



CIVIL AVIATION PUBLICATION

GEN 01

SAFETY MANAGEMENT SYSTEMS

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1. INTRODUCTION

1.1 Definitions

Change Management	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	Specific mitigating actions, preventive controls or recovery measures put in place to prevent the realization or escalation of a hazard into an undesirable consequence.
Errors	An action or inaction by an operational person that leads to deviations from organisational or the operational person's intentions or expectations.
High Consequence Indicators	Safety performance indicators pertaining to the monitoring and measurement of high consequence occurrences, such as accidents or serious incidents. Sometimes known as reactive indicators
Lower Consequence Indicators	Safety performance indicators pertaining to the monitoring and measurement of lower consequence occurrences, events or activities such as incidents, non conformance findings or deviations. Sometimes known as proactive/ predictive indicators
Risk Mitigation	The process of incorporating defences or preventive controls to lower the severity and/ or likelihood of a hazard's projected consequence.
Safety Management System	A systematic approach to managing safety, including the necessary organisational structures, accountabilities, policies and procedures.
Safety Performance	A service provider's safety achievement as defined by its safety performance targets and safety performance indicators.
Safety Performance Indicator	A data-based safety parameter used for monitoring and assessing safety performance.
Safety Risk	The projected likelihood and severity of the consequences or outcomes of a hazard
Violations	a deliberate act of wilful misconduct or omission resulting in a deviation from regulations, procedures, norms or practices.

1.2 General

ICAO Annexes 1, 6, 8, 11, 14 and 19 all include a requirement for the establishment of Safety Management Systems (SMS) for approved organisations (service providers). These Standards have been included into applicable Bahamian regulations.

In the context of safety management, the term “service provider” or “product and service provider” refers to any organisation providing aviation products and/ or services. The term thus encompasses;

- (a) approved training organisations that are exposed to safety risks during the provision of their services,
- (b) aircraft operators,
- (c) approved maintenance organisations,
- (d) organisations responsible for type design and/or manufacture of aircraft,
- (e) air traffic service providers; and
- (f) certified aerodromes.

The purpose of this document is to provide guidance on the implementation of Safety Management Systems (SMS) for Air Operators, Maintenance Organisations and Training Organisations. The guidance is designed to provide information on SMS concepts and the development of management policies and processes. The guidance in this document is not a training manual and assumes that the reader has a sound understanding of SMS principles. There is a significant amount of information giving guidance on the structure and implementation of SMS in various publications, both dealing with aviation and other industries. Guidance on SMS should also include *ICAO Document 9859 – Safety Management Manual*.

It is important to recognise that Safety Management Systems are top down driven systems, which means that the Accountable Manager of the organisation is responsible for the implementation and continuing compliance of the SMS. Without the wholehearted support of the Accountable Manager an SMS will not be effective.

There is no ‘one size fits all’ model of an SMS that will cater for all types of organisations. A complex SMS is unlikely to be appropriate for small organisations, and such organisations need to tailor their SMS to suit the size, nature and complexity of the operation and allocate resources accordingly.

1.3 INTRODUCTION TO SMS

An SMS is a system to assure the safe operation of aircraft through effective management of safety risk. This system is designed to continuously improve safety by identifying hazards, collecting and analysing data and continuously assessing safety risks. The SMS seeks to proactively contain or mitigate risks before they result in aviation accidents and incidents. It is a system that is commensurate with the organisation’s regulatory obligations and safety goals.

SMS is necessary for an aviation organisation to identify hazards and manage safety risks encountered during the delivery of its products or services. An SMS includes key elements that are essential for hazard identification and safety risk management by ensuring that:

- (a) the necessary information is available;
- (b) the appropriate tools are available for the organisation's use;
- (c) the tools are appropriate to the task;
- (d) the tools are commensurate with the needs and constraints of the organisation; and
- (e) decisions are made based on full consideration of the safety risk.

1.4 SCOPE

SMS addresses aviation activities of an aviation service provider that are related to the safe operation of aircraft. The scope of an SMS may indirectly include other organisational activities that support operational or product development, such as finance, human resources and legal. It is therefore essential to involve all internal and external aviation system stakeholders having a potential impact on the organisation's safety performance. Furthermore, any potential inputs should be taken into consideration at an early stage of SMS implementation and throughout future internal evaluations of the SMS. The following stakeholders may provide inputs to service providers depending upon their potential impact on the safety performance:

- (a) aviation professionals;
- (b) aviation regulatory and administrative authorities;
- (c) industry trade associations;
- (d) professional associations and federations;
- (e) international aviation organisations;
- (f) sub-contractors or principals of a service provider; and
- (g) the flying public.

2. SMS FRAMEWORK

This section introduces a framework for SMS implementation by relevant organisations (aviation service providers). It should be noted that the implementation of the framework should be commensurate with the size of the organisation and the complexity of the products or services provided.

The framework includes four components and twelve elements, representing the minimum requirements for SMS implementation. The four components of an SMS are:

- (a) safety policy and objectives;
- (b) safety risk management;
- (c) safety assurance; and
- (d) safety promotion.

Safety policies and objectives create the frame of reference for the SMS.

The objective of the safety risk management component is to identify hazards, assess the related risks and develop appropriate mitigations in the context related to the delivery of the organisation's products or services. Safety assurance is accomplished through on-going processes that monitor compliance with international standards and national regulations. Furthermore, the safety assurance process provides confidence that the SMS is operating as designed and is effective. Safety promotion provides the necessary awareness and training.

The four components, combined with the twelve elements comprise the SMS framework, are as follows:

1. Safety Policy and Objectives

- Element 1.1 Management commitment and responsibility
- Element 1.2 Safety accountabilities
- Element 1.3 Appointment of key safety personnel
- Element 1.4 Coordination of emergency response planning
- Element 1.5 SMS documentation

2. Safety risk management

- Element 2.1 Hazard identification
- Element 2.2 Risk assessment and mitigation

3. Safety assurance

- Element 3.1 Safety performance monitoring and measurement
- Element 3.2 The management of change
- Element 3.3 Continuous improvement of the SMS

4. Safety promotion

- Element 4.1 Training and education
- Element 4.2 Safety communication.

The following sections provide additional details regarding each of the four components and twelve elements. Each component begins with a high level summary, followed by the text from the SMS framework for each element.

Descriptions and general guidance on implementation strategies for each element are then presented.

2.1 SAFETY POLICY AND OBJECTIVES

Safety policy outlines the principles, processes and methods of the organisation's SMS to achieve the desired safety outcomes. The policy establishes senior management's commitment to incorporate and continually improve safety in all aspects of its activities. Senior management develops measurable and attainable organisation-wide safety objectives to be achieved.

2.1.1 Management Commitment and Responsibility (Element 1.1)

In any organisation, management controls the activities of personnel and the use of resources for the delivery of a product or service. The organisation's exposure to safety hazards is a consequence of these activities. Management mitigates the related safety risks by:

- (a) Setting the organisational priorities and tasking;
- (b) Prescribing procedures on how to perform activities or processes;
- (c) Recruiting, training and supervising employees; and
- (d) Procuring equipment to support the service-delivery activities.
- (e) Using the skills of its personnel;
- (f) Allocating the necessary resources;

Management should ensure that:

- (a) Safety directives and controls are imbedded in Standard Operating Procedures (SOPs);
- (b) Employees adhere to SOPs and safety directives; and
- (c) Equipment remains in a serviceable condition.

Management's primary responsibility for ensuring a safe and efficient operation is discharged through ensuring adherence to SOPs (safety compliance) and establishment and maintenance of a dedicated SMS that establishes the necessary safety risk controls (safety performance)

Implementation Strategy for Management Commitment and Responsibility

Senior management develops and endorses the safety policy, which is signed by the Accountable Manager.

Once the safety policy is developed senior management should:

- (a) Visibly endorse the policy;
- (b) Communicate the policy to all appropriate staff;
- (c) Establish safety performance targets for the SMS and the organisation; and

- (d) Establish safety objectives that identify what the organisation intends to achieve in terms of safety management.

The safety policy must include commitment to:

- (a) achieve the highest safety standards;
- (b) comply with all applicable regulatory requirements;
- (c) comply with international standards;
- (d) adopt proven best practices appropriate to the activity;
- (e) provide all the necessary resources;
- (f) ensure safety is a primary responsibility of all managers;
- (g) follow the disciplinary policy; and
- (h) ensure that the safety policy is understood, implemented and maintained at all levels.

The safety standards achieved are an indication of organisational behaviour and are also a measure of SMS performance. Furthermore, safety objectives and the safety performance standards must be linked to:

- (a) Safety performance indicators;
- (b) Safety performance targets; and
- (c) SMS mitigation actions.

The disciplinary policy is used to determine whether a violation has occurred requiring action beyond the risk management systems' analysis requirements. Therefore, it is essential to assure that persons responsible for making the determination have the necessary technical expertise to fully consider the context related to the report, thereby diminishing the likelihood that such personnel and the service provider itself may be exposed to unfair or inappropriate judicial proceedings.

A policy to appropriately protect safety data, as well as the reporters of such data, can have a significant positive effect on reporting culture. Once it is clear that a report does not involve a violation, the service provider should allow for the de-identification and aggregation of reports so as to conduct meaningful safety analysis without implicating personnel or specific service providers.

Safety is one of our core business functions. We are committed to developing, implementing, maintaining and constantly improving strategies and processes to ensure that all our aviation activities take place under an appropriate allocation of organisational resources, aimed at achieving the highest level of safety performance and meeting regulatory requirements, while delivering our services.

All levels of management and all employees are accountable for the delivery of this highest level of safety performance, starting with the Accountable Manager.

Our commitment is to:

- **Support** the management of safety through the provision of all appropriate resources, that will result in an organisational culture that fosters safe practices, encourages effective safety reporting and communication, and actively manages safety with the same attention to results as the attention to the results of the other management systems of the organisation;
- **Ensure** the management of safety is a primary responsibility of all managers and employees;
- **Clearly** define for all staff, managers and employees alike, their accountabilities and responsibilities for the delivery of the organisation's safety performance and the performance of our safety management system;
- **Establish and operate** hazard identification and risk management processes, including a hazard reporting system, in order to eliminate or mitigate the safety risks of the consequences of hazards resulting from our operations or activities to achieve continuous improvement in our safety performance;
- **Ensure** that no action will be taken against any employee who discloses a safety concern through the hazard reporting system, unless such disclosure indicates, beyond any reasonable doubt, gross negligence or a deliberate or wilful disregard of regulations or procedures;
- **Comply** with and, wherever possible, exceed, legislative and regulatory requirements and standards;
- **Ensure** that sufficient skilled and trained human resources are available to implement safety strategies and processes;
- **Ensure** that all staff are provided with adequate and appropriate aviation safety information and training, are competent in safety matters, and are allocated only tasks commensurate with their skills;
- **Establish and measure** our safety performance against realistic safety performance indicators and safety performance targets;

- **Continually improve** our safety performance through continuous monitoring and measurement, and regular review and adjustment of safety objectives and targets, and diligent achievement of these; and
- **Ensure** externally supplied systems and services to support our operations are delivered meeting our safety performance standards.

(Signed) _____
Accountable Manager

2.1.2 Safety Accountability (Element 1.2)

In the SMS context, accountability means being responsible for taking corrective actions, either due to the reporting of hazards and errors, as well as in response to accidents and incidents. The Accountable Manager is also responsible for the organisation's ability to learn from the analysis of data collected through its safety reporting system.

Historically, in most organisations Quality Assurance or the safety office managed the entire safety process within the organisation.

The safety officer was the person in charge of identifying the safety issues, proposing solutions, participating in the implementation of the solutions, and monitoring the effectiveness of the solutions. This practice placed ownership of the safety process entirely in Quality Assurance or the safety office, thereby removing executives and line managers from the safety decision making process. This created the perception that safety issues were not the line manager's problem; safety problems belonged to Quality Assurance or the safety office and their managers. Additionally, this approach neglected the valuable input that the production and operational units could bring to the organisational safety decision-making process.

