CIVIL AVIATION AUTHORITY

ADVISORY CIRCULAR

AC100-1 SAFETY MANAGEMENT

CAA
CIVIL AVIATION AUTHORITY
OF NEW ZEALAND
Te Mana Rererangi Tumatanui o Aotearoa

Safety Management

General

Civil Aviation Authority (CAA) advisory circulars (ACs) contain information about standards, practices, and procedures that the Director has found to be an acceptable means of compliance with the associated rule.

Consideration will be given to other methods of compliance that may be presented to the Director. When new standards, practices, or procedures are found to be acceptable they will be added to the appropriate AC.

Purpose

This AC describes an acceptable means of compliance and guidance material to assist aviation organisations in establishing, implementing and maintaining a safety management system (SMS), to meet Civil Aviation Rule Part 100 *Safety Management*.

Related Rules

This AC relates to Civil Aviation Rule Parts 100, 115, 119, 121, 125, 135, 137, 139, 151, 155, 156, 157, 158, 171, 172, 173, 174, and 175.

Change Notice

This AC, AC100-1 *Safety Management*, was published to provide acceptable means of compliance, and guidance material on the new Civil Aviation Rule Part 100 that came into force on 01 February 2016. On 15 June 2023, minor revisions were made to adapt the AC to current AC format as much as practicable, update references and remove out-of-date references and rule parts.

This AC now incorporates the following revisions:

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Version history and summary of revisions

REVISION NO.	EFFECTIVE DATE	SUMMARY OF REVISION
Rev 0	07 May 2015	This was the initial issue of this AC. It replaced and updated advisory circular AC00-4 that was issued in December 2012 to support proactive implementation of safety management systems. The re-numbering to AC100-1 is to align with the amendments proposed in NPRM 15-02 Safety Management.
Rev 0.4	03 December 2015	The AC was revised following NPRM consultation and feedback from industry workshops. Changes were made to the following sections: 1. Introductory information, 2. Elements of an SMS, 3. Implementing an SMS, Civil Aviation Rule Part 100 Safety Management and Implementing an SMS.
Rev 1	01 February 2016	The AC was revised following the signing of the SMS rules, Part 100 Safety Management that came into force on 01 February 2016 and feedback from industry. A summary of the changes are as follows: • one SMS evaluation tool (Form CAA24100/02) is being provided by CAA (sections 1.5.1 & 3.1) • safety policy content updated (section 2.1.1) • safety goals and safety objective guidance added (sections 2.1.2, 2.7.1 & 2.7.2) • SMS documentation file formatting guidance added (section 2.3.1) • requirements for an implementation plan detailed (section 3.1.2 in Implementing an SMS) • SMS implementation plan content updated (section 3.1.2) • diagram showing implementation timelines for Group 1 and Group 2 Organisations updated (Implementing an SMS).
Rev 2	19 December 2019	The AC was revised to reflect the changes in ICAO Annex 19 Amendment 1 Safety Management, the associated guidance material ICAO Doc 9859 4th edition Safety Management Manual, and field experience gained through SMS certification activity since Rule Part 100 Safety Management came into force. A summary of the changes are as follows: • Purpose statement and Change Notice revised on cover page. • Version history and summary of revision table reformatted and updated. • Glossary of Terms and Definitions revised (section 1.1). • The AC Purpose and Structure details revised (sections 1.2 &1.3). • SMS – An Overview is revised to reference ICAO SMS Framework Components and align principles with latest version of ICAO Doc 9859 SMM (sections 1.4.1 & 1.4.2). • Guidance on managing suppliers added (section 1.4.3). • Scalability of SMS revised (section 1.5). • Relationship between SMS and other management systems revised (section 1.6.2). • The concept of 'Safety Culture' has been included (section 1.7). • Section 1.8 Supplementary Information added containing guidance and information located in Appendix A, B and C of previous version. • Components of an SMS – this section provides information on what to look for in the components and elements of an SMS. The table highlights acceptable means of compliance and guidance. This information was previously contained in separate tables at end of each element. This information is now compiled into a single table (section 2.1).

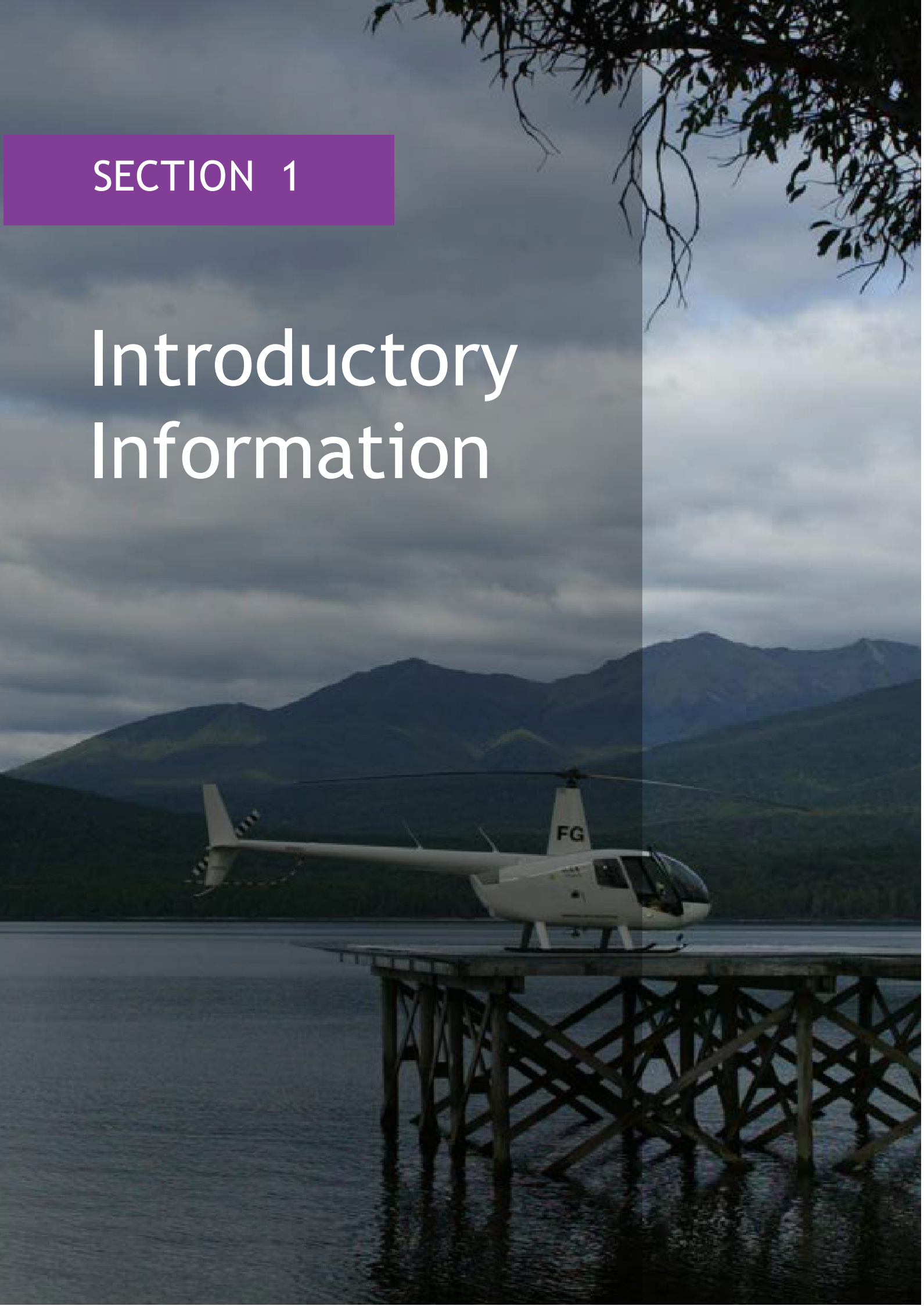
		• **Component 1: Safety Policy and Objectives**
		  • Element 1: Safety policy and accountability – content revised under the following headings: Safety policy and accountability, Safety policy, Safety goals and Safety accountabilities (section 2.2.1).
		  • Element 2: Coordinated Emergency Response Planning (ERP) – content added regarding human performance considerations (section 2.2.2).
		  • Element 3: Development, control and maintenance of safety management documentation – content added relating to overlapping systems and documentation guidance for smaller organisations (section 2.2.3).
		• **Component 2: Safety Risk Management**
		  • Element 4: Hazard Identification – all content revised (sections 2.3 & 2.3.1).
		  • Guidance on hazards related to SMS interfaces with external organisations added (section 2.3.1).
		  • Element 5: Risk Management – all content revised (section 2.3.2).
		  • Reasonably practicable and ALARP (section 2.3.3) provides guidance on ALARP concept and relationship to 'reasonably practicable' as defined by HSWA.
		• **Component 3: Safety Assurance**
		  • Element 6: Safety Investigation – content added under these headings: Internal safety investigations, Selecting and training investigators, Defining the scope of an investigation, Interpreting the facts and Report format (section 2.4.1).
		  • Element 7: Monitoring and Measuring safety Performance – all content revised (section 2.4.2).
		  • Element 8: Management of Change – all content revised (section 2.4.3).
		  • Element 9: Continuous Improvement of the SMS – all content revised (section 2.4.4).
		  • Element 10: Internal Audit Programme – content added under the headings, Internal Audit Programme, Developing a safety audit programme, Establishing an audit programme, Setting the scope and frequency of the audit, Conducting the audit and Writing the audit report (section 2.4.5).
		  • Element 11: Management Review – content added under the headings, Management Review, Management review activities, Inputs to the management review and Outputs from the management review (section 2.4.6).
		• **Component 4: Safety Promotion**
		  • Content added under this main heading describing the philosophy of safety promotion (section 2.5).
		  • Element 12: Safety Training and Competency- content added under this heading defining competency and competency-based training.
		  • Appendix E- Training and Competency Guidance Material in previous version of AC now incorporated in Element 12 (section 2.5.2).
		  • Element 13: Communication of Safety-Critical Information – content added under this heading regarding lessons learnt. Content also added under headings: What to communicate throughout the organisation and Methods of communication (section 2.5.2).
		• **Appendices**
		  • Implementing an SMS (section 3) expanded to include the guidance and information located in Appendix D and F of previous version.
		  • Appendices A – F in previous version have now been incorporated into body of this document.

Rev 3	15 June 2023	Minor revisions to align to current AC format as much as practicable, update references and remove out-of-date references and rule parts

Contents

SECTION 1

Introductory Information



Contents

1. Introductory Information

1.1 Glossary of Terms and Definitions Purpose

TERM	DEFINITION OR DESCRIPTION
As low as reasonably practicable (ALARP) *Source: Wikipedia*	Is a term often used in the management of safety-critical and safety-involved systems. The ALARP principle is that the residual risk shall be reduced as far as reasonably practicable.
Acceptable level of safety performance (ALoSP) *Source: ICAO*	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 (SPTs) and safety performance indicators (SPIs).
Change Management *Source: ICAO*	A formal process to manage changes within an organisation 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 *Source: ICAO*	Action that is taken to protect someone or something against harm. ICAO: 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.
Flight Operational Quality Assurance (FOQA)	Also referred to as 'Flight Data Monitoring' or 'Flight Data Analysis', FOQA is a programme where flight data is proactively used to identify trends that may result in a reduction in safety, or a gain in efficiency, and using this data to mitigate these risks.
Hazard *Source: ICAO*	Something that is dangerous and likely to cause a problem or damage. ICAO: A condition or an object with the potential to cause or contribute to an aircraft incident or accident.
Interface *Source: Cambridge Dictionary*	If two people, companies, systems, etc. interface, they are in contact, and work together with each other. See also Third party definition.
Just culture *Source: Reason 1997*	An atmosphere of trust in which people are encouraged, and even rewarded, for providing essential safety-related information, but in which they are also clear about where the line must be drawn between acceptable and unacceptable behaviour.
Line Operations Safety Audits (LOSA)	This is a safety programme focused on the proactive identification of threats and errors in 'normal' operational scenarios through observation. Traditionally conducted during flight operations, the LOSA concept has also been applied to cabin, ground, and military operations.
Normal Operations Safety Survey (NOSS) *Source: SKYbrary*	The Normal Operations Safety Survey (NOSS) is a methodology for the collection of safety data during normal air traffic control (ATC) operations. NOSS observations are performed by an observer situated close to or behind the controller working the operational position where the observation is taking place (direct observation). NOSS is designed to complement existing safety data collection sources. Its added value is that is provides data from normal operations (as opposed to abnormal occurrences during operations), and it is not occurrence-driven like most of the existing mechanisms.
Reasonably practicable *Source: Section 22 of HSWA 2015*	Doing what is effective and possible to ensure the health and safety of workers and others. HSWA 2015: Reasonably practicable means that which is, or was, at a particular time, reasonably able to be done in relation to ensuring health and safety, taking into account and weighing up all relevant matters.

Risk *Source: ISO 31 000:2018*	A situation involving exposure to danger. ISO: The effect of uncertainty on objectives. **Note:** *usually expressed in terms of risk sources, potential events, their consequences, and their likelihood.*
Risk management *Source: ISO 31 000:2018*	The skill or job of deciding what the risks are in a particular situation and taking action to prevent or reduce them. ISO: Coordinated activities to direct and control an organisation with regard to risk.
Risk mitigation *Source: ICAO*	A systematic reduction in the extent of exposure to a risk and / or the likelihood of its occurrence. ICAO: The process of incorporating defences, preventive controls or recovery measures to lower the severity and / or likelihood of a hazard's projected consequence.
Safety *Source: ICAO*	The condition of being protected from or unlikely to cause danger, risk, or injury. ICAO: 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 culture *Source: SM ICG*	The set of enduring values, behaviours and attitudes regarding safety, shared by every member at every level of the organisation.
Safety data *Source: ICAO*	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:* • *accident or incident investigations* • *safety reporting* • *continuing airworthiness reporting* • *operational performance monitoring* • *inspections, audits, surveys* • *safety studies and reviews*
Safety information *Source: ICAO*	Safety data processed, organised or analysed in a given context so as to make it useful for safety management purposes.
Safety management systems (SMS) *Source: ICAO*	A systematic approach to managing safety, including the necessary organisational structures, accountabilities, policies and procedures.
Safety performance *Source: ICAO*	A State's or service provider´s safety achievement as defined by its safety performance targets (SPTs) and safety performance indicators (SPIs).
Third party *Source: Wikipedia*	Any outside party, usually but not exclusively, a person or business that provides products, services, or data to your organisation (supplier), or a person or business that your organisation provides products, services, or data to (customer).

1.2 Purpose

This AC describes an acceptable means of compliance and guidance material to assist aviation organisations in establishing, implementing and maintaining a safety management system (SMS).

The following information is not intended as a prescriptive formula for the development and implementation of an SMS. A successful system needs to be tailored to an organisation's individual needs, and it is critical that its scope allows for the systematic management of both strategic and operational risk.

Guidance material on how to develop an SMS manual and associated documentation for smaller organisations, previously published as a draft appendix to AC 137-1, has been included where applicable. As such it addresses scalability at the lower end of size, nature and complexity of an organisation, and the hazards and associated risks inherent in the activities undertaken by the organisation.

CAA has produced a series of four booklets that forms part of our SMS resources for participants. The booklets contain practical advice about how to improve current systems, and explain the steps that can be taken to successfully, systematically, and proactively, manage safety.

Booklet 01 – Safety Management Systems (SMS) An Introduction

aviation.govt.nz/assets/publications/sms-resources/sms-booklet-1.pdf

Booklet 02 – From Quality Management Systems to Safety management Systems An Enhancement Guide

aviation.govt.nz/assets/publications/sms-resources/sms-booklet-2.pdf

Booklet 03 – Implementing Safety Management Systems Guidelines for Small Aviation Organisations

aviation.govt.nz/assets/publications/sms-resources/sms-booklet-3.pdf

Booklet 04 – Aviation Risk Management – An Introduction

aviation.govt.nz/assets/publications/sms-resources/sms-booklet-4.pdf

1.3 Structure of this AC

This AC is divided into four sections:

- an introduction
- the main body describing the four components of an SMS
- how to implement an SMS, and
- how to maintain and develop an SMS.

Within the main body, the four components have been further broken down into the 13 elements that CAA considers make an effective SMS. Regardless of the organisation's size and complexity, all elements are important, so information has been provided within each, for organisations to consider as they implement and develop their SMS.

The components and elements are derived from the standards and recommended practices (SARPs) published by the International Civil Aviation Organization (ICAO) in *Annex 19 Safety Management*, and further guidance provided within I*CAO Doc 9859 Safety Management Manual*, and supplemented by CAA's own existing requirements.

1.3.1 Rule structure

The safety management requirements are contained in *Civil Aviation Rule Part 100 – Safety Management (Part 100)* (Refer to Civil Aviation Rule Part 100 Safety Management) and the related organisational certification rule parts. These are *Parts: 115, 119, 121 ,125, 135, 137, 139, 151, 155, 156, 157, 158, 171, 172, 173,174, and 175.*

The high-level, performance-based principles adopted in Part 100 define the management outcomes expected of organisations to achieve increased safety performance; this structure provides the flexibility for organisations to adapt to the future and to scale SMS to their needs and circumstances.

The relationship between Part 100, AC100-1 and ICAO Annex 19, *Safety Management,* reflects the relationship between the ICAO Annex 19 SMS framework, the SMS elements in this AC, and the safety management rules (in this example Part 100 and Part 119).

1.4 SMS – An Overview

1.4.1 Purpose of an SMS

The purpose of an SMS is to provide organisations with a systematic approach to managing safety. It is designed to continuously improve safety performance through:

- the identification of hazards
- the collection and analysis of safety data and safety information, and
- the continuous assessment of safety risks.

The SMS seeks to proactively mitigate safety risks before they result in aviation accidents and incidents. It allows organisations to effectively manage their activities, safety performance and resources, while gaining a greater understanding of their contribution to aviation safety.

> *'…SMS is not a manual, a database, or a reporting process; these are all tools. It is how safety is managed day to day and becomes part of your organization's culture. It penetrates into the organization's processes and activities and it shapes critical management thinking. It is a vital management tool where the staff are the eyes and ears, the safety group is the heart and management is the decision-making 'brain' of the system.'*
>
> *SM ICG – Senior Manager's role in SMS, May 2016*

Organisations with an effective SMS typically show genuine management commitment, creating a working environment where staff are encouraged to engage in and contribute to the organisation's safety management processes. These organisations benefit from having an active Just Culture policy, supported by regular feedback on what has been done in response to staff reports, and from effective controls to manage the identified risks.

Hazard identification, risk assessment, evaluation, and control have therefore become an integral part of day-to-day business. Managers and staff understand that supervision of the operations, and therefore safety, is the responsibility of all, not just the Safety Manager.

Four simple audit questions that are really easy to answer if you have an effective SMS, and impossible to answer if you don't:

- *What is most likely to be the cause of your next accident or serious incident?*
- *How do you know that?*
- *What are you doing about it?*
- *Is it working?*

William R. Voss, Flight Safety Foundation, May 2012

1.4.2 Components and elements of an SMS

The 4 components and 13 elements are shown in the table below.

	COMPONENTS		ELEMENTS
1	Safety Policy and Objectives	1	Safety policy & accountability
		2	Coordinated Emergency Response Planning (ERP)
		3	Development, maintenance, and control of safety management documentation
2	Safety Risk Management	4	Hazard identification
		5	Risk management
3	Safety Assurance	6	Safety investigation
		7	Monitoring and measuring performance
		8	Management of change
		9	Continuous improvement of the SMS
		10	Internal audit programme
		11	Management review
4	Safety Promotion	12	Safety training and competency
		13	Communication of safety critical information

The first component of the SMS framework focuses on creating an environment where safety management can be effective. It is founded on a safety policy and objectives that set out senior management's commitment to safety, its goals and the supporting organisational structure.

The second component provides a framework to support organisations in managing their safety risks. This process is known as Safety Risk Management (SRM), which includes hazard identification, risk assessment and risk management.

The third component provides the means to verify the safety performance of the organisation, and to validate the effectiveness of safety risk controls.

The fourth component encourages a positive safety culture and helps the organisation achieve its safety goals and objectives through the combination of technical competence that is continually enhanced, effective communications, and information-sharing. Senior management provides the leadership to promote the safety culture throughout the organisation.

None of the components and elements can be considered to stand alone, as there are multiple interactions within the system. The following example event, is provided to demonstrate the connections between components.

Damage to Air NZ jet not reported by Fiji ground handlers

Radio New Zealand 11 January 2018

An Air New Zealand 777-300 aircraft was damaged by ground crew in Fiji over the weekend.

A loading platform grazed the Boeing's door on Sunday but was not reported by the ground handling agent. The airline only became aware of the damage after the aircraft returned to Auckland and routine inspections were made.

Fiji Trades Union Congress national secretary said the incident highlighted concerns around security at the airport and the safety of passengers.

"We have unqualified people who are performing duties that they really should not be performing," he said.

"Nadi is a place where accidents are waiting to happen."

The secretary said around 200 staff remain locked out of work since attending a shareholders' meeting on 16 December.

Management from the ground handling agent said "temporary" staff have been filling the void.

The airline has responded to an earlier version of this story with a statement saying, "staff providing ground handling services to Air New Zealand are fully trained".

It said damage to the aircraft was minor and did not compromise safety and the 342-seat aircraft was repaired on arrival in Auckland and returned to service.

The ground handling agent CE, has said previously that it is completely safe to travel to Fiji through Nadi airport.

Typically the ensuing safety investigation would have provided some recommendations to the management to prevent recurrence, such as re-training the individual(s) involved and possibly issuing an operational notice to all staff.

However, if the SMS elements are overlaid onto the event, it can be seen that there are many more considerations and connections within the system to drive improvement that will have more lasting impacts.

Examples of possible outcomes when the SMS elements are overlaid onto the example event:

- **Policy** – senior managers addressed a potential culture of cutting corners to maintain on-time departures through clear safety messaging, and follow-through on a review of scheduling adjustments.
- **Emergency response plan (ERP)**– the effectiveness of communications during the investigation was assessed and this led to an amendment to the ERP, including a drill to confirm that the changes worked.
- **Documentation** – revision to ramp procedures to add a 'caution', changes to the ERP flow-chart, and a revision to the risk management process to include front-line representation – see Figure 1.
- **Hazard identification** – some additional human performance hazards were identified relating to communications and distraction of ground crew by gate agents.
- **Risk management** – the risk register was updated after reviewing the new hazards, and existing controls relating to ramp movements were reviewed and updated based on the lessons learned.
- **Safety investigation** – the investigation was promptly instigated, which meant video footage was still available from the airport company.
- **Monitoring and measuring performance** – new safety performance measures showing total actual cost of ground damage against total cost of safety initiatives relating to ramp operations over time, was proposed at the following management review meeting.
- **Management of change** – the equipment involved in the damage event had been introduced before the organisation carried out formal management of change and stakeholder involvement had been non-existent. A retrospective review was instigated to identify improvements.
- **Continuous improvement of the SMS** – the original risk assessment process had not included front-line workers in the assessment group; the process was amended to ensure appropriate stakeholder representation.
- **Internal Audit** – an assessment of risk control effectiveness was added to the ramp survey. The Safety Manager provided independent oversight for the ERP drill.
- **Management review** – the proposed safety performance indicators (SPIs) were agreed as supporting the existing operational objective to reduce ground damage, noting that there had been a rising trend at that particular location corresponding to a recent high turnover of staff. The turnover had stabilised following changes to work schedules.
- **Safety training** – the training programme was reviewed, and it was identified it needed revising to keep up with recent staff turnover, and more focus was required on evaluating the effectiveness of the training.
- **Safety communications** – multi-method communications were used to enhance ramp safety initiatives being delivered, including messaging for senior managers and team leaders to share with staff.

1.4.3 Managing suppliers

Aviation activities are undertaken and supported by a multitude of interconnected businesses. The organisation is responsible for managing and monitoring how they interface with those businesses, also referred to as a third party. The overall level of safety in the aviation industry is likely to increase when the safety risks related to those connections are better understood and controlled.

