Civil Aviation Safety Authority
of Papua New Guinea

Advisory Circular

AC100-1

SAFETY MANAGEMENT SYSTEMS (SMS) AND QUALITY MANAGEMENT SYSTEMS (QMS) – THE FUNDAMENTALS.

Issue 3

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GENERAL

Civil Aviation Authority Advisory Circulars (AC) contain information about standards, practices and procedures that the Director has found to be an Acceptable Means of Compliance (AMC) with the associated rule.

An AMC is not intended to be the only means of compliance with a rule, and 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 Advisory Circular.

This Advisory Circular also includes Explanatory Material (EM) where it has been shown that further explanation is required. Explanatory Material must not be regarded as an acceptable means of compliance.

PURPOSE

This Advisory Circular provides methods, acceptable to the Director, for showing compliance with:

(1) Safety Management System (SMS) requirements of Part 100 Subpart B and Part 100 Appendix A; and

(2) Quality Management Systems (QMS) requirements of Part 100 Subpart C.

It also provides explanatory material to assist in showing compliance.

RELATED CAR

This AC relates specifically to Civil Aviation Rule Part 100.

CHANGE NOTICE

This AC replaces Issue 2 dated 01 July 2014.

TABLE OF CONTENTS

1. EM100 SUBPART B - BENEFITS OF SAFETY MANAGEMENT SYSTEMS (SMS)

1.1 The Safety Benefits of SMS Versus the Cost of an Accident

1.1.1 Those in business know a structured approach to safety management is something which complements and supports good management, engineering, and human factors practices. Some of the generally accepted benefits of an SMS include:

- a reduction in the direct cost of incidents, aircraft and component damage, aircraft recovery and lost time injuries
- a reduction in indirect costs such as insurance, legal action, business reputation etc.
- a reduction in some operating costs, by exposing inefficiencies in existing processes and systems. Integration with other internal or external management systems may also save on additional costs.

The Safety Management -International Collaboration Group (SM-ICG) released an excellent product titled “Determining the Value of SMS” which clarifies the steps needed for the safety professional to quantify and calculate return on investment of having an effective SMS.

SMS-ICG Products can be accessed on the below link:

http://www.skybrary.aero/index.php/Safety_Management_International_Collaboration_Group%20(SM_ICG).

1.1.2 **What Does an SMS Cost?** Yes, setting up and maintaining an SMS will have an associated cost depending on the size and complexity of your organisation, but an accident will cost far more – potentially your business. History shows organisations which have had fatal accidents often do not survive.

1.1.3 **Already Functioning SMS will cost less**. The cost of developing an SMS and ongoing annual operating expenditures will differ comparatively for small and medium sized airlines. These costs would be much less if an operator already has a functioning SMS. You need to weigh these costs against the direct and indirect costs of accidents and incidents. A small to medium-sized operator on a limited budget does not have to spend large amounts of money to improve its safety culture. In fact, implementing safety management programs will help to improve operational safety, reducing inefficiencies and leading to reduced operating costs. For a small maintenance organisation, this figure is likely to be halved.

1.1.4 **Cost of Not having an SMS.** “*If you think that a SMS is expensive, try an accident”*

Direct Costs: There are obvious, easily measured, on the-spot costs of incidents and accidents. These mostly relate to physical damage, and include things such as rectifying or replacing equipment, or compensating for property damage or injuries. For example, the direct cost of damage from a propeller strike on a light twin aircraft includes overhaul and engine strips.

As well as the direct costs from damage in the propeller strike on a light twin aircraft as mentioned above, indirect costs for aircraft cross hire, rescue and ferry activities could add up even further.

Indirect Costs: Indirect costs are usually higher than direct costs but are sometimes not as obvious and often delayed. Even a minor incident will incur a range of indirect costs. These costs include:

- loss of business and damage to the reputation of an organisation
- legal and damage claims
- increased insurance premiums
- loss of staff productivity
- recovery and clean-up
- cost of internal investigations
- loss of use of equipment
- cost of short-term replacement equipment.

1.1.5 **Strengthened safety culture** – An organization’s safety culture can be strengthened by making visible the commitment of management and actively involving personnel in the management of safety risk. When management actively endorses safety as a priority, it is typically well-received by personnel

and becomes part of normal operations.

1.1.6 **Documented, process-based approach to assure safety** – Establishes a clear and documented approach to achieving safe operations that is understandable by personnel and can be readily explained to others. In addition, clearly defining baseline performance allows controlled changes when continuously improving the safety programme/system, thereby helping the organization optimize resources required to implement change.

1.1.7 **Better understanding of safety-related interfaces and relationships** – The process of documenting and defining safety management interfaces can benefit the organization's understanding of the inter-process relationships, leading to an enhanced understanding of the end-to-end process and exposing opportunities for increased efficiencies.

1.1.8 **Enhanced early detection of safety hazards** – Improves the State/service provider's ability to detect emerging safety issues, which can prevent accidents and incidents through the proactive identification of hazards and management of safety risks.

1.1.9 **Safety data-driven decision-making** – Improves the State/service provider's ability to gather safety data for the purpose of safety analysis. With some strategic thinking to determine what questions need to be answered, the resulting safety information can aid decision makers, in near real-time, to make better-informed, valid decisions. An important aspect of this decision-making is the allocation of resources to areas of greater concern or need.

1.1.10 **Enhanced communication of safety** – Provides a common safety language throughout an organization and industry. A common safety language is a key enabler to the development of a common understanding of the organization's safety goals and accomplishments. In particular, it provides an appreciation for the organization's safety objectives and its safety performance indicators (SPIs) and safety performance targets (SPTs), which provide the direction and motivation for safety. Personnel will be more aware of the organization's performance and the progress being made toward achieving the defined safety objectives, as well as how they contribute to the organization's success. The common safety language enables service providers with multiple aviation businesses to aggregate safety information across organizational entities. It is necessary to support the management of interfaces across the aviation system.

1.1.11 **Evidence that safety is a priority –** Demonstrates how management supports and enables safety, how safety risks are identified and managed, and how safety performance is continually improved, resulting in increased confidence by the aviation community, internal and external to the organization. This also results in personnel who are confident about the organization's safety performance, which can lead to the increased attraction and retention of high calibre staff.

1.2 The Business Benefits of SMS – What's in it for me?

1.2.1 SMS is likely to produce several business benefits, the most obvious being a reduction in accidents and incidents, and in the longer term a reduced insurance rate. An effective SMS will also help to create a more positive working environment, resulting in better productivity and morale.

1.2.2 There are parallels between business, safety, and quality management. Business and safety management both involve goal setting, establishment of policies, measurement of performance and continuous improvement. However, a SMS goes beyond a business or quality management system (QMS) because it focuses on how people contribute to the safety outcomes of an organisation. Accordingly, SMS focuses on hazard identification, risk, and protection, while QMS focuses on products, services, and production. This people focus underlines the importance of integrating human factors and human performance in all parts of an SMS.

1.2.3 **Possible financial savings** – May allow for some service providers to qualify for a discount on their insurance premiums and/or a reduction to their workers' compensation premiums based on their SMS results.

1.2.4 **Improved efficiencies** – Possible reduction in the cost of operations by exposing inefficiencies in existing processes and systems. Integration with other internal or external management systems may also save on additional costs.

1.2.5 **Cost avoidance** – Through the proactive identification of hazards and safety risk management (SRM), the cost incurred due to accidents and incidents can be avoided. In such cases, direct costs may include: injuries; property damage; equipment repairs; and schedule delays. Indirect costs may include: legal action; loss of business and damaged reputation; surplus spares; tools and training; increased insurance premiums; loss of staff productivity; equipment recovery and clean-up; loss of use of equipment leading to short-term replacement equipment; and internal investigations.

1.3 An Overview of SMS in Papua New Guinea (PNG)

1.3.1 **Purpose of 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.

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.

PNG has mandated the SMS requirements of ICAO Annex 19 in Part 100 Subpart B SMS - Certification Requirements and Part 100 Appendix A.

1.3.2 **Components of SMS in Part 100 explained in detail in Advisory Circulars (ACs)**. Each of the ICAO Annex 19, four (4) Components and twelve (12) elements of SMS are further detailed in various Advisory Circulars (AC) shown in the table below. The ACs provide comprehensive and practical guidance on each of the 4 components and 12 elements. The below table provides a summary of this.