By requiring that the CAA-B approved organisation identify the accountable manager, accountability for safety performance is placed at a level in the organisation having the authority to take action to ensure the SMS is effective. In identifying the safety accountabilities of all members of the management team, the accountability framework is clear throughout the organisation. These accountability frameworks need to include accountability for the safety performance of the sub-product or sub-service providers that do not separately require safety certification or approval. These Safety responsibilities, accountabilities and authorities must be documented and communicated throughout the organisation, and they need to include a definition of the levels of management with authority to make decisions regarding safety risk tolerability. Additionally, the safety accountabilities of managers should include the allocation of human, technical, financial or other resources necessary for the effective and efficient performance of the SMS.

Implementation Strategy for Safety Accountability

Safety management should be a core function for any aviation service provider. The definition of accountabilities for all personnel involved in safety related duties will serve to ensure the delivery of safe products and operations, as well as an appropriately balanced allocation of resources.

The accountable manager identified by the service provider is the single person having ultimate responsibility for the SMS, including responsibility to provide the resources essential to its implementation and maintenance. The accountable manager's authorities and responsibilities include, but are not limited to:

- (a) full authority for human resources issues;
- (b) authority for major financial issues;
- (c) direct responsibility for the conduct of the organisation's affairs;
- (d) final authority over operations under its certificate/approval;
- (e) establishment and promotion of the safety policy;
- (f) establishment of the organisation's safety objectives and safety targets;
- (g) acting as the organisation's safety champion; and
- (h) having final responsibility for the resolution of all safety issues.

Depending on the size, structure and complexity of the organisation, the accountable manager may be:

- (a) the chief executive officer (CEO);
- (b) the chief operating officer (COO);
- (c) the chairperson of the board of directors;
- (d) a partner; or
- (e) the owner.

Additionally, the appointment of an accountable manager who is given the required authorities and responsibilities requires that the individual has the necessary attributes to fulfil the role. The accountable manager will have many functions in the organisation. Nonetheless, the accountable manager's role is to instil safety as a core organisational value and to ensure that the SMS is properly implemented and maintained through the allocation of resources and tasks.

All aviation safety-related positions, responsibilities, and authorities should be defined, documented and communicated throughout the organisation.

The safety accountabilities of each senior manager (departmental head or person responsible for a functional unit) are integral components of their job descriptions. Given that the management of safety is a core business function, every senior manager has a degree of involvement in the operation of the SMS.

This involvement is certainly deeper for those managers directly responsible for functional units that deliver the organisation's products or services (operations, manufacturing, maintenance, engineering, training and dispatch etc., hereafter referred to by the generic term "line managers") than for those responsible for support functions (human resources, administration, legal and financial).

A service provider is responsible for the safety performance of products or services provided by sub-contractors that do not separately require safety certification or approval. While all sub-contractors may not necessarily be required to have an SMS, it is nevertheless the service provider's responsibility to ensure that its own safety performance requirements are met. In any case, it is essential for the service provider's SMS to interact as seamlessly as possible with safety systems of sub-contractors that provide products or services pertinent to the safe operation of aircraft.

The interface between the organisation's SMS and that of the sub-product or sub-service provider's safety systems must address the identification of hazards, assessment of risk, and development of risk mitigation strategies where applicable. The service provider should ensure that:

- (a) there is a policy clearly establishing a safety accountability and authority flow between the service provider and the sub-contractor;
- (b) the sub-contractor has a safety reporting system commensurate with its size and complexity that facilitates the early identification of hazards and systemic failures of concern to the service provider;
- (c) the service provider's safety review board includes sub-contractor representation, where appropriate;
- (d) safety/quality indicators to monitor sub-contractor performance are developed, where appropriate;
- (e) the service provider's safety promotion process ensures sub-contractor employees are provided with the
- (f) organisation's applicable safety communications; and
- (g) any sub-contractor roles, responsibilities and functions relevant to the service provider's emergency response plan are developed and tested.

The SMS related accountabilities, authorities and responsibilities of all appropriate senior managers must be described in the organisation's safety management system documentation. Mandatory safety functions performed by the safety manager, safety office, safety action groups, etc. may be embedded into existing job descriptions, processes and procedures.

The safety manager function is described in detail in the next section. From an accountability perspective, the person carrying out the safety manager function is responsible to the accountable manager for the performance of the SMS and for the delivery of safety services to the other departments in the organisation.

2.1.3 Appointment of Key Safety Personnel (Element 1.3)

Implementation Strategy for the Appointment of Key Safety Personnel

In most organisations the safety manager is the individual responsible for the development and maintenance of an effective SMS. The safety manager also advises the accountable manager and line managers on safety management matters and is responsible for coordinating and communicating safety issues within the organisation, as well as with external stakeholders. The safety manager's functions include, but are not necessarily limited to:

- (a) managing the SMS implementation plan on behalf of the accountable manager;
- (b) performing/ facilitating hazard identification and safety risk analysis;
- (c) monitoring corrective actions and evaluating their results;
- (d) providing periodic reports on the organisation's safety performance;
- (e) maintaining records and safety documentation;
- (f) planning and facilitating staff safety training;
- (g) providing independent advice on safety matters;
- (h) monitoring safety concerns in the aviation industry and their perceived impact on the organisation's operations aimed at service delivery;
- (i) coordinating and communicating (on behalf of the Accountable Manager) with the CAA-B and other State agencies as necessary on issues relating to safety; and
- (j) coordinating and communicating (on behalf of the Accountable Manager) with international organisations on issues relating to safety.

The selection criteria for a safety manager should include, but not be limited to, the following:

- (a) safety/ quality management experience;
- (b) operational management experience;
- (c) technical background to understand the systems that support operations;
- (d) people skills;
- (e) analytical and problem-solving skills;
- (f) project management skills; and
- (g) oral and written communications skills.

Note: A sample job description for a safety manager is contained in Appendix 1. For small organisations, it may be viable to combine safety and quality management functions within the same office.

The safety manager is generally supported by additional staff. This will depend upon the size of the organisation and the nature and complexity of the organisation. The safety manager liaises directly with the line managers or their delegates, such as where operational units are supported by dedicated safety officers.

The safety manager is the person responsible for the collection and analysis of safety data, and the distribution of related safety information to line managers. The distribution of safety information by the safety services office is the first step in the safety risk management process. This information must be used by line managers to mitigate safety risks, which inevitably requires the allocation of resources. The necessary resources may be readily available to the line managers for this purpose.

Additionally, a formal process is required to assess the effectiveness and efficiency of any mitigation strategies used to achieve the agreed safety performance targets of the organisation. One potential process includes the creation of a Safety Review Board (SRB). The SRB provides the platform to achieve the objectives of resource allocation and to assess the effectiveness and efficiency of risk mitigation strategies. The SRB is a very high-level committee, chaired by the Accountable Manager and composed of senior managers, including line managers responsible for functional areas as well as those from relevant administrative departments.

The safety manager participates in the SRB in an advisory capacity only. The SRB may meet infrequently, unless exceptional circumstances dictate otherwise. The SRB:

- (a) monitors the effectiveness of the SMS ;
- (b) monitors that any necessary corrective action is taken in a timely manner;
- (c) monitors safety performance against the organisation's safety policy and objectives;
- (d) monitors the effectiveness of the organisation's safety management processes which support the declared corporate priority of safety management as another core business process;
- (e) monitors the effectiveness of the safety supervision of subcontracted operations;
- (f) ensures that appropriate resources are allocated to achieve safety performance beyond that required by regulatory compliance;

The SRB is strategic and deals with high-level issues related to policies, resource allocation and organisational performance monitoring. Once a strategic direction has been developed by the SRB, implementation of safety strategies must be coordinated throughout the organisation. In larger organisations this can be accomplished by creating a Safety Action Group (SAG). SAGs are composed of line managers and front-line personnel. SAGs are normally chaired by a designated line manager. SAGs are tactical entities that deal with specific implementation issues per the direction of the SRB. The SAG:

- (a) oversees operational safety performance within the functional areas of the organisation and ensures that appropriate safety risk management activities are carried out with staff involvement as necessary to build up safety awareness;
- (b) coordinates the resolution of mitigation strategies for the identified consequences of hazards and ensures that satisfactory arrangements exist for safety data capture and employee feedback;
- (c) assesses the safety impact related to the introduction of operational changes or new technologies;
- (d) coordinates the implementation of corrective action plans and ensures that corrective action is taken in a timely manner;
- (e) reviews the effectiveness of previous safety recommendations; and
- (f) oversees safety promotion activities as necessary to increase awareness of safety issues among relevant employees, to ensure that employees are provided appropriate opportunities to participate in safety management activities.

2.1.4 Coordination of Emergency Response Planning (Element 1.4)

Implementation Strategy for the Coordination of Emergency Response Planning

An emergency response plan (ERP) documents actions to be taken by all responsible personnel during aviation related emergencies. The purpose of an ERP is to ensure that there is an orderly and efficient transition from normal to emergency operations, including assignment of emergency responsibilities and delegation of authority. Authorization for action by key personnel is also contained in the plan, as well as the means to coordinate efforts necessary to cope with the emergency. The overall objective is to save lives, the safe continuation of operations and the return to normal operations as soon as possible...

The applicability of emergency response planning extends to providers of aviation products that may be attributable to, or affected by, an aviation safety occurrence. The product provider's processes are generally called "contingency product support" and include emergency airworthiness action, alert services, aircraft accident on-site support etc. The product provider need not change the name of these product support processes to ERP processes; however, they must be noted appropriately in the organisation's SMS documentation. Refer to Appendix 4 for further guidance on ERP.

2.1.5 SMS Documentation (Element 1.5)

The SMS documentation should include a top level description (exposition) document, which describes the organisation's SMS according to its components and elements. Such a document facilitates the organisation's internal administration, communication and maintenance of the SMS. At the same time, it serves as the organisation's SMS communication (declaration) to the CAA-B for the purpose of regulatory acceptance, assessment and subsequent oversight of the SMS.

This top level SMS document may be a standalone document or it can be a distinct “SMS Section/ Chapter” within an existing organisation’s CAA-B approved or accepted document. Where details of the organisation’s SMS processes are already addressed in existing documents, appropriate cross referencing to such documents is sufficient. This SMS document will need to be kept up to date and where significant amendments are intended or made, may require CAA-B concurrence where necessary. Guidance for the compilation of an SMS document is in Appendix 3.

Another aspect of SMS documentation is the compilation and maintenance of records substantiating the existence and on-going operation of the SMS. Such records should be organised according to the respective SMS elements and associated processes. For certain processes it may be sufficient for the SMS documentation system to include copies or samples of records maintained within the organisation’s other documentation systems (such as Technical Records department, central library, etc.).

During the initial implementation phase, the SMS documentation must include a record of the gap analysis and phased implementation plan.

Implementation Strategy for SMS Documentation

The SMS documentation covers all elements and processes of the SMS and normally includes:

- (a) A consolidated description of the SMS components and elements such as -
- (1) document and records management ;
 - (2) regulatory SMS requirements ;
 - (3) framework, scope and integration;
 - (4) safety policy and safety objectives ;
 - (5) safety accountabilities and key personnel ;
 - (6) voluntary hazard reporting system;
 - (7) incident reporting and investigation procedures;
 - (8) hazard identification and risk assessment processes;
 - (9) safety performance indicators;
 - (10) safety training and communication;
 - (11) continuous improvement and SMS audit ;
 - (12) management of change; and
 - (13) emergency or operations contingency planning;

- (b) A compilation of current SMS related records and documents such as;
- (1) hazards report register and samples of actual reports;
 - (2) safety performance indicators and related charts;
 - (3) record of completed or in-progress safety assessments;
 - (4) SMS internal review or audit records;
 - (5) safety promotion records;
 - (6) personnel SMS/ safety training records;
 - (7) SMS/ Safety committee (SRB/SAG) meeting minutes;
 - (8) SMS implementation plan (during implementation process to achieving Phase 2); etc.