An SMS does not just apply to the certificated organisation; it extends to third parties (people and organisations) that supply products and services, and to third parties that are supplied with products or services. Some of these third parties may not have (or require) an SMS, but they all have the potential to impact upon safety risks to the certificated organisation. By identifying and managing these interfaces, the organisation will have more control over any safety risks related to the interfaces. These third-party interfaces should be defined and described in the organisation's SMS.

Refer to Section 2.3.1, Element 4: Hazard Identification for guidance on hazards related to SMS interfaces with external organisations.

1.5 Scalability of SMS

Rule reference: 100.3(c)

'The organisation's system for safety management must correspond to the size of the organisation, the nature and complexity of the activities undertaken by the organisation, and the hazards and associated risks inherent in the activities undertaken by the organisation'.

One of the characteristics of SMS is that no one system fits all organisations. ICAO Annex 19 requires that the SMS of a service provider shall be commensurate with the size of the service provider and the complexity of its aviation products or services. The New Zealand aviation industry is characterised by a wide variety of organisations and operations. Each organisation has unique features relating to its operations and the associated safety risks; therefore an SMS should be tailored to meet the needs of the organisation.

Regardless of the size of the organisation, scalability should also be a function of the inherent safety risk of the activities undertaken. Even small organisations may be involved in activities that may entail significant aviation safety risks. Therefore, safety management capability should be commensurate with the safety risk to be managed.

Figure 1: Concept of size, nature and complexity in relation to activity risk

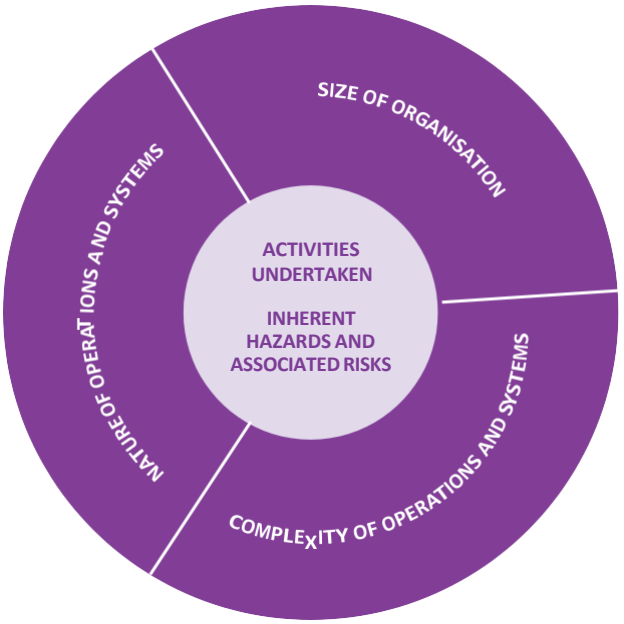


Figure 1 shows the relationship of hazards and associated risks for the activities undertaken, connected as a whole within the organisational context, and the business and physical environment.

The table below shows examples of three different types of operations, with an approximate size in terms of full-time equivalent employees (FTE). In the column showing complexity indicators, the bold type indicates the risk driver for each example (GA ops – new operator, int'l ops – multiple aircraft types, helicopter emergency medical service (HEMS) – remote locations). As experience builds, familiarity with managing multiple types, and operating into remote areas evolves, so the level of risk changes. With changes to those same example organisations (new aircraft, organisational merger, additional helicopter type), other risks may emerge. It is important to recognise these relationships, which are fundamental to the risk-based approach to SMS.

NATURE OF OPERATIONS AND SYSTEMS	SIZE	COMPLEXITY INDICATORS
General aviation operator	< 20 FTE	Day VFR; single-pilot crew; **new organisation** with immature systems; old aircraft
International airline operator	Several hundred	EDTO operations; international routes, **multiple aircraft types**; highly experienced management and staff
HEMS operations	< 20 FTE	Use of NVG; **remote locations**; single helicopter type; experienced management

Note*: *While the size of the organisation can be a starting point, the nature and complexity of its operations and systems (e.g. system for safety reporting, system for rostering etc.) should be equally considered when assessing operational safety risks and the overall complexity of the organisation.

Challenges for smaller organisations

For small organisations, the low volume of data generated by the business may mean that it is more difficult to identify trends or changes in the safety performance. It may be more appropriate to use meetings to raise and discuss safety issues with the appropriate expertise. This may be more qualitative than quantitative, but will help identify hazards and risks for the organisation. Collaborating with other organisations, user groups, or industry associations can be helpful, since these may have data that the organisation does not have such as safety risk information and identified safety performance trends. Another useful source are the sector risk profiles published by CAA. Organisations should adequately analyse and process their internal data even though it may be limited.

aviation.govt.nz/safety/safety-advice/sector-risk-profiles

1.5.1 Organisation size

An organisation should initially consider their activities as complex when it has a workforce of more than 20 FTEs involved in the certificated activities. Organisations with fewer than 20 FTEs may also consider their activities as complex after collectively assessing the size, nature and complexity of the operations against the hazards and associated risks inherent in their activities.

1.5.2 Nature of operations and systems

The inherent hazards and associated risks of the operation should be considered in the context of the business and physical environment. Here are some examples:

LESS RISK	MORE RISK
Day VFR	• Single piston engine IFR (SEIFR) • Helicopter emergency medical service (HEMS) • Use of night vision imaging system (NVIS) • Extended diversion time operations (EDTO) • Performance based navigation (PBN)
Local scenic	Charters over hostile terrain (offshore, mountainous, remote, etc.)
Agricultural aircraft engaged in dispensing activities over gently rolling land contour	Agricultural aircraft engaged in dispensing activities over steep and rugged land contour
Carriage of freight	Carriage of dangerous goods
High level of relevant experience and competence among management and / or personnel	Low level of relevant experience and competence among management and / or personnel
Steady workload	Peak seasonal workload
Day shift work	Rostered patterns, including night shifts
Multi-crew	Single pilot

1.5.3 Complexity of operations and systems

In terms of complexity, an organisation should consider the scope of activities performed under its certificate, including the systems used to support them. Examples of organisational activity that may determine that it is complex in nature, regardless of the number of FTEs, include:

LESS RISK	MORE RISK
Single fleet type	Mixed fleet of: • fixed / rotary wing • multiple type certificate holders / models • differing configurations
Aircraft / equipment of simple construction (e.g. un-pressurised aircraft with simple systems)	Aircraft / equipment with complex systems and methods of construction (e.g. pressurised aircraft with multiple hydraulic / pneumatic / electrical systems)
Domestic operations	International operations
Single base of operation	Multiple operating bases
In-house services	Multiple third party service providers
Paper-based reporting system for a small organisation	Paper-based reporting system for a large organisation

The need for an SMS to meet individual organisational needs means that flexibility is required. As a result, this AC contains the required elements for an effective SMS, but it does not prescribe how each of these elements should be adopted by an organisation.

Organisations should ask themselves the following questions at all stages of the development, implementation and functioning of their SMS:

- Is it appropriate for the size of the organisation and nature and complexity of the activities undertaken?
- Is it in place – present and suitable?
- Is it operational and being used?
- Is it effective and delivering the expected results?

The development and implementation of an SMS is part of driving improved operational integrity. Once the SMS is in place, a programme of continuous improvement is needed to ensure an ongoing commitment to safety.

1.5.4 Scalability and evaluation of an organisation's SMS

Each organisation is different. SMSs are designed to be tailored to meet the specific needs of the organisation. All components and all elements of SMS are interconnected and interdependent, and necessary to function effectively. The system is designed to deliver the desired outcomes for each organisation without undue burden. SMS, well implemented, are intended to complement and enhance the organisation'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 organisation's culture and operating environment.

CAA, when assessing an organisation's SMS, takes into consideration scalability. CAA has provided SMS Evaluation Tool form *CAA 24100/02*, to assist organisations in determining how to best assess, develop and implement the various elements of an effective SMS scaled to their organisation. The tool provides guidance during initial implementation and certification for assessing an organisation's processes and systems for an SMS that is scaled to be commensurate with the organisation's size, nature and complexity of its activities, and the hazards and associated risks inherent in the activities.

The tool is broken down into the 13 elements, and each element is further sub-divided to provide more detail to assist the organisation and CAA in evaluating the system. Not all sub-elements will apply, depending on the scale of the organisation.

Smaller, less complex organisations undertaking activities with fewer inherent hazards and lower associated risks may only need to demonstrate how they meet the requirements for each element at the high-level requirement shown at the top of each table in the form.

For larger, more complex organisations or those engaging in activities with more inherent hazards and higher associated risks, it is likely that progressively more of the sub-elements will need to be addressed, as the organisation develops its safety management processes.

Refer to sections 3 and 4 of this AC for further information and guidance on implementing the elements of an SMS.

1.6 SMS Integration with other Management Systems

1.6.1 Relationship between SMS and Quality Management Systems (QMS)

SMS and QMS share a number of common purposes and processes:

- both depend upon measuring and monitoring
- both strive for continual improvement, and
- both use some of the same tools, such as auditing and review.

However, a QMS does not include all the elements, features and activities of an SMS, as it focuses mainly on compliance, conformance and monitoring. SMS goes further and requires the organisation to identify and manage risk so as to achieve an acceptable level of safety performance. It is not so much a case of replacing QMS by SMS, but instead, realising that they are complementary and inextricably linked – one cannot build an effective SMS without applying QMS principles.

The application of quality management principles to safety management processes helps to ensure that the requisite system-wide safety measures have been taken to support the organisation in achieving its safety objectives. It is the integration of QMS principles into an SMS, establishing a structured approach to monitoring and improving the processes of managing safety risks, that will assist an organisation in managing safety risks to a point considered 'as low as reasonably practicable'.

1.6.2 Relationship between SMS and other management systems

It makes good business sense to integrate management systems where possible, and the introduction of an SMS offers this opportunity. The benefits of integrating systems include a reduction in the duplication of resources, a significant improvement in the collation and analysis of safety-related data, a reduction in potentially conflicting objectives, recognition of safety as the objective of all systems, improved internal communications, and better management oversight over the overall health of the business. A phased approach to integration should be considered: for example, it is not immediately necessary to link existing Health and Safety at Work (HSW) reporting systems into an operational reporting system, but there may be value in doing so in the future.

Some typical management systems are identified below. Organisations may choose to integrate these systems based on their unique needs, recognising that different systems may share processes. Risk management processes and internal audit processes are essential features of most of these systems. It should be recognized that the risks and risk controls developed in any of these systems could have an impact on other systems.

Note: Section 1.6.2 draws from ICAO Document 9859.

Health and safety at work (HSW)

Whereas Rule Part 100 intentionally focuses on safety management functions related to, or in direct support of, the safe operation of aircraft, HSW is a cross-disciplinary system concerned with protecting the safety, health and welfare of people in the workplace. In the Health and Safety at Work Act (HSWA) 2015, the identification of Occupational Health and Safety (OHS) hazards coupled with assessment and management of the associated risks are at the heart of the system, and therefore align with many of the elements of an SMS.

Depending upon the organisational size and structure, safety risks associated with compound hazards that simultaneously impact aviation (operational) safety as well as occupational safety, may be managed through separate risk mitigation processes to address the separate aviation and occupational consequences, respectively. Alternatively, an integrated aviation and occupational risk mitigation system could be used to address compound hazards.

Example of a compound hazard – Lightning strike on an aircraft at an airport gate

This hazard may be considered from an OSH perspective to be a 'workplace hazard' affecting ground personnel / workplace safety.

From an aviation safety perspective, 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 occupational and aviation safety consequences of such compound hazards, since they are not always the same. The purpose and focus of risk controls for occupational and aviation safety consequences may differ.

Fatigue risk management systems (FRMS)

An FRMS provides organisations with a means to systematically manage the complexities of physical and psychological fatigue-related risks and their effects. There are a number of case studies that demonstrate that the integration of an FRMS within the SMS framework is extremely beneficial, particularly when considered alongside other human factors-related risks. Another advantage of integration is that HSW legislation requires organisations to establish formal means to manage fatigue.

Security management systems

The purpose of a security management system is to systematically protect against danger, damage, loss or unlawful interference. Safety management is closely linked to a security management system.

Environmental management systems (EMS)

The goal of an environmental management system is to identify and improve the environmental impact of an organisation. Where specific legislation exists, organisations are required to demonstrate well-managed environmental practice, but overall, the goal of having an EMS is to positively contribute to the environmental safety of the company and community. Standards for environmental management, such as ISO 15001, are a protection standard and as such align particularly well with the aims of an SMS.

Business management systems

Organisations may also consider applying the SMS to other areas that do not have a current regulatory requirement for an SMS. An organisation will have in place a number of business management systems to achieve efficient and profitable outcomes. These may include formal financial management systems, project management processes, compliance management systems, and many others. An effective SMS could be integrated with these systems also, and not remain a stand-alone solution. This could result in mutually beneficial outcomes such as financial reporting that takes account of safety initiatives, and project management processes that incorporate SMS processes (such as reporting and management of change).

1.7 Safety Culture

1.7.1 Introduction

Safety culture is the set of enduring values, behaviours and attitudes regarding safety, shared by every member at every level of an organisation.

How safety values are incorporated into practices by management and personnel directly affects how key elements of the SMS are established and maintained. As a consequence, safety culture has a direct impact on safety performance. If someone in the organisation 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 organisation, therefore, significantly influences how their SMS develops and how effective it becomes. Safety culture is arguably the single most important influence on the management of safety. If an organisation has instituted all the necessary safety management requirements but does not have a possible safety culture, it is likely to underperform.

When the organisation 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 organisation's safety objectives. Effective safety management also supports efforts to drive towards and increasingly positive safety culture by increasing the visibility of management's support and improving active involvement of personnel in managing safety risk.

In simple terms, safety culture is how people behave towards safety when no one is watching.

Link between SMS and Safety Culture

Or another way of looking at it…

SMS + Culture = Safety Performance

(framework) + (behaviours) = (achievement)

SMS is never enough if practiced mechanically, it requires an effective safety culture to flourish.

(Hudson, 2001)

Safety culture can be described by six high-level characteristics, as shown below and expanded upon in section 1.7.4 *Developing a positive safety culture*:

1.7.2 Safety culture and safety reporting

Reporting culture emerges from personal beliefs about, and attitudes toward, the benefits and disadvantages associated with reporting systems.

A healthy reporting culture is built on a just culture, which aims to differentiate between intentional and unintentional deviations, with a focus on the behaviours exhibited rather than the outcomes. It encourages the determination of the best course of action for both the organisation as a whole and the individuals involved.

Staff must know that confidentiality will be maintained and the information they submit will be acted upon fairly and justly. Otherwise, they will determine there is little or no benefit in submitting a report.

Whether 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 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 management to effectively manage the associated safety risk(s).

1.7.3 Informed decision making

A positive safety culture is essential to an effective SMS. It creates an openness that encourages people to report safety issues. This in turn will help management make informed decisions based on what is really going on, through having a:

- reporting culture: does the organisation encourage reporting?
- learning culture: does the organisation treat information as an opportunity to grow its safety culture?
- flexible culture: does the organisation act on information to improve safety?

1.7.4 Developing a positive safety culture

We should be cautious of attempts to 'implement' or 'create' a culture as one would throw a switch. Cultures are not transformed overnight, but you *can* change the working environment and the way people work together, and clearly spell out the behaviours expected of all. You can assess attitudes and behaviours, but people will not change unless the new ways are accepted as an improvement.

Management needs to create the working environment, provide the tools and clear policy, and demonstrate behaviours that foster desirable safety behaviours. Actions by management and staff can help drive their safety culture to be more positive.

The table below provides examples of the types of management and staff actions that will enable or disable a positive safety culture in an organisation. Organisations should focus on providing enablers and removing any disablers to promote and achieve a positive safety culture.

CHARACTERISTIC	ENABLERS	DISABLERS
Commitment The extent to which every level of the organisation has a positive attitude towards safety and recognises its importance. Senior management should be genuinely committed to maintaining a high level of safety and motivating employees to do so as well.	Management leads safety culture and is actively motivating staff 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 only when required by regulations or after accidents. There is no or little oversight or governance with regards to safety management.
Awareness The extent to which management and staff are aware of the risks for themselves and for others implied by the organisation's operations. Management and staff 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(s). The organisation stays abreast of important safety improvements and adapts itself accordingly. The organisation systematically evaluates if safety improvements are implemented and working as intended. Members of the organisation 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 organisation does not stay abreast of important safety improvements. The organisation does not evaluate if safety improvements are implemented properly. Members of the organisation 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.

	**Justness** The extent to which safe behaviour and reporting of safety issues are encouraged or even rewarded and unsafe behaviour is discouraged.	There is a distinction between acceptable and unacceptable behaviour, which is known to all employees. Occurrence investigations (including accidents and incidents) consider individual, as well as organisational factors. Good aviation safety performance is recognised and rewarded on a regular basis. There is a willingness among staff to report events in which they have been involved.	There is no identifiable distinction between acceptable and unacceptable behaviour. Staff are systematically and vigorously punished for human errors. Accident and occurrence investigations focus on individual factors only. Good safety performance and safe behaviour is taken for granted.
	**Adaptability** The extent to which management and staff are willing to learn from experiences and are able to take whatever action is necessary to enhance the level of safety within the organisation.	Staff input is actively encouraged when addressing safety issues. All incidents and audit findings are investigated and acted upon. Organisational processes and procedures are questioned for their safety impact (high extent of self-criticism). A clear proactive approach to safety is demonstrated and followed.	Staff input on safety issues is not sought from all levels of the organisation. Actions are often taken only after accidents or when required by regulations. Organisational processes and procedures are considered adequate as long as no accident occurs (complacency or lack of self-criticism). Even when an accident occurs the organisation is unwilling to question itself. A reactive approach to safety is demonstrated and followed.
	**Information** The extent to which information is distributed to the right people in the organisation. Work-related information must be communicated in the right way to the right people.	An open and just safety reporting environment exists. Staff 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 regards 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.
	**Behaviour** The extent to which every level of the organisation behaves to maintain and improve the level of safety. From the management side, the importance of safety should be recognised, and everything needed to maintain and enhance safety should be put in place.	Staff motivate themselves to act safely and by acting as role models. Continuous monitoring of safe behaviour is practised. Intentional unsafe behaviour is not tolerated by management and colleagues. The working conditions support aviation safety at all times.	Individuals are not punished for intentional unsafe behaviour that benefits them or other interests. The working conditions provoke behaviour and work-arounds that are detrimental to aviation safety. There is no monitoring of aviation safety within the organisation's products or services. Constructive criticism to the benefit of aviation safety is not welcomed.

1.7.5 Monitoring safety culture

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

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

There are a number of tools that can be used to assess safety culture maturity, usually in combination:

- questionnaires
- interviews and focus groups
- observations, and
- document reviews.

Assessing the safety culture and the organisation's maturity in this area can provide valuable insight, leading to actions by management that will encourage the desired safety behaviours.

The assessment of safety culture does pose challenges, and organisations should initially focus on kicking off initiatives to hear back from the organisation, rather than wondering what is the 'right' method. 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 organisation to strive to achieve the 'right' score, rather than working together to understand and improve the safety culture.

1.8 Supplementary Information

1.8.1 Civil Aviation Rule Part 100 Safety Management

Part 100 Safety Management

100.1 Applicability

This Part applies to an organisation that is required by the Civil Aviation Rules to establish, implement, and maintain a system for safety management.

100.3 System for safety management

(a). An organisation to which this Part applies must have a system for safety management that includes:

(1) a safety policy on which the system for safety management is based; and

(2) a process for risk management that identifies hazards to aviation safety, and that evaluates and manages the associated risks; and

(3) safety assurance measures that ensure:

(i) hazards, incidents, and accidents are internally reported and analysed and action is taken to prevent recurrence; and

(ii) goals for the improvement of aviation safety are set and the attainment of these goals is measured; and

(iii) there is a quality assurance programme that includes conducting internal audits and regular reviews of the system for safety management; and

(4) training that ensures personnel are competent to fulfil their safety responsibilities.

(b) The organisation must document all processes required to establish and maintain the system for safety management.

(c) The organisation's system for safety management must correspond to the size of the organisation, the nature and complexity of the activities undertaken by the organisation, and the hazards and associated risks inherent in the activities undertaken by the organisation.

1.8.2 Part 100 Safety Management relationship to AC100-1 Elements and ICAO Annex 19 SMS High level summary of SMS components and elements

The following diagram depicts the relationships between Part 100-1 requirements, AC100-1 SMS elements, and the ICAO Annex 19 SMS Appendix 2 SMS framework. It will assist organisations with an overview of the safety management requirements and show where to find the acceptable means of compliance and guidance material in the AC that correspond to the rule requirements.

It demonstrates how CAA's SMS elements are consistent with the ICAO SMS framework specified in Appendix 2 of Annex 19 *Safety Management*.

Key to the colours used in the diagram:

BLUE TEXT	Text from Part 100 *Safety Management.*
RED TEXT	Text from Civil Aviation certification-based rules that specify safety management requirements *Examples from Civil Aviation Rule Part 119 are used in the diagram.*
GREEN TEXT	Text from Civil Aviation operations-based rules that specify other requirements that are relevant to safety management. *Examples from Civil Aviation Rule Part 121 are used in the diagram.*

This diagram is also available as an A3 pdf.

ICAO Annex 19
SMS Framework
4 Components
and 12 Elements

AC100-1
Safety Management
13 Elements

Organisation Certification Rule requiring Safety Management *Replaces Quality Assurance rule*

Part 100 Safety Management
and related organisation certification rule references
– Example Rule Part 119

SAFETY MANAGEMENT REQUIREMENTS – Example 119.79 Safety management

An applicant for the grant of an airline air operator certificate must establish, implement, and maintain a system for safety management in accordance with rule **100.3**.

100.3 System for safety management

(a) An organisation to which this Part applies must have a **system for safety management that includes**

1. Safety policy and objectives

1.1 Management commitment and responsibility

1.2 Safety accountabilities

1.3 Appointment of key safety personnel

1. Safety Policy and Accountability

(a) (1) a **safety policy** on which the system for safety management is based;

PERSONNEL REQUIREMENTS – Example 119.51

(a) An applicant for the grant of an airline operator air operator certificate must employ, contract, or otherwise engage.

(1) a senior person identified as the **CE** who:

(i) has the **authority** within the applicant's organisation to ensure that all activity undertaken by the organisation under the authority of the certificate can be financed and carried out in accordance with the requirements and standards prescribed by this Part; and

(ii) is **responsible** for ensuring that the applicant's organisation complies with the requirements of this Part.

EXPOSITION REQUIREMENTS – Example 119.81

(a) (3) the duties and responsibilities of the senior persons required by rules 119.51(a)(1) and (2), including:

(ii) **responsibilities for safety management**;

(a) (6A) information identifying the lines of **safety responsibility** within the organisation.

PERSONNEL REQUIREMENTS – Example 119.51

(b) the senior persons required by paragraph (a) must –

(1) Unless otherwise acceptable to the director as a consequence of the size and expected scope of the applicant's organisation, each be responsible for no more than one of the following functions:

(iv) the **system for safety management** required under rule **119.79**.

1.4 Coordination of emergency response planning

2. Coordinated Emergency Response Planning

CURRENT RULE REQUIREMENTS – Example 121.95 Emergency situation action plans

(a) Each holder of an air operator certificate shall ensure action plans are developed for handling in-air and on-ground emergency situations and minimising risk of injury to persons.

1.5 SMS Documentation

3. Development, Control and Maintenance of Safety Management Documentation

(b) The organisation must **document all processes** required to **establish and maintain** the system for safety management.

EXPOSITION REQUIREMENTS – Example 119.81

(a) (1A) in relation to the system for safety management required by rule 119.79

(i) all of the documentation required by **rule 100.3(b)**.

2. Safety risk management

2.1 Hazard identification

4. Hazard Identification

(a) (2) **a process for risk management that identifies hazards to aviation safety, and that evaluates and manages the associated risks.**

2.2 Safety risk assessment and mitigation

5. Risk Management

3. Safety assurance

3.1 Safety performance monitoring and measurement

6. Safety Investigation

(a) (3) **safety assurance measures** that ensure:

(i) **hazards, incidents,** and **accidents** are **internally reported** and **analysed** and **action is taken** to **prevent recurrence**; and

(ii) **goals for the improvement of aviation safety are set** and the attainment of these goals is **measured**.