Part 100 Appendix A (ICAO Annex 19 SMS Framework ***4 Components***	**Part 100 Appendix A** (ICAO Annex 19 SMS Framework ***12 elements***	**Advisory Circular** (AC-100 Series) Guidance
1. Safety Policy and Objectives	1.1 Management Commitment	**AC 100-1A – SMS Safety Policy, Objectives and Resources: A Practical Guide.**
	1.2 Safety Accountability and Responsibilities	
	1.3 Appointment of key safety personnel	
	1.4 Coordination of emergency response planning	
	1.5 SMS Documentation	
2. Safety Risk Management	2.1 Hazard Identification	**AC 100-1B -SMS Safety Risk Management: A Practical Guide**
	2.2 Safety Risk Assessment and Mitigation	
3. Safety Assurance	3.1 Safety Performance monitoring and measurement	**AC 100-1C – SMS Safety Assurance: A Practical Guide**
	3.2 The Management of Change	
	3.3 Continual Improvement of SMS	
4. Safety Promotion	4.1 Training and Education	**AC 100-1D - SMS Safety Promotion: A Practical Guide**
	4.2 Safety Communication	

1.3.3 ICAO Annex 19 requires PNG to establish and implement an effective State Safety Programme (SSP) comprising of:

(1) an effective SMS implementation by all participants (regulated entities); and

(2) effective National Aviation Safety Plans, National Air Navigation Plans (eg. NASP, NANP, Vision

2050, etc) to manage safety enhancement initiatives (SEIs) focussing on the prevention of harm from our top eight (8) National High Risk category (N-HRC) occurrences:

- Controlled Flight Into Terrain (CFIT);
- Loss of Control Inflight (LOC-I)
- Mid-Air Collision (MAC)
- Runway excursion (RE)
- Runway incursion (RI)
- Turbulence encounters (TE)
- Abnormal Runway contact (ARC)
- System Malfunctions -Non Powerplant (SM-NP).

1.3.4 CASA PNG's State Safety Management system includes the following key components:

(1) Safety Policy & Objectives;
(2) Safety Risk Management;
(3) Safety Assurance;
(4) Safety Promotion;
(5) ICAO's Effective Implementation (EI) scoring of PNG under the ICAO continuous monitoring approach online framework (CMA-OLF) against ICAO's eight (8) critical elements (CEs);
(6) PNG National Aviation Safety Plan (3-yearly);
(7) PNG National Air Navigation Plans (NANP);
(8) Vision 2050; and other similar National Plans and initiatives.

1.3.5 CASA has five (5) safety oversight levers that allows PNG to enhance or adjust before N-HRCs could become harm:

(1) **Regulate** – set clear objectives, requirements and accountability for risk control. This includes setting the risk appetite for PNG by setting Acceptable Levels of Safety Performance (ALoSP);
(2) **Guide** -ensure consistent interpretation and decision across all areas of responsibility;
(3) **Approve** – control what enters the PNG Aviation Ball park; verify capability and limits;
(4) **Surveillance** – detect drift, emerging hazards and weak internal controls in real-time operations through on-going annual surveillance, audits and safety investigations;
(5) **Correct** – enhance oversight system, restore conformity and drive durable improvement.

1.3.6 CASA's five (5) safety oversight levers allows PNG to control and monitor safety performance, accountability and conformity in a closed loop system as illustrated in the figure below.

The below figure illustrates this:

1.4 PNG CAR Part 100 Subpart B - SMS Requirements mandated in PNG since 2011

1.4.1 PNG has established a solid foundation for the Aviation Industry to achieve effective safety management implementation when it first mandated the SMS requirements of ICAO Annex 19 since 2011.

The following aspects should be addressed as the first steps in implementing SMS requirements:

(1) **Senior management commitment**: It is essential that senior management is committed to effective safety management implementation.

(2) **Compliance with prescriptive requirements**: PNG ensures that a mature safety oversight system is in place for the licensing, certification, authorization and approval of individuals and organizations performing aviation activities in the PNG Aviation system, including qualified technical personnel. Service providers should ensure that they have processes in place to ensure continued compliance with the established prescriptive requirements.

(3) **Enforcement regime:** PNG has established an enforcement policy and frameworks to enable parties to manage and resolve safety issues.

(4) **Safety information protection:** PNG has put in place a protective legal framework to ensure the continued availability of safety data and safety information.

1.4.2 Description of the PNG Civil Aviation System: The life-cycle approach to regulating civil aviation is the philosophy that CASA has adopted with the introduction of the new civil aviation rules (CAR) framework in 2004. This characterizes the civil aviation system as a closed system, the boundary of which is established by the rules.

The life cycle approach recognises broadly three stages of participant involvement in the civil aviation system, viz. *entry*, *operation or participation*, and *exit*. The life cycle approach recognises broadly five stages of regulatory involvement, coinciding with the core regulatory functions of the CASA.

These are: (1) setting standards, (2) controlling entry, (3) surveillance of existing participants, (4) controlling exit, and (5) change analysis. These various stages are explained further in this section.

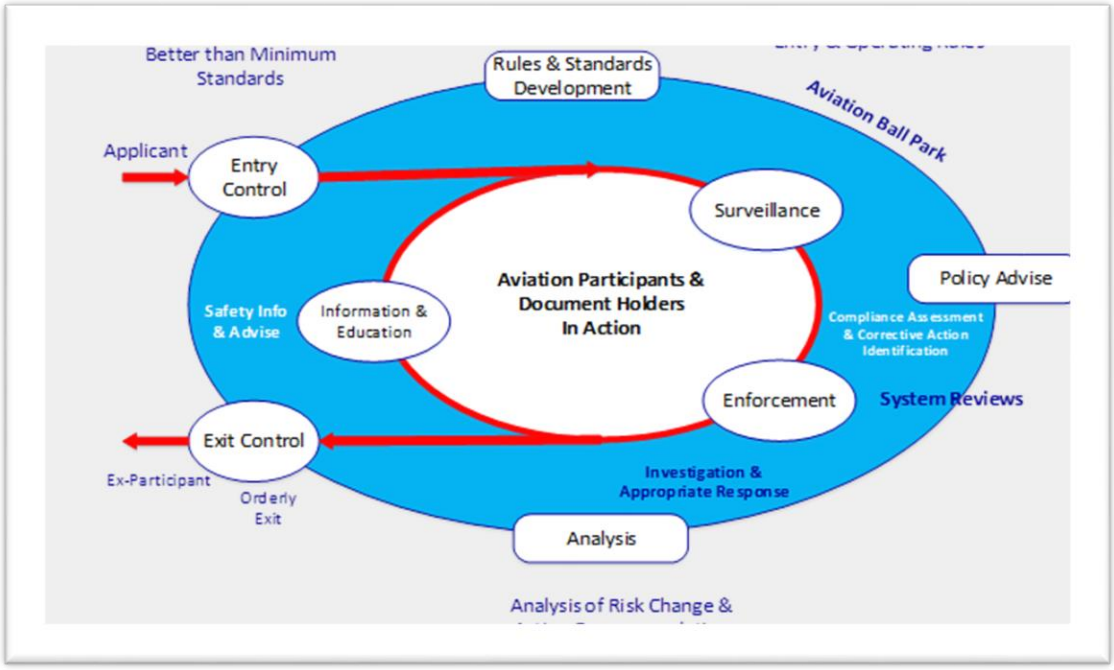

Figure 1: The diagram of Lifecycle Approach

1.4.3 ***Entry Control:*** Participants enter the civil aviation system after they have satisfied the minimum certification standards and are issued the relevant aviation document(s). While in the system they must continue to operate in compliance with these standards and the conditions of their documents. At intervals their adherence to standards is checked, and corrective actions are identified to bring performance up to the required standard.

1.4.4 ***Participants in action:*** Section 45(d) of the PNG Civil Aviation Act 2000 ("Act") places the responsibility for the safety of operations on aviation document holders, including organisations must ensure that they have:

- established and follow a safety management system that will ensure compliance with CAR Part 100;
- provide training and supervision to all employees to maintain compliance with CAR Part 100;
- provide sufficient resources to ensure compliance with CAR Part 100.

In return while operating within the civil aviation system the holder is able to exercise certain privileges that are vested in the aviation document.

1.4.5 ***Exit Control:*** Participants exit the system, either voluntarily by surrendering their documents or as the result of enforcement action by the Director to suspend or revoke the document. The CASA takes such exit actions in the interests of safety, when other regulatory tools have failed or are inappropriate.

1.5 PNG CAR Part 100 Subpart C - QMS Requirements mandated in PNG since 2011

The rule is self-explanatory.

Appendix A to this AC provides detailed guidance on the Establishment of a QMS and how this complements SMS.

1.6 Safety Culture

1.6.1 A safety culture within an organisation is generally thought to be a set of beliefs, norms, attitudes, or practices which reduce the exposure of all people in and around the organisation to conditions considered dangerous or hazardous. Safety culture can also be described as how people behave in relation to safety and risk when no one is watching.