2.2 SAFETY RISK MANAGEMENT

Service providers should ensure that the safety risks encountered in aviation activities are controlled in order to achieve their safety performance targets. This process is known as safety risk management and includes hazard identification, safety risk assessment and the implementation of appropriate remediation measures.

The safety risk management component systematically identifies hazards that exist within the context of the delivery of its products or services. Hazards may be the result of systems that are deficient in their design, technical function, human interface or interactions with other processes and systems. They may also result from a failure of existing processes or systems to adapt to changes in the service provider's operating environment.

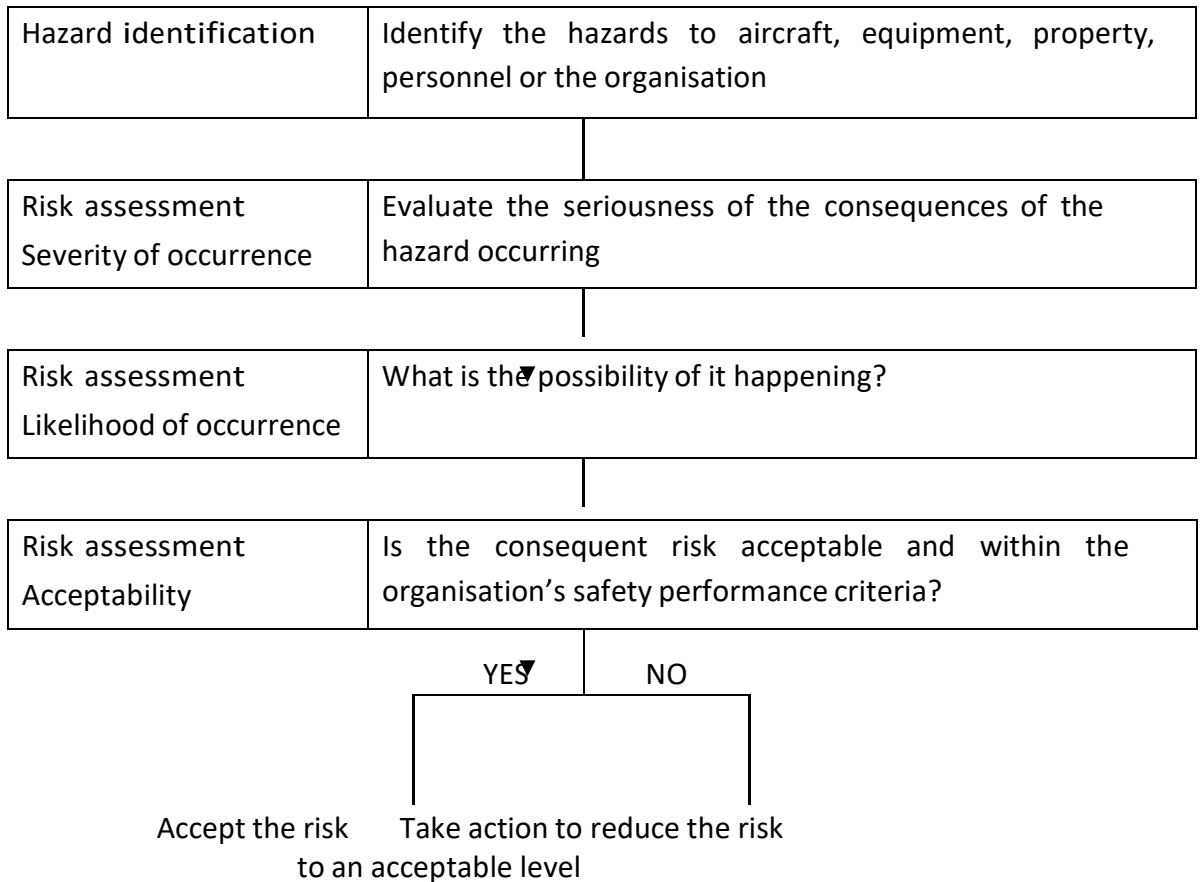
Careful analysis of these factors during the planning, design, and implementation phases can often identify potential hazards before the system becomes operational.

Understanding the system, and its operating environment are also essential for achievement of high safety performance. Hazards may be discovered during the operational life cycle, through employee reports or incident investigations. Analysis of these hazards should be conducted in the context of the system. This context is key to avoid attribution of events to "human error," where defects in the system may be neglected, remaining latent for future and potentially more serious events to occur.

Guidance on hazard identification and risk assessment procedures and format are addressed in the following two elements.



The Process of Safety Risk Management



2.2.1 Hazard Identification (Element 2.1)

Safety risk management (SRM) requires the service provider to develop and maintain a formal process to identify hazards that may contribute to aviation safety-related occurrences. Hazards may exist in ongoing aviation activities or be inadvertently introduced into an operation whenever changes are introduced to the aviation system. In this case, hazard identification is an integral part of the change management processes as described in SMS framework element 3.2 – *The management of change*.

Hazard identification is based on a combination of reactive, proactive and predictive safety data collection methods. Hazard identification is the first step in the SRM process. The corresponding safety risks are then assessed within the context of the potentially damaging consequences related to the hazard. Where the safety risks are assessed to be unacceptable, additional safety risk controls must be built into the system.

In mature safety management systems, hazard identification is continuous and is an integral part of the service provider's organisational processes. A number of conditions trigger more in-depth and far-reaching hazard identification activities and may include:

- (a) instances where the organisation experiences an unexplained increase in aviation safety-related events or regulatory non-compliance;
- (b) significant operational changes, including anticipated changes to key personnel or other major systems components; and

- (c) significant organisational change, including anticipated growth and contraction, corporate mergers, or acquisitions.

A structured approach to the identification of hazards may include the use of panel discussions (in some circles the term “brainstorming” is deemed unacceptable) in which subject matter experts conduct detailed analysis scenarios. Hazard identification sessions require a range of experienced operational and technical personnel and are managed by a facilitator. The same group may also be used to assess corresponding safety risks.

The service provider’s safety information management system should include safety assessment documentation that contains hazard descriptions, the related consequences, the assessed likelihood and severity of the safety risks, and required safety risk controls. Existing safety assessments should be reviewed whenever new hazards are identified and proposals for further safety risk controls are anticipated.

Hazards are constantly identified through various data sources. The service provider is expected to identify hazards, eliminate these hazards or to mitigate the associated risks. In the case of hazards identified in products or services delivered through subcontractors, a mitigation could be the service provider’s requirement for such organisations to have an SMS or an equivalent process for hazard identification and risk management.

The safety management information system becomes a source of safety knowledge to be used as reference in organisational safety decision making processes. This safety knowledge provides material for safety trend analyses, as well as for safety education.

Implementation Strategy for Safety Risk Management

The following may be considered while engaged in hazard identification process:

- (a) design factors, including equipment and task design;
- (b) human performance limitations (e.g. physiological, psychological and cognitive);
- (c) procedures and operating practices, including their documentation and checklists, and their validation under actual operating conditions;
- (d) communication factors, including media, terminology and language;
- (e) organisational factors, such as those related to the recruitment, training and retention of personnel, the compatibility of production and safety goals, the allocation of resources, operating pressures and the corporate safety culture;
- (f) factors related to the operational environment of the aviation system (e.g. ambient noise and vibration, temperature, lighting and the availability of protective equipment and clothing);
- (g) regulatory oversight factors, including the applicability and enforceability of regulations; the certification of equipment, personnel and procedures;

- (h) performance monitoring systems that can detect practical drift or operational deviations; and
- (i) human-machine interface factors.

Hazards may be identified through proactive and predictive methodologies or as a result of accident or incident investigations. There are a variety of data sources of hazard identification that may be both internal and external to the organisation. Examples of the internal hazard identification data sources include:

- (a) normal operations monitoring schemes (e.g. flight data analysis for aircraft operators);
- (b) voluntary and mandatory reporting systems;
- (c) safety surveys;
- (d) safety audits;
- (e) feedback from training; and
- (f) investigation and follow-up reports on accidents/ incidents.

Examples of external data sources for hazard identification include:

- (a) industry accident reports;
- (b) CAA-B mandatory incident reporting system;
- (c) CAA-B voluntary incident reporting system;
- (d) CAA-B oversight audits; and
- (e) information exchange systems.

The type of technologies used in the hazard identification process will depend upon the size and complexity of the organisation and its aviation activities. In all cases the service provider's hazard identification process is clearly described in the organisation's SMS/safety documentation. The hazard identification process considers all possible hazards that may exist within the scope of the service provider's aviation activities including interfaces with other systems, both within and external to the organisation. Once hazards are identified, their consequences (i.e. any specific events or outcomes) should be determined. Refer to CAP GEN 04 for guidance on voluntary and confidential reporting systems.

2.2.2 Risk Assessment and Mitigation (Element 2.2)

The process starts with the identification of hazards and their potential consequences. The safety risks are then assessed in terms of probability and severity, to define the level of safety risk (safety risk index). If the assessed safety risks are deemed to be tolerable, appropriate action is taken and the operation continues.



The completed hazard identification and safety risk assessment and mitigation process is documented and approved as appropriate and forms part of the safety information management system.

If the safety risks are assessed as intolerable, the following questions become relevant:

- (a) **Can the hazards and related safety risk(s) be eliminated?** If the answer is yes, then action as appropriate is taken and documented. If the answer is no, the next question is:
- (b) **Can the safety risk(s) be mitigated?** If the answer is no, related activities must be cancelled. If the answer is yes, mitigation action as appropriate is taken and the next question is:
- (c) **Do any residual safety risks exist?** If the answer is yes, then the residual risks must be assessed to determine their level of tolerability, as well as whether they can be eliminated or mitigated, as necessary to ensure an acceptable level of safety performance.

Safety risk assessment involves an analysis of identified hazards that includes two components — the severity of a safety outcome as well as the probability that it will occur. Once risk have been assessed, the service provider will engage in a decision making process to determine the need to implement risk mitigation measures.

This decision making process involves the use of a risk categorization tool that may be in the form of an assessment matrix. An example of a safety risk (index) assessment matrix is provided below.

Example of a Safety Risk (Index) Assessment Matrix

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

An example of Risk severity definitions is given below:

Aviation definition	Meaning	Value
Catastrophic	Aircraft / Equipment destroyed. Multiple deaths.	A
Hazardous	A large reduction in safety margins, physical distress or a workload such that organisations cannot be relied upon to perform their tasks accurately or completely. Serious injury or death to a number of people. Major equipment damage.	B
Major	A significant reduction in safety margins, a reduction in the ability of organisations to cope with adverse operating conditions as a result of an increase in workload, or as a result of conditions impairing their efficiency. Serious incident. Injury to persons.	C
Minor	Nuisance. Operating limitations. Use of emergency procedures. Minor incident.	D
Negligible	Little consequence.	E

An example of Risk probability definitions, i.e. likelihood of an occurrence, is given below.

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

Using this matrix, risks can be categorised according to an assessment of their potential severity and probability. While an assessment matrix methodology is recommended, other equivalent methods of depicting risk tolerance are available. The risk assessment matrix may be customised to reflect the context of each service provider’s organisational structure, its aviation activities and may be subject to agreement by the CAA-B.

Based on this matrix example, risks reflected as being unacceptable (Red and yellow categories) must be mitigated so as to reduce their severity and / or probability. The service provider should consider suspension of any activities that continue to expose the organisation to intolerable safety risks in the absence of mitigating actions that reduce the risks to an acceptable level.

After safety risks have been assessed, appropriate mitigations can be implemented. Mitigation measures may include a number of alternatives including, but not limited to, modifications to existing operating procedures, training programmes, or equipment used in the delivery of aviation products or services. Additional alternatives may include the introduction of new operating procedures, training programmes, technologies or supervisory controls. Almost invariably these alternatives will involve deployment or redeployment of the three traditional aviation safety defences - technology, training and regulations. A determination of any unintended consequences, particularly the introduction of new hazards, should be made prior to the implementation of any risk mitigation measures.