7. Monitoring and Measuring Performance

3.2 The management of change

8. Management of Change

3.3 Continuous improvement of the SMS	**9. Continuous improvement of the SMS**	(iii) there is a **quality assurance programme** that includes conducting **internal audits** and **regular reviews** of the **system for safety management**.
	10. Internal Audit Programme	
	11. Management Review	
4. Safety promotion		
4.1 Training and education	**12. Safety Training and Competency**	**(a)** (4) **training** that ensures personnel are **competent** to fulfil their safety responsibilities.
4.2 Safety communication	**13. Communication of Safety Critical Information**	
Requirements not within framework		
SMS be commensurate with the size of the service provider and the complexity of its aviation products or services	**1. Scalability of SMS** Organisation's; size, nature & complexity, associated risks	**(c)** The organisation must ensure that the system for safety management **corresponds to the size** of the organisation, the **nature** and **complexity** of the **activities** undertaken by the organisation, and the **hazards and associated risks** inherent in the **activities** undertaken by the organisation.
SMS Implementation (from SMM Doc 9859)		

Part 100 Safety Management
relationship to
AC100-1 Elements and
ICAO Annex 19 SMS Framework
Rule effective – 1 February 2016
Refer to AC100-1 Section 1.8.1

EXPOSITION REQUIREMENTS
Example – Rule 119.81(a)(i)

(a) An applicant for the grant of an airline air operator certificate must provide the Director with an exposition that contains

…

(1A) in relation to the system for safety management required by rule 119.79,—

(i) all of the documentation required by rule 100.3(b); and

(ii) for an applicant that is not applying for a renewal of an airline air operator certificate, an implementation plan that describes how the system for safety management will be implemented;

1.8.3 References and further information

ACI	Airports Council International (ACI) is the global trade representative of the world's airports. ACI represents airports' interests with Governments and international organisations such as ICAO, develops standards, policies and recommended practices for airports, and provides information and training opportunities to raise standards around the world. https://aci.aero/
ARMS	Aviation Risk Management Solutions (ARMS) Working Group (2010); The ARMS Methodology for Operational Risk Assessment in Aviation Organisations, 2007-2010; ARMS Working Group.
ATSB	Australian Transport Safety Bureau (2008); Analysis, Causality and Proof in Safety Investigations, Aviation Research and Analysis Report AR-2007-053, Australian Transport Safety Bureau, Canberra, Australia.
CAAS	Civil Aviation Authority of Singapore (2013); *AC 1-3(4) – Safety Management System;* Civil Aviation Authority of Singapore.
CANSO	Civil Air Navigation Services Organisation (CANSO) purpose is, as a global and regional voice of air traffic management (ATM) that facilitates and supports improvements in global and regional ATM performance. They operate across three broad areas of safety, operations and strategy and integration, working with industry stakeholders and States to transform ATM performance in their regions and globally. http://www.canso.org/
CASA AUSTRALIA	Civil Aviation Safety Authority, Australia (2008); *Managing change in the aviation industry*; Civil Aviation Safety Authority, Australia. Civil Aviation Safety Authority, Australia (2009); *Civil Aviation Advisory Publication CAAP SMS-1(0) Safety management systems for regular public transport (RPT) operations*; Civil Aviation Safety Authority, Australia. Civil Aviation Safety Authority of Australia (2009); *Civil Aviation Advisory Publication CAAP SMS-2(0) Integration of human factors (HF) into safety management systems (SMS)*; Civil Aviation Safety Authority of Australia. Civil Aviation Safety Authority, Australia (2015); *Safety management systems for aviation – A practical guide, 2nd edition December 2015*; Retrieved March 9, 2015, from casa.gov.au/safety-management/safety-management-systems
CAA NEW ZEALAND	Safety Management Systems (SMS) aviation.govt.nz/safety/sms-safety-management-systems
FAA	Federal Aviation Administration (2015); AC 120-92B Safety management systems for aviation service providers; Federal Aviation Administration. Federal Aviation Administration Flight Standards Service (2010); SAFETY MANAGEMENT SYSTEM (SMS) IMPLEMENTATION GUIDE For: Safety Management System (SMS) Pilot Project Participants and Voluntary Implementation of Service provider SMS Programs; Federal Aviation Administration Flight Standards Service- SMS Program Office Revision 3 June 1, 2010.
ICAO	International Civil Aviation Organization (ICAO) (2013); Annex 19 to the Convention on International Civil Aviation; Safety Management, First edition July 2013; ICAO. International Civil Aviation Organization (ICAO) (2013); Doc 9859; Safety Management Manual, 3rd edition 2013; ICAO.
IHST	International Helicopter Safety Team. US Joint Helicopter Safety Team (2009); *Safety management system toolkit, 2nd edition*; International Helicopter Safety Team, Alexandria, Virginia.
ISO	International Organization for Standardization (2018); *ISO31000:2018 Risk management – guidelines;* International Organization for Standardization, Geneva. International Organization for Standardization (2009); *IEC/ISO31010:2009 Risk Management: Risk Assessment Techniques;* International Organization for Standardization, Geneva. International Organization for Standardization (2018); *ISO 19011:2018 Guidelines for auditing management systems*; International Organization for Standardization, Geneva.
SACAA	South African Civil Aviation Authority (2015); AC Safety Management Systems – A guide to implementation. CA AOC-AC-FO-017; South African Civil Aviation Authority.

SM ICG	Safety Management International Collaboration Group (2012); *Safety management system evaluation tool*; Safety Management International Collaboration Group. Safety Management International Collaboration Group (2013); *Measuring safety performance guidelines for service providers*; Safety Management International Collaboration Group. Safety Management International Collaboration Group (2013); *How to support a successful SSP and SMS implementation – Recommendations for regulators*; Safety Management International Collaboration Group. Safety Management International Collaboration Group (2013); *Hazard Taxonomy Examples*; Safety Management International Collaboration Group.
TRANSPORT CANADA	Transport Canada (2008); AC 107-001 –Guidance on safety management systems development; Transport Canada, Ottawa. Transport Canada (2008); AC 107-002 –Safety management systems development guide for small operators / organisations; Transport Canada, Ottawa.
UK CAA	United Kingdom Civil Aviation Authority, Safety Regulation Group (2010); *Safety management systems – Guidance to organisations (3)*; United Kingdom Civil Aviation Authority, London. United Kingdom Civil Aviation Authority, Safety Regulation Group (2013); *Safety management systems – Guidance for small, non-complex organisations*; United Kingdom Civil Aviation Authority, London.
INDIVIDUALS	Dekker, SWA (2005); Ten questions about human error: A new view of human factors and system safety; Lawrence Erlbaum Associates, Mahwah, New Jersey. Hudson, P. December (1999); Safety Culture – Theory and Practice; Universiteit Leiden, The Netherlands. Lowe, C (2008); 'A human factors perspective on safety management systems', In Redmill, F & Anderson, T (Eds), Improvements in System Safety, Springer, London. Reason, J (1997); Managing the risks of organisational accidents; Ashgate Publishing Limited, Aldershot, England. Stolzer, AJ, Halford, CD & Goglia, JJ (2008); Safety management systems in aviation; Ashgate Publishing Limited, Aldershot, England.

SECTION 2

Components of an SMS

Contents

2. Components of an SMS

2.1 High level summary of SMS components and elements

This section provides information in a 'shortened version' of the detailed description of each element i.e. what to look for in the components and elements of an SMS. The tabled information highlights acceptable means of compliance, guidance notes, as well as further information so organisations can find what works best for them taking into consideration the organisation's culture and operating environment.

More detailed information on what to consider when implementing SMS can be found in the paragraphs thereafter under each component heading.

Click here for components of SMS at a glance.

COMPONENT 1 – SAFETY POLICY AND OBJECTIVES	
Element 1 - Safety policy and accountability	
Safety policy and goals	
Acceptable means of compliance	There is a safety policy endorsed by the CEO and communicated to all personnel. The CEO and the senior management team promote and demonstrate their commitment to the safety policy through active and visible participation in the system for safety management. The safety policy has been developed considering the following: • senior management commitment and intentions with regard to safety establishment of safety as a core value • a commitment to continuous improvement of the performance of the SMS • provision of appropriate resources • non-punitive reporting policy (Just Culture) • recognition that compliance with procedures, standards and rules is the duty of all personnel. Evidence of regular review and revision as required.
Guidance notes	There is one safety policy used throughout the organisation and it is implemented at all levels of the organisation. The organisation has a safety management system that interfaces with other management system functions (e.g. quality, environmental, finance etc.). Safety policy objectives drive the safety performance of the SMS. The organisation regularly ensures that personnel throughout the organisation are familiar with and have understood the policy and their safety responsibilities. The non-punitive reporting (Just Culture) policy is actively endorsed by management and personnel representatives. There is evidence of decision making, actions and behaviours that reflect a positive safety culture.
Further information	For more information on the development of an effective and meaningful safety policy, safety goals and objectives, research using the following key phrases: • establishing and maintaining safety accountability • setting safety goals and objectives • demonstrating accountability and commitment.

Safety accountabilities	
Acceptable means of compliance	A chief executive (CE) has been appointed with full responsibility and ultimate accountability for the SMS to ensure it is properly implemented and performing effectively. Safety accountabilities, authorities and responsibilities are defined and documented throughout the organisation. Personnel at all levels are aware of, and understand, their safety accountabilities, authorities and responsibilities regarding all safety management processes, decisions and actions. There are documented management organisational diagrams and job descriptions for all personnel. Safety management is shared across the organisation (and is not just the responsibility of the safety manager and his / her team).
Guidance notes	Key safety activities are clearly described in senior management duties and responsibilities are incorporated into personnel performance targets. Management recognises positive safety behaviours and contributions to maintain the organisation's SMS. There is evidence of personnel involvement and consultation in the establishment and operation of the SMS.
Appointment of key safety personnel	
Acceptable means of compliance	A competent person with the appropriate knowledge, skills and experience has been appointed or engaged to manage the operation of the SMS and fulfils the required job functions and responsibilities. The organisation has allocated sufficient resources to manage the SMS including, but not limited to, manpower for safety investigation, analysis, auditing and promotion.
Guidance notes	The person responsible for managing the SMS is given appropriate status in the organisation reflecting the importance of the safety role within the organisation and is independent of line management. If the organisation is combining the senior person for managing the SMS role with other senior person roles for operational functions, in conflict of interest situations an independent person is either employed directly or contracted by the organisation to maintain system integrity. Individuals within the organisation that have a key safety role have their knowledge maintained through additional training and attendance at industry relevant conferences, seminars and workshops.

Element 2 – Coordinated emergency response planning	
Acceptable means of compliance	An emergency response plan (ERP) that reflects the size, nature and complexity of the operation has been developed and defines the procedures, roles, responsibilities and actions of the various organisations and key personnel. Key personnel in an emergency have easy access to the ERP at all times. The organisation has a process to distribute the ERP procedures and to communicate the content to all personnel. The ERP is periodically tested for the adequacy of the plan and the results reviewed to improve its effectiveness.
Guidance notes	Emergency authority has been delegated. Emergency responsibilities during coordinated activities have been assigned. Processes to record activities during an emergency response have been implemented. Compatibility with emergency response planning of other stakeholders (e.g. other airfield users, neighbouring aviation operations, alliance partners, etc.) has been established. The organisation has liaised with emergency service providers and government authorities. The process for updating change of personnel / organisation and contact lists is in place. The organisation has implemented a Critical Incident Stress Management programme for its personnel.
Further information	For more information on the development of an effective ERP, research using the following key phrases: • benefits of implementing an ERP • initial response actions • establishing a crisis response centre • records to be kept during and after an ERP exercise or occurrence • an operator's responsibilities at an accident site • how to handle the media • family assistance responsibilities • post critical-incident stress debriefing • maintaining hardcopy references.

Element 3 – Development, control and maintenance of safety management documentation	
Acceptable means of compliance	There is documentation that describes the safety management system and the interrelationships between all of its elements. Safety system procedures are commensurate with the complexity of the organisation and are available to all personnel. SMS documentation is readily available to all personnel. SMS documentation, including SMS-related records, are regularly reviewed and updated with appropriate version control in place. The SMS documentation details and references the means for the storage of other SMS related records. Safety records are retained and demonstrate system performance.
Guidance notes	Specific templates have been created that support safety risk management and safety assurance activities. The organisation can demonstrate that safety management processes are integrated into other organisational systems. The organisation has analysed and uses the most appropriate medium for the delivery of documentation at both the corporate and operational levels.
Further information	For more information on the development of an effective document control system, research using the following key phrases: • structuring a safety management manual • safety records.

COMPONENT 2 – SAFETY RISK MANAGEMENT

Element 4 – Hazard identification

Acceptable means of compliance	Documented and demonstrated means that ensure aviation safety hazards, including near misses and errors are identified. Documented process that ensures identified hazards are recorded, analysed and acted on in a timely manner. Documented process to provide feedback to the reporter of any actions taken (or not taken) and, where appropriate, how to disseminate this to the rest of the organisation. Documented process to establish causal contributing factors, i.e. why the event occurred and not just what happened.
Guidance notes	Differentiate between different types of hazards. Determine a suitable hazard identification process for the organisation. Determine formal hazard reporting and recording processes. Determine a suitable hazard control process, including responsibilities. Determine appropriate monitoring processes. Ensure that there is a documented trail from identification through to resolution for each hazard identified. Maintain a register of hazards. Train all personnel on hazard identification and reporting. Integrate human factors into hazard identification and reduction.
Further information	For more information on the development of effective hazard identification processes, research using the following key phrases: • aviation safety hazard identification • aviation human performance related hazards.

Element 5 – Risk management

Acceptable means of compliance	Documented process for the management of risk that includes the assessment of risk associated with identified hazards. Documented process and criteria for evaluating the level of risk the organisation is willing to accept. Documented method for recording risks and the treatment strategies taken, including timelines and responsibilities. Documented procedures to review and revise risk management processes on a periodic basis.
Guidance notes	Implementation of different risk identification processes such as conducting risk assessments when operational changes take place (e.g. new aircraft type, new maintenance facility, new air traffic management software systems). Implementation of risk reporting and recording processes, available to all personnel and involving key personnel in the analysis process. Development of risk control and monitoring process such as the use of a risk register, and regular meetings to discuss risk treatment strategies. Development of risk communication processes such as regular alert messages to personnel, training, etc. Development and implementation of operational risk profiles can be a way to achieve all of the above.
Further information	For more information on the development of an effective risk management system, research using the following key phrases: • operational risk management • risk profiling: strategic risk management • enterprise risk management • ALARP • risk management concepts • three lines of defence assurance.

COMPONENT 3 – SAFETY ASSURANCE

Element 6 – Safety investigations

Acceptable means of compliance	Documented and demonstrated means for conducting internal safety investigations. Internal safety investigator(s) appointed and appropriately trained.
Guidance notes	There is a documented trail from identification through to resolution when an investigation is completed. There is a clear record of the investigation process, findings, and required actions. There are formal procedures to trigger investigations, processes for gathering evidence and conducting the analysis, processes for developing recommendations, and for distributing the report. There are processes for monitoring and review of actions taken in response to safety investigation. Criteria for the safety investigator skills and knowledge are established and documented.
Further information	For more information on the implementation of an effective safety investigation capability, research using the following key phrases: • data collection methods and processes • safety investigation analysis theories and methods • writing a safety investigation report • qualities and qualifications of a safety investigator • human factors • investigation and analytical techniques • cause and effect analysis • Reason model.

Element 7 – Monitoring and measuring safety performance

Acceptable means of compliance	Documented and demonstrated means of monitoring safety performance. Documented process to identify reactive, proactive and interactive sources of safety data. Documented and demonstrated means to measure safety performance through set indicators. Safety performance targets established consistent with the organisation's safety objectives.
Guidance notes	Implementation of a safety reporting system. Surveying of personnel perceptions of safety within the organisation (e.g. a safety culture survey). Systematic capturing of data to help contextualise statistics (e.g. number of occurrences per month, number of defect reports per month, etc.). Developing methods to track how the safety management system is working (e.g. balanced scorecard). Establishing regular meetings to review safety performance.
Further information	For more information on the development of effective performance monitoring and measuring, research using the following key phrases: • lagging and leading performance indicators • measuring safety performance for service providers.

Element 8 – Management of change	
Acceptable means of compliance	Documented process to conduct aviation safety-related hazard analysis and risk assessments for changes within the organisation, including changes to senior management and operations that may affect safety. Documented process to ensure appropriate internal and external stakeholders are involved in the management of change process. Documented management of change process includes the review of previous risk assessments and existing hazards as appropriate. Documented process to record the outcome of each stage of the plan.
Guidance notes	Processes are established for: • hazard and risk identification • risk reporting and recording • risk control (including responsibilities) • risk monitoring (including responsibilities) • communication of risks.
Further information	For more information on the development and implementation of change management processes, research using the following key phrases: • change management principles • change management process • change management in project management • risk management.

Element 9 – Continuous improvement of the SMS	
Acceptable means of compliance	Documented process that shows how the organisation uses its performance monitoring and measuring procedures and internal audit programme to inform the management review process so that actions can be taken to improve the effectiveness of the SMS. Documented action plan and allocation of resources to achieve improvements.
Guidance notes	Surveys or other feedback mechanisms are conducted to gauge the safety performance (e.g. safety climate surveys). Maintenance of safety management processes and systems is implemented to facilitate continuous improvement. Quality and safety improvement mechanisms (e.g. suggestion boxes, internal reporting system, safety review teams) are implemented.
Further information	For more information on how to achieve continuous improvement, research using the following key phrases: • continuous improvement • stages of safety maturity • Kaizen • 'Plan, Do, Check, Act' model.

Element 10 – Internal audit programme	
Acceptable means of compliance	**Safety auditing** Documented audit programme. An internal audit procedure which defines audit types, and associated procedures, and identifies the personnel who will conduct the audit. Audits performed by trained and independent auditing personnel. Audit results reported to the personnel responsible for activity. Preventive or corrective action taken in response to problems identified during the audit. These actions are monitored to ensure they are appropriate, have been implemented in a timely manner, and are effective. Root cause analysis is utilised to identify the causes of non-conformances or non-compliances. The operation of the internal audit programme is subject to independent audit. **Audit reports** Documented and communicated.
Guidance notes	**Safety auditing** Ensure the audit programme has been developed and resourced to be sufficiently flexible so that it can accommodate a risk-based approach. The person(s) nominated to do the audit should be independent of the function, operation or group being audited. Take an evaluative approach to auditing, to make the most of the resources and time required. Ensure that audits are planned, and well documented; all findings and subsequent actions should be tracked and monitored. Ensure that the personnel conducting audits are adequately trained and experienced and maintain their skills. **Audit reports** Audit reports are easy to read with findings and corrective actions clearly stated. Timeframes for implementing corrective actions are specified.
Further information	For more information on the development and conduct of an effective audit programme, research using the following key phrases: • principles and processes of auditing • audit scheduling • auditor competency.
Element 11 – Management review	
Acceptable means of compliance	Documented and demonstrated methods of conducting formal and regular reviews by senior management of the effectiveness of the SMS. Structured agenda. Documented processes specifying the frequency of management reviews. Results of the review are evaluated and recorded.
Guidance notes	Processes for documenting meetings, decisions and responsibilities are implemented. Processes to follow up decisions and actions and to review effectiveness are implemented. Documented analysis methods are used. An agenda is published and circulated prior to meetings. The review includes both reactive and proactive outputs.
Further information	For more information on the process of conducting effective management reviews, research using the following key phrases: • safety governance and oversight • safety communication methods • management accountability.

COMPONENT 4 – SAFETY PROMOTION

Element 12 – Safety training

Acceptable means of compliance	Documented process to identify SMS training requirements so that personnel are competent to perform their duties. Documented process to measure the effectiveness of training and take appropriate action to improve subsequent training. Documented process that evaluates the individual's competence and takes remedial action when necessary. Training programme includes initial and recurrent training. Documented process specifying responsibilities for development of training content, scheduling and training record management.
Guidance notes	Training needs analysis (to determine gaps and requirements for all personnel) is regularly reviewed. A training syllabus that caters to the different safety responsibilities of personnel involved in the SMS is implemented. Refer 2.5.2 *Training and Competency Guidance Material*. Training material consistent with the content of the organisation's SMS is developed. Depending on personnel requirements, there is consideration of different training delivery methods.
Further information	For more information on the development of an effective safety training programme, research using the following key phrases: • training needs analysis (TNA) • safety training principles • aviation safety training (including crew resource management / human factors).

Element 13 – Communication of safety- critical information

Acceptable means of compliance	Demonstrated and documented means for safety communication that ensures personnel are aware of the SMS commensurate with their safety responsibilities. It conveys safety critical information and explains why particular safety actions are taken and why safety procedures are introduced or changed.
Guidance notes	Regular safety communication processes (e.g. safety magazine, newsletters, regular emails, safety committee meetings, etc.) are developed and implemented. Methods for personnel to provide feedback on safety issues are developed. An awareness of the importance of communicating relevant safety information is fostered at all levels of the organisation and to external companies where appropriate. Targeted safety promotion activities are conducted, not only within one's own organisation but with other relevant third-party organisations.
Further information	For more information on the process of conducting effective safety promotion and communication processes, research using the following key phrases: • effective aviation safety promotion strategies • processes for communicating safety-critical information • determining effectiveness of safety communication and promotion activities.

2.2 Component 1: Safety Policy and Objectives

2.2.1 Element 1: Safety policy and accountability

Management commitment and safety leadership is key to the implementation of an effective SMS and is asserted through the safety policy and the establishment of safety goals and objectives. Management commitment to safety is demonstrated through management decision-making and allocation of resources; these decisions and actions should always be consistent with the safety policy and objectives to cultivate a positive safety culture.

Senior managers, and especially the CE, need to have a strong sense of ownership of the SMS. Implementing an effective safety management programme will not succeed without an absolute commitment at all levels of management to champion and strategically manage safety within the organisation. It is the responsibility of senior management to ensure that safety risks are systematically managed.

Safety policy

The CE is responsible for developing a statement of their commitment and vision, by direct involvement in the crafting of the wording and then endorsing the Safety Policy with their signature. Senior management, key safety personnel and, where appropriate, staff representative bodies (employee forums, trade unions) should be consulted in the development of the safety policy to promote a sense of shared responsibility.

The policy should not just be a picture on the wall, it should link the policy of the organisation to the culture that the CE wishes to embed. It is important that the CE's voice can be heard through the words that are chosen – not just standard impersonal phrases – and it should be made clear that they will do what it takes to meet that commitment – including resourcing to support the safety goals and objectives.

Outline the organisation's safety reporting policy; staff need to know that there is a fair reporting system, and what type of behaviour would attract disciplinary action. Try to keep the policy short enough so that the reader can understand and remember what the CE has committed to, and what is expected of them. Safety goals can be stated within the policy, or the policy can describe where they can be found.

The safety policy should be visibly endorsed by senior management and the CE. 'Visible endorsement' refers to making management's active support of the safety policy visible to the rest of the organisation. This can be done via any means of communication and through the alignment of activities to the safety policy.

The safety policy should be clearly visible, or available, to all personnel (including significant contracted organisations) and be included in key documentation and communication media. It is the responsibility of management to communicate the safety policy throughout the organisation to ensure all staff understand and work in accordance with the safety policy.

Some points to consider when developing a safety policy:

- ensuring the CE's voice can be heard through the words that are chosen
- keeping the policy short enough so that the reader can understand and remember what the CE has committed to
- senior management commitment and intentions with regard to safety, and promoting a positive safety culture
- how the organisation treats safety as a core value
- a commitment to continuous improvement of the performance of the SMS, and
- recognition that compliance with procedures, standards and rules is the duty of all staff.

The safety policy should be reviewed periodically to ensure it remains current. The organisation should regularly verify that staff and contractors throughout the organisation are familiar with and have understood the policy.