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.

1.6.2 ICAO identifies it as an expression of how safety is perceived, valued, and prioritised by management and staff, and is reflected by the extent to which individuals are:

- aware of risks and hazards within the organisation
- continuously behaving to uphold and enhance safety
- able to access resources necessary for safe operations
- willing and able to adapt when facing safety issues
- willing to communicate safety issues
- consistently assessing safety related behaviours through the organisation.

1.6.3 ***Positive Safety Culture:*** In a positive safety culture, a shared concern for, commitment to, and accountability for safety is promoted. Positive safety culture features include managers and staff making decisions and taking actions to promote safety.
This is reinforced by:

- individuals and teams continually critiquing their behaviours and processes looking for opportunities to improve, and welcome critique from others
- management and staff sharing a common awareness of hazards and risks within the organisation and the need to manage risks
- individuals making decisions according to a common belief that safety is part of the way they do business
- individuals valuing being informed and informing others about safety
- individuals trusting their colleagues and managers with information about their experiences, and the reporting of errors and mistakes is encouraged to improve safety.

1.6.4 When management actively endorses safe practices, safety becomes embedded within the organisational culture and underpins the normal way of doing things. 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.

1.6.5 According to the James Reason model, there are five key ingredients or elements that make up a positive safety culture which is effective.

- **Learning culture**: The organisation must possess the willingness and the competence to draw the right conclusions from its safety information system and be willing to implement major reforms.
- **Informed culture**: Those who manage and operate the system have current knowledge about the human, technical, organisational, and environmental factors that determine the safety of the system.
- **Reporting culture**: An organisational climate exists in which people are prepared to report their errors and near-misses.
- **Just culture:** There is an atmosphere of trust. People are encouraged, even rewarded, for providing essential safety related information, but they are also clear about where the line must be drawn between acceptable and unacceptable behaviour.
- **Flexible culture:** The organisation can adapt in response to changing operating environments, including emergency scenarios. Having plans in place to manage change including shifting its structure to allow for ongoing effective performance indicates flexibility.

1.6.6 There is an inter-relationship between the above 5 elements, for example an informed culture relies on a good reporting culture, which in turns depends on a just culture. Overall, these safety culture elements combine to create a culture of trust, helping the organisation to manage and improve its safety performance. If this culture of trust is missing staff do not feel supported or encouraged to report accidents, incidents, or near misses. Without this information an organisation cannot be aware of its hazards nor manage its risks to ensure the safety of operations.

1.6.7 **Benefits of an effective safety culture:** An effective safety culture not only helps to meet your moral and legal obligations, such as providing a safe work environment for employees, but also has other benefits, including:

- ***Return on investment:*** A positive safety culture provides a much greater control over losses. In turn, this allows your organisation to operate in inherently risky environments where the return on investment is the greatest.
- ***Trust:*** A positive safety culture will generate trust on the part of other customers and other aviation organisations, potentially generating more business through alliances.
- ***Improved audits:*** A positive safety culture will welcome audits as an important source of external information and confirmation about how well your organisation is performing.

1.6.8 There is a strong relationship between safety culture and a safety management system. An SMS consists of several defined minimum standards. However, standards are just words on paper. As Professor Patrick Hudson says:

'Sound systems, practices and procedures are not adequate if merely practised mechanically. They require an effective safety culture to flourish. Improvements in safety culture are needed to move off the plateau of performance.'

1.6.9 While safety culture can be considered like the oil that lubricates the engine parts (elements of the SMS), ultimately, safety culture is the link between behaviour (errors and violations) and the effectiveness of the SMS. An SMS will not be effective unless there is a positive safety culture, which in turn determines how your people will contribute to the SMS and what they think about it.

2. EM100 SUBPART B - ICAO FRAMEWORK FOR SMS (4 COMPONENTS AND 12 ELEMENTS)

2.1 Safety Policy, Objectives and Resources (Component 1)

2.1.1 **Safety Policy:** A safety policy outlines what your organisation will do to manage safety. Your policy is a reminder of 'how we do business around here'. Safety policy statements typically include:

- the overall safety objectives of the organisation
- the commitment of senior management to provide the resources necessary for effective safety management
- a statement regarding responsibility and accountability for safety at all levels of the organisation
- management's explicit support of a 'positive safety culture', as part of the overall safety culture of the organisation.

2.1.2 **Safety Objectives:** The safety objectives should state an intended safety outcome, that is, what you are going to do. These objectives may be expressed in terms of short-, medium- and long-term safety goals. To be able to measure the effectiveness of operational safety objectives, they should be SMART: specific, measurable, achievable, and relevant; and have a specified timeframe within which they are to be achieved. For more information about safety policy and objectives, see booklet 2 in this kit.

PNG Advisory Circular AC 100-1A provides further Guidance on Safety Policy, Objective and Resources.

2.2 Safety Risk Management (Component 2)

2.2.1 Risk management is a key component of an SMS and involves two fundamental safety activities:

- identifying hazards
- assessing risks and mitigating their potential to cause harm.

To determine what controls you use to mitigate risk, you apply the 'as low as reasonably practicable' (ALARP) principle. However, while it has been used for some time in risk mitigation, there are limitations to the ALARP principle.

Risk management is simply a careful examination of what could cause harm, so that you can weigh up whether you have taken enough precautions or should do more to prevent harm.

2.2.2 **Identifying Hazards:** A hazard is anything which may cause harm to people, or damage to aircraft, equipment, or structures. Examples of aviation hazards are bad weather, mountainous terrain, wildlife activity near an aerodrome, contaminated fuel, poor workshop lighting and fatigue. You have to identify and manage organisational hazards, so they do not compromise the safety of your operation.

Generally, the hazard exists now, while the risk associated with that hazard might occur in the future. Several ibis birds at the landfill centre adjacent to the aerodrome is a present hazard. The future risk is that if they are involved in a bird strike, they could cause engine failure and an aircraft accident.

2.2.3 **Risk** is the probability or likelihood, that somebody could be harmed by various hazards, together with an indication of how serious the consequence or the harm could be. Don't overcomplicate the process. Many aviation organisations know their hazards well and the necessary control measures are easy to apply. If you run a small organisation and you are confident you understand what is involved, you can do the assessment yourself. Risk management is fundamental to safety management and involves some essential steps, as shown in the figure below.

PNG Advisory Circular AC 100-1B provides further Guidance on Safety Risk Management.

2.3 Safety Assurance (Component 3)

2.3.1 Safety assurance involves establishing a systematic process for assessing and recording an organisation's safety performance. This includes activities such as internal audits, safety investigations, management of change, monitoring, analysis, and continuous improvement.

2.3.2 **Safety Performance Indicators**: Safety performance indicators (SPIs) are metrics or parameters that provide information relating to your safety objectives and are a reference point for your safety data collection. SPIs are an essential component of data-driven decision-making and measure the achievement of your safety objectives. In addition, they provide a measure of the integrity and effectiveness of SMS processes and activities.

Initially SPIs may be developed using limited sources of safety information. Identifying key SPIs that are relevant or harmonised across the aviation industry can be a good starting point for developing your SPIs. Later more safety data will be available and the organisation's safety analysis capabilities will likely mature. As this happens you should consider refining the scope of your SPIs to better align with your safety objectives.

The ICAO indicator catalogue provides a framework for a harmonised approach to the development of SPIs and can be used to assist organisations in identify key indicators relevant to aviation safety. These can address objectives at an individual organisational level and assist with organisations addressing State Safety Programme (SSP) considerations.

Examples of some ICAO Indicators is shown in the table below.

Indicator	Rational	Indicator Type
Number of traffic collision avoidance system (TCAS) events by advisory type. (Advisory types include resolution advisories or traffic advisories)	TCAS alerts indicate potential loss of separation and the risk of mid-air collision.	Reactive or lagging
Number of accidents by operation type, occurrence category risk category and injury level	Number of accidents is an overall indicator of safety performance	Reactive or lagging
Accident rate by operation type and occurrence category	The accident rate is an overall indicator of safety performance	Reactive or lagging
Long landings: the percentage of landings over 1000 feet from threshold	This indicator helps measure the risk of runway safety occurrences	Reactive or lagging
Ratio of finding per ramp inspection	Findings raised during a ramp inspection indicate a safety concern. Since more inspections would be expected to generate more findings, therefore, a ratio of findings	Predictive or leading

	(instead of just the number of inspections) would be a more appropriate indicator for comparison.	
Runway inspections by finding category and inspection period	Inspections are important as they allow early detection of non-compliances. The indicator helps assess the effective implementation of runway inspections schedule within the organisation.	Predictive or leading

2.3.3 **Safety Investigations:** Investigating incidents and accidents in a structured way is fundamental to an effective SMS. If you do not investigate incidents thoroughly, you cannot learn from them, and therefore will miss opportunities to identify risks to your operation. James Reason has formulated one of the most widely accepted and respected theories of how and why accidents happen.