The three generic safety risk mitigation approaches include:

- (a) **Avoidance.** The activity is suspended, either because the associated safety risks are intolerable or deemed unacceptable vis-à-vis the associated benefits.
- (b) **Reduction.** Some safety risk exposure is accepted, although the severity or probability associated with the risks are lessened, possibly by measures that mitigate the related consequences.
- (c) **Segregation of exposure.** Action is taken to isolate the potential consequences related to the hazard or to establish multiple layers of defences to protect against them.

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

- (a) **Effectiveness.** The extent to which the alternatives reduce or eliminate the safety risks. Effectiveness can be determined in terms of the technical, training and regulatory defences that can reduce or eliminate safety risks:
- (b) **Cost/benefit.** The extent to which the perceived benefits of the mitigation outweigh the costs.
- (c) **Practicality.** The extent to which the mitigation is implementable and appropriate in terms of available technology, financial and administrative resources, legislation and regulations, political will, etc.
- (d) **Acceptability.** The extent to which the alternative is consistent with stakeholder paradigms.
- (e) **Enforceability.** The extent to which compliance with new rules, regulations or operating procedures can be monitored.

- (f) **Durability.** The extent to which the mitigation will be sustainable and effective.
- (g) **Residual safety risks.** The degree of safety risk that remains subsequent to the implementation of the initial mitigation, and which may necessitate additional risk control measures.
- (h) **Unintended consequences.** The introduction of new hazards and related safety risks associated with the implementation of any mitigation alternative.

Once the mitigation has been approved and implemented, any associated impact on safety performance provides feedback to the service provider's safety assurance process. This is necessary to ensure integrity, efficiency and effectiveness of the defences under the new operational conditions.

Risk Management Documentation/ Worksheet

Each risk mitigation exercise is to be documented progressively. This may be accomplished using a variety of applications ranging from basic spreadsheets or tables to customised commercial risk mitigation software. Completed risk mitigation documents should be approved by the appropriate level of management. For an example of a basic hazard risk mitigation worksheet, or risk log refer to Appendix 5.

2.3 SAFETY ASSURANCE

Safety assurance consists of processes and activities undertaken by the service provider to determine whether the SMS is operating according to expectations and requirements.

The service provider continually monitors its internal processes as well as its operating environment to detect changes or deviations that may introduce emerging safety risks or the degradation of existing risk controls. Such changes or deviations may then be addressed together with the safety risk management process.

The safety assurance process complements that of Quality Assurance, with each having requirements for analysis, documentation, auditing, and management reviews to assure that certain performance criteria are met. While Quality Assurance typically focuses on the organisation's compliance with regulatory requirements, safety assurance specifically monitors the effectiveness of safety risk controls.

The complementary relationship between safety assurance and Quality Assurance allows for the integration of certain supporting processes. Such integration can serve to achieve synergies to assure that the service provider's safety, quality and commercial objectives are met.

Finally, safety assurance activities should include the development and implementation of corrective actions in response to findings of systemic deficiencies having a potential safety impact. Organisational responsibility for the development and implementation of corrective actions should reside with the departments cited in the findings.

2.3.1 Safety Performance Monitoring and Measurement (Element 3.1)

Implementation Strategy

Information used to measure the organisation's safety performance is generated through its safety reporting systems.

Reporting Systems

There are two types of reporting systems:

- (a) mandatory incident reporting systems; and
- (b) voluntary incident reporting systems.

Mandatory incident reporting systems require the reporting of certain types of events (e.g. serious incidents, runway incursions). This necessitates implementation of detailed regulations identifying the reporting criteria and scope of reportable occurrences. Mandatory reporting systems tend to collect more information related to high consequence technical failures than on other aspects of operational activities.

Voluntary reporting systems allow for the submission of information related to observed hazards or inadvertent errors without an associated legal or administrative requirement to do so. Such systems are considered "non-punitive" as they afford protection to reporters thereby ensuring the continued availability of such information to support continuous improvements in safety performance. While the nature and extent of service providers' non-punitive policies may vary, the intent is to promote an effective reporting culture and proactive identification of potential safety deficiencies.

Voluntary reporting systems may be confidential, requiring that any identifying information about the reporter is known only to "gatekeepers" in order to allow for follow-up action. Confidential incident reporting systems facilitate the disclosure of hazards leading to human error, without fear of retribution or embarrassment. Voluntary incident reports may be archived and de-identified once any necessary follow up actions are taken. De-identified reports can support future trending analyses to track the effectiveness of risk mitigations and to identify emerging hazards.

To be effective, safety reporting tools should be readily accessible to operational personnel. Operational personnel should be educated on the benefits of safety reporting systems and provided with positive feedback regarding remedial actions taken in response to the report. The alignment of reporting system requirements, analysis tools and methods can facilitate exchange of safety information as well as comparisons of certain safety indicators. In order to encourage reporting the service provider should ensure that, wherever possible, feedback is provided to the reporter.

Further guidance on voluntary and confidential reporting systems is contained in CAP 22

Other sources of safety information to support safety performance monitoring and measurement may include:

Safety studies are analyses used to gain an understanding of broad safety issues or those of a global nature. For example, the airline industry may produce safety recommendations and implement measures to reduce accidents and incidents during the approach and landing phases. Individual service providers may find these global recommendations to improve safety performance in the context of its aviation activities.

Safety reviews are a fundamental component of change management. They are conducted during the introduction of new technologies, new procedures, or systemic changes that affect the aviation operations. Safety reviews have a clearly defined objective that is linked to the change under consideration. Safety reviews ensure that safety performance is maintained at appropriate levels during periods of change.

Safety surveys examine procedures or processes related to a specific operation. Safety surveys may involve the use of checklists, questionnaires and informal confidential interviews. Safety surveys generally provide qualitative information that may require validation to determine appropriate corrective action. Nonetheless, surveys may provide an inexpensive source of significant safety information.

Audits focus on the integrity of the organisation's SMS and its supporting systems. Audits provide an assessment of safety risk controls and related quality assurance processes. Audits may be conducted by entities that are external to the service provider, or through an internal audit process having the necessary policies, and procedures to ensure its independence and objectivity. Audits are intended to provide assurance of the safety management functions, including staffing, compliance with approved regulations, levels of competency and training.

Internal investigations are conducted for certain reportable safety events in accordance with internal or regulatory requirements. Accidents and serious incidents, investigated by the appropriate State or regional authorities, may also provide the impetus for internal investigations to be undertaken by service provider organisations.

Safety Performance Indicators

The final output of a safety performance monitoring and measurement process is the development of safety performance indicators based on analysis of data collected through the sources referenced above. The monitoring and measurement process involves the use of selected safety performance indicators, corresponding safety performance targets and alert levels. An example of some safety performance indicators and their targets are contained in Appendix 6.

2.3.2 The Management of Change (Element 3.2)

Implementation Strategy for the Management of Change

Aviation service providers experience change due to a number of factors including, but not limited to: organisational expansion or contraction; changes to internal systems, processes or procedures that support delivery of the products and services; and changes to the organisation's operating environment. Change may affect the appropriateness or effectiveness of existing safety risk mitigation strategies. In addition, new hazards, and related safety risks may be inadvertently introduced into an operation whenever change occurs.

Such hazards should be identified so as to enable the assessment and control of any related safety risks. Safety reviews, as discussed in the discussion on safety performance monitoring and measurement, can be valuable sources of information to support decision making processes and manage change effectively.

The organisation's management of change process should take into account the following three considerations:

- (a) **Criticality.** Criticality assessments determine the systems, equipment or activities that are essential to the safe operation of aircraft. While criticality is normally assessed during the system design process it is also relevant during a situation of change. Systems, equipment and activities that have higher safety criticality should be reviewed following change to make sure that corrective actions can be taken to control potentially emerging safety risks.
- (b) **Stability of systems and operational environments.** Changes may be planned and under direct control of the organisation. Such changes include organisational growth or contraction, the expansion of products or services delivered, or the introduction of new technologies. Unplanned changes may include those related to economic cycles, labour unrest, as well as changes to the political, regulatory or operating environments.
- (c) **Past performance.** Past performance of critical systems and trend analyses in the safety assurance process should be employed to anticipate and monitor safety performance under situations of change. The monitoring of past performance will also assure the effectiveness of corrective actions taken to address safety deficiencies identified as a result of audits, evaluations, investigations or reports.

As systems evolve, incremental changes can accumulate, requiring amendments to the initial system description. Therefore, change management necessitates periodic reviews of the system description and the baseline hazard analysis to determine their continued validity.

2.3.3 Continuous Improvement of the SMS (Element 3.3)

Implementation Strategy for the Continuous Improvement of the SMS

Continuous improvement is measured through the monitoring of an organisation's safety performance indicators and is related to the maturity and effectiveness of an SMS. Safety assurance processes support improvements of the SMS through continual verification and follow up actions. These objectives are achieved through the application of internal evaluations and independent audits of the SMS.

Internal evaluations involve assessment of the service provider's aviation activities that can provide information useful to the organisation's decision making processes. It is here where the key activity of SMS – hazards identification and risks mitigation (HIRM) takes place. Evaluations conducted for the purpose of this requirement must be conducted by persons or organisations that are functionally independent of the technical processes being evaluated. The internal evaluation function includes evaluation of safety management functions, policymaking, safety risk management, safety assurance and safety promotion throughout the organisation.

Internal audits involve the systematic & scheduled examination of the service provider's aviation activities, including those specific to implementation of the SMS. To be most effective, internal audits are conducted by persons or departments that are independent of the functions being evaluated. Such audits provide the accountable manager as well as senior management officials responsible for the SMS, the ability to track the implementation and effectiveness of the SMS as well as its supporting systems.

External audits of the SMS may be conducted by relevant authorities responsible for acceptance of the service provider's SMS. Additionally, audits may be conducted by industry associations or other third parties selected by the service provider. These external audits enhance the internal audit system as well as provide independent oversight.

In summary, the evaluation and audit processes contribute to the service provider's ability to achieve safety continuous improvement in safety performance. On-going monitoring of the SMS, its related safety controls and support systems assures that the safety management process is achieving its objectives.

2.4 SAFETY PROMOTION

Safety promotion encourages a positive safety culture, and creates an environment that is conducive to achievement of the service provider's safety objectives. A positive safety culture is characterised by values, attitudes, and behaviour that are committed to the organisation's safety efforts. This is achieved 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.

An organisational safety effort cannot succeed solely by mandate or strict adherence to policies. 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 service provider must establish and implement processes and procedures that facilitate effective communication throughout all levels of the organisation. Service providers should communicate their safety objectives, as well as the current status of any related activities and events. Service providers must also encourage "bottom up" communication, providing an environment that allows senior management to receive open and constructive feedback from operational personnel.

2.4.1 Training and Education (Element 4.1)

Implementation Strategy for Training and Education

The safety manager should provide current information and training facilitation relevant to specific safety issues encountered by organisational units. The provision of training to appropriate staff, regardless of their level in the organisation, is an indication of management's commitment to an effective SMS. Safety training and education curricula should consist of the following:

- (a) Organisational safety policies, goals & objectives ;
- (b) Organisational safety roles and responsibilities related to safety;
- (c) Basic safety risk management principles;
- (d) Safety reporting systems;
- (e) Safety management support (including evaluation and audit programmes);
- (f) Lines of communication for dissemination of safety information;
- (g) A validation process that measures the effectiveness of training;
- (h) Documented initial indoctrination and recurrent training requirements;

Training requirements consistent with the needs and complexity of the organisation should be documented for each area of activity. A training file should be developed for each employee, including management.

Safety training within an organisation must ensure that personnel are competent to perform their safety related duties.

Training procedures should specify initial and recurrent safety training standards for operational personnel, managers and supervisors, senior managers and the Accountable Manager. The amount and the level of safety training should be appropriate to the individual's responsibility and involvement in the SMS. The SMS training documentation should also specify responsibilities for development of training content and scheduling as well as training records management.

The training should include the organisation's safety policy, safety roles and responsibilities, SMS principles related to safety risk management and safety assurance, as well as the use and benefits of the organisation's safety reporting system(s).