Safety goals

Taking into consideration its safety policy, the organisation should also establish safety goals to define what it aims to achieve in respect of safety outcomes. Safety goals should be short, high-level statements of the organisation's safety priorities and should address its most significant safety risks. They are supported by objectives (or enablers) and performance is measured using indicators and targets as described later in this document.

For example, if one of the organisation's goals was to promote a positive safety culture, this could be supported by an objective that addresses the safety culture characteristics described in the previous section. By aiming to remove disablers to a positive culture and promote enablers, over a period of time, the organisation could create a programme with measurable indicators of its progress.

Safety accountabilities – Chief Executive (CE)

In the context of SMS, safety accountability is the obligation of a person to demonstrate task achievement and safety performance in accordance with agreed expectations, and to be answerable for the performance within their scope. Safety accountability cannot be delegated.

The CE is the person who has ultimate authority over the safe operation of the organisation, they establish and promote the safety policy and safety goals that instill safety as a core organisational value. They should:

- have the authority to make decisions on behalf of the organisation
- have control of resources, both financial and human, and
- be responsible for ensuring appropriate actions are taken to address safety issues and safety risks and responding to accidents and incidents.

In the case where an SMS applies to several different certificates of approval, that are all part of the same legal entity, there should be a single accountable executive. Where the organisation is part of a group comprising a number of separate legal entities, individual CEs should be identified for each organisation and clear lines of responsibility and accountability defined; it is also important to identify how their safety accountabilities will be coordinated.

Safety accountabilities – managers and staff

Accountabilities and responsibilities of all management and staff involved in safety-related duties supporting the delivery of safe products and operations should be clearly defined. The safety responsibilities should focus on the staff member's contribution to the safety performance of the organisation (the organisational safety outcomes).

Since the management of safety is a core function, every senior manager has a degree of involvement in the operation of the SMS, including responsibility and accountability for making decisions with respect to safety risk. The organisation should therefore also identify the safety responsibilities, accountabilities and authorities of all members of senior management and staff (irrespective of other functions) with respect to the safety performance of the SMS. These accountabilities and responsibilities should be documented and communicated throughout the organisation, and include a definition of the levels of management with authority to make decisions regarding safety risk tolerability.

The question of safety accountability and responsibility also extends to organisations that engage third parties (agents or contractors) (e.g. ground handling agent, refueller, maintenance provider, cleaner, etc.). In these circumstances it is important to remember that while the third party is responsible for their own actions, the organisation that engages them is still accountable for the safety outcome to their customers. It is important to make sure that identified accountabilities and responsibilities are reflected in the contract or service level agreement (SLA) in place between the organisations.

Appointment of key safety personnel

Where an organisation is required to have a senior person responsible for the system for safety management (*will be referred to as the safety manager*), this safety manager should be responsible for oversight and coordination of all SMS-related policies, procedures and activities, but is not responsible for ensuring or 'managing safety'. The safety manager should report to or have direct access to the CE and senior managers, and should not hold conflicting responsibilities for operational areas.

***Note*:** *Previous rule requirements for a senior person for quality assurance are superseded by the new requirement for a senior person responsible for the system for safety management, since quality assurance only forms part of the process for safety assurance.*

This is an opportunity for the organisation to look at the division of roles and responsibilities afresh, not just maintain the status quo. To effectively embed SMS within an organisation requires leadership and communication skills as much as relying upon the operational experience and technical expertise of the individual. The safety manager needs to be available to provide advice and encouragement to the CE and line managers on safety management matters. This may not be as successful if the organisation relies upon contracted third parties that only visit the organisation periodically. In such cases it may be beneficial to the organisation to appoint an internal senior person as safety manager, while contracting in specialist support such as for audit and investigation activity. For further guidance on training and competencies for safety roles, refer to element 12.

Avoiding the potential for conflict of interest is relatively simple for larger organisations, where typically senior persons are only responsible for one operational function. However, in most small to medium organisations, the senior person responsible for the system for safety management may, subject to acceptance by the Director, combine this role with other senior person roles for operational functions or possibly, if no other options are available, hold the role in addition to being the CEO. In such cases it may be appropriate to use an independent person, either employed directly or contracted by the organisation, to maintain system integrity.

An example of conflicting responsibilities might be a small organisation where the safety manager is also responsible for occurrence investigation (Part 12) and crew training and competency assessment. Clearly if an investigation indicates that there may be deficiencies in crew training, there is a potential for conflict of interest. Having an independent competent person conduct or at least review the investigation and recommendations would be appropriate in that case. Similarly, if the senior person responsible for the system for safety management (and therefore safety assurance) is also responsible for the control and scheduling of maintenance, performing an audit on their own work would also have the potential for conflict of interest. Again, the use of an independent competent person to perform the audit would be appropriate.

Depending upon the size and complexity of the organisation, the safety manager may need to be supported by a safety group. This could consist of representative members of management and operational personnel and may include people from other organisations or groups that the organisation has dealings with or links. Where an organisation has an existing group addressing occupational safety matters, there may be an opportunity to integrate the activities of both.

2.2.2 Element 2: Coordinated Emergency Response Planning (ERP)

Some rule parts require organisations to have an 'emergency situation action plan' for handling in-air and on-ground emergency situations and minimising risk of injury to persons. SMS builds on and enhances this by encouraging multiple organisations to coordinate their emergency response planning so that the desired safety outcomes from emergency situations can be achieved.

Organisations engaged in aircraft operations should ensure that an emergency response plan that provides for the orderly and efficient transition from normal to emergency operations and the return to normal operations, and is properly coordinated with the emergency response plans of those organisations it must interface with during the provision of its service.

For service providers not located on an airfield, the emergency response plan might be as simple as documenting actions to be taken in the event that a customer experiences an emergency. Such actions would likely include communication channels and delegated emergency authorities, securing of documents, permitted access by investigators, identification of who can authorise return to normal operations. These may also be integrated with existing business continuity plans.

The organisation's intentions regarding, and commitment to dealing with, emergency situations and their corresponding recovery controls, should be documented and be commensurate to the size, nature and complexity of the organisation. The emergency response plan (ERP) should have procedures for:

- what are the triggers for the organisation activating the ERP
- orderly and efficient transition from normal to emergency situations and return to normal
- delegation of emergency authority i.e. a responsible and qualified person to lead the emergency response
- assignment of emergency responsibilities i.e. the duties and responsibilities of key personnel in an emergency
- authorisation by key personnel for actions mandated by the plan
- effective coordination of efforts to handle the emergency
- planned and coordinated action to manage and minimise the risks associated with an incident / accident
- a process for periodically checking and updating emergency contact lists, and
- conducting periodic, scheduled emergency response drills, exercises and / or tests.

Testing of the organisation's ERP

Aviation accidents / serious incidents are rare events and despite the importance of implementing immediate and positive action, evidence shows that very few organisations are prepared when such an event occurs. Initiation of timely and appropriate action is extremely critical in situations where delays or the implementation of incorrect actions may affect the chances of someone's survival.

People who have been involved in the immediate response to an aircraft accident will readily agree that during the first few minutes (and maybe hours) events can be confusing and chaotic. How an organisation performs in the aftermath of an accident or other emergency can depend on how well it handles the immediate response during that time immediately following a major safety event.

Successful response to an emergency begins with effective planning. The ERP provides the basis for adopting a systematic approach to managing the organisation's affairs and operations following a significant and unplanned event.

To improve its effectiveness, and to ensure designated emergency response team members are prepared, the plan should be practiced and reviewed regularly by conducting exercises. Training in emergency response may take two forms, table-top exercises or full-scale exercises.

Table-top exercise

The table-top exercise is designed to provide training, to evaluate plans and procedures, and to resolve questions of coordination and emergency response team responsibilities in an informal, non-threatening format.

Full-scale exercise

The full-scale exercise is the most comprehensive test. It is intended to evaluate the operational capability of the emergency management system in a stress environment with actual mobilisation and deployment of resources and personnel. The decision to conduct a full-scale exercise should be coordinated with other local organisations and agencies where practicable.

At the conclusion of an exercise or actual emergency, a formal review should take place. It should measure the effectiveness of the plan with feedback from participants and by assessing the impact, this feedback has a flow on effects for evaluating and revising policies, plans and procedures.

Human performance considerations

Critical incidents can lead to stress reactions- so-called post-traumatic stress reactions – for the staff involved. Critical Incident Stress Management (CISM) programmes are a formal framework designed to help people negatively affected by such events, to recover from these affects and return to normal functioning and behaviour. Even if your organisation doesn't have the resource to develop such a programme, there are still things that you can do to minimise the risk associated with humans performing work after experiencing a traumatic event.

As with all forms of stress, there are basically two approaches to take; prevention and coping. Whilst you cannot guarantee to prevent the incident or accident occurring, there are still some prevention methods that can be applied to minimise the effects:

- ERP training – the better a person is prepared for the role, the better they perform when under pressure and therefore better that they can cope with unusual situations
- open, supportive attitudes and behaviours – this can be reflected broadly as the way the organisation communicates and works, or down at a personal level, where you have someone you trust available to step in to perform essential roles or tasks. If you are a small, intimate organisation and / or perhaps have a personal relationship with the person involved in the incident, it is unlikely that you will be able to continue to function effectively in a critical role for a period of time.

When it comes to coping with the effects of an incident, the ability to recognise signs of stress in yourself or others is key. The risk of an error being made as a result of distraction or tiredness is much higher after a stressful event. People may be reliving the event over and over, they may have a loved one who was badly injured or killed, they may not be sleeping due to external influences (e.g. aftershocks to an earthquake, family members unwell etc.). Managers and supervisors are likely to be the first to notice sudden changes in emotional symptoms, mental functioning or behaviour in their teams, that might indicate a need for professional support.

Time management and prioritising tasks becomes even more important. It is likely that there will be a reduced number of staff available to complete work. Everyone has their own level of resilience which is influenced by the nature of the incident as well as the physical and mental condition of the person affected. This means that some may take longer before they are ready to return to work. The organisation will need to assess their ability to return to work and at what level of criticality, and level of supervision required.

The work itself may have been interrupted by the incident so it will be necessary to review and re-establish known points before continuing. An example is where a complex task, such as a maintenance activity, was in progress; it will be necessary to establish the current state (of airworthiness) from physical surveys, staff interviews and document review, before establishing what can be re-started versus what needs to be completely re-done.

Another important consideration is how the organisation supports staff as they come to terms with the incident. Developing support systems for staff can range from the individual developing an adequate coping mechanism (with or without the support of others, family or friends), support from the organisation via an employee assistance programme, through to referral to an externally appointed professional counselling service or mental health practitioner.

2.2.3 Element 3: Development, control and maintenance of safety management documentation

Rule reference: 100.3(b)

The extent of documented information and the medium on which it is contained for a SMS can differ from one organisation to another due to:

- the size of the organisation and its type of activities, processes and services
- the complexity of processes and their interactions, and
- the competence of personnel.

Accurate safety-related information is integral to achieving appropriate control over organisations' operations. The development, control and maintenance of SMS-related documentation is essential to ensure that the approach to safety is effectively communicated to the whole organisation and remains current and relevant.

Policies, procedures and processes developed for a SMS should be integrated within existing systems such as Quality Management System (QMS), Human Factor and Error Management System (HFEMS), Environmental Management System (EMS), Occupational Health and Safety (OHS), etc.

It is recognised that despite the advantages offered by systems integration, some organisations will choose to retain separate documented systems. In this case, careful consideration must be given to how the systems overlap (example of a compound hazard described in the previous Section 1.6) and the clarity for staff and contractors in areas such as: policies, goals and objectives; reporting processes; risk controls; and the communication of safety critical information.

Note: *While an implementation plan is required as part of the certification process, it is not required to be contained within the SMS documentation. There is benefit to the organisation in maintaining it as a stand-alone document as SMS becomes embedded; further developing the plan after certification as a means of demonstrating continuous improvement activity.*

Development of SMS documentation

A feature of SMS is that all safety management activities are documented and visible and the documentation provides the authoritative basis of the SMS. This can be in the form of a separate safety manual, or integrated within an existing exposition or quality manual. What is important is that all personnel know where to access the documentation and when it has been updated. Robust documentation shows how safety activities integrate with those of other functions and systems in the business, and how these activities link to the organisation's safety policy. SMS documentation should include, or make reference to, relevant and applicable rules and requirements. Depending upon the complexity of the organisation, a typical safety manual or integrated exposition would include:

- scope of the SMS
- safety policy
- the safety objectives of the organisation (they may be referenced separately)
- non-punitive reporting policy (Just Culture) and supporting processes
- safety accountabilities and responsibilities
- key safety personnel
- the structure of the safety management organisation
- a description of specific templates, such as reporting forms, risk registers and SPTs, and
- details of contracted activities (key service providers) procedures for:
  - documentation control
  - hazard identification
  - risk assessment
  - safety reporting
  - safety investigation
  - safety audit
  - safety performance monitoring and measurement
  - change management
  - management review
  - safety records management, including identification, access, handling, storage, retrieval and preservation
  - safety promotion, including training and communication of safety information, and
  - coordination of emergency response planning.

Documentation for smaller organisations

Guidance material on how to develop an SMS manual and associated documentation has been provided in the form of the document SMS Manual Format – Scalable. Originally aimed at smaller agricultural aviation organisations that have not previously been required to produce an exposition or manual, this material may also prove helpful to other small organisations with simple processes.

Document format and naming conventions

In common with current exposition amendments, an electronic format is preferred for SMS documentation submitted for review during the certification process and for any subsequent amendments. The preferred file format is PDF, but MS Word, and Open Office are also acceptable. The use of a consistent file naming convention, keeping file names short, and formatting dates using 'yyyy/mm/dd' assists with increased efficiency of document management and amendment processing:

- identify your organisation – this may be the Client ID, or client name
- identify the manual – this may be identified with a rule part number, or an abbreviated form of the manual name e.g. MAINT for Maintenance Manual
- include information to identify the exposition revision status – this may be a revision number or date of revision (or both), and
- examples:
  - 12345MELRev6.3.pdf (Client 12345, Minimum Equipment List, Revision 6.3)
  - WOW_155_20151205.pdf (Wings of Wind, Maintenance Manual (Part 155), revised 05 Dec 2015).

Control and maintenance of SMS documentation

Robust document control should ensure current versions of relevant documents are available at all locations where operations are performed, and obsolete documents are promptly removed from all points of use.

Each organisation should have a document control process to ensure that the SMS documentation is regularly reviewed and updated. Changes should be approved at the delegated level of authority, assessed for risk impacts, and be accepted by the regulator as part of the exposition as required by the Rules.

SMS documentation includes safety records that require processes for identification, access, handling, storage, retrieval and preservation. A safety record is any information that can be used to demonstrate that the SMS is operating and performing, and to identify and resolve safety issues through a system of risk management. Examples of relevant safety records include: hazard logs, safety reports and investigations, risk assessments and safety cases, audit reports, meeting minutes, training records etc.

Documentation and maintenance of safety records should be balanced against the value of the data, and the business needs. In particular, special effort should be made to ensure proper recording and documentation of safety assurance processes (safety surveys, safety monitoring etc.).

SMS documentation changes notifiable to the Director

Individual operating rules specify the changes that require prior acceptance by the Director; this includes changes to the system for safety management, if the change is a material change. With the exception of changes to the senior person responsible for safety management (already listed within the operational rules as a notifiable change), material changes are considered to be those affecting the performance of a fundamental process or system underpinning the safety management system, examples of which include:

- methodologies for:
  - setting safety goals, objectives and performance measures (note: only the process methodology, not the individual measures)
  - hazard identification and risk management
  - audit programme development, and
  - management review.

Changes to the safety training program e.g. high-level changes to the safety training syllabus.

For organisations with an accepted system for safety management, submissions supporting such requests for change should include evidence that their management of change process has been applied.

2.3 Component 2: Safety Risk Management (SRM)

Rule reference: 100.3(a)(2)

Safety risk management (SRM) is a key component of safety management and includes a combination of processes for 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 emerge, and some hazards and their associated risks may change over time. In addition, the effectiveness of implemented safety risk mitigation strategies need to be monitored to determine if further action is required.

Put simply, SRM describes the overall process you use for identifying things that can or have gone wrong, assessing how bad that consequence could be, and deciding what you will do to either reduce the likelihood of it happening, or the impact on your business if it does. It is very similar at an operational level, to the methods used for '*Threat and Error Management*', as is already practised by many professional and recreational aviators alike.

A short video describing the difference between a hazard and a risk may be found at this link:

youtube.com/watch?v=Sk88kkuIo6g

2.3.1 Element 4: Hazard Identification

Hazard identification focusses on conditions or objects that could cause or contribute to the unsafe operation of aircraft or aviation safety-related equipment, products and services.

It is not uncommon for people to confuse hazards with their potential consequences (the risk). A simple test to apply is that hazards exist in the present, whereas the potential consequence of interaction with that hazard is a future possible event.

Example

Consider a contaminated runway. This exists in the present and can be identified as a hazard. If someone interacts with it (such as when landing) a possible consequence (in the future) could be a runway excursion.

Hazard: contaminated runway.

Risk: runway excursion.

Examples of hazards include:

- documentation, processes and procedures (expired aeronautical or maintenance information, poor design of equipment or procedures)
- weather or natural disasters (thunderstorms and lightning, volcanic or forest fire ash, floods)
- geography (mountains, bodies of water)
- self-imposed stresses (high workload / fatigue, use of alcohol and other drugs, complacency)
- aircraft loading (loose articles such as clothing and equipment, improper weight and balance calculations), and
- maintenance activity (poor control of outsourced maintenance, inappropriate or incorrect use of tools for the task).

Further examples may be found within the SM ICG document 'Hazard Taxonomy Examples' at the following link:

Hazard Taxonomy Examples

Hazard identification in practice

Hazards exist at all levels in the organisation and are detectable through many sources including reporting systems, inspections, audits, brainstorming sessions, information sharing, and expert judgement. The goal is to proactively identify hazards before they lead to accidents, incidents or other safety-related occurrences.

The two main methodologies for identifying hazards are:

- Reactive – this methodology involves analysis of past outcomes or events. Hazards are identified through investigation of safety occurrences or quality audits. Incidents and accidents are an indication of system deficiencies and therefore can be used to determine which hazard(s) contributed to the event. Sharing safety critical data can mean that an event for one organisation or part of an organisation, can become a learning opportunity for others.
- Proactive – this methodology involves collecting safety data of lower consequence events or process performance. Analysis of the safety information and frequency of occurrence will assist the organisation to determine if a hazard could lead to an accident or incident. The safety information for proactive hazard identification primarily comes from safety reporting systems, programmed safety inspections and the safety assurance function.

Proactive hazard identification can also be achieved through systematic reviews of organisational processes and procedures as well as during planning for change that the organisation may consider.

Hazards can also be identified through safety data analysis (including, where available, flight data analysis (FDA) or flight operations quality assurance (FOQA) programmes) which identifies adverse trends and makes predictions about emerging hazards and future outcomes.

Safety reporting

An important mechanism for proactive hazard identification is a voluntary safety reporting system. Certificated organisations already have mandatory reporting requirements under Part 12, *Accidents, Incidents and Statistics*, and for other regulators such as WorkSafe. Mandatory occurrence reporting systems tend to collect more technical information – hardware failures – than human performance aspects. To address the need for a greater range of safety reporting, organisations should also implement a voluntary safety reporting system. This aims to acquire more information, including human factors related aspects, and enhance aviation safety. The scope of this safety reporting scheme also includes occurrences not normally reported to the authorities. The objectives of the occurrence reporting scheme are to:

- enable an assessment of the safety implications of each incident and accident, including previous occurrences of a similar nature, so that any necessary action can be initiated, and
- ensure that knowledge of relevant near misses, incidents and accidents are effectively disseminated, so that others may learn from these.

The benefits of an organisation having a reporting policy is so that everyone has a clear understanding of the organisation's values regarding the reporting of safety-related information and how it encourages a healthy reporting culture.

The reporting policy could be combined with the Safety Policy and should:

- encourage employees to report hazards, incidents or accidents, and
- define the conditions under which punitive disciplinary action would be considered (e.g., illegal activity, negligence, willful misconduct).

Personnel at all levels and across all disciplines should be encouraged to identify and report hazards and other safety issues through their safety reporting systems. To be effective, safety reporting systems should be readily accessible to all personnel. Depending on the situation, a paper-based, web-based or desktop form can be used.

Having multiple entry methods available maximizes the likelihood of staff engagement. Everyone should be made aware of the benefits of safety reporting and what should be reported.

Anybody that submits a safety report should receive feedback on what decisions or actions have been taken. Feedback to reporters in voluntary reporting schemes also serves to demonstrate that such reports are considered seriously. This helps to promote a positive safety culture and encourage future reporting.

There may be a need to filter reports on entry when there are a large number of safety reports. This may involve an initial safety risk assessment to determine whether further investigation is necessary and what level of investigation is required.

Hazard identification methodologies

The hazard identification method(s) chosen should be appropriate to the organisation and the activities conducted. The hazard identification process should provide sufficient detail for the organisation to understand fully the nature of each hazard.

Hazards are diverse, and there are a number of techniques, or combination of techniques that an organisation may choose to apply. Some of the more common hazard identification techniques are listed below:

- brainstorming – typically a facilitated discussion within a representative group, brainstorming can be effective at identifying obscure hazards of a type that may be overlooked by more systemic methods, especially when they involve front line and support staff. An example might be to consider the operational cycle for a flight from beginning (perhaps the booking) through to the end when the aircraft is 'put to bed'. By breaking the cycle up into phases and focusing first on those phases with highest perceived risk, the process becomes much more manageable and effective. These sessions benefit from the contributions of a range of experienced operational and technical personnel. Existing safety committee meetings (SRB, SAG, etc.) could be used for such activities; the same group may also be used to assess associated safety risks.
- task analysis – developed specifically to identify hazards associated with human factors, procedural errors and the 'man-machine interface'. By breaking a task down into individual elements, hazards associated with the task can be identified. An example here might be to look at a maintenance process from end to end. In this case a phase approach could be taken as above, or the process could be broken out into elements (people, tools & equipment, data, materials & parts, facilities). Again, it is important to have representation from the 'doers', not just the management team.
- feedback from training – training that is interactive (two-way) can facilitate identification of new hazards from attendees.
- external sources – user groups, type certificate holders, Sector Risk Profiles, State investigation reports (CAANZ, TAIC, ATSB, AAIB, NTSB etc.) can all provide global safety information that identifies hazards that may be relevant to an organisation.

Hazards related to SMS interfaces with external organisations

As discussed in the section 1.4.3 introduction, organisations should also identify hazards related to their safety management interfaces. This should, where possible, be carried out as a joint exercise with the interfacing organisations. The hazard identification should consider the operational environment and the various organisational capabilities (people, processes, technologies) which could contribute to the safe delivery of the service or product's availability, functionality or performance.

As an example, an aircraft turnaround involves many organisations 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.

The following steps can help organisations manage these risks:

Identification of SMS third party interfaces

Performing a business activity mapping exercise or workshop with key stakeholders will often identify SMS interfaces which an organisation is not necessarily fully aware of. These may be interfaces where there is not a formal agreement, such as power supply, or building maintenance services for example. If the organisation already has some form of business continuity planning in place, this might be a good starting point as much of the work will have been done already.

Once the SMS interfaces have been identified, the organisation should consider their relative criticality. This enables the organisation to prioritise the management of the more critical interfaces, and their potential safety risks. Things to consider are:

- what is being provided
- why it is needed
- whether the organisation involved has an SMS or another management system in place, or holds some form of certification (for example from a professional body), and
- whether the interface involves the sharing of safety data / information.

Assessing the safety impact of interfaces

The organisation should then identify any aviation safety hazards related to the third-party interfaces and carry out a risk assessment using its existing safety hazard identification and risk assessment processes. Based on the safety risks identified, it may be beneficial to consider working with the other organisation(s) to determine and define an appropriate safety risk control strategy. Involving other organisations will allow them to contribute to identifying hazards, assessing the safety risk, as well as determining the appropriate safety risk control.

It is also important to recognise that each organisation has the responsibility to identify and manage risks that affect their own business. This may mean the criticality of the interface is different for each organisation, since they may apply different safety risk classifications and have different safety risk priorities (in terms of safety performance, resources, time etc.).

