety are often made when required by regulations or after accidents • Neither oversight nor governance with regard to safety management is established
Adaptability			
	Adaptability reflects the extent to which employees and management are willing to learn from past experiences and are able to take action necessary in order to enhance the level of safety within the organization.	• Employee input is actively encouraged when addressing safety issues • All incidents and audit findings are investigated and acted upon • Organizational processes and procedures are questioned for their safety impact (high extent of self-criticism)	• Employee input on safety issues is not sought from all levels of the employees • Actions are often taken only after accidents or when required by regulations • Organizational processes and procedures are considered adequate as long as no accident occurs (complacency or lack of self-criticism)

Element	General Description	Enablers	Disablers
		A clear proactive approach to safety is demonstrated and followed	- Even when an accident occurs the organization is unwilling to question itself. - A reactive approach to safety is demonstrated and followed.
Awareness			
	Awareness reflects the extent to which employees and management are aware of the aviation risks faced by the organization and its activities. From a State perspective personnel are aware of both the safety risks induced by their own activities and the organizations they oversee. Employees and management should be constantly maintaining a high degree of vigilance with respect to safety issues.	- An effective way of hazard identification has been established - Investigations seek to establish the root cause - The organization stays abreast of important safety improvements, and adapts itself accordingly as necessary - The organization systematically evaluates if safety improvements are implemented and working as intended - Where appropriate members of the organization are well aware of the safety risks induced by their individual actions and company operations / activities	- No effort is spent on hazard identification - Investigations stop at the first viable cause rather than seek the root cause - The organization does not stay abreast of important safety improvements - The organization does not evaluate if safety improvements are implemented properly - Where appropriate members of the organization are not aware of the safety risks induced by their individual actions and company operations - Safety data is gathered but not analysed and acted upon
Behaviour with respect to safety			
	Behaviour with respect to safety reflects the extent to which every level of the organization behaves such as to maintain and improve the level of safety. The importance of safety should be recognized and processes and procedures needed to maintain it should be put in place.	- The employees motivate themselves to act safely and by acting as role models - Continuous monitoring of safe behaviour is practised	Employees are not punished for intentional unsafe behaviour to the benefits of their own or other interests

<i>Element</i>	<i>General Description</i>	<i>Enablers</i>	<i>Disablers</i>
		- Intentional unsafe behaviour is not tolerated by management and colleagues - The working conditions support aviation safety at all times	- The working conditions provoke behaviour and work arounds that are detrimental to aviation safety - No monitoring of aviation safety within the organization's products or services is practised - Constructive criticism to the benefit of aviation safety is not welcomed
Information			
	Information reflects the extent to which information is distributed to all necessary people within the organization. Employees should be enabled and encouraged to report aviation safety concerns and receive feedback on their reports. Work information related to aviation safety has to be communicated meaningfully to the right people in order to avoid miscommunication that could lead to hazardous aviation system situations and consequences. The State is open to share aviation safety related information to all service providers.	- An open and just safety-reporting environment exists. - Employees are provided with safety-relevant information in a timely manner in order to allow for safe operations or decisions to be made. - Management and supervisors regularly check whether safety-relevant information is understood and acted upon - Knowledge transfer and training with regard to aviation safety is actively practiced (e.g. sharing of lessons learned)	- A blaming safety reporting environment is evident - Safety-relevant information is withheld - Safety communication is not monitored for its effectiveness - No knowledge transfer or training is provided

<i>Element</i>	<i>General Description</i>	<i>Enablers</i>	<i>Disablers</i>
Trust			
	Employee contribution to safety thrives in a reporting environment that fosters trust - trust that their actions or omissions, commensurate with their training and experience, will not be punished. A workable approach is to apply a reasonableness test – i.e. is it reasonable that a person with the same level of experience and training might do the same thing. Such an environment is fundamental to effective and efficient safety reporting. Effective safety reporting systems help to ensure that people are willing to report their errors and experiences, so that States and service providers have access to relevant data and information that is necessary to address existing and potential safety deficiencies and hazards. These systems create an environment in which people can be confident that safety data and safety information will be used exclusively for improving safety.	• There is a distinction between acceptable and unacceptable behaviour, which is known to all employees. • Occurrences (including accidents and incidents) investigations consider individual as well as organizational factors. • Good aviation safety performance is recognized and rewarded on a regular basis. • There is willingness among employees and operational personnel to report events in which they have been involved.	• There is no identifiable distinction between acceptable and unacceptable behaviour. • Employees are systematically and rigorously punished for human errors. • Accident and occurrence investigations focus on individual factors only. • Good safety performance and safe behaviour is taken for granted.

3.3.3 Monitoring safety culture

3.3.3.1 Safety culture is subject to many influences and organizations may choose to assess their safety culture to:

- understand how people feel about the organization and how importantly safety is perceived;
- identify strengths and weaknesses;
- identify differences between various groups (subcultures) within an organization; and
- examine changes over time (e.g. in response to significant organizational changes such as following an accident, a change in senior management or altered industrial relations arrangement).

3.3.3.2 There are a number of tools which are used to assess safety culture maturity, usually in combination:

- a) questionnaires;
- b) interviews and focus groups;
- c) observations; and
- d) document reviews.

3.3.3.3 Assessing safety culture maturity can provide valuable insight, leading to actions by management that will encourage the desired safety behaviours. It should be noted that there is a degree of subjectivity with such assessments and they may reflect the views and perceptions of the people involved at a particular moment only. Also, scoring safety culture maturity can have unintended consequences by inadvertently encouraging the organization to strive to achieve the “right” score, rather than working together to understand and improve the safety culture.

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