Safety training for senior managers should include content related to compliance with national and organisational safety requirements, allocation of resources, and active promotion of the SMS including effective inter-departmental safety communication. In addition, safety training for senior managers should include material on establishing safety performance targets and alert levels.

Finally, the safety training programme may include a session designed specifically for the Accountable Manager. This training session should be at a high level providing the Accountable Manager with an understanding of the SMS, the regulations requiring an SMS and its relationship to the organisation's overall business strategy.

2.4.2 Communication (Element 4.2)

Implementation Strategy for Safety Communication

The service provider should communicate the organisation's SMS objectives and procedures to all operational personnel. The safety manager should regularly communicate information regarding the safety performance trends and specific safety issues through bulletins and briefings. The safety manager should also ensure that lessons learned from investigations and case histories or experiences, both internally and from other organisations, are distributed widely.

Safety performance will be more efficient if operational personnel are actively encouraged to identify and report hazards.

Safety communication therefore aims to:

- (a) ensure that staff are fully aware of the SMS;
- (b) convey safety-critical information;
- (c) raise awareness of corrective actions; and
- (d) provide information regarding new or amended safety procedures.

Examples of organisational communication initiatives include:

- (a) safety management systems manual dissemination;
- (b) safety processes and procedures;
- (c) safety newsletters, notices and bulletins; and
- (d) websites or email.

3. SMS IMPLEMENTATION PLANNING

3.1 System Description

A systems review and description of the SMS elements and their interface with existing systems and processes is the first step to define the scope and applicability of the SMS. This exercise provides an opportunity to identify any gaps related to service provider's SMS components and elements. The system description includes the SMS interfaces within the organisation, as well as pertinent interfaces with other external organisations such as sub-contractors.

An overview of the system description and its accountability and reporting structure should be included in the SMS documentation. For large and complex organisations, details of basic systems and organisational procedures are addressed in the service provider's relevant exposition or administrative manuals.

In such cases, a brief outline together with an organisation chart with appropriate cross references may be adequate for the purpose of the system description.

3.2 Integration of Management Systems

Depending upon the organisational, operational and regulatory contexts, a service provider may implement an integrated SMS. Integration has the potential to provide synergies by managing safety risks across multiple areas of aviation activities. For example, a service provider may implement a single SMS for its design organisation, production organisation, and business aviation flight department. Alternatively, there may be situations where an individual SMS for each type of aviation activity is appropriate.

The organisation may define the best means to integrate or segregate its SMS as suits its business or organisational model, subject to satisfying the CAA-B that its SMS duties in all service provider roles are being properly discharged. The service provider's SMS may also be integrated with security, occupational health and environmental management systems.

3.3 SMS and QMS Integration

Aviation service providers typically implement enterprise-wide management systems. Organisational safety performance is dependent on the effective integration of these systems to support the delivery of products and services. In the context of SMS, the most significant aspect of integration is with the service provider's Quality Management System (QMS). QMS is generally defined as the organisational structure and associated accountabilities, resources, processes, and procedures necessary to establish and promote a system of continuous quality assurance and improvement while delivering a product or service.

QMS is an existing aviation regulatory requirement for most service providers including production approval (Annex 8), maintenance organisations (Annex 6 Part I) and meteorological and aeronautical data service providers (Annexes 3 and 15, respectively).

The QMS and SMS are complementary. QMS is focused on compliance to prescriptive regulations and requirements, to meet customer expectations and contractual obligations while the SMS is focused on safety performance. The objectives of an SMS are to identify safety related hazards, assess the associated risk, and implement effective risk controls. In contrast, the QMS focuses on the consistent delivery of products and services that meet relevant specifications. Nonetheless, both the SMS and QMS:

- (a) must be planned and managed;
- (b) depend upon measurement and monitoring of performance indicators;
- (c) involve all organisational functions related to the delivery of aviation products and service; and
- (d) strive for continuous improvement.

SMS and QMS utilise similar risk management and assurance processes. The objective of the SMS is to identify safety related hazards the organisation must confront, and to control the associated risks. SMS is designed to manage safety risk and measure safety performance during delivery of products and services.



The safety risk management process eliminates hazards or provides effective controls to mitigate safety risks by maintaining an appropriate resource allocation balance between production and protection to meet safety performance requirements.

A QMS provides consistency in the delivery of products and services to meet performance standards as well as customer expectations. The QMS also has an independent assurance function that utilises a feedback loop to assure delivery of products and services that are fit for purpose and free of defects or errors. The quality assurance function identifies ineffective processes and procedures that must be redesigned for efficiency and effectiveness.

Furthermore, SMS and QMS utilise similar tools. Safety and quality practitioners are essentially focused on the same goal of providing safe and reliable products and services to customers. Both quality and safety practitioners are trained on various analysis methods including root cause analysis and statistical trending analysis.

Given the complementary aspects of SMS and QMS, it is possible to establish a synergistic relationship between both systems that can be summarized as follows:

- (a) an SMS is supported by QMS processes such as auditing, inspection, investigation, root cause analysis, process design, statistical analysis, and preventive measures;
- (b) a QMS may anticipate safety issues that exist despite the organisation’s compliance with standards and specifications; and
- (c) quality principles, policies and practices are linked to the objectives of safety management.

The relationship between SMS and QMS leads to the complementary contributions of each system to the attainment of the organisation’s safety and quality goals. A summary comparison may be reflected as follows:

QMS	SMS
Quality	Safety
Quality assurance	Safety assurance
Quality control	Hazard identification & Risk control
Quality culture	Safety culture
Compliance to requirements	Acceptable level of safety performance
Prescriptive	Performance-based
Standards & specifications	Organisational & human factors
Reactive > Proactive	Proactive > Predictive

GAP ANALYSIS

A gap analysis compares the service provider’s existing safety management processes and procedures with requirements contained in the SMS framework. Aviation service providers will have typically implemented various SMS functions due to their compliance with national regulations or adoption of industry best practices. The development of an SMS should build upon existing organisational structures and control systems.

The gap analysis facilitates development of an SMS implementation plan by identifying the gaps that must be addressed to fully implement an SMS. Once the gap analysis is complete and fully documented, the resources and processes that have been identified as missing or inadequate will form the basis of the SMS implementation plan.

Appendix 2 provides a listing of gap analysis questions to facilitate service providers in systematically assessing their existing processes. From an objective response to each gap analysis question, it will then be apparent as to what enhancements or actions are required.

3.4 SMS Implementation Plan

An SMS implementation plan is developed in consultation with the Accountable Manager and managers responsible for the delivery of products and services related to, or in support of, the safe operation of aircraft. Once completed, the Accountable Manager endorses the plan. The SMS implementation plan includes timelines and milestones consistent with the requirements identified in the gap analysis process, the size of the service provider and the complexity of its products or services. The plan should address coordination with external organisations or contractors where applicable.

The service provider's implementation plan may be documented in different forms, varying from a simple spreadsheet or specialised project management software. The implementation plan should address gaps, through completion of specific actions and completion of milestones according to the stated timeline. Assignment of each task assures accountability throughout the implementation process. The plan should be reviewed regularly and updated as necessary. A format example of an SMS implementation plan/ schedule is in Appendix 2.

Full implementation of all components and elements of the SMS framework may take up to five years, depending on an organisation's maturity and complexity. For a small organisation the CAA-B would expect implementation to take no longer than two years.

3.5 Safety Performance Indicators

An SMS defines measurable performance outcomes to determine whether the system is truly operating in accordance with design expectations and not simply meeting regulatory requirements. The safety performance indicators are used to monitor known safety risks, detect emerging safety risks and to determine any necessary corrective actions.

These safety performance indicators also provide objective evidence for the CAA-B to assess the effectiveness of the service provider's SMS and to monitor achievement of its safety objectives. The service provider's safety performance indicators consider factors such as the organisation's safety risk tolerance, the cost/ benefits of implementing improvements to the system, regulatory requirements and public expectations.

Safety performance indicators should be selected and developed in consultation with the CAA-B.

This process is necessary to facilitate the CAA-B's aggregation and harmonisation of service provider's safety performance indicators for the same aviation sector.

The safety performance indicators and associated targets should be accepted by the CAA-B as part of their approval of the organisations' SMS. Safety performance indicators are supplementary to any legal, or regulatory requirements and do not relieve service providers from their regulatory obligations.

In practice, the safety performance of an SMS is expressed by safety performance indicators and their corresponding alert and target values. The service provider should monitor current indicators' performance in the context of historical trends to identify any abnormal changes in safety performance. Likewise, target and alert settings should take into consideration recent historical performance for a given indicator. Desired improvement targets should be realistic and achievable for the service provider and the associated aviation sector.

Establishing an alert level for a safety indicator is pertinent from a risk monitoring perspective. An alert level is a common criterion to delineate the acceptable from the unacceptable performance regions for a particular safety indicator. As per generic safety metrics textbooks, a basic objective method for setting out-of-control (OCC) alert criteria is the use of Standard Deviation principle. This method takes into consideration the standard deviation and average values of the preceding historical data points for a given safety indicator. These two values are then used to establish the alert level for the next monitoring period of the indicator.

A range of high consequence as well as lower consequence safety performance indicators provide a more comprehensive insight into the service provider's safety performance. This will ensure that high consequence outcomes (e.g. accidents and serious incidents) as well as lower consequence events (e.g. incidents, non-conformance reports, deviations), are addressed. Safety performance indicators are essentially data trending charts that track occurrences in terms of event rates (e.g. number of incidents per 1000 flying hours). High consequence indicators should be addressed first whilst lower consequence indicators may be developed at the more matured phase of SMS implementation.

Once safety performance indicators and their corresponding targets and alert settings are defined, performance outcomes of each indicator should be updated and monitored on a regular basis. The target and alert level for each indicator may be tracked for their respective performance status. A consolidated summary of the overall target/ alert performance outcome of the complete safety performance indicators package may also be compiled/ aggregated for a given monitoring period. Qualitative values (satisfactory / unsatisfactory) may be assigned for each target achieved and each alert level not breached. Alternatively, numeric values (points) may be used to provide a quantitative measurement of the overall performance for the package of indicators. Examples of safety indicators and targets are in Appendix 6.

3.6 Phased Implementation Approach for New AOC Holders

The implementation of an SMS is a systematic process and for new CAA-B approval holders cannot realistically be achieved at the start of an approval. For this reason the CAA-B would expect a new approval holder to have achieved a certain standard for the initial grant of an approval, and full compliance and an effective SMS achieved within a further twelve months. Table A below defines what is expected for the grant of an approval (Phase 1). It is done in the format of a questionnaire so that the organisation can assess their compliance and understand the CAA-B's expectations.

Table A – Phase 1 Assessment

		Compliance Y/ N /	Comments / Reference to compliance
Management commitment and responsibility	Is there a written safety policy endorsed by the Accountable Manager?		
	Are Senior Management expected to continuously promote and demonstrate its commitment to the safety policy?		
	Has the safety policy been communicated effectively throughout the organisation?		
	Does the safety policy cover the points in CAP GEN 01?		
Safety accountabilities	Are the safety accountabilities and responsibilities of the Accountable Manager and other key staff members clearly defined and published for all staff and contractors to see?		
	Does the Accountable Manager have full responsibility for the SMS and authority to make decisions regarding the budget?		
	Has the management structure of the organisation been defined?		
	Are all staff members aware of their safety roles and responsibilities?		
Appointment of key safety staff members	Has a focal point/Safety Manager for the SMS been appointed?		
	Is there a direct reporting line between the SMS focal point/ Safety Manager and the Accountable Manager?		
	Does the SMS focal point/ Safety Manager have the appropriate SMS knowledge and understanding?		
	Does the organisation have a Safety Review Board or equivalent?		
Safety Review Board	Is the Safety Review Board or equivalent required to monitor the safety performance and the effectiveness of the SMS?		
	Does the Safety Review Board or equivalent required to meet at least annually and are the meetings to be minuted?		
Emergency response planning	Has an emergency response plan been developed and required to be kept up to date?		