To help prioritise resources and the level of managing and monitoring required, it may be beneficial to develop a simple table that groups the third parties according to the level of safety risk they bring to the organisation (for example aviation third parties, business service providers, government third parties, etc.).

Other workplace obligations

The assessment process described above is similar to the approach required under the Health and Safety at Work Act (HSWA) 2015, when managing overlapping duties of Persons Conducting a Business or Undertaking (PCBU). This collaborative effort is needed because the perception of safety risks may not be the same for each organisation. The risk controls could be applied by either or all organisations concerned as applicable; the basic premise being that the more influence and control a business has over a health and safety matter, the more responsibility it is likely to have to control it.

Managing and monitoring interfaces

The certificated organisation is responsible for managing and monitoring the interfaces to ensure the safe provision of services and products. This will ensure the interfaces are managed effectively and remain current and relevant. Formal agreements such as contracts and SLAs are an effective way to accomplish this, as the interfaces and associated responsibilities can be clearly defined. Besides any commercial considerations, the contract or SLA should include:

- clarification of each organisation's roles and responsibilities, including decision-making authorities
- agreement of decisions on the actions to be taken (e.g. safety risk control actions and timescales)
- identification of what safety information needs to be shared and communicated (e.g. safety reports, the results of investigations and audits etc.)
- how and when coordination should take place (regular meetings, ad hoc or dedicated meetings, audit requirements etc.)
- any monitoring or training arrangements
- SPTs where applicable, and

- required actions as a result of ERP being activated.

Any changes in the interfaces and associated impacts should be communicated to the relevant organisations. All safety issues or safety risks related to the interfaces should be documented and made accessible to each organisation for sharing and review. This will allow the sharing of lessons learned and the pooling of safety information that will be valuable for both organisations. Operational safety benefits may be achieved through an enhancement of safety reached by each organisation, as the result of shared ownership of safety risks and responsibility.

There are some challenges associated with the organisation's ability to manage interface safety risks that include:

- one organisation's safety risk controls not being compatible with the other organisation
- willingness of both organisations to accept changes to their own processes and procedures
- insufficient resources or technical expertise available to manage and monitor the interface, and/ or
- the number and location of interfaces.

Overcoming these challenges, as for any other business challenges, requires a combination of soft skills (such as the ability to build relationships and communicate), technical skills (such as risk management) and a framework or system that describes the expectations and processes in use by the parties concerned.

Humans in the system

How people think about their responsibilities towards safety and how they interact with others to perform their tasks at work significantly affects their organisation's safety performance. Managing safety needs to address how people contribute, both positively and negatively, to organisational 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 optimise the human contributions to organisational safety.

There are some useful tools to help organisations recognise human performance related hazards to safety including:

- the 'Swiss Cheese' (Reason) model for accident causation:
  skybrary.aero/index.php/James_Reason_HF_Model

- the SHELL model used to illustrate the impact and interaction of the different system components on the human (Software – procedures, training, support; Hardware – machines and equipment; Environment – the working environment in which the rest of the L-H-S system must function; Liveware – other humans in the workplace):
  skybrary.aero/index.php/ICAO_SHELL_Model

- the Dupont 'Dirty Dozen' – a list of twelve of the most common human error preconditions, or conditions that can act as precursors to accidents or incidents:
  skybrary.aero/index.php/The_Human_Factors_%22Dirty_Dozen%22

- CASA SMS resource kit booklet 6 Human Factors:
  Human factors and safety behaviours | Civil Aviation Safety Authority (casa.gov.au)

Investigation of hazards

Hazard identification should be continuous and part of the organisation's ongoing activities. Some conditions may merit more detailed investigation. These may include:

- instances where the organisation experiences an unexplained increase in aviation safety-related events or regulatory non-compliance, and/ or
- significant changes to the organisation or its activities.

See also element six 'safety investigation' within this section of this AC.

Developing a hazard system identification process

A hazard identification process enables the collecting, recording, analysing, acting on and generating feedback about hazards that affect the safety of the operational activities of the organisation. The alignment in design of reporting system requirements, analysis tools and methods can facilitate exchange of safety information as well as comparisons of certain SPIs. In a mature SMS, hazard identification is an ongoing process. The following are some steps for the capture of information identified as hazards, the structure of which will vary depending on the size and complexity of the organisation.

Communicate and consult

In order to achieve the safety objectives of the organisation, an appropriate level of involvement of the workforce is required. Often, members of the workforce are in the best position to understand and articulate the hazards involved in their daily tasks. Their involvement can facilitate effective and accurate identification of new or changed hazards and associated risks, and the identification and development of practical and effective control measures.

Communicating and consulting with the workforce will establish the ideal framework for personnel to submit hazard reports, and enable efficient processing within identified timeframes. Depending on the size and complexity of the organisation, consider the following:

- the hazard types likely to be reported, and the design of a suitable reporting medium around this
- how to make the reporting mechanism accessible, easy to use and as intuitive as possible, and
- how personnel can most efficiently access and submit reports, given the available technology for on-line reporting.

Analyse safety hazard reports

The analysis of safety reports is necessary to validate the contents of the reports, establish any trends, (good or bad) and assess the significance of the reported information i.e. the potential to cause or contribute to an aircraft incident or accident. This will assist the organisation in identifying safety risks and their potential consequences, and hence determine priorities for subsequent safety action. The assessment of the consequences of the risk and associated control strategies are part of the risk management process (refer to element 5 below). Therefore, effective analysis of safety reports becomes a key source of information for SRM.

Collation, storage and distribution of data

The outcomes from hazard identification form the basis of the subsequent steps of the risk management process, namely the risk assessment and control measures. The main requirements are that the hazard identification documentation:

- clearly shows linkages between hazards, hazardous events, underlying causes and control measures where appropriate
- contains a numbering system for hazards and controls to allow easy identification and tracking
- contains sufficient information to support the subsequent steps of risk management
- is easy to administer
- has records of hazard identification which can directly accommodate the process of revisiting and updating the knowledge of hazards, details of hazards, incidents, control measures, lessons from incidents and accidents, etc., and
- is managed under a document control system. Depending on the size and complexity of the organisation, an electronic system for the management of identified hazards may be easier to use for the maintenance of records.

If organisations need to transmit or receive safety reports to or from a third party, consider using an effective means of information transfer that is appropriate to the organisation's needs.

2.3.2 Element 5: Risk Management

Risk management is the coordination of activities to direct and control an organisation with regard to risk, and provides a basis for identifying, evaluating, defining and justifying the selection (or rejection) of control measures for eliminating or reducing risk, and to lay the foundations for demonstrating that the risks have been reduced to an acceptable level. The process addresses aviation safety risks and considers technical, human, organisational, and environmental aspects, as well as financial, legal, or economic aspects and all significant influences that may adversely impact aviation safety risks. The same risk management methodology can also be expanded to other types of risks, such as health and safety risks.

The risk management process is intrinsically linked to a number of other SMS processes such as: hazard identification, safety investigation, management of change, safety audit and management review. All of these processes provide input to, and are informed by, the risk management activities performed by the organisation.

The integration of risk management throughout all levels of the organisation improves awareness and understanding of the risks in the operating environment and is therefore an essential tool of the SMS.

Reactive, proactive and predictive risk management

Risk management can be conducted using a combination of reactive, proactive, and predictive approaches. The objective is to ensure that ongoing operations remain safe and planned operations can be undertaken safely.

Reactive risk management responds to events that have already happened, such as serious incidents or accidents. The objective is to avoid the recurrence of the same or similar events.

Proactive risk management actively seeks to identify safety risks through the analysis of the organisation's environment, activities and processes. It uses predictive and monitoring techniques. It is especially applicable to new or changing parts of the organisation.

Predictive risk management is the use of data to identify possible negative future outcomes or events using analytical tools and techniques.

One form of risk management should not preclude any other. Reactive risk management strategies should be favoured to obtain information on risk and errors in the initial phases of the organisation's SMS implementation plan, as well as monitoring and follow-up phases. As the reactive risk management gets more mature, the organisation should focus more on proactive risk management. Proactive strategies include a thorough hazard analysis of business processes. After identifying hazards, the organisation can manage the associated risks.

Risk management process

The International Standard on Risk Management ISO 31000:2018 provides a generic framework for establishing the context, identifying, analysing, evaluating, treating, monitoring and communicating risk. The risk management process outlined in ISO 31000:2018 can be tailored and applied to any organisation, and at any level of the organisation. The process can be embedded in the policies, processes and culture, thus providing a consistent and systematic approach to managing risk.

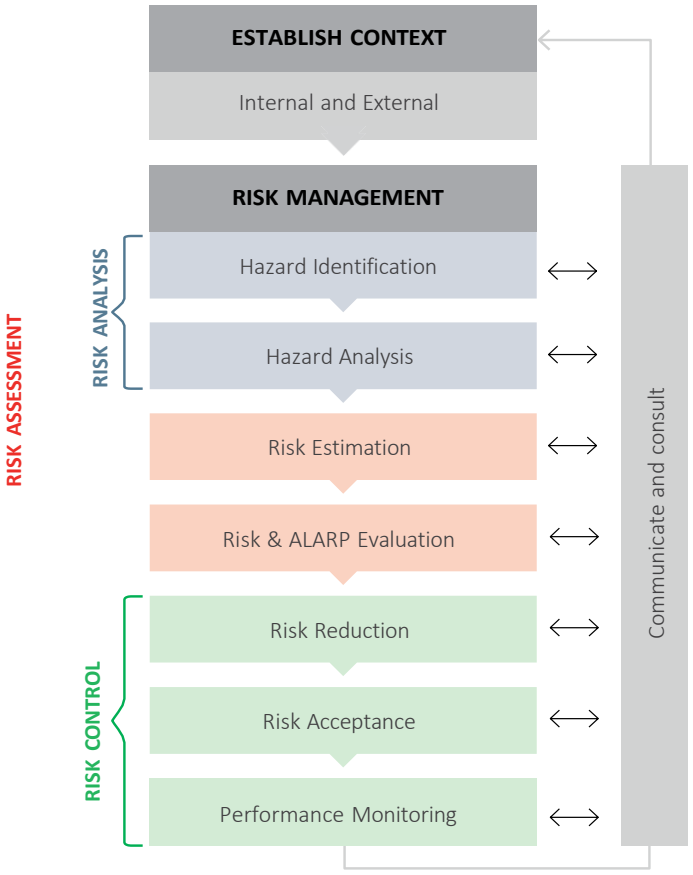
It is critical that the steps of 'communicate and consult' and 'monitor and review' are ongoing throughout the risk management process. These two activities provide validation that the risk management process is effective, is meeting its objectives for all stakeholders, and is supported through ongoing interaction with key personnel. It is recommended that readers research each of the above steps to develop an understanding of the risk management process.

The following example shows how the risk management process steps could be used:

- an organisation needs to assess the hazard of bird activity in a certain location, to ascertain bird strike risks
- setting the context would include identifying the physical location, environmental conditions, etc
- the risks could then be identified in a meeting with aviation operators in that area, and by a review of safety reporting statistics and information collated by environmental agencies
- thirdly, the analysis and evaluation of the risks would take into account the likelihood and consequences of a bird strike. A decision must be made about the tolerability of the risk, whether to commence or continue operations and under what conditions, and
- lastly, treatment strategies for minimising the likelihood, the consequences, or both, could be developed, and implemented. The effectiveness (of these decisions could then be tracked through regular subsequent meetings.

The below diagram shows the risk management process described in ISO 31000:2018 and how the above example hazard relating to bird activity aligns with the risk management steps.

Risk management diagram showing ISO 31000:2018 risk management concept



Risk assessment and mitigation

Organisations need to develop a safety risk assessment model and procedures which will allow a consistent and systematic approach for the assessment of safety risks. This should include a method that will help determine what safety risks are acceptable or unacceptable and to prioritise actions.

Organisations should prioritise their safety risk assessments and identification of safety risk controls so that they:

- assess and control the highest safety risks
- allocate sufficient resources to the highest safety risks
- effectively maintain or improves safety
- achieve the stated and agreed safety goals and objectives, and
- can demonstrate that risks are reduced to 'as low as reasonably practicable' (see below).

Analysing the risk

Once a hazard and its associated risk(s) has been identified, the organisation will need to analyse what the consequence(s) might be and how likely it is to occur. It is then possible to assess these to establish which risks are acceptable and which risks are unacceptable.

There is a common belief that risk management is based on a risk matrix. This is not the case; a risk matrix is simply one tool that can be used. A risk matrix is one way to combine consequence and likelihood into a risk level (either qualitatively or quantitatively or both). This works well for more formal risk assessments, such as a Risk Management Plan. However, for smaller-scale risk assessments, an organisation might just rank their risks according to what looks the highest. ***It is all about getting to the point where the organisation has decided on actions to minimise unacceptable risks*** – it is not about whether they're perfectly organised.

The table below shows some commonly used risk assessment tools along with some strengths and weaknesses.

TOOL	STRENGTHS	WEAKNESSES
Risk Matrix	Easy to use Provides a value that can be compared (e.g. untreated versus treated risk)	Confusion over how to use consequence and likelihood Does not lend itself to complex risk assessments
Bowtie Analysis	Provides visual description of causes and effects including preventative and mitigating controls Drives a thorough evaluation of hazard and method(s) of interaction	Requires a competent facilitator to set the correct level of analysis Time consuming to develop and maintain
Strengths Weaknesses Opportunities and Threats (SWOT)	Simple to perform – works well with brainstorming Recognises positive risk (opportunities)	Can over-simplify and lack definition through use of vague terms Subject to compiler bias and scope creep

The tools used may need to be reviewed and customised periodically to ensure they are suitable for the organisation's operating context, as they may find more sophisticated approaches that better reflect the needs of their operation as their SMS matures. Note that changes to hazard identification and risk management processes that are considered to 'affect the performance of the process or system underpinning the safety management system are considered to be 'material changes' and require prior acceptance by the Director – see section 3 of this AC.

Evaluation

Managing risks involves identifying, evaluating, defining and justifying the selection (or rejection) of control measures for eliminating or reducing risk, and to lay the foundations for demonstrating that the risks have been reduced to an acceptable level through a hierarchy of controls.

The first step in mitigating or controlling the risk will depend upon the defined risk tolerance for the organisation. There are a number of options for the organisation to consider:

- risk avoid – go or no go for the activity
- risk reduction – see risk controls below
- risk transfer – share it e.g. through a contract (limited protection for safety risks)
- risk segregation – e.g. Queenstown operations where specific equipment levels and types of operation are required in certain conditions
- risk assumption – 'all good'.

Decision makers

Decisions made on risk tolerability must take into account the principles of ALARP – as low as reasonably practicable – and be made at an appropriate level of authority within the organisation. The level of authority required to make risk acceptance decisions should be clearly stated within the organisation's documentation, and understood by all staff. In larger organisations this is often shown by documenting which level of management can accept a given level of risk e.g. high risk might require CEO acceptance (or refusal), whereas medium risk might require a senior manager to accept the risk and associated controls.

Reasonably practicable and ALARP

Part 100, *Safety Management*, requires that hazards to aviation safety are identified, and associated risks are managed. Aviation SRM is often based on the concept of ALARP or 'as low as reasonably practicable'.

There is wide acceptance that not all risk can be eliminated. For a risk to be ALARP, it must be possible to demonstrate that the cost involved in reducing the risk further would be grossly disproportionate to the benefit gained. The ALARP principle arises from the fact that infinite time, effort and money could be spent in the attempt of reducing a risk to zero.

Refer to 'Reasonably practicable and ALARP' at the rear of this section for guidance on the ALARP concept.

Controls

After safety risks have been assessed, appropriate safety risk controls can be implemented. As discussed previously under 'hazard identification', it is important to involve the 'end users' and subject matter experts in determining appropriate safety risk controls. Ensuring the right people are involved will maximize the practicality of safety risk chosen mitigations. A determination of any unintended consequences, particularly the introduction of new hazards, should be made prior to the implementation of any safety risk controls.

When considering what controls to apply, it is important to understand both the hazard and the nature of interaction with that hazard, as well as the possible consequences and likelihood of it occurring. Armed with this knowledge, it is then possible to identify controls that either: reduce the likelihood, also known as preventative controls (e.g. anti-skid systems reduce the likelihood of loss of control that may lead to a runway excursion, when interacting with the hazard of a contaminated runway); or reduce the consequences of an event, also known as mitigating controls (e.g. Runway End Safety Area (RESA) in the event of an excursion / overrun). It is usually better to focus on reducing the likelihood of an event, than trying to reduce the consequence, but both types of control will reduce the overall risk.

Control effectiveness

Not all controls are equal, so this must be taken into account when re-assessing a mitigated (treated) risk. The control needs to be examined for its effectiveness in that application (small hand-held fire extinguisher in an office, versus in a hangar environment) and the reliability that it will function when called upon.

There is also the hierarchy of controls to consider, ranging in effectiveness from hazard elimination, followed by minimisation through: substitution- isolation- engineering / design controls, administrative controls (training and operational procedures) and lastly, personal protective equipment (PPE).

Consider a company car being driven on a wet road where the hazard being analysed is the wet road, rather than say a fatigued driver. There is a risk that the driver may skid while interacting with the hazard during braking (loss of control event) leading to a crash (consequence). Since it is not practical to only drive on dry roads, four controls that may be applied are:

- operational rules that instruct the driver to reduce speed in wet weather (preventative, administrative)
- operational rules that require regular checks on tyre wear and pressure (preventative and mitigation, administrative)
- design requirements for anti-lock braking systems (preventative, engineering)
- design requirements for passenger restraint system (mitigation, engineering).

All four controls will reduce the overall risk, but the two engineering controls are more effective (when supported by regular maintenance). The effectiveness of the two administrative controls will be affected by the competence and compliance of the driver; the more drivers involved, the less reliable the control.

Responsibility for managing and resourcing the risk controls should be allocated to an appropriate person in the organisation – usually the manager responsible for that area of activity.

Monitoring

Once a safety risk control has been agreed and implemented, the safety performance should be monitored to assure the effectiveness of the control. This is necessary to verify the integrity, efficiency and effectiveness of new safety risk controls under operational conditions. There are basically two ways to do this: penetration testing of the control such as used for cyber security; or an assurance programme, such as the organisation's internal safety audit function. The frequency of this monitoring activity will depend upon the criticality of the risk control and the number of controls in place.

Look at the assessed level of risk being managed and the number of controls in place. Consider if a particular control was absent, or the effectiveness was rated as very poor, would you be thinking about stopping the operation? Of course the importance of less critical controls cannot be ignored, otherwise there would be no point in having them; having several controls fail may be just as detrimental as one critical control.

Safety reports that highlight the success or weaknesses of risk controls provide an opportunity to review both the effectiveness of the control, and the frequency of monitoring through the audit programme.

Safety risk management (SRM) documentation

SRM 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 that shows risks of each level in each functional area of the operation assigned to a particular accountable manager. Some organisations may use a database or other software where large amounts of safety data and safety information can be stored and analysed.

Maintaining a register of identified hazards minimises the likelihood that the organisation 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; and 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.

Safety risk decision-making tools and processes can be used to improve the repeatability and justification of decisions taken by organisational safety decision makers. Examples of safety risk decision aides may be found within CAANZ SMS resource kit booklet 04:

aviation.govt.nz/assets/publications/sms-resources/sms-booklet-4.pdf

and CASA SMS resource kit booklet 3:

casa.gov.au/files/2015-sms-book3-safety-risk-management.pdf

2.3.3 Reasonably practicable and ALARP

Part 100, *Safety Management*, requires that hazards to aviation safety are identified, and associated risks are managed. Aviation SRM is often based on the concept of ALARP or 'as low as reasonably practicable'.

There is wide acceptance that not all risk can be eliminated. For a risk to be ALARP, it must be possible to demonstrate that the cost involved in reducing the risk further would be grossly disproportionate to the benefit gained. The ALARP principle arises from the fact that infinite time, effort and money could be spent in the attempt of reducing a risk to zero.

Relationship to HSWA

The Health and Safety at Work Act 2015 (HSWA) is the New Zealand statute for work and safety law. A guiding principle of HSWA is that workers and other persons should be given the highest level of protection against harm to their health, safety, and welfare from work risks as is reasonably practicable. The requirement of Part 100 to identify hazards to aviation safety and manage the associated risks, sits within the requirements of HSWA.

Reasonably practicable (Section 22 of HSWA)

22. Meaning of reasonably practicable

In this Act, unless the content otherwise requires, **reasonably practicable**, in relation to a duty of a PCBU set out in subpart 2 of Part 2, means that which is, or was, at a particular time, reasonably able to be done in relation to ensuring health and safety, taking into account and weighing up all relevant matters, including:

a. the likelihood of the hazard or the risk concern occurring

b. the degree of harm that might result from the hazard or risk

c. what the person concerned knows, or ought reasonably to know about:

   i. the hazard or risk; and

   ii. ways of eliminating or minimising the risk; and

c. the availability and suitability of ways to eliminate or minimise the risk.

d. after assessing the extent of the risk and the available ways of eliminating or minimising the risk, the cost associated with available ways of eliminating or minimising the risk, including whether the cost is grossly disproportionate to the risk.

Compare: Model Work Health and Safety Act (Aust) s 18

Primary Duty of Care and assessing what is reasonably practicable

The primary duty of care means that an organisation has the primary responsibility for the health and safety of workers and others influenced by its work. All organisations must ensure, so far as is reasonably practicable, the health and safety of their workers and other people who could be at risk by the work of the business, for example customers, visitors, or the general public.

When used in this context, something is reasonably practicable if it is reasonably able to be done to ensure health and safety, having weighed up and considered all relevant matters, including:

- how likely are any hazards or risks to occur?
- how severe could the harm that might result from the hazard or risk be?
- what a person knows or ought to reasonably know about the risk and the ways of eliminating or minimising it (e.g. by removing the source of the risk or using measures such as a physical control to minimise it).
- what measures exist to eliminate or minimise the risk (control measures)?
- how available and suitable is the control measure(s)?

Lastly, weigh up the cost:

- what is the cost of eliminating or minimising the risk?
- is the cost grossly disproportionate to the risk?

After assessing the criteria above, consider the costs associated with the ways to eliminate or minimise risks including whether they are grossly disproportionate to the risk. A risk may sit on a spectrum from very low (where it is very unlikely that it would be possible to reduce the risk further) through to levels of risk that are very high.

The greater the initial level of risk under consideration, the greater the effort likely to be required to demonstrate that risks have been reduced to a level that is as low as reasonably practicable. However, just because the initial level of risk may be low, doesn't mean it may not be reasonably practicable to reduce it further.

If a measure is practicable and it cannot be shown that the cost of the measure is grossly disproportionate to the benefit gained; then the measure is considered reasonably practicable and should be implemented. The criterion is reasonably practicable not reasonably affordable.

Considerations with the use of risk matrices when assessing reasonably practicable

The use of risk matrices is a widely adopted approach to assess and analyse risks. They are commonly used in a variety of risk-management contexts, including health, safety, environment and financial as the primary risk-management tool. A risk matrix is a graphical presentation of the likelihood, (or probability), of an outcome and the consequence (or severity) should that outcome occur. Risk matrices are useful to rank and prioritise possible outcomes so that resources can be directed toward the most-beneficial areas. Typically, risk matrices categorise the possible outcomes into three bands of Unacceptable, Tolerable, and Broadly Acceptable, (these may then be coloured red, yellow, and green).

The perceived benefit of the risk matrix is its intuitive appeal and simplicity. However, the risk matrix as a tool only portrays how likely are risks to occur against how severe the harm could be, resulting from that risk eventuating. Therefore, when determining what is 'reasonably practicable', the following criteria should also be considered:

- what do you know, or ought reasonably to know, about the hazard or risk and the ways of eliminating or minimising the risk?
- what is the availability of the control measures, and how suitable are they for the specific risk?
- what are the costs of the control measure and are the costs grossly disproportionate to the risk?