Reason says accidents have multiple causes and involve many people operating at different levels of an organisation. After Reason's ground-breaking work, it is now generally accepted that accidents do not result from a single cause but are due to multiple contributing factors.

PNG Advisory Circular AC 100-1C provides further Guidance on Safety Assurance.

2.4 Safety Promotion (Component 4)

2.4.1 Under the ICAO SMS structure, safety promotion is divided into two elements:

(1) safety communication

(2) safety training and education.

Effective safety promotion fosters awareness and understanding of an SMS throughout the organisation, helping to create a positive safety culture. Safety training provides skills and knowledge, as well as raising awareness of risk issues. Safety communication sets the tone for individual behaviour, giving a sense of purpose to safety efforts. You need strong lines of communication at all stages of your SMS implementation. Maintaining your SMS requires ongoing communication, from reporting to raising awareness of safety issues. Both activities help the organisation to adopt a culture that goes beyond merely avoiding accidents or reducing the number of incidents. It becomes more about doing the right thing at the right time in response to both normal and non-normal or emergency situations. Safety communications and training help to foster safety best practice.

PNG Advisory Circular AC 100-1D provides further Guidance on Safety Promotion.

3. EM100 SUBPART B - SMS SELF-EVALUATION TOOL

3.1 SMS Evaluation Tool

While the SMS framework components can be tailored to an organisation's size and complexity, the framework is a standardised common approach to safety management across all aviation domains. The Safety Management International Collaboration Group (SM ICG) developed an SMS Evaluation Tool, in direct compliment to this common approach. The tool evaluates the overall effectiveness of an organisation's SMS, as a function of both compliance and performance, through a series of indicators based on the ICAO SMS framework. CASA PNG has adapted this tool and provided this in AC 100-1A, AC 100-1B, AC 100-1C and AC 10-1D, as a self-assessment tool for each of the four (4) components and twelve (12) elements of SMS.

Each indicator can be reviewed by an organisation to assist in evaluating the extent to which it is Present, Suitable, Operating and Effective, using the guidance provided against each SMS component.

This concept of evaluating SMS effectiveness supports the move from traditional, compliance-based oversight to performance-based oversight focusing on how the SMS is performing. It provides a common baseline for SMS effectiveness evaluation that creates a sound basis for mutual acceptance of SMS.

The SM ICG SMS Evaluation Tool has been adopted and integrated into the PNG aviation system by CASA as a useful tool for aviation organisations to use to evaluate their SMS from commencement through to continuous improvement.

3.2 Present Suitable Operating Effective (PSOE)

When evaluating SMS components and elements, indicators are assessed using the PSOE principles. Allowing organisations to evaluate the individual indicators to determine if they are present, suitable, operating and effective.

PRESENT	There is evidence that the relevant indicator is documented within the organisation's SMS documentation.
SUITABLE	The relevant indicator is suitable based on the size, nature, and complexity of the organisation and the inherent risk in its activity.
OPERATING	There is evidence that the relevant indicator is in use and an output is being produced.
EFFECTIVE	There is evidence that the relevant indicator is achieving the desired outcome and has a positive safety impact.

When starting out on your SMS journey the indicators will be mainly evaluated as meeting the present and suitable classifications. However, as your SMS starts to become fully functional you would start to be meeting, or aiming to achieve, the operating and effective classifications.

Due to the continuously changing and dynamic nature of aviation, during ongoing and subsequent evaluations, the suitable designation should be constantly re-evaluated, considering any changes to the organisation, its activities and operating environment.

An item cannot be considered operating or effective if it is not present and it cannot be considered as present if it is not documented, documentation ensures consistent repeatable and systematic outcomes.

4. EM100 SUBPART B - HUMAN PERFORMANCE (HP) CONSIDERATIONS IN AN EFFECTIVE SMS

4.1 Human Performance

Human performance (HP) refers to **how** people perform a task and represents the human contribution to system performance. Human performance is about the actions and decisions made in an aviation activity. Human performance focuses on how individuals or teams perform their work in the aviation system. Human performance provides needed flexibility and adaptability in operational systems, making human performance a valuable part of any aviation system.

4.2 Human Factors

Human Factors (HF) explains **why** people do things the way they do and makes use of that knowledge to optimize human performance. Human Factors is an applied science concerned with the application of what we know about human beings, their abilities, characteristics, and limitations[1] to their interactions in and with the world around them. Ergonomics is a subset of Human Factors and is primarily concerned with the physical function of the user equipment and environment in which work is performed. Human Factors includes anything that affects human performance.

4.3 Relationship between the two terms: HP and HF

Before we consider human performance issues involved in an SMS, we need to clearly understand the terminology. The terms human performance, Human Factors, and ergonomics are sometimes confused and often used interchangeably. Although they are closely linked, they are different.

We often see human performance as an observation or description of the actions and decisions of the person within the system, whereas the application of Human Factors provides an explanation of that human performance in the system. Human Factors also tells us how to design and improve the system to optimize human performance.

[1] ICAO Doc 10151, Human Performance (HP) Manual for Regulators

4.4 ICAO's Five Human Performance Principles

According to ICAO there are 5 principles that apply to human performance[2] (HP). Knowing and applying these principles helps us shape, improve, and optimize safety performance at all levels of an aviation system.

The below Table identifies the 5 HP principles and offers some corresponding questions to help you apply the principles in an operational context. Please note that the questions listed are for illustrative purposes and are not exhaustive.

Principle	In Practice
Principle 1: People's performance is shaped by their capabilities and limitations	• Are people trained so they can perform their duties competently? • Are people hired with the qualifications and experience we need? • Are people maintaining their competencies and currency with the programs we have? • Are people working with an optimal level of workload most of the time? • Are people's capabilities and limitations such as their vision, hearing, size and other individual characteristics understood and considered when developing tasks and procedures?
Principle 2: People interpret situations differently and perform in ways that make sense to them	• Did the actions and assessments of the people involved make sense at the time given the conditions and circumstances present during an event? • Are we working to detect drift in practices from procedures? • What knowledge and skills do people need to perform their work? • Are there cultural norms, beliefs and values influencing people's performance? • Are people learning from their experiences through the safety risk management process?
Principle 3: People adapt to meet the demands of a complex and dynamic work environment	• Do leaders appreciate that adaptation is necessary in an operational setting, and should be managed, underpinned by consideration of human performance? • What pressures and demands of work goals are driving the actions and decisions of our people? • When people 'find a way' – for better or worse, how do we learn from the experience? • When we implement a change, what steps do we take to manage it?
Principle 4: People assess risks and make trade-offs	• What activities and decisions are too risky and are people supported to stop or pause a flight or task? • What actions and decisions are beyond the risk acceptance of our organisation? • Do operational personnel know about the threats and hazards in their day-to-day work and how to manage them? • Do we provide adequate risk assessment tools and training so that operational personnel can make good decisions? • Are people adapting and drifting away from how we want the work to be done? What are we doing to understand why?
Principle 5: People's performance is influenced by working with other people, technology, and the environment	• Are people working in ways that are aligned with our culture, policies and procedures? • Are peers influencing safe or unsafe practices? • Are we learning from our safety risk management and safety assurance processes?

[2] ICAO Doc 10151, Human Performance (HP) Manual for Regulators

Principle	In Practice
	• Do we have problems keeping people in our organisation? • Are any of our people struggling with personal issues that are negatively affecting their work performance? • Do managers take an interest in their employees at an individual level - do they try to understand and truly appreciate each person doing the work and take this into consideration when allocating tasks? • Are our work processes harnessing the benefits of automation and computerized processes? Is there more we can do to be safe and efficient? • Are there any ergonomic issues that need to be addressed in our aircraft, in our hangars, in our control towers, our offices, etc.?

4.5 Human Performance in SMS

Integrating human performance considerations is essential to the success of any Safety Management System (SMS), as it directly influences safety outcomes across all levels of aviation operations. Every aspect of the global aviation system—whether designed, constructed, maintained, authorized, or managed—involves people. Understanding how human capabilities, limitations, and behaviours interact with the system enables organisations to develop strategies that enhance performance while managing error.