		Compliance Y/ N /	Comments / Reference to compliance
	Are the roles, responsibilities and actions of key staff members defined in the ERP?		
	Does the ERP include all the considerations in CAP GEN 01 guidance material if appropriate?		
	Is the ERP required to be regularly reviewed and tested?		
Safety documentation	Does the safety management manual or safety documentation in existing manuals contain all the elements as detailed in CAP GEN 01?		
	Is it required to be regularly reviewed?		
	Is there a system for the recording and storage of SMS documentation and records i.e. hazard logs, risk assessments, safety reports from staff/contractors and safety cases?		
Hazard identification	Is there a confidential safety reporting system?		
	Are safety reports assigned an 'owner' and reviewed by the Safety Review Board or equivalent?		
	Is there feedback to the reporter?		
	Is there a written procedure describing how hazards are identified?		
	Have the major hazards associated with the organisation been identified?		
Risk assessment and mitigation	Is there a risk assessment process in place?		
	Is the risk tolerability matrix appropriate and can it be applied consistently?		
	Is there a process for deciding any necessary risk mitigation?		
	Are risk mitigations and controls required to be verified/audited to confirm the effectiveness?		
	Are risks required to be managed to a reasonable level?		



		Compliance Y/ N /	Comments / Reference to compliance
	Are the hazards and risks recorded on a hazard log or risk register?		
Safety performance monitoring	Have safety performance indicators been defined?		
	Are the safety performance indicators required to be reviewed regularly to identify any trends?		
Management of change	Is there a process to proactively identify hazards and to mitigate risks when significant changes in the organisation occur?		
Incident management	Are safety investigations required to be carried out after incidents or accidents to establish root cause?		
	Are the hazards identified from safety investigations required to be addressed and communicated to the rest of the organisation?		
Continuous improvement	Is continuous improvement in the safety performance required to be achieved?		
Safety auditing	Are safety audits and surveys required to be carried out?		
	Is there an independent quality system or third party agency that audits the SMS?		
Safety training	Have all staff been appropriately trained in respect of the SMS and their safety roles and responsibilities?		
Communication	Does the system require safety related information to be communicated to all staff members as appropriate?		
	Does relevant safety information reach external users/customers etc.?		
SMS implementation	If applicable, has a gap analysis been carried out so that full compliance and effectiveness can be achieved within 12 months?		
	Is there an SMS implementation plan?		
	If applicable. does the implementation plan reflect the gap analysis?		
	Is the implementation plan on target?		

Table B below defines what is expected twelve months after for the grant of an approval and within two years for those operators/organisation issued with a Phase 1 approval. It is done in the format of a questionnaire so that the organisation can assess their compliance and understand the CAA-B’s expectations.

Table B – Phase 2 Assessment

SAFETY RISK MANAGEMENT

HAZARD IDENTIFICATION

The organisation has processes in place to enable aviation safety hazards to be identified. This should include expert judgement, a reporting system and the investigation of incidents and accidents to identify potential hazards.

COMPLIANCE Hazard Identification		Yes/No	How it is achieved	CAA-B Remarks
1.1.1	The organisation has a reporting system to capture errors, hazards and near misses that is simple to use and accessible to all staff.			
1.1.2	The organisation has proactively identified all the major hazards and assessed the risks related to its current activities.			
1.1.3	Safety investigations are carried out to identify underlying causes and potential hazards for existing and future operations.			
1.1.4	Safety reports are acted on in a timely manner.			
1.1.5	Hazard identification is an ongoing process and involves all key personnel and appropriate stakeholders.			
1.1.6	Personnel express confidence and trust in the organisations reporting policy and process.			
1.1.7	Human performance related hazards are being identified.			

RISK ASSESSMENT AND MITIGATION

The organisation will develop and maintain a process that ensures identified hazards are risk assessed and managed to an acceptable level.

COMPLIANCE Risk Assessment and Mitigation		Yes/No	How it is achieved	CAA-B Remarks
1.2.1	There is a structured process for the management of risk that includes the assessment of risk associated with identified hazards, expressed in terms of likelihood and severity			

1.2.2	There are criteria for evaluating the level of risk the organisation is willing to accept and risk assessments and risk ratings are appropriately justified.			
1.2.3	The organisation has risk control strategies that deliver effective and robust mitigations and controls and where applicable corrective action.			
1.2.4	Corrective actions resulting from the risk assessment, including timelines and allocation of responsibilities are documented.			
1.2.5	Senior management have visibility of medium and high risk hazards and their mitigation and controls.			

SAFETY ASSURANCE

SAFETY PERFORMANCE MONITORING AND MEASUREMENT

The organisation will develop and maintain the means to verify the safety performance of the organisation and to validate the effectiveness of safety risks controls. This is achieved through audits and the establishment and monitoring of safety performance indicators.

COMPLIANCE Safety Performance Monitoring & Measurement		Yes/No	How it is achieved	CAA-B Remarks
2.1.1	Safety performance indicators have been defined, promulgated and are being monitored and analysed for trends.			
2.1.2	Risk mitigations and controls are being verified/audited to confirm they are working and effective.			
2.1.3	Safety Assurance and Compliance Monitoring activities feed back into the hazard identification and risk management process.			
2.1.4	Safety assurance takes into account activities carried out in all directly contracted / sub-contracted organisations.			
2.1.5	The organisation is monitoring its current, future and third party safety risks and is taking action to address unacceptable safety risks.			

THE MANAGEMENT OF CHANGE

The organisation will develop and maintain a process to identify changes within the organisation and its operation. It should identify any related hazards which should be risk assessed and managed to ensure that the change does not have an adverse effect on safety performance.

COMPLIANCE Management of Change		Yes/No	How it is achieved	CAA-B Remarks
2.2.1	The organisation has established a process and conducts formal hazard analyses/risk assessment for major operational changes, major organisational changes and changes in key personnel.			
2.2.2	Key stakeholders are involved in the change management process.			
2.2.3	During the change management process previous risk assessments and existing hazards are reviewed for possible effect.			

CONTINUOUS IMPROVEMENT OF THE SMS

The organisation will strive for continuous improvement through regular management reviews, a process which may include formal and informal cross organisational meetings, employee continuous improvement processes to enhance the organisation's safety performance.

COMPLIANCE Continuous Improvement of the SMS		Yes/No	How it is achieved	CAA-B Remarks
2.3.1	The SMS is periodically reviewed (at least annually) for improvements in safety performance.			

SAFETY POLICY AND OBJECTIVES

MANAGEMENT COMMITMENT AND RESPONSIBILITY

The organisation will define its safety policy which shall be signed by the Accountable Manager of the organisation. The safety policy should set a clear high level direction for the organisation to follow in order to manage safety effectively. The safety policy should include the safety reporting procedures and clearly indicate which types of behaviours are unacceptable and shall include the conditions under which disciplinary action would not apply. The safety policy should be periodically reviewed to ensure its remains relevant and appropriate to the organisation.

COMPLIANCE Management Commitment and Responsibility		Yes/No	How it is achieved	CAA-B Remarks
3.1.1	There is a safety policy that includes a commitment towards achieving the highest safety standards signed by the Accountable Manager			
3.1.2	The safety policy is communicated to all employees with the intent that they are made aware of their individual contributions and obligations with regard to Safety.			
3.1.3	The safety policy includes a commitment to continuous improvement, observe all applicable legal requirements, standards and best practice providing appropriate resources and defining safety as a primary responsibility of all Managers.			
3.1.4	The safety policy actively encourages			



	safety reporting			
3.1.5	The safety policy is reviewed periodically to ensure it remains current			
3.1.6	A Just Culture policy has been defined that clearly identifies the conditions under which punitive action would be considered (e.g. illegal activity, negligence or wilful misconduct)			

SAFETY ACCOUNTABILITIES

The organisation will identify the accountable manager who shall have ultimate responsibility and accountability, on behalf of the organisation, for the implementation and maintenance of the SMS. Safety responsibilities, accountabilities and authorities should be documented and communicated throughout the organisation so everyone is aware of their roles and responsibilities.

COMPLIANCE Safety Accountabilities		Yes/No	How it is achieved	CAA-B Remarks
3.2.1	An Accountable Manager has been appointed with full responsibility and ultimate accountability for the SMS to ensure it is properly implemented and performing effectively.			
3.2.2	The Accountable Manager is fully aware of their SMS roles and responsibilities in respect of the safety, policy, safety standards and safety culture of the organisation.			
3.2.3	Staff at all levels are aware of and understand their safety accountabilities, authorities and responsibilities regarding all safety management processes, decisions and actions.			

APPOINTMENT OF KEY PERSONNEL

The organisation will identify a safety manager to be the responsible individual and focal point for the implementation and maintenance of an effective SMS. Where appropriate a Safety Review Board, or equivalent, should support the Accountable Manager and the Safety Manager in delivering an effective SMS.

COMPLIANCE Appointment of Key Personnel		Yes/No	How it is achieved	CAA-B Remarks
3.3.1	A competent person with the appropriate knowledge, skills and experience has been nominated to manage the operation of the SMS and fulfils the required job functions and responsibilities.			

CO-ORDINATION OF EMERGENCY RESPONSE PLANNING

The organisation will 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 is properly coordinated with the emergency response plans of those organisations it must interface with during the provision of its service.

COMPLIANCE Co-ordination of Emergency Response Planning		Yes/No	How it is achieved	CAA-B Remarks
3.4.1	An emergency response plan 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.			
3.4.2	The organisation has a process to communicate and distribute the ERP procedures and key personnel in an emergency have easy access to the ERP at all times.			
3.4.3	The ERP is periodically tested for the adequacy of the plan and the results reviewed to improve its effectiveness			

SMS DOCUMENTATION

The organisation will develop and maintain SMS documentation describing the safety policy, processes and procedures and appropriate safety records as hazard logs and risk assessments. The organisation may incorporate the SMS documentation into its existing operational documentation, or develop and maintain a standalone safety management system manual (SMSM).

COMPLIANCE SMS Documentation		Yes/No	How it is achieved	CAA-B Remarks
3.5.1	There is documentation that describes the safety management system and the interrelationships between all of its elements			
3.5.2	SMS documentation, including SMS related records, are regularly reviewed and updated with appropriate version control in place			
3.5.3	SMS documentation is readily available to all personnel			

SAFETY PROMOTION

TRAINING AND EDUCATION

All personnel are trained and competent to perform their SMS related duties and are aware of the organisation’s safety policy, procedures and processes.



COMPLIANCE Training and Education		Yes/No	How it is achieved	CAA-B Remarks
4.1.1	There is a documented process to identify Safety Management training requirements, including initial and recurrent training, so that personnel are competent to perform their duties, including appropriate training records.			

SAFETY COMMUNICATION

The organisation will communicate safety critical information to its own personnel and other parties where appropriate.

COMPLIANCE Safety Communication		Yes/No	How it is achieved	CAA-B Remarks
4.2.1	Significant events and investigation outcomes are communicated to staff, including contracted organisations where appropriate.			



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APPENDIX 1

SAMPLE JOB DESCRIPTION FOR A SAFETY MANAGER

1. OVERALL PURPOSE

The safety manager is responsible to the accountable manager for providing guidance and direction for the planning, implementation and operation of the organisation's safety management system (SMS). The safety manager provides SMS related services to the certificated, non-certificated and third party areas of the organisation that are included in the SMS and may have delegated responsibilities on behalf of persons holding positions required by regulations.

2. KEY ROLES***Safety advocate***

Demonstrates an excellent safety behaviour and attitude, follows regulatory practices and rules, recognises and reports hazards and promotes effective safety reporting.

Leader

Models and promotes an organisational culture that fosters safety practices through effective leadership.

Communicator

Acts as an information conduit to bring safety issues to the attention of management and to deliver safety information to the organisation's staff, contractors and stakeholders.
Provides and articulates information regarding safety issues within the organisation.

Developer

Assists in the continuous improvement of the hazard identification and safety risk assessment schemes and the organisation's SMS.

Relationship builder

Builds and maintains an excellent working relationship with the organisation's Safety Action Group (SAG) and within the safety services office (SSO).

Ambassador

Represents the organisation on government, international organisation and industry committees (e.g. ICAO, IATA, etc.).