Overview of the ALARP principle

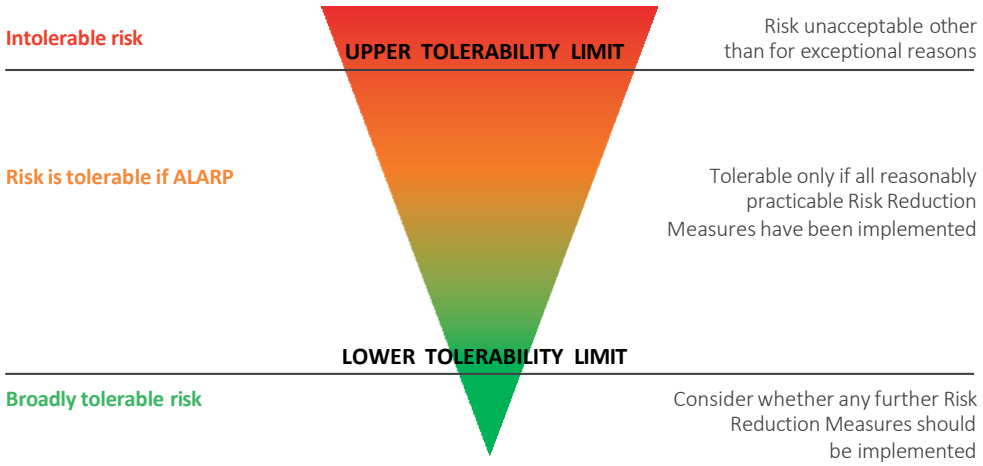
The ALARP principle is illustrated in Figure 1. The triangle represents an increasing level of overall risk from a low risk, represented by green at the base of the triangle, to a high risk, represented by red at the top of the triangle.

The ALARP principle identifies three bands of risk:

- **Unacceptable** risks are classified as unacceptable regardless of the benefits associated with the activity. An unacceptable risk must be eliminated or reduced so that it falls into one of the other two bands, or there must be exceptional reasons for the activity or practice to continue.
- **Tolerable** risks are those that people are generally prepared to tolerate to secure their benefits. Tolerable risks must be properly assessed and controlled to keep the residual risk ALARP, and must be reviewed periodically to ensure they remain that way (e.g. the potential risk of pedestrians, walking between the terminal and the aircraft, being struck by a moving vehicle is only tolerated IF appropriate barricading, security escort and lighting are in place).
- **Broadly acceptable** risks are considered sufficiently low and well controlled. Further risk reduction is required only if reasonably practicable measures are available. Broadly acceptable risks are those that people would regard as insignificant or trivial in their daily lives, or which exist, but have no practicable mitigation (e.g. most organisations accept that staff could be injured on their way to work, but have little control over what happens on public roads).

The ALARP principle

Figure 1: Schematic diagram illustrating the ALARP principle



Fundamental approach to consider for demonstrating ALARP

When considering how to demonstrate that the risks are managed to a level that is ALARP, it is fundamental that the hazard identification and risk management processes carried out have been systematic as they provide the foundation on which to base the control measure selection.

There is no prescribed methodology for demonstrating that the necessary control measures are identified to reduce risks to ALARP. However, for the control measures that has been considered, the content and level of detail needs to be sufficient to gain an appreciation of the scope and process for undertaking the consideration, including rationale for excluding controls from that consideration.

Given the issues that may need consideration in demonstrating that the necessary control measures have been identified, it is appropriate that organisations develop an approach that is logical, structured and documented to provide evidence the ALARP principle is being applied. Therefore, when demonstrating ALARP, it is important to show the range of control measures that were considered, including those that may have been discarded.

References

1. Health and Safety at Work Act 2015
   legislation.govt.nz/act/public/2015/0070/latest/DLM5976660.html

2. Introduction to the Health and Safety at Work Act 2015 – special guide
   worksafe.govt.nz/managing-health-and-safety/getting-started/introduction-hswa-special_guide/#lf-doc-22804

3. Meaning of reasonably practicable – *Section 22 HSWA*
   legislation.govt.nz/act/public/2015/0070/latest/DLM5976866.html

4. Primary duty of care – *Section 36 HSWA*
   legislation.govt.nz/act/public/2015/0070/latest/DLM5976895.html

5. Meaning of PCBU – *Section 17 HSWA*
   legislation.govt.nz/act/public/2015/0070/latest/DLM5976849.html

6. Safety Risk Management – CASA Safety management system kit- Booklet 3
   casa.gov.au/files/2015-sms-book3-safety-risk-managementpdf

7. UK HSE – ALARP Principles and Guidelines
   hse.gov.uk/risk/theory/alarp1.htm

2.4 Component 3: Safety Assurance

Rule reference: 100.3(a)(3)

2.4.1 Element 6: Safety Investigation

The purpose of developing and implementing an SMS is to reduce the risk of accidents, incidents and occurrences. However, complete elimination of risk is not always possible, and there are likely to be occasions when 'things go wrong'. A process for determining what went wrong, why, and how to prevent a recurrence, is an integral component of the SMS, and includes the conduct of safety investigations.

The purpose of a safety investigation is to:

- identify contributing or causal factors
- identify and implement the necessary corrective action(s), and
- identify and implement controls necessary to avoid a repetition of the occurrence.

The safety investigation process should not be undertaken to apportion blame.

Internal safety investigations

Internal safety investigations are conducted in response to an accident or incident (e.g. reactive), as well as adverse trending of hazards and risks, or cases where more in-depth follow-up is required (e.g. proactive).

Part 12 defines the requirements for the conduct of safety accident and incident investigations, and AC12-2, *Occurrence Investigations,* details CAA's expectations with respect to safety investigations.

Other legislative requirements e.g. those relating to health and safety requirements in the workplace (HSWA 2015), also require investigation of workplace incidents.

Responsibility for conducting safety investigations

Internal safety investigations should be conducted by personnel having competency-based training in incident investigation and where practicable be independent of the operation. The duties and responsibilities for the management of internal safety investigations should be documented with consideration of:

- the scope of the investigation and what 'triggers' an investigation
- the composition of the investigation team, including specialist assistance if required
- investigation outcomes being recorded for follow up and trend analysis, and
- the timeframe for completion.

The role of the investigator is to identify where corrective or preventive actions are necessary using appropriate causal analysis methodologies. It is for the organisation's management to decide what those actions should be and to implement them.

Selecting and training safety investigators

Internal safety investigations should be conducted by trained and competent personnel who, where practicable, are independent of the operation. Whilst it is preferable that investigators have received formal training in aviation incident and accident investigation, it should also be recognised that Stage 2 Health and Safety representative training includes investigation, reporting and feedback processes. The organisation should identify training needs in relation to performing investigation activities relevant to the complexity and activities of the organisation.

The following are the typical knowledge, experience and skill requirements of a safety and / or occurrence investigator:

- trained in safety investigation and can recognise when subject matter expertise is required.
- technically competent and have experience in interpreting occurrence information to determine causal factors
- well-developed research and listening skills to gather all necessary evidence and interpret it appropriately
- proficient in written and verbal communication skills
- integrity
- the ability to act independently, and
- the ability to present reports which are a clear representation of the facts and causes.

This role is not necessarily required on a full-time basis, (either amongst existing personnel / crew or externally).

Defining the scope of an investigation

Not all occurrences or hazards can or should be investigated, the decision to conduct an investigation and its depth should depend on the actual or potential consequences of the occurrence or hazard. Investigations into occurrences and hazards considered to have a high-risk potential are more likely to be instigated and should be investigated in greater depth than those with lower risk potential. Organisations should use a structured decision making approach with defined trigger points. These will guide the safety investigation decisions: what to investigate and the scope of the investigation. This could include:

- the severity or potential severity of the outcome
- regulatory or organisational requirements to carry out an investigation
- safety value to be gained
- opportunity for safety action to be taken
- risks associated with not investigating
- contribution to targeted safety programmes
- identified trends
- training benefit, and
- resources availability.

The extent of the investigation will depend on the actual and potential consequences of the event or risk level associated with a hazard. This can be determined through an initial risk assessment of the actual outcome(s) or potential outcome(s).

Since the level of risk is the product of consequence and likelihood, trying to assign a risk level to an event that has occurred provides little value; the likelihood is irrelevant – it has happened, and past events cannot be managed. However, when deciding whether to investigate an event and to what extent, consideration should be given to the other potential outcomes in the same contextual setting. By considering alternative, credible outcomes and considering the effectiveness of existing risk treatments or controls, it is possible to assign a risk level to this and similar events.

While the majority of investigations will focus on cause and effect, the application of a deeper systemic and thematic safety investigation will also complement an SMS. Thematic and systemic investigations require a more holistic perspective of how a whole system is performing, to identify potential weaknesses or emerging risks within the system. Typically, the output from this type of safety investigation is information on emerging or potential risks, specifically, information on the characteristics, structure, weaknesses and strengths of the system. Ideally, a systemic and thematic safety investigation will identify the resilience of the system, allowing the level of safety within the system to be measured.

Steps of an effective safety investigation

Commencing a safety investigation

The following steps should be considered when launching an internal safety investigation:

- a safety investigator should be appointed
- involved personnel and companies should be notified
- a repository of all information relating to the investigation should be established (e.g. a file in the safety reporting dataset), and
- the repository for investigation information should be secure and confidential to ensure the integrity of the data.

Gathering evidence

The first step in the investigation process is to gather all factual information about the occurrence. Factual information can come from a number of different sources, depending on the nature of the occurrence. Some of the most common sources in the context of aviation-related occurrences include the following:

- interviews with involved personnel, crew and witnesses
- recordings, and
- records and documentation, e.g. maintenance logs, manuals, notices and other correspondence.

Interpreting the facts

Once the evidence is gathered, all the information should be analysed to identify 'what' happened and, more importantly, 'why' it happened. It is often easy to identify 'what' happened; the factual information should reveal this. The 'why' it happened can be challenging, but this is where the real lessons and safety benefits are. Investigators should keep asking the question 'why' until they get to the real cause(s). AC12-2 provides guidance in this area and there are a number of well-known tools available such as: 5-why analysis (root cause), Ishikawa or 'fishbone' (separates themes and is used in conjunction with the 5 why method), Maintenance Error Decision Aid (MEDA):

skybrary.aero/index.php/Maintenance_Error_Decision_Aid_(MEDA),

Human Factors Analysis and Classification System (HFACS):

skybrary.aero/index.php/Human_Factors_Analysis_and_Classification_System_(HFACS)

It is often worthwhile to use pre-established and proven analytical methodologies to help identify and organise the causal links of an occurrence. This will help to avoid bias, misidentification, or misinterpretation.

Developing conclusions and recommendations

If faced with a group of similar occurrences or similar causes, it may be appropriate to group the information into emerging themes. The reasons for these trends should be identified from a holistic point of view.

Identifying appropriate findings and recommendations is the key focus of any investigation, and it is vital to remain focused on organisational learning, rather than pinpointing individual failings or corrective measures. When making recommendations consider phraseology that emphasises the safety-related improvements attainable by implementation.

Report format

Clear reporting of the investigation will enable effective and consistent communication of the results. ICAO Annex 13 provides a structure that can be applied to incidents and accidents in a way that is more easily recognised by all parties involved:

- synopsis – administration details and a brief description of the circumstances
- factual information – established as such, not opinion or conjecture, documents the event timeline
- analysis – provides a logical framework that ties the facts together and identifies any missing information; supports the conclusions and recommendations
- conclusions – lists findings (chronological sequence of events) and identifies causes – focus on the organisational learning, rather than pinpointing individual failings
- recommendations – proposed safety related improvements attainable by implementation.

Distributing and presenting the safety investigation report

It is important to consider how the distribution of safety investigation reports is controlled. The final report needs to be presented to all personnel and organisations involved, particularly those who have findings / recommendations assigned to them. It is important to remember that distributing a report with commercially sensitive information may not always be possible. Therefore, summaries of reports may be a more appropriate means of communicating outcomes.

Monitoring safety investigation outcomes

Once the report has been presented, the actions resulting from the findings and recommendations need to be monitored and recorded as a function of 'closing the loop'.

2.4.2 Element 7: Monitoring and Measuring Safety Performance

Safety performance management is central to the functioning of the SMS. Properly implemented, it will provide an organisation with the means to determine whether its activities and processes are working effectively to achieve its safety objectives. This is accomplished through the identification of safety performance indicators (SPI) and (where appropriate) targets, which are used to monitor and measure safety performance. Having done this, the organisation should then document and communicate the results to staff (and customers!) so that they are clear on the relationship between safety policy – the associated safety goals – the objective(s) related to each goal – SPI related to each objective and any targets.

Safety performance management helps the organisation to ask and to answer four important questions[1] regarding safety management:

- what are the organisation's top safety risks?
- what does the organisation want to achieve in terms of safety and what are the top safety risks that need to be addressed? [The organisation's safety objectives].
- how will the organisation know if it is making progress toward its safety objectives? [Through SPI].
- what safety data and safety information are needed to make informed safety decisions? [Including the allocation of the organisation's resources].

> *'Safety is more than the absence of risk; it requires specific systemic enablers of safety to be maintained at all times to cope with the known risks, to be well prepared to cope with those risks that are not yet known, and to address the natural 'erosion' of risk controls over time. Thus, from the perspective of your company there cannot be any direct measures of safety.'*
>
> *SM ICG Measuring Safety Performance Guidelines for Service Providers, July 16, 2013*

Safety goals

As described earlier under the section on safety policy, safety goals should be short, high-level statements of the organisation's safety priorities – areas of safety performance that the organisation aspires to reach. They should address its most significant safety risks and provide a sound basis for safety related decision-making. They are supported by objectives (or enablers) and performance is measured using indicators and targets.

Goals will typically be based upon aspirations for either safety system (staff engagement with the system, safety culture promotion, actively develop and improve etc.), or operational safety risk management (minimise the risks associated with aircraft operations etc.).

Within New Zealand there are some resources that might help an organisation frame their safety goals and objectives. These are the State Safety Programme (SSP):

and the applicable Sector Risk Profile (SRP):

aviation.govt.nz/safety/safety-advice/sector-risk-profiles

As the organisation's SMS matures, it may be appropriate to include safety goals relating to external influences (new technologies, competition, rule changes, etc.). The important thing is to start small with a few goals that are well supported with objectives, before expanding. Well thought out goals will not need to be changed frequently. It is more likely that minor wording changes would result over time, as the system and organisational awareness mature.

[1] Note: not to be confused with William R. Voss' four questions that will be considered under management review.

The examples in the table below illustrate the relationships between goals, objectives, and indicators. Organisations should consider what indicators are relevant to them. The number of indicators and the level of detail would only increase with the maturity of the SMS and as the data actually becomes available.

SAFETY GOAL	OBJECTIVE	SAFETY PERFORMANCE INDICATOR
To implement an SMS that all of our staff are fully engaged with.	Ensure that our staff are trained and competent in our safety reporting system.	Training and assessment of all new staff within one month of joining.
		Staff can demonstrate use of the reporting system (audit interview).
	Promote safety culture characteristics of management commitment and just culture throughout FY 20XX.	Monthly operations meetings include manager led review of safety improvement activities (minutes taken).
		Increasing number of safety reports where staff identify their own unsafe acts.
To actively manage our safety risks so that no harm comes to our staff and customers, our equipment, and our operation.	Proactive hazard identification workshops completed for Part 119-135 flight operations by end of FY 20XX.	Workshops completed to plan +/-10% variance.
		Hazards and associated risks are documented for assessment.
		Risk controls are in place and monitored for all medium and above risks.
	All significant operational changes managed through our formal MoC process are documented and communicated.	Meeting minutes show stakeholder consultation and communication.
		Staff involved are aware of applicable risk controls (audit interviews).

Safety objectives

Safety objectives describe the specific, tangible products and deliverables against each goal. Objectives that underpin safety system goals are typically top-down (system driven) such as to:

- ensure that an initial programme of proactive hazard identification has been completed in (x) area by (mm/yy) date
- establish a programme to remove disablers to a positive safety culture and promote enablers (possibly phased by breaking out the characteristics (discussed in section 1.7 Safety Culture) into manageable chunks over realistic time periods)
- increase the proportion of proactive to reactive safety reporting over the period of (xx) months
- ensure that significant (as defined) changes are effectively managed using the organisation's published process (can also be operational for risk management aspects as shown in the table above).

Objectives that underpin operational safety risk management are typically bottom-up (driven by safety data) in response to threats to the business such as to:

- improve the detection and removal of FOD from aircraft and components prior to their release from maintenance
- reduce the number and severity of ground damage events (may be location specific) over the period mm/yy – mm/yy
- reduce the annual number of adverse apron safety events from the previous year (may need to consider context or use a rate – is this reasonable if there is significant airport growth?)
- increase the effectiveness of bird scaring activities at location ABC.

Documenting safety objectives

Since the safety objectives may be short, medium or long range, they will need to change periodically to support continuous improvement. For this reason, it is better to document the process for setting objectives within the organisation's safety manual or exposition, with the actual objectives published outside the manual, making it easier to update them.

Safety performance indicators (SPIs)

SPIs are used to help senior management know whether or not the organisation is likely to achieve its safety objective; they can be qualitative or quantitative. Qualitative indicators are descriptive and measure by quality, such as a descriptive image of the safety situation (what does good look like?). Quantitative indicators can be expressed as a number (x incursions) or as a rate (x incursions per n movements). In some cases, a numerical expression will be sufficient. However, just using numbers may create a distorted impression of the actual safety situation if the level of activity fluctuates.

For example, if air traffic control records three altitude busts in July and six in August, there may be great concern about the significant deterioration in safety performance. But August may have seen double the movements of July meaning the altitude busts per movement, or the rate, has decreased, not increased. This may or may not change the level of scrutiny, but it does provide another valuable piece of information that may be vital to the data-driven safety decision-making.

Lagging and leading indicators

The two most common categories used by organisations to classify their SPIs are lagging and leading. Lagging SPI measure events that have already occurred. They are also referred to as outcome-based SPIs and are normally (but not always) the negative outcomes the organisation is aiming to avoid. Leading SPI measure processes and inputs being implemented to improve or maintain safety. These are also known as activity or process SPIs, as they monitor and measure conditions that have the potential to become or to contribute to a specific outcome.

Lagging SPIs help the organisation understand what has happened in the past and are useful for long-term trending. Because lagging SPIs measure safety outcomes, they can measure the effectiveness of safety mitigations. They are effective at validating the overall safety performance of the system.

For example, monitoring the number of ramp collisions per number of movements between vehicles following a redesign of ramp markings, provides a measure of the effectiveness of the new markings (assuming nothing else has changed). The reduction in collisions validates an improvement in the overall safety performance of the ramp system; which may be attributable to the change in question.

Lagging indicators are further divided into two types: low probability / high severity (accidents or serious incidents); high probability / low severity – outcomes that did not necessarily result in a serious accident or incident, also known as precursor indicators.

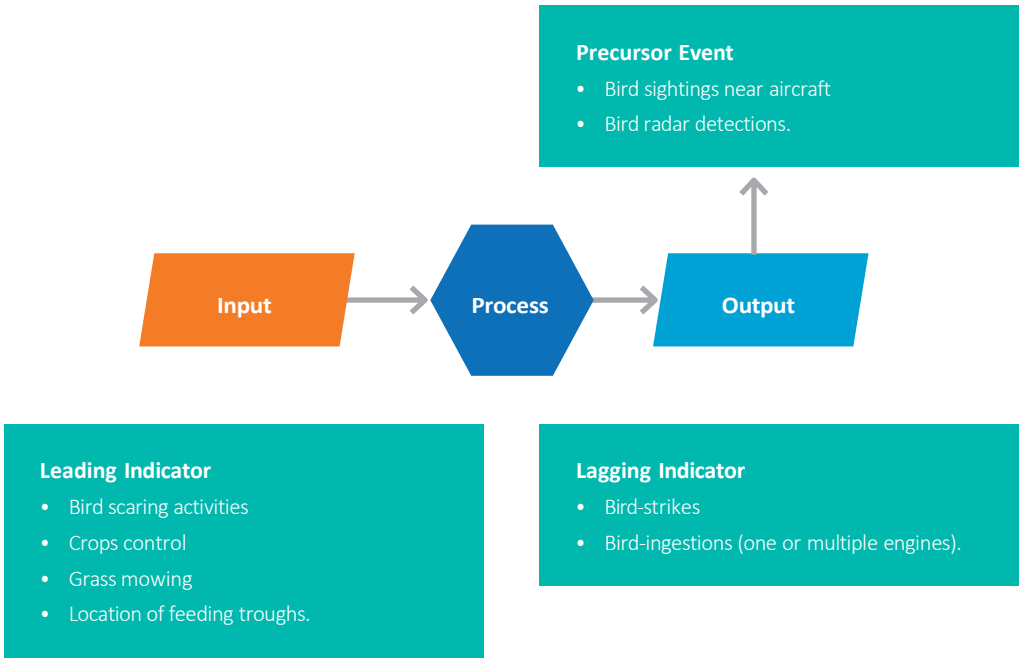
Aviation safety indicators have historically been biased towards the measurement of low probability / high severity outcomes. Whilst these rare, high-profile events might be easy to count, from a safety performance management perspective, it makes it difficult to perform statistical analysis to identify trends. This approach does not necessarily indicate that the system is safe and may provide a false sense of confidence that an organisation's safety performance is effective.

Leading indicators are measures that focus on processes and inputs that are being implemented to improve or maintain safety. Examples of leading SPIs driving the development of organisational capabilities for proactive safety performance management include such things as 'percentage of staff who have successfully completed safety training on-time' or 'frequency of bird scaring activities'.

Leading SPIs may also inform the organisation about how their operation copes with change, including changes in its operating environment. The focus will be either on anticipating weaknesses and vulnerabilities as a result of the change, or monitoring the performance after a change. An example of an SPI to monitor a change in operations would be 'percentage of sites that have implemented procedure X'.

For a more accurate and useful indication of safety performance, a lagging SPI, measuring both 'low probability / high severity' events and 'high probability / low severity' events should be combined with a leading SPI. The Figure overleaf illustrates the concept of leading and lagging indicators that provides a more comprehensive and realistic picture of the organisation's safety performance.

Leading vs lagging indicator concept
ICAO Doc 9859 safety Management Manual 4th Edition



It is likely the initial selection of SPIs will be limited to the monitoring and measurement of parameters representing events or processes that are easy and / or convenient to capture (safety data that may be readily available). Ideally, SPIs should focus on parameters that are important indicators of safety performance, rather than on those that are easy to attain and should be:

- related to the safety objective they aim to indicate
- selected or developed based on available data and reliable measurement
- appropriately specific and quantifiable, and
- realistic, by taking into account the possibilities and constraints of the organisation.

Documenting SPIs

As for safety objectives, SPIs will need to change periodically to support continuous improvement. For this reason, it is better to document the process for setting SPIs and any associated targets (see below) within the organisation's safety manual or exposition, with the actual SPIs published outside the manual, making it easier to update them.

Safety performance targets (SPTs)

SPTs act as 'milestones' that provide confidence that the organisation is on track to achieving its safety objectives and provide a measurable way of verifying the effectiveness of safety performance management activities. SPT setting should take into consideration factors such as the prevailing level of safety risk, safety risk tolerability (ALARP), as well as expectations regarding the safety of the particular aviation sector and the maturity of the organisation's SMS.

Safety objectives can be difficult to communicate and may seem challenging to achieve; by breaking them down into smaller concrete safety targets, the process of delivering them is easier to manage. In this way, targets form a crucial link between strategy and day-to-day operations. Organisations should identify the key areas that drive the safety performance and establish a way to measure them. It is recommended that organisations start by targeting trending rates of increase (e.g. increased rate of hazard reporting) or decrease (e.g. reduction in ground damage sustained during…), rather than arbitrary figures (e.g. 10% reduction) until the SMS has been operating long enough to provide reliable data on which to base specific targets.

The following should also be considered in deciding appropriate SPTs:

- driving undesirable behaviours; if managers are too focused on achievement of the numbers as an indicator of success, they may not achieve the intended improvement in safety performance
- operational targets; too much focus on achieving operational targets (such as: on-time departures, reduction in overhead costs, etc.) without a balance of SPTs can lead to 'achieving the operational targets' while not necessarily improving safety performance
- where the focus is on quantity rather than quality; this can encourage personnel or departments to meet the target, but in doing so deliver a poor product or service
- inhibiting innovation; although not intended, once a target is met this can lead to a relaxation and that no further improvements are needed, and complacency can set in
- organisational conflict; targets can create conflict between departments and other organisations as they argue over who is responsible rather than focusing on trying to work together.