Historically, aviation safety was seen as being compromised mainly by human weaknesses and unreliability, with individual errors viewed as the primary source of failure in an otherwise safe system. More recently, the approach to improving human performance, guided by the 5 HP principles, reflects a shift from focusing solely on individual errors to recognising the positive contributions people make to safety, resilience, and efficiency. Individuals often adapt to interruptions and disturbances—such as severe weather or mechanical failures—ensuring the system continues to function effectively.

Modern SMS practices must recognise the importance of assessing human contributions not only when things go wrong, but also when they go right. This includes understanding why actions made sense to individuals at the time, given the conditions and circumstances. By acknowledging that people can be both the source of and solution to safety risks, organisations can better support safe and effective operations.

ICAO Annex 19 stresses the importance of embedding the 5 HP principles into safety management processes. We can accomplish this by, for example:

- Identifying potential threats to human performance;
- Designing operational tasks, procedures, equipment, and environments that respect human capabilities and limitations; and
- Fostering a culture that encourages open communication and reporting through learning from past events.

To manage human performance in the aviation system effectively, organisations need:

- Clearly documented individual safety management responsibilities;
- A positive safety culture including processes and procedures to encourage open hazard and occurrence reporting;
- Management of change processes that consider evolving tasks and the broader impact of changes at the individual level;
- Robust training programs;
- Fatigue management strategies; and
- Decision-making tools to support personnel under stress or uncertainty.

Incorporating human performance considerations into the SMS helps us identify related safety trends, offering insights that drive continuous safety improvements. It is important that safety data and information are analysed to recognise those risks related to variable human performance and human limitations. Particular attention should also be made to understanding factors at the operational and organisational level. People contribute both positively and negatively to aviation safety. Ultimately, maintaining a focus on human performance ensures that SMS are comprehensive, effective, and aligned with the overarching goal of maintaining and enhancing aviation safety.

4.6 Human Performance Considerations in designing Safety Policy and Objectives (Component 1)

To address the way that your organisation influences human performance there must be senior level management support[3] to implement effective safety management. For example, a workplace with a positive safety culture is where safe and professional practices are not only expected normal behaviours but are routinely reinforced and supported by management, even when there are considerable time and customer pressures present. In this type of organisation, personnel will tend to 'do it by the book' and take the time to ensure appropriate work practices, inspections, cross-checks, and signoffs are carried out. In this case, the organisation's positive safety culture has influenced human performance. If, however, management overlooks routine shortcuts and workarounds taking place to enable quicker turnarounds and faster task completion, a 'near enough is good enough' attitude will prevail. This could ultimately result in the acceptance of lower standards of work and degraded safety performance.

Your safety policy and objectives should capture human performance considerations. Policies, processes, and procedures should be clear, concise and workable, with the aim of[4]:

- Understanding and applying knowledge about human capabilities and limitations;
- Acknowledging that making mistakes is human;
- Identifying threats and managing errors;
- Improving human performance;
- Enabling human resilience and contributions to safety;
- Reducing the unwanted consequences of variability in human performance; and
- Harnessing the benefits of adaptable and flexible human performance.

A documented safety policy that identifies and promotes positive safety behaviours is only the first step to human performance integration within your safety culture.

The second step is for leadership and management to consistently demonstrate their commitment to safety, aligning their own behaviour with stated values and priorities and providing overt support for people who demonstrate positive safety behaviours and performance. Senior leadership must show a clear commitment to enhancing human performance for all personnel, contractors, and stakeholders involved in operations. It is critical that employees know they can provide feedback to management without fear of retribution. A 'just-culture' foundation is essential to identify trends, learn from past events, inform policies and objectives, and clearly define acceptable and unacceptable performance within the operations.

Setting safety objectives should be a dynamic exercise. Safety objectives must be shaped not just by feedback and your organisational goals but also considering the 5 HP principles and the promotion of a positive, people-focused, safety culture.

4.7 Human Performance Considerations in Safety Risk Management (Component 2)

General Considerations: When identifying hazards, assessing safety risk, and implementing risk controls, it is important to consider the hazards that interact with human performance and how well human-centred risk controls work. For example, a well-trained pilot would be considered part of the effective risk controls for mitigation of runway excursion but is likely to be less effective where the pilot is impaired to any degree.

Critical to understanding human performance in risk management is the collection and analysis of safety data. This can be collected from various sources, including mandatory and voluntary safety reports or investigations. Analysis should focus on both what went wrong and what went right, including why actions made sense to the respective individuals at the time. Analysing safety data represents an important opportunity to examine the interactions between the human and other system components. Some key human performance considerations for safety reporting and data analysis include:

- Is there a positive safety culture including a clear non-punitive safety reporting policy endorsed and demonstrated by senior management?
- Is the reporting process simple and user-friendly?

[3] ICAO Annex 19 - Management Commitment is the first element within the Safety Policy and Objectives pillar.

[4] ICAO Doc 9859, Safety Management Manual

- Do people understand what to report and how?

Hazard Identification: Considering human performance is critical to effective hazard identification. This requires moving beyond simply labelling incidents as 'human error' and instead conducting deeper analysis of contributing factors. Some questions to ask in relation to hazard management and human performance include:

- Are the human performance issues involved with hazards clearly understood by your safety and management teams?
- Are workplace or organisational factors that increase the error potential for hazards, such as high workload, distractions or inadequate equipment availability or design, considered?
- Is there a standard process to investigate and analyse human performance issues?

As part of the risk assessment processes it is important to understand that not all controls will be effective to manage all human performance considerations.

When developing controls to manage human performance risks, it is important to understand the underlying factors that negatively impact human performance and ways to improve human performance.

Some examples of risk controls associated with human performance include[5]:

- **Fatigue Management:** Fatigue can significantly impair performance. Effective management includes policies to ensure fatigue contributing factors are recognised and included in the design of work practices and rosters, regulated work hours, rest periods, education, monitoring for signs of fatigue, and responsibilities for fatigue risk management.
- **Training:** Continuous training keeps personnel up to date with the latest procedures and technologies and helps maintain their competence in performing their duties.
- **Communication:** Clear and effective communication is essential to avoid misunderstandings that could lead to human performance errors. This includes both verbal and non-verbal communication.
- **Stress and Workload Management:** High-stress levels, including time pressure, can negatively impact decision-making and human performance.
- **Human-Centred Design:** Designing equipment and systems that are intuitive and user-friendly can improve human performance.
- **Teamwork and Collaboration:** Effective teamwork and collaboration among all aviation personnel are essential for safe and efficient operations. Peer pressure and self-esteem may cause both positive and negative impacts on their safety behaviours.
- **Practicing a Just Culture:** The protection to report safety-related concerns, hazards and events, non-punitive error reporting, trust and mutual respect, encouragement of participation, and reduction of authority gradients are essential elements to support human role in positive safety culture and psychological safety.
- **Task, Job, and Procedure Design:** Identifying tasks or jobs that are more prone to human performance limitations and variability. Then, designing procedures that are standardized, for easy comprehension and practical applications and address the areas of identified human performance risks. Ensuring critical job roles have backup to avoid over-reliance on specific individuals (redundancy). Then, reinforcing the importance of the stringent use of procedures and checklists to reduce reliance on memory processes.

Identifying hazards and assessing the risks related to human performance in aviation systems is challenging because the system is complex. Human performance is influenced by context and is highly adaptable. This adaptability is critical for the safe functioning of the aviation system. There are a wide range of internal and external influences on people that interact in different ways. This makes it challenging to predict how these influences will impact human performance. The performance of people and the systems they operate in will depend on the many conditions involved including the task being performed, the tools and equipment being used, the environment, and the context.

Knowledge of Human Factors can help you to identify hazards and assess safety risks in this challenging environment. A systematic approach that combines qualitative and quantitative methods is the most effective, that goes beyond just identifying what happened and asking why it happened. That is identifying and understanding the contributing factors and what organisational and work-related conditions are more likely to negatively impact human performance.

[5] https://www.icao.int/safety/OPS/OPS-Normal/Pages/HP.aspx

4.8 Human Performance Considerations in Safety Assurance (Component 3)

Safety Performance Monitoring and Management

The adaptability and variability of human performance in aviation usually makes evaluating the associated risks more challenging than assessing risks from technology and the environment.

Safety data systems are designed to track outcomes, for example: technical failures, runway incidents, and unstable approaches. To understand how human performance is influenced and impacted by the circumstances and conditions involved in these occurrences and why these outcomes happened, we need to collect, analyse, and monitor human performance data along with its context.

Safety performance indicators can help you monitor and measure how well your SMS is achieving positive human performance contributions and outcomes. For example:

Occurrences: Monitoring the patterns in safety occurrences that involve a Human Factors element (positive or negative) helps assess and manage the associated risk. Tracking trends and patterns using taxonomies that respect the 5 HP principles (but are not limited to them).