Analyst

Analyses technical data for trends related to hazards, events and occurrences.

Process management

Effectively utilises applicable processes and procedures to fulfil roles and responsibilities.
Investigates opportunities to increase the efficiency of processes.
Measures the effectiveness and seeks to continually improve the quality of processes.

3. RESPONSIBILITIES

The safety manager is responsible for amongst other duties:

- (a) managing the operation of the safety management system;
- (b) collecting and analysing safety information in a timely manner;
- (c) administering any safety-related surveys;
- (d) monitoring and evaluating the results of corrective actions;
- (e) ensuring that risk assessments are conducted when applicable;
- (f) monitoring the industry for safety concerns that could affect the organisation;
- (g) involvement with actual or practice emergency responses;
- (h) involvement in the development and updating of emergency response plan and procedures; and
- (i) ensuring safety-related information, including organisation goals and objectives, are made available to all personnel through established communication processes.

4. NATURE AND SCOPE

The safety manager must interact with operational personnel, senior managers and departmental heads throughout the organisation. The safety manager should also foster positive relationships with regulatory authorities, agencies and product and service providers outside the organisation. Other contacts will be established at a working level as appropriate.

5. QUALIFICATIONS

To qualify as a safety manager the person should have:

- Full-time experience in aviation safety in the capacity of an aviation safety investigator, safety/ quality manager or safety risk manager;
- Sound knowledge of the organisation's operations, procedures and activities;
- Broad aviation technical knowledge;
- Extensive knowledge of Safety Management Systems (SMS) and have completed appropriate SMS training;
- An understanding of Risk Management principles and techniques to support the SMS;
- Experience implementing and/or managing Safety Management Systems (SMS);

- Experience and qualifications in aviation accident/ incident investigation and human factors;
- Experience and qualifications in conducting safety/ quality audits and inspections;
- Sound knowledge of aviation regulatory frameworks, including ICAO Standards and Recommended Practices (SARPS) and relevant Civil Aviation Regulations;
- Ability to communicate at all levels both inside and outside the company;
- Ability to be firm in conviction, promote a just and fair culture and yet advance an open and non-punitive atmosphere for reporting;
- Ability and confidence to communicate directly to the accountable manager as his advisor and confidante;
- Well-developed communication skills and demonstrated interpersonal skills of a high order, with the ability to liaise with a variety of individuals and organisational representatives, including those from differing cultural backgrounds;
- Computer literacy and superior analytical skills;

6. AUTHORITY

- (a) Regarding safety matters, the safety manager has direct access to the Accountable Manager and appropriate senior and middle management.
- (b) The safety manager is authorised under the direction of the Accountable Manager to conduct safety audits, surveys and inspections of any aspect of the operation in accordance with the procedures specified in the safety management system documentation
- (c) The safety manager is authorised under the direction of the Accountable Manager to conduct investigations of internal safety events in accordance with the procedures specified in the organisation's safety management system documentation.
- (d) The safety manager should not hold other positions or responsibilities that may conflict or impair his role as a SMS/ Safety manager. This should be a senior management position not lower than or subservient to production or operational functions of the organisation.



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APPENDIX 2

GUIDANCE ON SMS GAP ANALYSIS AND IMPLEMENTATION PLAN

1 INITIAL GAP ANALYSIS CHECKLIST (TABLE 1)

The initial gap analysis questions checklist (Table 1) that follows can be used as a template to conduct the first step of a SMS gap analysis. This format with its overall —Yes/ No/ Partial response will provide an initial indication of the broad scope of gaps and hence overall workload to be expected. The questionnaire may be adjusted to suit the needs of the organisation and the nature of the product or service provided. This initial information should be useful to senior management in anticipating the scale of the SMS implementation effort and hence the resources to be provided (This initial checklist would need to be followed up by an appropriate implementation plan per Table 2 & 3).

A —Yes response indicates that the organisation meets or exceeds the expectation of the question concerned. A —No response indicates a substantial gap in the existing system with respect to the question's expectation. A —Partial response indicates that further enhancement or development work is required to an existing process in order to meet the question's expectations.

GAP Analysis Checklist Table 1

No.	Aspect to be analysed or question to be answered	Answer	Status of implementation
Component 1 — SAFETY POLICY AND OBJECTIVES			
Element 1.1 — Management commitment and responsibility			
1	Is there a safety policy in place?	Yes No Partial	
2	Does the safety policy reflect senior management commitments regarding safety management?	Yes No Partial	
3	The Safety Policy is appropriate to the size, nature and complexity of the organisation.	Yes No Partial	
4	The Safety Policy is relevant to aviation safety.	Yes No Partial	
5	Is the safety policy signed by the Accountable Manager?	Yes No Partial	
6	Is the safety policy communicated, with visible endorsement, throughout the organisation?	Yes No Partial	
7	Is the safety policy periodically reviewed to ensure it remains relevant and appropriate to the organisation?	Yes No Partial	
Element 1.2 — Safety accountabilities			
1	Has the organisation identified an Accountable Manager who, irrespective of other functions, shall have ultimate responsibility and accountability, on behalf of the organisation, for the implementation and maintenance of the	Yes No Partial	

No.	Aspect to be analysed or question to be answered	Answer	Status of implementation
	SMS?		
2	Does the Accountable Manager have full control of the financial and human resources required for the operations authorised to be conducted under the operations certificate?	Yes No Partial	
3	Does the Accountable Manager have final authority over all aviation activities of his organisation?	Yes No Partial	
4	Has the organisation identified and documented the safety accountabilities of management as well as operational personnel, with respect to the SMS?	Yes No Partial	
5	Is there a Safety Review board for the purpose of reviewing SMS and safety performance?	Yes No Partial	
6	Is the Safety Review Board chaired by the Accountable Manager or by an appropriately assigned deputy, duly substantiated in the SMS manual?	Yes No Partial	
7	Does the Safety Review Board include relevant operational or departmental Heads as applicable?	Yes No Partial	
8	Are there Safety Action Groups that work in conjunction with the Safety Committee? (large/ complex organisations as appropriate)	Yes No Partial	
Element 1.3 — Appointment of key safety personnel			
1	Has the organisation appointed a qualified person to manage and oversee the day-to-day operation of the SMS?	Yes No Partial	
2	Does the qualified person have direct access or reporting to the Accountable Manager concerning the implementation & operation of the SMS?	Yes No Partial	
3	The Manager responsible for administering the SMS does not hold other responsibilities that may conflict or impair his role as SMS manager.	Yes No Partial	
4	The SMS Manager is a senior management position not lower than or subservient to other operational or production positions	Yes No Partial	
Element 1.4 — Coordination of emergency response planning			
1	Does the organisation have an emergency response/contingency plan appropriate to the size, nature and complexity of the organisation?	Yes No Partial	
2	Does the Emergency/ Contingency plan address all possible or likely emergency/ crisis scenarios relating to the organisation's aviation product or service deliveries?	Yes No Partial	
3	Does the ERP include procedures for the continuing safe production, delivery or support of its aviation products or services during such emergencies or contingencies?	Yes No Partial	
4	Is there a plan and record for drills or exercises with respect to the ERP?	Yes No Partial	
5	Does the ERP address necessary coordination of its emergency response/contingency procedures with the emergency/response contingency procedures of other organisations where applicable?	Yes No Partial	



No.	Aspect to be analysed or question to be answered	Answer	Status of implementation
6	Does the organisation have a process to distribute and communicate the ERP to all relevant personnel, including relevant external organisations?	Yes No Partial	
7	Is there a procedure for periodic review of the ERP to ensure its continuing relevance & effectiveness?	Yes No Partial	
Element 1.5 — SMS documentation			
1	There is a top level SMS summary or exposition Document which is approved by the Accountable Manager and accepted by the CAA-B.	Yes No Partial	
2	Does the SMS Documentation address the organisation's SMS and its associated components and elements?	Yes No Partial	
3	Is the organisation's SMS framework in alignment to the regulatory SMS framework?	Yes No Partial	
4	Does the organisation maintain a record of relevant supporting documentation pertinent to the implementation and operation of the SMS?	Yes No Partial	
5	Does the organisation have a SMS implementation plan to establish its SMS implementation process, including specific tasks and their relevant implementation milestones?	Yes No Partial	
6	Does the SMS implementation plan address the coordination between the service provider's SMS and the SMS of external organisations where applicable?	Yes No Partial	
7	Is the SMS implementation plan endorsed by the Accountable Manager?	Yes No Partial	
Component 2 — SAFETY RISK MANAGEMENT			
Element 2.1 — Hazard identification			
1	There is a process for voluntary hazards/ threats reporting by all employees.	Yes No Partial	
2	Is the voluntary hazard/ threats reporting simple, available to all personnel involved in safety-related duties and commensurate with the size of the service provider?	Yes No Partial	
3	Does the organisation's SDCPS include procedures for incident/ accident reporting by operational or production personnel?	Yes No Partial	
4	Is incident/ accident reporting simple, accessible to all personnel involved in safety-related duties and commensurate with the size of the service provider?	Yes No Partial	
5	Does the organisation have procedures for investigation of all reported incident/ accidents?.	Yes No Partial	
6	Are there procedures to ensure that hazards/ threats identified or uncovered during incident/ accident investigation processes are appropriately accounted for and integrated into the organisation's hazard collection and risk mitigation procedure?	Yes No Partial	
7	Are there procedures to review hazards/ threats from relevant industry reports for follow up actions or risk evaluation where applicable?	Yes No Partial	

No.	Aspect to be analysed or question to be answered	Answer	Status of implementation
Element 2.2 — Safety risk assessment and mitigation			
1	Is there a documented Hazard Identification and Risk Mitigation (HIRM) procedure involving the use of objective risk analysis tools.	Yes No Partial	
2	Is the risk assessment reports approved by departmental managers or higher level where appropriate?	Yes No Partial	
3	Is there a procedure for periodic review of existing risk mitigation records?	Yes No Partial	
4	Is there a procedure to account for mitigation actions whenever unacceptable risk levels are identified?	Yes No Partial	
5	Is there a procedure to prioritise identified hazards for risk mitigation actions?	Yes No Partial	
6	Is there a program for systematic and progressive HIRM performance of all aviation safety-related operations/ processes/ facilities/ equipment as identified by the organisation?	Yes No Partial	
Component 3 — SAFETY ASSURANCE			
Element 3.1 — Safety performance monitoring and measurement			
1	Are there identified safety performance indicators for measuring & monitoring safety performance of the organisation's aviation activities?	Yes No Partial	
2	Are safety performance indicators relevant to the organisation's safety policy as well as management's high level safety objectives/ goals?	Yes No Partial	
3	Do the safety performance indicators include alert/ target settings to define unacceptable performance regions and planned improvement goals?	Yes No Partial	
4	Is the setting of alert levels or out of control criteria based on objective safety metrics principles?	Yes No Partial	
5	Do the safety performance indicators include quantitative monitoring of high consequence safety outcomes (e.g. accident & serious incident rates) as well as lower consequence events (e.g. rate of non-compliance, deviations)?	Yes No Partial	
6	Are safety performance indicators and their associated performance settings developed in consultation with, and subject to the CAA-B's agreement?	Yes No Partial	
7	Is there a procedure for corrective or follow up action to be taken when targets are not achieved and alert levels are exceeded/ breached?	Yes No Partial	
8	Are the safety performance indicators periodically reviewed?	Yes No Partial	
Element 3.2 — The management of change			
1	Is there a procedure for review of relevant existing aviation safety related facilities and equipment (including any HIRM records) whenever there are pertinent changes to those facilities or equipment?	Yes No Partial	