Monitoring safety performance

Once an organisation has identified the targets based on the SPIs they believe will deliver the planned outcome, they need to ensure the stakeholders follow through by assigning clear responsibility for delivery. Mechanisms for monitoring and measuring the organisation's safety performance should be established to identify what changes may be needed if the progress made isn't as expected and reinforce the commitment of the organisation in meeting the safety objectives. These mechanisms will be a combination of management review, and audit activity as described later in this section.

Measuring the right things

Determine the best SPIs that will show the organisation is on track to achieving its safety objectives. Also consider what are the biggest safety issues and safety risks faced by the organisation and identify SPIs which will show effective control of these.

Availability of data

Is there data available which aligns with what the organisation wants to measure? If there isn't, there may be a need to establish additional data collection sources. For small organisations with limited amounts of data, the pooling of data sets may also help to identify trends. This may be supported by industry associations who can collate safety data from multiple organisations.

Reliability of the data

Data may be unreliable either because of its subjectivity or because it is incomplete.

Common industry SPIs

It may be useful to agree on common SPIs with similar organisations so that comparisons can be made between organisations. Industry associations or user groups may enable these.

2.4.3 Element 8: Management of Change

Organisations may experience change due to a number of factors including, but not limited to:

- organisational expansion or contraction
- business improvements that impact safety; these may result in changes to internal systems, processes or procedures that support the safe delivery of the products and services
- changes to the organisation's operating environment
- changes to the SMS interfaces with external organisations, and/or
- changes to legislation or regulation approach or requirements (including the rules).

Change may affect the effectiveness of existing safety risk controls. In addition, new hazards, and related safety risks may be inadvertently introduced into an operation when change occurs. Hazards should be identified, and associated safety risks assessed and controlled as defined in the organisation's existing hazard identification or SRM procedures. Human-factor-related risks such as resistance to change and distraction should be assessed during the planning process.

Organisational processes

The organisation's management of change process should take into account:

- criticality – how critical is the change? The organisation should consider the impact on their activities, and the impact on other organisations and the aviation system
- availability of subject matter experts – it is important that key members of the aviation community are involved in the change management activities. This may include individuals from external organisations, and
- availability of safety performance data and information – what data and information (including past performance) is available that can be used to give information on the situation and enable analysis of the change.

Small incremental changes often go unnoticed, but the cumulative effect can be considerable. Changes, large and small, might affect the organisation's system description, and may lead to the need for its revision. Therefore, the system description should be regularly reviewed to determine its continued validity, given that most service providers experience regular, or even continuous, change.

The organisation should define the triggers for the formal change process. Changes that are likely to trigger formal management of change include:

- introduction of new technology or equipment
- changes in the operating environment
- changes in key personnel
- significant changes in staffing levels
- changes in safety regulatory requirements
- significant restructuring of the organisation, and
- physical changes (new facility or base, aerodrome layout changes etc.).

Many organisations underestimate the human dimension of managing change. This is demonstrated by past performance in restructuring and adapting to different requirements where the failure rate is surprisingly high not because of strategy, but because of underestimating the human factor. Organisations should also consider the impact of the change on personnel. This could affect the way the change is accepted by those affected. Early communication and engagement will normally improve the way the change is perceived and implemented.

The management of change process should include activities to:

- understand and define the change, this should include a description of the change and why it is being implemented
- understand and define who and what it will affect, this may be individuals within the organisation, other departments or external people or organisations. Equipment, systems and processes may also be impacted. A review of the system description and organisation's interfaces may be needed. This is an opportunity to determine who should be involved in the change. Changes might affect risk controls already in place to mitigate other risks, and therefore change could increase risks in areas that are not immediately obvious
- identify hazards related to the change and carry out a safety risk assessment, this should identify any hazards directly related to the change. The impact on existing hazards and safety risk controls that may be affected by the change should also be reviewed. This step should use the existing organisation's SRM processes
- develop an action plan, this should define what is to be done, by whom and by when. There should be a clear plan describing how the change will be implemented and who will be responsible for which actions, and the sequencing and scheduling of each task
- sign-off on the change, this is to confirm that the change is safe to implement. The individual with overall responsibility and authority for implementing the change should sign the change plan
- assurance plan, this is to determine what follow up action is needed. Consider how the change will be communicated and whether additional activities (such as audits) are needed during or after the change. Any assumptions made need to be tested.

Changes notifiable to the Director

Individual operating rules specify the changes that require prior acceptance by the Director; this includes changes to the system for safety management, if the change is a material change. With the exception of changes to the senior person responsible for safety management (already listed within the operational rules as a notifiable change), material changes are considered to be those affecting the performance of a fundamental process or system underpinning the safety management system, examples of which include:

- methodologies for:
  - setting safety goals, objectives and performance measures (note: only the process methodology, not the individual measures)
  - hazard identification and risk management
  - audit programme development, and
  - management review.

Changes to the safety training program e.g. high-level changes to the safety training syllabus.

For organisations with an accepted system for safety management, submissions supporting such requests for change should include evidence that their management of change process has been applied.

2.4.4 Element 9: Continuous Improvement of the SMS

Most organisations already employ continuous improvement processes for business activity either a QA system, or other programmes designed to improve productivity and drive out waste. Maintenance and continuous improvement of the organisation's SMS effectiveness is supported by safety assurance activities that include the verification and follow up of actions and the internal audit processes. It should be recognised that maintaining and continuously improving the SMS is an ongoing journey as the organisation itself and the operational environment will be constantly changing.

Assessing an SMS for effectiveness should not be based solely on SPIs; organisations should use a variety of methods to determine its effectiveness, measure outputs as well as outcomes of the processes, and assess the information gathered through these activities. Such methods, as described in more detail under 'Management Review', may include:

- management reviews
- audits
- monitoring of occurrences
- assessments; includes assessments of safety culture and SMS effectiveness
- safety surveys, and
- addressing lessons learnt.

2.4.5 Element 10: Internal Audit Programme

An audit is a methodical, planned review to determine how activities are being conducted, and whether they are being conducted in accordance with published procedures. Safety auditing is closely linked with quality management processes, and is considered to be a proactive safety management activity which provides means for identifying potential problems before they have an impact on safety. Safety audits focus on assessing the integrity of the organisation's SMS and supporting systems. Safety audits are one of the tools that can be used to evaluate the effectiveness of implemented safety risk controls or to monitor compliance with safety regulations. Ensuring independence and objectivity is a challenge for safety audits. Independence and objectivity can be achieved by engaging external entities or internal audits with protections in place through policies, procedures, roles, and communication protocols.

Auditing has traditionally focused on compliance with regulations and conformance with policies and procedures. Organisations are now recognising that there is more value in looking at the effectiveness of those policies and procedures; this is particularly important for safety management systems. Internal safety auditing is a tool used to ensure compliance (the organisation meeting its obligations) and to monitor safety performance.

Safety audits should be used to identify that:

- safety risk is being managed and risk controls are effective
- company procedures and instructions are complied with
- the organisation's SMS has a sound structure and adequate staffing levels
- the required level of personnel competency and training to operate equipment and facilities, and to maintain their levels of performance, is achieved
- equipment performance is adequate for the safety levels of the service provided
- effective arrangements exist for promoting safety, monitoring safety performance and processing safety issues
- adequate arrangements exist to handle foreseeable emergencies, and
- if needed, corrective measures are identified by the business area being audited.

Developing a safety audit programme

The following guidelines are intended to assist organisations in developing an audit capability. Simple toolkits can be found in CASA Resource booklet 4:

https://www.casa.gov.au/search-centre/safety-kits/resource-kit-develop-your-safety-management-system

Further guidelines for auditing management systems can be found within AS/NZS ISO 19011:2015

aviation.govt.nz/rules/advisory-circulars/show/AC00-3

Establishing an audit programme

A programme of audits covering one or two years will help the organisation plan its audit activities and resources. The schedule should show the planned date of each audit, a brief scope description and the names of the auditors. Consideration should be given to how, and by whom, this schedule will be maintained, and how relevant personnel can access it. Changes to the scheduling and scope should be clearly justified and documented with authority for agreement set at an appropriate senior manager level.

Setting the scope and frequency of the audit

The audit scope describes the breadth of operational disciplines or areas to be covered and depends on the focus area for the audit. The nature and scope of audits will be a balance of risk-based and compliance-based need, driven primarily by the safety significance of an operational area, whilst maintaining compliance (a compliance failure is likely to be a safety risk). Most organisations will be familiar with compliance-based auditing; some will also have used process auditing techniques through product sampling, or for specific organisational processes.

The frequency will in part be driven by compliance requirements of external parties such as regulators and customers, and in part by the organisation's activity level and experience. For example, an audit on one operational area may only be necessary once every two years, but an area which has known or suspected issues may need more frequent or additional audits. These should be added to the programme – and the reasons recorded.

Using safety risk as a basis for scope and audit frequency will require the organisation to consider at least some or all of these points:

- what are the top risks the organisation is managing, and where do they occur?
- how many risk controls are in place and how effective are they (engineering, administrative, PPE)?
- what is working well – and why? Would an audit help to understand lessons that could be applied to other parts of the operation?
- safety data from reports and the results of previous investigations and audits – were control failures identified that might be applicable to other areas?
- are changes taking place that require closer monitoring to verify that planned control measures are effective?
- how is the organisation tracking with its SPIs?

Setting audit objectives

Audit objectives define tangible achievements expected from each audit. It is advisable to set out the detailed objectives well in advance of the audit to help the auditors to plan and conduct the audit.

For example, for an audit of Flight Dispatch, one audit objective might be to 'determine how dispatch errors are identified, managed and reported to ascertain the effectiveness of safety processes.'

Outlining audit methodology

It is important to outline the policies, processes and methodologies required to conduct internal safety audits. The person managing the audit programme should select and determine the methods for collectively conducting an audit, depending on the defined audit objectives, scope and criteria.

Documentation of processes

All audit processes need to be clearly documented so that they are easy to understand and, most importantly, allow audits to be conducted in a standardised manner.

Conducting safety audits and monitoring outcomes

An audit should include the following steps:

Planning the audit

Careful planning helps the auditor to prepare tools appropriate to the audit objective and scope. One tool is the audit checklist (not 'tick list'), which should be used to identify the functions to be audited and to ensure that nothing is missed; it might include specific questions to allow the auditor to ascertain the effectiveness of the quality and safety processes. Checklists should never be used merely to show compliance by ticking boxes.

Conducting the audit

The audit is conducted to gather information through a combination of document review, interviews with managers and staff, and observations on the part of the auditor(s). Auditors should:

- focus on how – and if – the documented procedures are practised, and whether the current practices and procedures are conducive to effective and safe operations
- use open-ended questions, asked in a neutral manner, and maintain a high-level of engagement with personnel in the audited department, and
- provide an initial summary of findings or observations to the auditees at the conclusion of the audit.

Writing the audit report

It is essential that the content of the audit report is accurate, and that findings are supported by robust evidence that can be understood by the reader. Report writers should ensure:

- consistency of findings, recommendations and observations
- conclusions are supported with references
- findings, recommendations and observations are stated clearly and concisely without the use of generalisations, and
- criticism is not directed at individuals or positions.

Disseminating and tracking audit findings

The audit report should be formally presented to the auditees so that they can address any findings. Actions to address the findings need to be tracked in a transparent and systematic manner (e.g. agenda item at a monthly safety committee meeting).

Selecting and training auditors

Auditors should receive formal training to develop competence in auditing skills and techniques, and should be encouraged, or even required, to gain formal auditor qualifications. An effective auditor would also be expected:

- to act in a strictly trustworthy and unbiased manner
- to disclose any potential conflicts of interest
- not to accept any gifts, etc, and
- not to disclose the findings or any other information gained in the course of the audit to any third party unless authorised to do so.

Operational independence ensures auditors are not put in a position where their objectivity may be affected by conflicting responsibilities or loyalties. Small organisations might consider employing a third party to conduct audits; the third party could be a similar organisation.

2.4.6 Element 11: Management Review

Like any business management system (e.g. financial, health and safety), to ensure the continuing adequacy and effectiveness of the SMS, the CE should conduct periodic reviews of SMS processes and procedures, and evaluate the organisation's safety performance. There are many ways in which the CE can review the SMS, such as receiving and reviewing a report generated by the safety manager or other personnel, electronic communication, as part of a regular management meeting or carried out at a separate meeting. The organisation needs to describe how the management review process will be conducted. If by meeting, then how often they will meet, who will be at the meeting, what will be discussed as a standing agenda, and how agreed actions and their progress tracking will be documented.

'...four simple audit questions that are really easy to answer if you have an effective SMS, and impossible to answer if you don't:

- *What is most likely to be the cause of your next accident or serious incident?*
- *How do you know that?*
- *What are you doing about it?*
- *Is it working?*

The easiest way to make people do silly things is to measure them against mindless objectives. I think SMS was always a serious and practical idea. It is supposed to change the way you manage risk. Find a way to measure those changes, and you will find a way to drive an effective implementation.'

William R. Voss, Flight Safety Foundation, May 2012

Management review activities

It is important that senior management review the effectiveness of the SMS. This may be carried out as one of the functions of the highest-level safety committee. Management reviews:

- examine whether the safety objectives are being achieved by the organisation
- use the opportunity to look at all the available safety performance information to identify overall trends
- evaluate SPIs and SPTs considering trends and, when appropriate data is available, compare (benchmark) to other similar organisations, national, or global data
- review audit performance; this includes internal audits and audits carried out by other organisations
- monitor occurrences for the recurrence of safety events, including accidents and incidents as well as unsafe conditions or acts
- review the results of any assessments performed, including assessments of safety culture and SMS effectiveness
- review the results of safety surveys, including cultural surveys providing useful feedback on staff engagement with the SMS (it may also provide an indicator of the safety culture of the organisation), and
- provide a platform for the organisation to address lessons learnt from safety reporting systems and safety investigations- these should lead to safety improvements being implemented.

Inputs to the management review

The input to the management review should consider, among other things, information on:

- audit / review results
- safety objective achievement results
- hazard and event status and results
- corrective and preventive action(s) status and results
- training programme effectiveness
- follow up actions from previous management reviews
- changes that could affect the SMS, and
- recommendations for improvement.

These inputs may then be used to measure the overall effectiveness of the SMS, and the review team can then decide on any changes that need to be made to improve the SMS.

Outputs from the management review

As outputs of the management review process, there should be evidence of decisions related to:

- continuous improvement activity
- the current safety risk picture
- safety communications
- training updates, and
- policy and procedure revisions.

Documented information as evidence of the results of management reviews is required, and the format of this can be varied. Minutes of meetings is the most common type, but electronic records, statistical charts, presentations or photographs of the results of discussions (flip charts, whiteboards, noticeboards etc.) are acceptable types. It is important that the person taking the minutes is not also trying to chair the meeting or lead the discussions; they need to be able to accurately transcribe sufficient information to evidence the decision process. Accountability for implementing each action should be assigned to an individual with the appropriate responsibility, and the appropriate resources allocated.

Frequency of management reviews

Management reviews should be conducted as often as necessary to ensure the effectiveness of the system is truly tested. This should reflect the size and complexity of the organisation, coupled with the amount of information to be reviewed. The inputs and outputs of the management review process should also be relevant to the organisation's size and complexity. The frequency and nature of reviews should also take into consideration the different levels of monitoring that takes place, such as the activities of safety groups or committees. The review should not occur so often that it gets mired down in minutiae that would obscure shortcomings in the larger SMS. On the other hand, it should take place often enough to avoid situations where decisions are made too late to address threats to the SMS. An *ad hoc* review could also be conducted after a particular large or unusual event, or ahead of changes.

The organisation should consider the following when setting the frequency of its management reviews:

- anticipated changes or threats to the operations and SMS. New systems require more attention and resource allocation to follow up and close action items, and
- establishing a list of significant safety items that would trigger a management review between planned sessions.

2.5 Component 4: Safety Promotion

Rule reference: 100.3(a)(4)

Safety promotion encourages a positive safety culture and helps achieve the organisation's safety objectives, through the combination of technical competence that is continually enhanced through training and education, effective communications and information-sharing. Senior management provides the leadership to promote the safety culture throughout an organisation.

Effective safety management cannot be achieved solely by mandate or strict adherence to policies and procedures. Safety promotion affects both individual and organisational behaviour, and supplements the organisation's policies, procedures and processes, providing a value system that supports safety efforts.

The organisation should establish and implement processes and procedures that facilitate effective two-way communication throughout all levels of the organisation. This should include clear strategic direction from the top of the organisation and the enabling of 'bottom-up' communication that encourages open and constructive feedback from all staff.

2.5.1 Element 12: Safety Training and Competency

Note: *Within this AC the terminology of training has been used for consistency. Other terminology such as education and learning can also be used, sometimes interchangeably and with slightly different meanings. The acceptable means of compliance and guidance material provided here is not intended to be taken as definitive material within the learning field but is specific for SMS competency.*

To ensure that personnel are competent to perform their safety-related duties, they need to be trained in their organisation's SMS to understand the organisation's safety objectives and to acquire the skills and knowledge to help achieve them. Safety training is a foundation for the development and maintenance of an organisation's safety culture.

The Safety Management International Collaboration Group (SM ICG) defines a competency as:

> *A capability that allows a person to perform various processes or tasks and achieve outcomes. It is a combination of relevant knowledge, skills, and attitudes. It is the demonstrated ability to apply knowledge and skills.*

Competency is manifested and observed through behaviours-

- **observable behaviours** are single job-related behaviours that can be observed and may not be measurable

Those behaviours (observable) mobilise the relevant knowledge, skills and attitudes to carry out activities or tasks under specified conditions

- **knowledge** is specific information used to enable a person to apply skills and attitudes and to recall facts, identify concepts, apply rules, procedures or principles
- **skill** is an ability to perform and activity or action
- **attitude** is a persisting internal mental state or disposition that influences and individual's choice of personal action toward some object, person or event that can be learned.

The focus of safety training in an SMS should include:

- training for the CE in SMS, including safety responsibilities, oversight and governance and its relationship to the organisation's business strategy and other management systems
- training for senior persons, managers and line supervisors in how to effectively lead the development, implementation and ongoing sustainment of the SMS
- competency for organisational leadership and key safety personnel in the application of risk management practices
- training that provides competency for the senior person for the system for safety management (safety manager) in the management and administration of the SMS and risk management practices Refer to Training and Competency Guidance Material, and
- competency-based training for all personnel in the participation and use of the organisation's SMS that is appropriate to their safety-related duties.

ICAO define competency-based training as: training and assessment characterised by a performance orientation, emphasis on standards of performance and their measurement and the development of training to the specified performance standards.

Demonstration of the competencies can be assessed using the behavioural indicators, which should meet the required level of performance, as established by the organisation for its specific operation.

Competency-based training has the following benefits if it:

- enables individuals to reach their highest level of operational capability while ensuring a basic level of competence as a minimum standard
- enables individuals to cope with predictable and unforeseen situations
- is relevant to the job/role and context in which the job will be performed, and
- is geared towards learning rather than passing a test.

The following competency-based training and assessment principles should be followed:

- relevant competencies are clearly defined for a particular role within the organisation's SMS
- competencies can be trained for, observed and assessed consistently
- common understanding of the competency requirements
- clear performance criteria are established by training provider for assessing competence
- evidence of competent performance is valid and reliable
- link between competencies and training, required performance and assessment
- assessment based on multiple observations across multiple context, and
- demonstration of an integrated performance of all the required competencies.

The below table helps to show the relationship between competency and behavioural indicator:

COMPETENCY	COMPETENCY DESCRIPTION	BEHAVIOURAL INDICATOR
Application of ERP procedures (specific to the role)	Identifies and applies procedures in accordance with published operating instructions, using the appropriate knowledge	identifies the source of operating instructions
		identifies and follows applicable operating instructions in a timely manner (e.g. during a desk top exercise)
		Applies relevant procedural knowledge

Developing the content of the safety training programme

It is the responsibility of the CE to ensure sufficient resources are allocated, and the safety manager to ensure the programme develops the required individual personnel competencies, so the SMS is understood and effectively applied across the different levels of the organisation, while building a strong safety culture.

Appropriate external training organisations may be used, if required, to provide the necessary training to meet certain personnel responsibilities. It is the responsibility of the organisation to ensure that any external training is appropriate to the training needs and competency requirements of their SMS.

Conducting a training needs analysis

A training needs analysis (TNA) should be undertaken to identify the appropriate training programme for all personnel, the scope of the training programme should be appropriate to each individual's role and involvement in the organisation's SMS. A training needs analysis can be accomplished by:

- analysing the job:
  - start by looking at the specific documentation that describes the job, such as the position description. Identify phrases that specify important skills, processes or areas of knowledge required.
- determine the skills / knowledge gaps:
  - develop a list of areas where training would be required to improve the effectiveness of the job in question
  - decide whether there is a gap in the skills or knowledge, or if some revision is required to improve the general skill set
  - obtain feedback from a representative group of individuals doing the job on what areas they consider require addressing.
- identifying training solutions:
  - establish the best way of closing the skills / knowledge gaps identified in the previous step. Different options may include training courses conducted internally or externally, self-directed learning, one-on-one training, or mentoring in the work environment.
- evaluating performance after training to determine if performance gaps still exist and the training solution selected was appropriate. This can be achieved by:
  - asking the personnel and / or their manager to evaluate their effectiveness in the task
  - asking the personnel if the performance gaps that were the reason for the training are still there
  - assessing the personnel as they perform tasks to determine whether there is still evidence of skill or knowledge deficiency.

Determining the timeframes of the safety training programme

With respect to timeframes for the training programme, both initial and recurrent training requirements need to be considered, developed and appropriately resourced.

Safety training syllabus

At a minimum a safety training syllabus should include the following high-level areas of focus:

- organisational safety policies, goals and objectives
- organisational safety roles and responsibilities related to safety
- SMS fundamentals, including relationship to human factors
- safety risk management principles
- hazard identification and safety reporting, and
- safety communication.

The training programme should identify the scope and depth of the training syllabus for the various safety-related duties and functions consistent with needs and complexity of the organisation. Training programme guidance for the safety manager position is contained in Training and Competency Guidance Material.

Training programme and qualification documentation

Training and qualification requirements should be documented for each activity area in the organisation. A training file should be developed for all personnel, including management, to identify and record their training and competency requirements and achievements.

Who needs to undertake safety training

All personnel should take part in the organisation's safety training programme appropriate for their safety responsibilities. In particular, all operational / support personnel, managers, supervisors, senior managers, senior persons and the CE should be trained and be competent to perform their SMS duties.

Sub-contractors may also require training on the use of the SMS or how to integrate their practices with the organisation's SMS, and on the organisation's expectations regarding safe working practices, hazard identification and safety reporting processes.

2.5.2 Training and Competency Guidance Material

Safety Manager (senior person responsible for the system for safety management)

The safety manager is the senior person responsible for the development, implementation, operation and

continuous improvement of the organisation's SMS. They should act as a focal point for safety in the organisation.

Typically, the safety manager is required to be competent and responsible for the following:

- management of the SMS implementation plan on behalf of the CE
- facilitating the risk management process (hazard identification, risk assessment and risk control)
- management of safety performance processes
- monitoring corrective and preventative actions to ensure their accomplishment
- maintaining safety documentation
- ensuring appropriate safety management training is provided
- providing independent advice on safety matters
- overseeing safety management processes
- appropriate involvement in safety investigations
- monitoring safety concerns in the aviation industry and their perceived impact on the organisation's operations, and
- coordinating and communicating (on behalf of the CE) with CAA as necessary on issues relating to safety.

Alongside the above, understanding of the organisation's operation and related safety-critical tasks and systems, and competency in regard of safety management principles, some key skills / experience should be taken into consideration to complement the professional expertise of the safety manager:

- professional knowledge of the organisation's specific operations and environment
- analytical thinking and problem-solving abilities
- inter and intra-organisation project management skills
- people-oriented skills such as, objectivity, fairness etc., and
- communication skills, both written and oral.