Normal Operations: Monitoring normal operations for best practices and procedural drift can provide safety performance information. In some cases, procedures may need to be modified, training enhanced, or design improved.

Training: Human Factors training (initial and recurrent) is critical. Examples include Human Factors, Crew Resource Management, and Threat and Error Management training. Monitoring the number of eligible personnel who have completed the training should provide a leading measure of the effectiveness of your Human Factors training policy.

Continuous Improvement – Data driven decision making

Analysing safety performance indicators and using a feedback loop to make data-driven decisions will drive continuous improvement. Systematically collecting and analysing safety data related to human performance allows organisations to identify trends, assess gaps, and take proactive steps to address emerging risks.

Some examples of data to evaluate the effectiveness of risk controls associated with human performance include:

- **Fatigue Management:** Fatigue-related occurrence reports, self-reporting fitness for duty issues due to fatigue, flight duty time exceedances
- **Training:** Performance observations from operational training
- **Communication:** Safety report descriptions of breakdowns in communication and alternatively when communication prevented a situation from worsening or recovered a situation
- **User-Centred Design:** Design feedback or hazard report detailing an aspect of human performance associated with a new or changed design
- **Teamwork and Collaboration:** Situations of interpersonal conflict or breakdowns in teams or alternatively data regarding crew resource management and threat and error management

Change Management

Change is an inevitable part of progress. The global aviation system is introducing change on an almost continual basis, and individual organisations follow suit to adapt. These changes offer potential for improvement but also come with safety risks that must be managed. The most common change drivers include:

- Technological Evolution
- Process Reviews
- Crisis
- Consumer Habit Changes
- Organisational Restructuring

Change management is a collective term for all approaches to prepare, support, and help individuals, teams, and organisations to make organisational or operational change. There are various change management models available to organisations. Some examples include the Awareness, Desire, Knowledge, Ability and Reinforcement (ADKAR) Model, Kotter's 8 Step, or the McKinsey 7-S frameworks which are all designed to assist with and formalise the adoption of change.

Change management should always consider human performance. While many change management models

exist, they all include stakeholder identification and management. Prior to implementing a change, a change management process should be used to ensure the desired outcomes are achieved without compromising safety performance.

Here is a 7-step change management process[6]:

(1) Define the Change
(2) Identify Key Stakeholders
(3) Align Change with Relevant Plans
(4) Assess the Change
(5) Develop and Implement an Action Plan
(6) Continuous Monitoring
(7) Review the Change

Integrating the 5 Human Performance (HP) principles into your change management process enhances both the effectiveness of implementation and the focus on safety. Change management inherently involves multiple human performance considerations, including cultural dynamics, leadership styles, resistance to change, levels of commitment, and communication strategies.

It is important to assess human performance risks and opportunities not only resulting from the change itself but also emerging during its planning and implementation. Key questions to consider include:

- Does the change alter how tasks are performed or how people interact within the organisation?
- Does it require new knowledge, skills, or the processing of unfamiliar information?
- Does it introduce new technology or automation?
- Is the change occurring alongside other changes?

If the answer to any of these is yes, additional human performance risks must be addressed as part of the change risk assessment. A proactive approach to these considerations supports safer, more resilient, and more successful change outcomes.

4.9 Human Performance Considerations in Safety Promotion (Component 4)

In a safety management system (SMS), the **promotion component** refers to the activities, strategies, and processes through which a positive safety culture is encouraged, recognized, and advanced within an organisation. Human performance plays a significant role in this component, as it directly influences how safety behaviours, attitudes, and practices are fostered and sustained across the workforce. The effects of human performance in the promotion component of an SMS can be understood through several key areas.

Culture:

Human performance influences safety culture. When personnel at all levels are motivated, engaged, and understand the importance of safety, they are more likely to adopt and promote safe behaviours. Positive human performance is influenced by the following:

- **Leadership Commitment**: Managers and supervisors who prioritize safety through clear communication, visible support for safety initiatives, and a commitment to continuous improvement can drive a culture of safety. Employees who see safety promoted through leadership will be more likely to embrace and promote safety practices themselves.
- **Peer Influence**: Workers are often influenced by the behaviour of their peers. If safety-conscious employees are recognized and promoted, they set an example for others.
- **Presence of Just Culture**[7]: Fostering an environment where employees can openly share safety concerns or near-miss reports without fear of reprisal is critical to establishing a fully engaged safety

[6] SM ICG, Change Management at the State Level (2022)

[7] "Roadmap to a Just Culture: Enhancing the Safety Environment," GAIN Working Group E, (2004): https://flightsafety.org/files/just_culture.pdf

"A Roadmap to a Just Culture: Enhancing the Safety Environment," *Flight Safety Digest* (2005): 1-34, https://skybrary.aero/sites/default/files/bookshelf/6121.pdf

culture. Reporting positive actions and contributions can contribute to the overall learning within an organization.

Training and Skill Development

Training is a key element in the promotion of the organisation's SMS. Human performance directly impacts how individuals understand and apply safety protocols, risk management techniques, and emergency procedures.

Not only do people need to be trained and competent to perform their roles but they should also be trained to understand human performance aspects of safety. Human performance training is a key element of SMS integration. Knowledge and awareness of the 5 HP principles help shape, improve, and optimize human performance within the aviation system.

- **Competency and Confidence**: Effective training programs that cater to human learning styles and provide realistic, scenario-based simulations improve knowledge and practical competence. This helps employees to react appropriately in safety-critical situations.
- **Adaptability and Continuous Improvement**: Human performance can vary due to conditions such as fatigue, stress, or distractions and it adapts to the procedures, processes, and systems in our organisations. One crucial aspect that safety promotion addresses is ongoing skill development and knowledge retention. This could involve refresher training, scenario-based drills, or feedback mechanisms to ensure knowledge retention and skill improvement derived from learning from the SMS outputs.

Feedback mechanisms and Recognition

Feedback systems are often used to encourage positive behaviours and correct unsafe practices. How you evaluate and respond to human performance can shape future behaviour.

- **Positive Reinforcement**: Recognizing and rewarding safe practices or improvements in safety behaviours enhances motivation and promotes further positive human performance. Incentives, acknowledgment, or career advancement tied to safety achievements reinforce the importance of safe practices.
- **Constructive Feedback**: When human performance does not align with safety expectations, feedback that is corrective, but supportive helps employees understand what went wrong and how to improve. This promotes a learning environment rather than one of blame, leading to continuous improvement in performance.

Employee engagement and Ownership of Safety

Human performance in the promotion of safety also involves engaging employees in the SMS process. Workers who feel ownership over safety are more likely to contribute positively to safety outcomes.

- **Empowerment and Involvement**: When employees are encouraged to participate in safety audits, safety meetings, or hazard identification processes, they take an active role in promoting safety. Human performance can be enhanced when individuals feel empowered to take responsibility for their own safety and the safety of others.
- **Communication**: Effective communication channels are essential for promoting safety. Human performance affects how well information about hazards, safety procedures, and lessons learned is communicated across the organisation.

Human performance has a profound effect on the promotion component of an aviation SMS. It influences the development of a safety culture, the effectiveness of training programs, the success of feedback systems, and the engagement of employees in safety activities. By focusing on the Human Factors conditions that drive safe behaviour and ensuring that human performance is actively considered and managed, an aviation organisation can significantly enhance its overall safety outcomes.

5. EM100 SUBPART C - ESTABLISHING A QUALITY MANAGEMENT SYSTEM

EM100.101 Establishing a Quality Management System

An inherent component of a Safety Management System is an internal quality assurance system. All Civil Aviation Rule Parts for the certification of organizations state that an organization is entitled to a certificate if it

meets the requirements of Part 100. One of those requirements is that an applicant must establish an internal quality assurance system to ensure compliance with the requirements of Part 100 Subpart C.

Objectives and Strategy: Objectives and strategies of the quality assurance system should be documented in the exposition to ensure all personnel know what the system is trying to achieve and how the organization will go about reaching those achievements.

This understanding equips personnel to apply quality assurance procedures and participate in quality assurance programme in an informed way.

Objectives would typically include—

(a) To give effect to the safety policy through a total commitment of management and staff to quality

(b) Transparent, objective evidence of compliance with all regulatory requirements

(c) The needs and expectations of clients met through on time delivery of passengers and freight

(d) The operation of aircraft which are defect free and able to attain the highest possible levels of reliability

(e) Achievement of company financial targets through effective use of skilled and motivated staff in a safe and efficient working environment

(f) A professional company image

Strategies would typically include—

(a) Planned and systematic continuous quality improvement

(b) Development and implementation of processes and systems to consistently ensure required actions are completed on time

(c) Sound recording practices to provide traceability and accountability

(d) Identification of required work skills and provision of training to meet needs

(e) Integration of the quality assurance system with company strategic planning

(f) Adherence to documented procedures

(g) A planned programme of internal assessment which continually evaluates the effectiveness of the quality assurance system

Objectives and strategies should be contained in the quality assurance section of the exposition, generally ahead of detailed procedures and programmes.

Internal quality assurance procedures will identify, document and correct instances of non-conformance, or non-compliance. These procedures must be put in place for all areas of the organization's activities that are covered by the rules. Internal quality assurance procedures, as well as providing confidence in the organization meeting regulatory compliance, can improve the organization's commercial performance and should be of benefit to both the organization and its customers.

To provide a sound basis for the internal quality assurance system, specific elements of the safety management system are explicitly called up in each Part under the requirements for internal quality assurance.

These include a safety policy and procedures to ensure the safety policy and the quality system objectives and strategies are understood at all levels of the organization. Standards for an internal quality assurance system are described in detail further on in this AC.

Organizations certificated under Civil Aviation Rules are required to have an internal quality assurance system which should include the following essential elements—

(a) a **Senior Person** responsible directly to the Chief Executive for the internal quality assurance system; and

(b) a documented **safety policy** issued by the Chief Executive; and

(c) documented **objectives and strategies** of the quality assurance system; and

(d) **procedures** for ensuring the safety policy and quality assurance system objectives and strategies are **understood** throughout the organisation; and

(e) **quality indicators**, including defect and incident reports, and personnel and customer feedback, and procedures to monitor these indicators to identify existing problems or potential causes of problems within the system; and

(f) a procedure for **corrective action** to ensure that the cause of a detected non-compliance or non-conformity within the system are corrected, and;

(g) a procedure for **preventative action** to ensure that the cause of a potential non-compliance or non-

conformity that have been identified within the system are corrected; and

(h) a procedure for **occurrence investigations** conducted in accordance with Part 12; and

(i) an **internal audit programme** to audit the applicant's organisation for conformity with the procedures in its exposition and achievement of the objectives set for the quality assurance system; and

(j) a procedure for regular and structured **management review** of the Safety Management System and internal quality assurance outputs; and

(k) a **records system** that clearly documents what has taken place, allowing for statistical analysis and monitor for continuing suitability and effectiveness of the Safety Management System and the organisation's operation; and

(l) a **document control procedure** to manage, develop, document, change, and distribute the organisation's quality and operational procedures.

Senior Person - Quality Manager

An organisation's exposition should identify a senior person within the organisation, who has the responsibility and authority to:

(a) develop, implement and maintain the internal quality assurance system; and

(b) manage the organisation's internal audit programme; and

(c) identify and record any findings or concerns, and the evidence necessary to confirm findings or concerns; and

(d) initiate, recommend, or provide solutions to findings or concerns through consultation with the management owning the non-conforming process or activity;

(e) communicate and co-ordinate activities with external auditors; and

(f) analyse the root causes of concerns and findings for presentation to management for a review of trends and potential areas of concern; and

(g) facilitate and record regular management reviews to ensure corrective and preventive actions are addressed and closed out within a specific time.

This senior person is normally assigned the title of Quality Assurance Manager and depending on the size of the organisation may head a team of quality assurance specialists or in the case of small organisations, may carry out all the functions as a single individual.

Irrespective of the size of the organisation, the Quality Assurance Manager and his team should have the authority to allow them to work within the organisation to implement and maintain the internal quality assurance procedures.

The Quality Assurance Manager should have a direct reporting line to the highest level of management necessary (generally the Chief Executive) to sustain management commitment to the organisation's safety policy.

For large organisations such as airlines operating under Part 121, operating size may justify the costs associated with having full-time, dedicated, resources and personnel in a separate quality assurance department or group.

For most organisations, a single person appointed full time to the position of Quality Assurance Manager will have the capacity to carry out all the necessary functions. However, in the case of the smallest organisations, such as Part 145 maintenance providers employing only 3 or 4 engineers, it will be necessary to engage an outside person or organisation to carry out some of the functions of the Quality Assurance Manager.

Irrespective of how the role of Quality Assurance Manager is carried out, for those wishing to relate to ISO 9000, the person assigned to this position is the Management Representative.

EM100.103 Audits

An audit is a methodical, planned review used to determine how activities are being conducted, and compares results with how the activities should have been conducted according to established procedures. Audits are conducted for different purposes and have distinct identities that are defined for the purposes of this AC.

First party audits

First party audits are those conducted internally by the organisation, using its own trained staff, to evaluate the organisation's, or parts of the organisation's, performance. The results are used by management to confirm

compliance with the documented standards and procedures to initiate corrective action when the standard is not met or preventive actions where there is potential for non-conformance or non-compliance.

The auditor must be independent of the function, operation or group being audited. For small operators it may be necessary to engage an outside agency. To contain costs, provided they can provide a substantive report and produce creditable findings and concerns, the outside agency could be—

(a) a relative
(b) another small operator
(c) a sub-contractor
(d) a business associate.

Second party audits

Second party audits are carried out by an organisation on its suppliers or subcontractors. These audits are intended to satisfy the contracting organisation that the subcontractor meets the agreed quality requirements.

Third party audits

Third party audits are those carried out by independent bodies such as regulatory authorities or commercial auditing companies. Audits carried out by the Civil Aviation Authority are third party audits and are intended to give the Director an assurance that the organisation is in control and that the organisation's Safety Management System and internal quality assurance procedures are working effectively.

Third party audits will confirm that non-compliances are being identified and corrected by first, or second, party audit.

The Audit Programme

A mandatory element of the internal quality assurance system is the organisation's audit programme. This programme should:

(a) define the audit types and associated procedures;
(b) maintain a cyclic schedule of audits that ensures complete coverage of the operation over a specified period;
(c) define the frequency and scope of audits;
(d) provide for review, reporting, and close-out of findings and concerns;
(e) identify qualified personnel to conduct audits;
(f) provide for follow-up audits to ensure effectiveness of any corrective and preventative action taken.

Planned Audits

Planned audits are performed during a set calendar period.

To facilitate and ensure a planned audit is thorough, the organisation should be divided into audit components or modules based on the organisation's operational or functional structure. The audit cycle would usually ensure all components or modules are carried out in one year. The scheduling of particular components or modules should be sufficiently flexible to ensure adequate resources can be committed.

Special Purpose Audits or Spot Checks

Special purpose audits, or spot checks, should be conducted in response to concerns identified internally by the organisation, as a result of external audits, or from customer complaints. An organisation may also choose to schedule spot checks on specific activities in the organisation to determine priorities for planned audits.

External Audits

External audits are initiated and conducted by agencies with regulatory oversight of the organisation such as the CASA or by contracted customers of the organisation such as fuel companies.

The content and focus of an organisation's programme of planned audits will be largely determined by the need to anticipate or respond to the requirements and findings of external audits.

The internal audit programme should not be misunderstood as a process that will replace the existing third party audit requirements that are carried out by the Civil Aviation Authority.

Audit Construction

The various elements that comprise an effective audit are:

(a) preparation by the auditor(s)
(b) the opening or entry meeting:
(c) introduce the audit team and confirm the scope of the audit;
(d) outline the audit process to be used and the schedule;
(e) confirm the resources, people and facilities needed for the audit are aware and available for the audit.
(f) the examination:
(g) interview personnel, review documents, observe and inspect operations and select samples;
(h) document evidence;
(i) document findings and concerns.
(j) the closing or exit meeting:
(k) present findings and concerns;
(l) establish a programme to close-out findings.
(m) a written audit report containing:
(n) descriptions of all the findings and observations with the supporting evidence;
(o) the agreed corrective and preventive actions;
(p) the schedule for follow up and the closure of the corrective and preventive actions.

Procedures in the organisation's exposition should define the manner in which audits will be constructed and carried out in line with the elements described above. When full-time, dedicated audit resources and personnel are not practical, the organisation should develop procedures that preclude persons directly responsible for the areas to be evaluated from participating in an audit team.

For very small organisations, an appropriate approach to the audit requirement could consist of check-lists and a schedule for accomplishing the check-list items. Each checklist must be signed. The operator should then schedule a regular independent review of the check-lists and the checklist items.

CASA Monitoring and Intervention

CASA monitors the industry by carrying out on-going surveillance and analysis to verify that operators are upholding their responsibilities. Internal quality assurance systems are intended to assist CASA's monitoring process by identifying and resolving safety related issues. The internal quality assurance documentation and records provide a convenient point of entry to the organisation for auditing purposes.