The following table outlines a sample content of the safety training for the position of safety manager. The syllabus for training should take account of the complexity of the organisation and the training needs analysis for the position.

SAMPLE CONTENT FOR SAFETY MANAGEMENT TRAINING FOR SAFETY MANAGER
Safety management principles and practices in the aviation environment: • the need for an SMS • what is different about SMS • relationship / integration with other management systems • key principles and processes • regulatory requirements.
The organisation's SMS including: • safety policy, goals and objective • safety roles and responsibilities • emergency response planning • documentation • risk management • safety assurance and measurement • safety reporting • safety communication and training.
Safety risk management (SRM) principles • hazard identification, risk assessment and control. Safety investigation principles
Human performance • human factors • understanding the role of the human in safety • human behaviour and performance • error management.
Safety culture

2.5.3 Element 13: Communication of Safety-Critical Information

One of the most important components of the SMS is the process for communicating safety-critical information, both within and outside the organisation. Internally, relevant information should be escalated to senior management to ensure appropriate visibility for good decision making.

Communication should supplement training by providing a continuous flow of safety information. It also ensures that the SMS is visible and shown to be effective and integrated. The safety manager should also ensure that lessons learnt from investigations and case histories or experiences, both internally and from other organisations, are distributed widely.

What to communicate throughout the organisation

The following information needs to be regularly communicated to personnel in a systematic and measurable manner:

- leadership commitment to the SMS, its objectives and safety performance
- safety risk information; risks identified, methods of treatment, residual risks, new safety risk controls and corrective actions etc.
- identified hazards and required controls
- personnel feedback on safety report submissions – the feedback loop should be closed
- safety reporting trends and statistics
- how findings that inform safety decisions are disseminated
- changes to the SMS

- changes to operational activities that may affect safety or existing procedures
- outcomes of safety investigations, audits and associated corrective and preventive actions, and
- lessons learnt and 'good-to-know' safety information.

What to communicate outside of the organisation

The following information should be communicated as required:

- potential hazards, risks or occurrences that may affect others
- lessons learned and solutions to identified hazards and risks, and
- potential risks associated with change (e.g. new infrastructure, regulatory changes, etc.).

Methods of communication

Safety communication should be delivered by the most appropriate method based on the individual's role and need to receive safety-related information. This may be done through meetings, safety newsletters, notices, bulletins, briefings or training courses. Some SMS software packages have notification functions either via e-mail or messaging applications. It is important to use more than just one medium, ensuring there is a mixture of both active communication (e.g. the ability to interact and receive feedback) and passive communication. Some examples are:

Active methods of communication

- regular safety-related meetings
- senior management conveying strategic safety information, goals and objectives (top down)
- personnel informing management on safety issues (bottom up). This is usually more tactical information about what is going on in functional / departmental areas
- team briefings and 'road show' initiatives.

Passive methods of communication

- the publication of an organisational safety magazine or newsletter
- web-based presentation
- forums
- emails.

The methods of communication should be commensurate with the size and complexity of the organisation.

Safety promotion

Safety promotion supports safety communication goals and objectives. It is closely linked with safety training and the dissemination of safety information. It refers to those activities which the organisation carries out to ensure that personnel understand:

- why SMS procedures are in place
- what safety management means
- why particular safety actions are taken, etc.

Safety promotion provides a mechanism through which lessons from safety investigations and other safety-related activities are made available to all affected personnel.

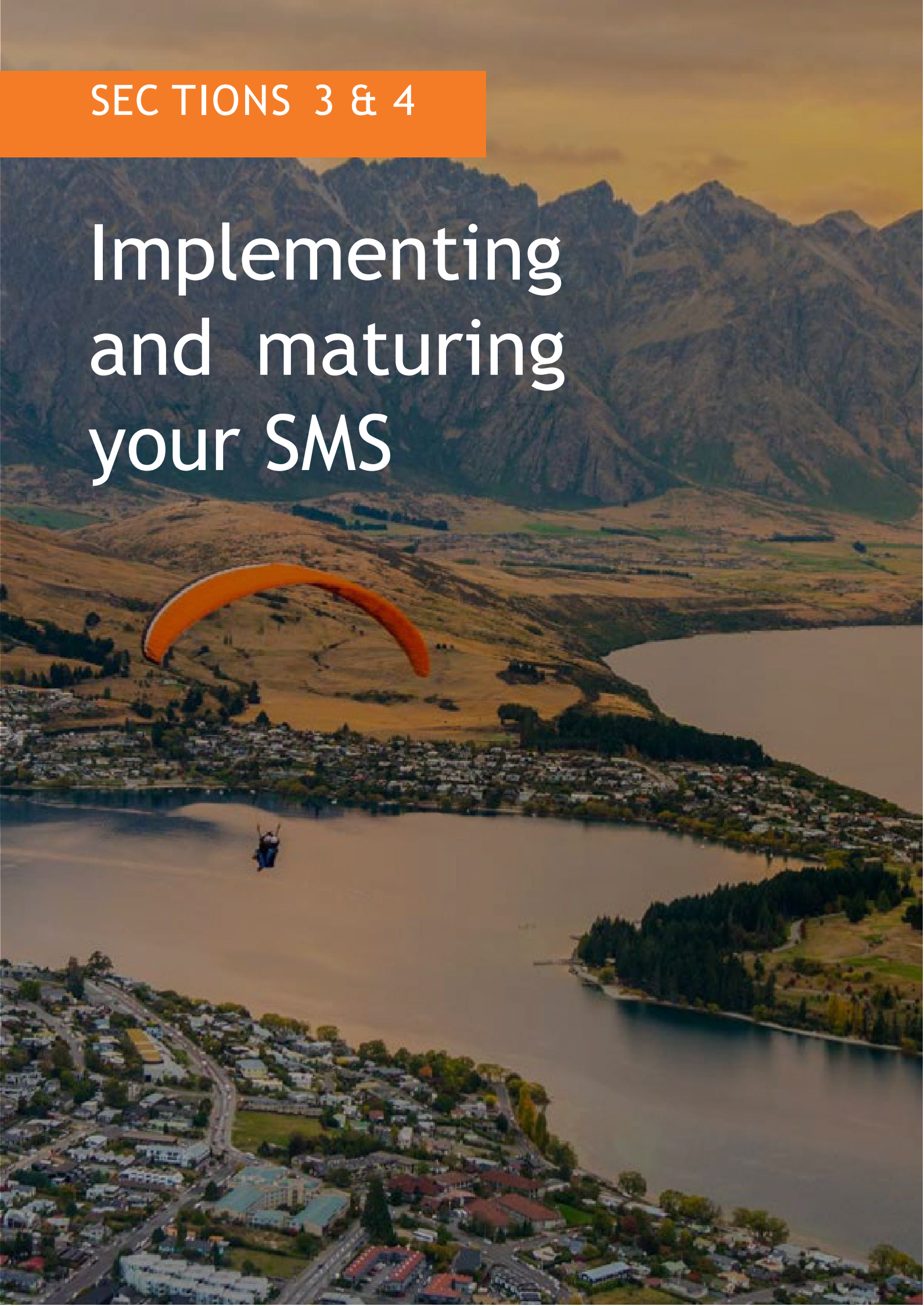
How to promote safety effectively

Safety promotion activities should complement education and communication initiatives. The organisational safety promotion programme should be based on several different communication methods for reasons of flexibility and cost. Typical methods are:

- spoken word: perhaps the most effective method, especially if supplemented with a visual presentation
- written word: the most popular method because of speed and economy, the printed safety promotion material also competes for attention with considerable amounts of other printed material
- electronic media: the use of the internet offers significant potential for improvement in the promotion of safety. This could include electronic newsletters, blogs, feedback tools such as surveys, etc.

SEC TIONS 3 & 4

Implementing and maturing your SMS



Contents

3. Implementing an SMS

3.1 Implementation planning

Many organisations have implemented forms of safety management over the years. Some have been based upon occupational safety approaches, including hazard management risk management methodologies. Some early adopters used reactive methods (safety reporting) in combination with a quality management system. These systems are a good starting point, but an organisation's SMS cannot be considered to demonstrate compliance with Part 100 until an application is made, CAA has formally evaluated the organisation and issued amended operating certificate documents to show that the SMS has been accepted.

The success of the organisation's implementation will be determined by CAA through the use of an evaluation tool, form *CAA 24100/02*. This can also assist organisations in determining how to best assess, develop and implement the various elements of an effective SMS that is scalable as described in Section 1.

The tool has been developed from guidance material published by the SM ICG. To help assess the maturity and effectiveness of an organisation's SMS, the tool uses the concept of different levels of performance in respect to the organisation's safety management capability. These are described in the figure below:

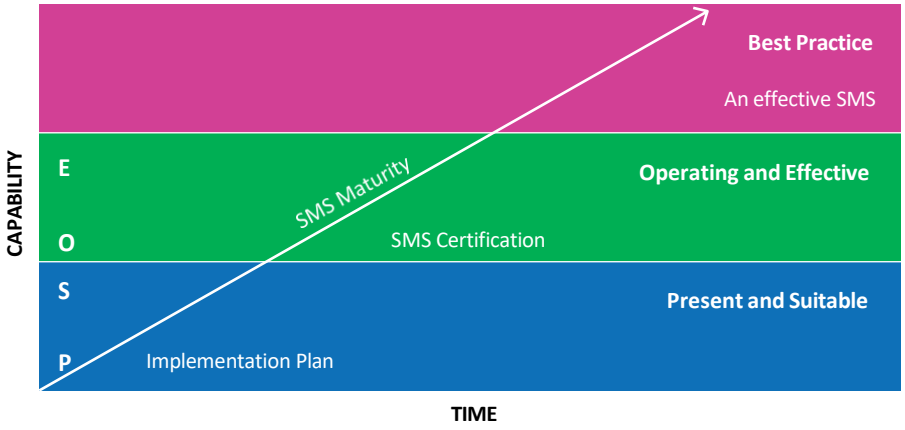
Figure 3: Description of Individual Performance Indicators

PRESENT	There is evidence that the 'indicator' is clearly visible and is documented within the organisation's SMS documentation.
SUITABLE	The indicator is suitable based on the size, nature, complexity of the organisation and the inherent risk in the activity, including consideration of the industry sector
OPERATING	There is evidence that the indicator is in use and an output is being produced.
EFFECTIVE	There is evidence that the indicator is effective and achieving the desired outcome.
BEST PRACTICE	Organisations seeking to continually improve can use the best practice indicators to achieve a higher level of safety performance.

The tool can assist organisations to assess whether the required elements of an SMS are 'present and suitable' during implementation and at a later stage 'operating and effective' also recognising 'best practice'. The tool is based on a series of indicators for each SMS element.

The following figure has been developed by the SM ICG and shows the different levels of SMS maturity as an organisation implements and develops its SMS.

Figure 4: The SMS Journey



3.1.1 Gap analysis

Most organisations are made up of a complex network of interfaces and interactions involving different internal departments as well as different external organisations that all contribute to the safe operation of the organisation. A system overview helps to identify the organisational processes including any interfaces to define the scope of the SMS and an opportunity to identify any gaps between current state and the requirements for an SMS. A system overview may also serve as a starting point to identify organisational and operational hazards. A system description may include a bulleted list with references to policies and procedures. A graphic depiction, such as a process flow chart or annotated organisation chart, may be enough for some organisations. An organisation should use a method and format that works for them.

New organisations

Applications for a **new** organisational certificate (not an organisation applying for certificate renewal) submitted after 1 February 2016, to which Part 100 applies, must include an implementation plan for SMS that meets the requirements of Part 100.

In this case, there will be no gaps and all the components and elements will apply. In this case the implementation plan should show how the organisation intends to implement SMS as part of the certification process. One way to evidence this would be through completing the evaluation tool, Form *CAA 24100/02.*

3.1.2 Implementation plan

Evaluation Process

Organisations that are making an initial application to operate under an SMS, are required to submit an implementation plan to CAA that describes how the system for safety management will be implemented.

The CAA will evaluate the plan and provide feedback to the organisation. CAA will if acceptable approve the organisation's implementation plan and set the date for implementation (certification) having regard to the following:

- the capability of the organisation
- the complexity of the organisation
- the risks inherent in the activities of the organisation
- the date of any certificate renewal
- any resource or scheduling impacts on the organisation or CAA or both.

Content of the Plan

The implementation plan is a roadmap describing how the organisation intends to implement processes that meet the requirements of Part 100 and associated organisation certification rules. Therefore, the implementation plan should be a strategy for managing SMS implementation including adequate resourcing and realistic timeline. SMS implementation will require some level of investment to address training, documentation changes, development time and possibly system tools to manage data streams and assist with analysis. The changes that are necessary to implement SMS should be managed in a structured way to ensure that there is an awareness of impacts and potential consequences, and that these are managed appropriately.

The implementation plan need not be complex. However, there should be sufficient detail to ensure that the organisation has identified how it will meet the overall objective of successfully implementing a SMS. This means that each element is present and suitable in the context of the activities the organisation undertakes.

The implementation plan should be developed in consultation with the chief executive and individuals who are responsible for functions within the organisation.

The implementation plan should be documented in a format that is appropriate to the content and complexity, and provide an implementation overview describing: operations; management; management system (relationship with other systems etc.); the fleet or service provided; and the planning process.

3.2 SMS Certification

3.2.1 General

Current CAA certification processes will be used for certification of an organisation's SMS. It will consist of an assessment of the exposition and supporting documentation, followed by an on-site inspection and demonstration.

3.2.2 Assessment and review

As part of the assessment process, the exposition and supporting documentation will be reviewed to confirm that the organisation has developed and implemented its SMS. While this AC provides the framework for an acceptable means of compliance with the Rules, it is not intended to provide the only means of compliance and consideration will be given to other methods of compliance that may be presented to the Director. Applicants must submit documentation that demonstrates to the Director that they have addressed all the SMS elements. This is best achieved using a CAA Safety Management System Evaluation Tool Form *CAA 24100/02* that CAA will use to assist in evaluating the capability of the organisation's SMS. The SMS processes and procedures may be documented in an SMS manual or incorporated in other manuals.

The nomination of a safety manager (the person responsible for facilitating and administering the organisation's SMS) should also be submitted at the same time. Senior person interviews may be undertaken as part of the CAA's on-site activities.

For senior persons transitioning from a similar role, or subject to acceptance by the Director, combining the role for the system for safety management with other senior person roles for operational functions, the focus will be on satisfying section 9 and section 12 of the Civil Aviation Act (or equivalent sections in subsequent acts) – qualifications and experience, and having sufficient resources as is applicable to that role.

Where applicable, the integration of safety management processes with quality management processes should be clearly established and documented.

3.2.3 Ongoing monitoring

An organisation's SMS will be subject to routine CAA surveillance (inspection and monitoring) to verify that the SMS's capability and performance is maturing towards 'operating' and 'effective' (refer to 3.1 and section 4). CAA safety oversight activities are based on the safety risks identified through analysis. Regulatory decisions and interventions are based on the assessment of the organisation's safety performance. Ongoing monitoring is used to obtain assurance of the organisation's safety management capability and its ability to deliver on its safety performance objectives.

3.2.4 Changes to certificate holder's organisation

Individual operating rules specify the changes that require prior acceptance by the Director; this includes changes to the system for safety management, if the change is a material change. With the exception of changes to the senior person responsible for safety management (already listed within the operational rules as a notifiable change), material changes are considered to be those affecting the performance of a fundamental process or system underpinning the safety management system, examples of which include:

- methodologies for:
  - setting safety goals, objectives and performance measures (note: only the process methodology, not the individual measures)
  - hazard identification and risk management
  - audit programme development
  - management review
  - Changes to the safety training program e.g. high level changes to the safety training syllabus.
- changes should be directed to the appropriate CAA operational unit, as is currently the case for other exposition changes requiring prior approval by the Director.

3.2.5 Renewal

For organisations that have an accepted SMS in place, CAA will evaluate the SMS at certificate renewal as part of the broader organisation recertification. At that stage, the maturity level should have progressed from the entry level of present and suitable to operating and developing towards effective. Organisations must use the SMS evaluation tool to assess and demonstrate the progression in their maturity and any changes introduced as part of continuous improvement activities.

The same certification process is applied in accordance with CAA certification policy, in a four-step process:

APPLICATION	The applicant must submit an application for renewal that includes an updated Safety Management System Evaluation Tool 24100/02 and supporting documentation.
ASSESSMENT	CAA performs a 100% desktop review. From this review, focus areas of the management system are identified for detailed evaluation during the site inspection.
INSPECTION AND DEMONSTATION	Depending upon the outcome of this review, typical areas for focus might be: ERP, risk management, management of change, performance monitoring and measuring and internal audit. Senior person interviews will continue to focus on knowledge of organisational or regulatory changes, awareness of risk, and the persons' attitude to safety, and staff throughout the organisation will be engaged with to evaluate whether the SMS operates at all levels of the organisation.
CERTIFICATION	The overall SMS is evaluated against 24100/02. This forms part of the broader decision about the organisation's overall compliance with the requirements to remain in the aviation system and obtain a renewal of its certificate(s).

4. Maturing your SMS

4.1 Reflection - how's it going?

So now you have implemented your SMS and it has been certificated as meeting a maturity standard of Present and Suitable – time to get back to Business as Usual (BAU). Actually, this is the new business and there should be little that is 'usual' about it other than your organisation routinely applies safety risk management to everyday decisions, and is actively uneasy – what might still go wrong?

There will be opportunities for the organisation to pause and reflect on what is working, what could work better, and what didn't work as expected; events such as:

- Significant change – did the management of change process deliver?
- High safety risk identified – proactive or reactive identification?
- SMS review – are the objectives and measures giving you the information to support decision making?

Try and focus on what is working well; take the opportunity to share and apply those processes and practices as widely throughout the organisation, and where possible related third parties.

4.2 How do I know that the system is maturing?

One way is to critically examine each component (or element) as a process to see if it is operating as intended, then look for outputs to see if it is effective. Refer to the latest version of your SMS evaluation tool to help you and update it for any changes. For example:

PROCESS	IMPLEMENTATION PHASE		INCREASED CAPABABILITY / MATURITY	
	PRESENT	SUITABLE	OPERATING	EFFECTIVE
Management of change	Process is established and documented.	Triggers for using the MoC process exist; process considers internal / external stakeholders.	The process is being used and risk controls are put in place before the change takes place.	The process is used for all changes that may impact on safety. Initiated in a planned, timely and consistent manner.
Appointment of key personnel / safety communication	The organisation has established safety committees(s).	The scope of the safety committee(s) includes safety risks and compliance issues. The attendance of the highest-level safety committee Includes at least the CE and the heads of functional areas.	Minutes show: meetings taking place; attendance; discussions; actions identified. Effectiveness of the SMS is being monitored, including: sufficient resources, actions taken and appropriate measures established.	Meetings include key stakeholders. The outcomes are documented and communicated and any actions are agreed, taken and followed up in a timely manner. The safety performance measures are reviewed and actioned as appropriate.

4.3 CAA inspection and monitoring

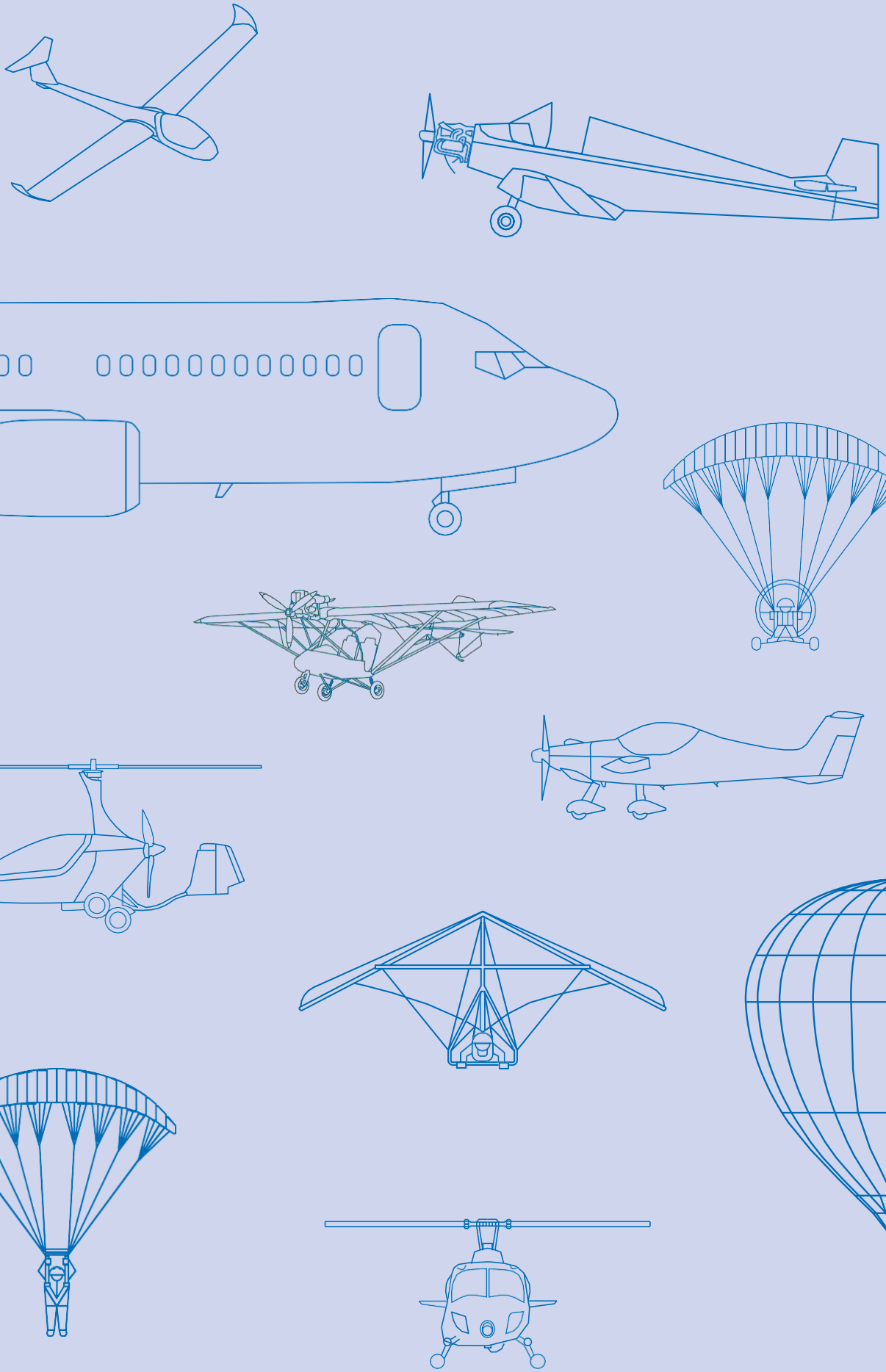
As a result of the inspection and monitoring process, CAA will be looking at the following areas for each participant:

- Is the organisation effectively employing its SMS processes?
- Is the organisation effectively monitoring and measuring their safety performance and SMS progress / effectiveness?
- Is the organisation effectively employing risk management?
- Have the outputs of SMS processes resulted in deficiencies being identified and addressed as well as meaningful safety improvements?
- What is the safety culture of the organisation?

Note: *The inspection and monitoring process will be applied in accordance with CAA policy on inspection and monitoring of safety performance.*

It is not intended that the SMS evaluation tool is used as a comprehensive, element-by-element "checklist". Rather, it is a tool to guide the inspector(s) and capture the effectiveness of those elements that have been evaluated during an inspection. The evaluation will be performed using a process audit approach, informed by various sources of risk and compliance information – as for current risk-based audit activities. This therefore provides a method and tool to:

- evaluate participant performance against a set of criteria and guidance
- record that evaluation, and
- report the results, both internally (to generate intelligence for CAA) and externally to the participant (to establish and promote meaningful engagement that focusses on important safety outcomes).



CIVIL AVIATION AUTHORITY OF NEW ZEALAND
Te Mana Rererangi Tūmatanui o Aotearoa

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