The results of CASA audits act as a barometer of the organisation's performance. It will be apparent from the level of findings and resolutions in the internal quality assurance documentation and records whether the Safety Management System and the safety policy are functioning satisfactorily. The performance of the organization will dictate the level of CASA intervention that is necessary.

If the organization performs well the CASA will have less need to monitor its compliance. As confidence is built up the level, and frequency, of audits may be reduced.

EM100.105 Management Review

Management should, at specified intervals, review—

(a) quality indicators and audit results to verify the Safety Management System is working;

(b) corrective and preventive actions to ensure they have been recorded, implemented, and closed out;

(c) the effectiveness of internal quality assurance procedures;

(d) the operation for opportunities for improvement;

(e) training needs;

(f) the need to respond to changing regulatory requirements;

(g) the need to update the organisation's exposition.

For the purposes of this procedure, the term **management** *means the* team *or person who has the authority to resolve issues and take action.*

Management review meetings should be scheduled at a frequency appropriate to the organisation. For a newly certificated organisation, this would typically be every 3 months, increasing out to every 6 months when systems had been bedded in.

A management review meeting should not be regarded as an additional burden. It simply formalizes a review process that should be operating in any successful business. In most organizations a set agenda can be used and the review meeting can be held in conjunction with a regular team meeting.

At least once a year, the organization should review all company policies, processes, and procedures. The review should be carried out by senior staff and encompass all the activities, procedures, and processes of the organisation.

This annual review should comprehensively consider the following:

(a) the overall effectiveness of the organisation in achieving its stated objectives.

(b) the ability of the internal quality assurance and the operational procedures to respond to new technologies, to market strategies, to legislative or regulatory changes, and to social or environmental conditions.

(c) whether or not the current processes and procedures are up-to-date, effective, and relevant

The Chief Executive should provide leadership to the management review process by chairing management reviews.

The associated procedure contained in the organization's exposition should identify who is assigned to the management review team, prescribe responsibilities for scheduling and organizing review meetings, recording of proceedings, filing action, responsibilities and processes for follow-up of agreed actions, and how proceedings are communicated to personnel.

EM100.11 Document Control

Controlled documented internal quality assurance and operational procedures are a mandatory element and requirement of a Safety Management System for all aviation certificated organisations.

Each organisation should review the size and complexity of their operation to determine the scale of processes and procedures that are appropriate for them and when documented will provide a transparent statement of how that organisation intends to comply with the requirements of the applicable rule Part.

Internal quality assurance procedures should:

(a) be concise and complete enough to be a useful guide for a user with the appropriate skills to perform the task(s) within the procedure;

(b) state specifically how the organisation will address and meet the requirements of Rules, the means of compliance and standards in ACs, or the standards in any other document relating to the procedure. For example, it is not sufficient for a procedure to simply state: Organisation ABC will comply with Rule XYZ.

(c) be current and met the requirements of referenced document(s);

(d) be accessible to all users of the process;

(e) comply with a standard format defined by the organisation, for example—

(i) Title

(ii) **Purpose** (the objective of the procedure);

(iii) **Scope** (what the procedure applies to);

(iv) **Responsibility** (who is responsible for what);

(v) **Definitions** (definitions of terminology introduced by this procedure, or statements that may lead to misinterpretation)

(vi) **Procedure** (what is actually done to ensure compliance);

(vii) **References** (other documents, such as Rules, standards, and other procedures that affect or are related to this procedure);

(viii) **Flowchart**(s) (to support or clarify the procedure);

(ix) **Records** (for example checklists, reports, reviews, measurements.)

EM100.107 Continuous Improvement

Continuous improvement of the overall level of safety**.** Managing safety is not a one-day affair. It is an ongoing activity that can be successful only through continuous improvement. An SMS aims to make continuous improvements to the overall level of safety of an organization. In accordance with the nature of safety management as a core business function, an SMS involves non-stop, daily hazard identification, collection and analysis, safety risk estimation, and implementation of mitigation strategies.

There is no specific point at which an SMS stops or slows down. An SMS is a constant, never-ending operation that aims at maintaining and, if possible, improving safety levels that are commensurate with the organization's strategic objectives and supporting core business functions. In this sense, an SMS is profoundly different from the traditional notion of accident investigation, which waited for an accident to occur, then extracted and distributed as many safety lessons as possible learned from the investigation in order to prevent similar accidents.

An SMS actively looks for hazards, continuously assesses safety risks, to contain them before they result in an accident. Continuous improvement of the SMS thus aims at determining the immediate causes of below standard performance and their implications in the operation of the SMS, and rectifying situations involving below standard performance identified through safety assurance activities.

Continuous improvement is achieved through internal evaluations, internal and external audits and applies to:

(a) proactive evaluation of facilities, equipment, documentation and procedures, for example, through internal evaluations;

(b) proactive evaluation of an individual's performance, to verify the fulfillment of that individual's safety responsibilities, for example, through periodic competency checks (form of evaluation/audit); and

(c) reactive evaluations in order to verify the effectiveness of the system for control and mitigation of safety risks, for example, through internal and external audits.

As a conclusion, continuous improvement can occur only when the organization displays constant vigilance regarding the effectiveness of its technical operations and its corrective actions. Indeed, without ongoing monitoring of safety controls and mitigation actions, there is no way of telling whether the safety management process is achieving its objectives. Similarly, there is no way of measuring if an SMS is fulfilling its purpose with efficiency.

EM100.109 Error and Non-compliance Management Procedures

Quality Indicators

Each organisation should develop, measure and monitor its own quality indicators. Some examples of typical quality indicators are:

(a) Reports derived from the analysis of operational logs and records kept of incidents, occurrences, and accidents;

(b) Root cause analysis from corrective and preventive action records;

(c) Performance measurements of the organisation's operation;

(d) Customer complaints;

(e) Customer surveys, external and internal.

It is important that in establishing quality indicators, organisations select indicators which are easily measurable and provide a clear message with minimal effort. Detailed analysis should be avoided unless there are dedicated quality assurance staff available.

Limiting the number of the indicators chosen is necessary if their use is to be effective. Too many will result in

the assessment and measurement task becoming a burden and eventually lead to disuse. It is also important that the indicators chosen are meaningful to that operation and are reviewed regularly and changed to reflect changes in the operation.

A standard should be attached to each indicator so that there is a measure of acceptability/unacceptability.

For example:

Indicator	Standard	Measurement	Compliance Compliance Targets
Accidents and incidents are reported, analysed and corrective and preventative actions taken	All reportable accidents and incidents are formally reported to the CASA within 72 hours.	3 monthly review	100%
	All incidents are investigated, the root cause identified and corrective action taken within 10 days of the event.	3 monthly review	100%
Records are completed, actioned and maintained	Duty records show conformity with duty requirements.	2 monthly review	90%
Quality Improvement forms are processed in a timely manner	Quality Improvement forms are reviewed, investigated and actioned by the Chief Executive or Quality Assurance Manager within 14 days of the form being raised	Monthly review	85%

Corrective actions

Internal quality assurance system should include a procedure to ensure that corrective actions are developed in response to findings or concerns. The procedure should include:

(a) how corrective actions are to be recorded;

(b) the process for allocation and acceptance of ownership;

(c) the form of monitoring to verify each corrective action is completed in the prescribed timeframe;

(d) mechanisms to test that the corrective action is long-term and ensures the issue does not recur;

(e) the requirement to regularly review root causes of all corrective actions.

Preventive actions

The internal quality assurance system should include procedures for preventive action identical to the corrective action procedure. The only difference is that preventive action anticipates and corrects the cause of a potential failure. Often a corrective action will generate one or more, associated, preventive actions to ensure a complete and long term fix.

Occurrence investigations

The internal quality assurance system should include procedures for conducting occurrence investigations and complying with the requirements of Part 12. Generally, the approach to an occurrence investigation is that same as the process applied to investigating and implementing corrective and preventive actions.

There are specific reporting actions prescribed in Part 12 which the occurrence investigator must ensure compliance with. These requirements should be included in the documented procedure contained in the organization's exposition.

EM100.113 Records

Records documenting the performance of quality assurance procedures and the results which arise should be maintained by the organisation. Records are the principal form of evidence. Documented evidence is essential in analysing and determining the root cause of findings or concerns so that potential areas of non- compliance or non-conformance can be identified by the organisation. The record must be accurate, complete, reliable, and accessible.

The following quality records should be maintained—

(a) audit reports;

(b) management reviews minutes, reports and supporting data;

(c) corrective and preventive actions with supporting documentation;

(d) analysis of root causes and the ensuing trends and management reports;

(e) analysis of quality indicators and resulting reports to management
(f) quality training plans and records.