No.	Aspect to be analysed or question to be answered	Answer	Status of implementation
2	Is there a procedure for review of relevant existing aviation safety related operations and processes (including any HIRM records) whenever there are pertinent changes to those operations or processes?	Yes No Partial	
3	Is there a procedure for review of new aviation safety related operations and processes for hazards/ risks before they are commissioned?	Yes No Partial	
4	Is there a procedure for review of relevant existing facilities, equipment, operations or processes (including any HIRM records) whenever there are pertinent changes external to the organisation such as regulatory/ industry standards, best practices or technology?	Yes No Partial	
Element 3.3 — Continuous improvement of the SMS			
1	Is there a procedure for periodic internal audit/ assessment of the SMS?	Yes No Partial	
2	Is there a current internal SMS audit/ assessment plan?	Yes No Partial	
3	Does the SMS audit plan include the sampling of completed/ existing safety risk assessments?	Yes No Partial	
4	Does the SMS audit plan include the sampling of safety performance indicators for data currency and their target/ alert settings performance?	Yes No Partial	
5	Does the SMS audit plan cover the SMS interface with sub-contractors or customers where applicable?	Yes No Partial	
6	There is a process for SMS audit/ assessment reports to be submitted or highlighted for the Accountable Manager's attention where appropriate.	Yes No Partial	
Component 4 — SAFETY PROMOTION			
Element 4.1 — Training and education			
1	Is there a program to provide SMS training/ familiarization to personnel involved in the implementation or operation of the SMS?	Yes No Partial	
2	Has the Accountable Manager undergone appropriate SMS familiarisation, briefing or training?	Yes No Partial	
3	Are personnel involved in conducting risk mitigation provided with appropriate risk management training or familiarisation?	Yes No Partial	
4	Is there evidence of organisation wide SMS education or awareness efforts?	Yes No Partial	
Element 4.2 — Safety communication			
1	Does the organisation participate in safety information sharing with relevant external industry product and service providers or organisations, including the relevant aviation regulatory organisations?	Yes No Partial	
2	There is evidence of a Safety (SMS) publication, circular or channel for communicating Safety (SMS) matters to employees.	Yes No Partial	
3	Are the organisation's SMS manual and related guidance materials accessible or disseminated to all relevant personnel?	Yes No Partial	



2 DETAILED SMS GAP ANALYSIS & IMPLEMENTATION TASKS (TABLE 2)

The above Table 1 initial gap analysis checklist will now need to be followed up by a detailed –Required Tasks/ Actions|| plan such as per Table 2 example below. This Table 2 will provide follow up analysis on details of the gaps and translating these into actual required tasks and sub-tasks in the specific context of the organisation’s processes and procedures. Each Task is accordingly assigned to appropriate individuals or groups for action. It is important that correlation of individual element/ task development to their descriptive placeholders in the SMS Document be provided for in this Table 2. This will trigger progressive updating of the draft SMS Document even as each element is being enhanced or implemented. (Initial element write-ups in SMS documents tend to be anticipatory rather than declaratory).

3 Actions/ Tasks Implementation Schedule (Table 3)

Table 3 may be a separate consolidation of all outstanding Actions/ Tasks or if preferred, be a continuation of Table 2 in the form of a spread sheet. This Table will show the milestones (Start-End dates) as scheduled for each Task/ Action. For a Phased implementation approach, these Tasks/Actions would need to be sorted according to its related element’s Phase allocation. Refer to Phased Approach Section of this document for the phased prioritisation of SMS elements as appropriate. Where it is anticipated that the actual number of Tasks/ Actions and their milestones are sufficiently voluminous and complex as to require utilising a project management software to manage them. This may be done by using those such as MS project/ Gantt chart as appropriate.

Table 2 – SMS Gap Analysis & Implementation Tasks Identification (Format Example)

GA Q Ref	Gap Analysis Question	Answer: Yes/ No/ Partial	Description of Gap	Action/ Task Required to fill Gap	Assigned Task Group/ Person	SMS Document Ref/	Action/ task Status (Open/ WIP/ Closed)
1.1-1	Is there a safety policy in place?	Partial	Existing safety policy addresses Health and Safety only.	a) To enhance existing safety policy to include aviation SMS objectives and policies OR develop a separate aviation safety policy b) Safety policy to be approved and signed by Accountable Manager.	Task Group 1	Chapter 1, Section 1.3.	Open
Etc.							

Table 3 – SMS Implementation Schedule (Format Example)

Action/ Task Required to fill Gap	SMS Doc Ref/	Assigned Task Group/ Person	Action/ task Status	Schedule/ Timeline													
				1Q 10	2Q 10	3Q 10	4Q 10	1Q 11	2Q 11	3Q 11	4Q 11	1Q 12	2Q 12	3Q 12	4Q 12	etc.	
1.1-1a) To enhance existing safety policy to include aviation SMS objectives and policies OR develop a separate aviation	Chpt 1, Sect 1.3.	Task Group 1	Open														
1.1-1b) Safety policy to be approved and signed by Accountable																	
Etc																	

APPENDIX 3

GUIDANCE FOR THE DEVELOPMENT OF A SMS MANUAL

This Appendix serves to guide organisations in their compilation of a top level SMS Manual or Document to define their SMS framework and its associated elements. This Document can be a stand-alone SMS Manual or be integrated as a consolidated SMS Section/ Chapter within an appropriate approved/accepted manual of the organisation (e.g. Organisation Exposition Manual, Company Manual, Operations Manual etc.).

The suggested format and Content items in this Appendix is one way in which an organisation can develop its top level SMS Document. The actual Content items would depend on the specific SMS framework and elements of the organisation.

The description under each element would be commensurate with the scope and complexity of the organisation's SMS processes.

This Document will serve to communicate the organisation's SMS framework internally as well as with relevant external organisations. This Document may be subject to endorsement or approval by the CAA-B as evidence of the acceptance of the SMS.

Note: A distinction is to be made between a SMS Manual / Document from its operational supporting records and documents. The latter refers to historical and current records and documents generated during implementation and operation of the various SMS processes. These are documentary evidence of the on-going SMS activities of the organisation.

This SMS Document/ Manual guide is formatted in the following manner:

- (a) Section heading
- (b) Objective
- (c) Criteria
- (d) Cross Reference Documents

Below each numbered section heading is a description of the Objective for that section, followed by its Criteria and Cross Reference Documents. The Objective is what the organisation intends to achieve by doing what is described in the section. The Criteria defines the scope of what should be considered when writing the section. The Cross Reference Document links the information to other relevant manuals or SOPs of the organisation which contain details of the element or process as applicable.

The manual contents include:

1. Document control ;
2. SMS regulatory requirements ;

3. Scope and integration of the safety management system ;
4. Safety policy ;
5. Safety objectives ;
6. Safety accountabilities and key personnel ;
7. Safety reporting and remedial actions ;
8. Hazard identification and risk assessment ;
9. Safety performance monitoring and measurement ;
10. Safety-related investigations and remedial actions ;
11. Safety training and communication ;
12. Continuous improvement and SMS audit ;
13. SMS records management ;
14. Management of change ; and
15. Emergency Response Planning.

1. Document Control

Objective

Describe how the manual(s) kept up to date and ensure that all personnel involved in safety-related duties have the most current version.

Criteria

- (a) Hard copy or controlled electronic media and distribution list.
- (b) Correlation of this SMS manual with other existing manuals such as a Maintenance Control (MCM), Maintenance Management Exposition (MME), Operations Manual, should be explained.
- (c) Process for periodic review of the manual and its related forms/ documents to ensure their continuing suitability, adequacy and effectiveness.
- (d) Manual administration, approval and regulatory acceptance process.

Cross Reference Documents: *Quality manual; Engineering manual; etc.*

2. SMS Regulatory Requirements

Objective

Address current SMS regulations and guidance materials for necessary reference and awareness by all concerned.

Criteria

- (a) Spell out current SMS CAA-B regulations/standards. Include compliance timeframe and advisory material references as applicable.
- (b) Where, appropriate, elaborate or explain the significance and implications of those regulations to the organisation.
- (c) Correlate to other safety related requirements or standards where appropriate.

Cross Reference Documents: *SMS regulation/ requirement reference; SMS Guidance document CAP AIR 01; etc.*

3. Scope and Integration of the Safety Management System

Objective

Describe scope and extent of the organisation's aviation-related operations and facilities within which the SMS will apply. The scope of Hazard Identification and Risk Management eligible processes (e.g. does it include Health & Safety regulations, business risk etc.), equipment and operations should also be addressed.

Criteria

- (a) Spell out nature of the organisation's aviation business and its position or role within the industry as a whole.
- (b) Identify major areas, departments, workshops and facilities of the organisation within which the SMS will apply.
- (c) Identify major processes, operations and equipment which are deemed to be eligible for the organisation's HIRM program; especially those which are pertinent to aviation safety. If the scope of HIRM eligible processes, operations and equipment is too detailed or extensive, it may be controlled under a supplementary document as appropriate.
- (d) Where the SMS is expected to be operated or administered across a group of interlinked organisations or contractors, such integration and associated accountabilities should be defined and documented as applicable.
- (e) Where there are other related control/ management systems within the organisation such as QMS, Health & Safety, etc., their relevant integration (where applicable) within the aviation SMS should be identified.

Cross Reference Documents: *Quality Manual, Engineering Manual, etc.*

4. Safety Policy

Objective

Describe the organisation's intentions, management principles, and commitment to improving aviation safety in the product or service provider. A safety policy should be a short description similar to a mission statement.

Criteria

- (a) The safety policy should be appropriate to the size and complexity of the organisation.
- (b) The safety policy states the organisation's intentions, management principles and commitment to continuous improvement in aviation safety.
- (c) The safety policy is approved by the Accountable Manager.
- (d) The safety policy is promoted by the Accountable Manager and all other managers.
- (e) The safety policy is reviewed periodically.
- (f) Personnel at all levels are involved in the establishment and maintenance of the safety management system.
- (g) The safety policy is communicated to all employees with the intent that they are made aware of their individual safety obligations.
- (h) The safety policy should be signed by the Accountable Manager.

Cross Reference Documents: *Health & Safety policy, etc.*

5. Safety Objectives

Objective

Describe the safety objectives of the organisation. The safety objectives would be a short statement that describes in broad terms what you hope to achieve.

Criteria

- (a) Safety objectives have been established
- (b) Safety objectives are expressed as a top-level statement describing the organisation's commitment to achieving safety.
- (c) There is a formal process to develop a coherent set of safety objectives.

- (d) Safety objectives are publicized and distributed.
- (e) Resources have been allocated for achieving the objectives.
- (f) Safety objectives are linked to safety indicators to facilitate monitoring and measurement where appropriate.

Cross Reference Documents: *safety performance indicators document, etc.*

6. Roles and Responsibilities

Objective

Describe the safety authorities, responsibilities and accountabilities for personnel involved in the SMS.

Criteria

- (a) The Accountable Manager is responsible for ensuring that the safety management system is properly implemented and performing to requirements in all areas of the organisation.
- (b) Appropriate Safety Manager (office), Safety Review Board or Safety Action Groups have been appointed as appropriate.
- (c) Safety authorities, responsibilities and accountabilities of personnel at all levels of the organisation are defined and documented.
- (d) All personnel understand their authorities, responsibilities and accountabilities in regards to all safety management processes, decisions and actions.
- (e) An SMS organisational accountabilities diagram is available.

Cross Reference Documents: *Company exposition manual, SOP manual, Administration manual, etc.*

7. Safety Reporting

Objective

A reporting system should include both reactive (accident/incident reports etc.) and proactive/predictive (hazard reports). Describe the respective reporting systems. Factors to consider include: report format, confidentiality, addressees, investigation/ evaluation procedures, corrective/ preventive actions and report dissemination.

Criteria

- (a) The organisation has a procedure that provides for the capture of internal occurrences including accidents, incidents, and other occurrences relevant to SMS.

- (b) A distinction is to be made between mandatory reports (accidents, serious incidents, major defects, etc.) which are required to be notified to the CAA-B and other routine occurrence reports which remain within the organisation.
- (c) There is also a voluntary and confidential hazard/ occurrence reporting system, incorporating appropriate identity/ data protection as applicable.
- (d) The respective reporting processes are simple, accessible and commensurate with the size of the organisation.
- (e) High consequence reports and associated recommendations are addressed to and reviewed by appropriate level of management.
- (f) Reports are collected in an appropriate database to facilitate necessary analysis.
- (g) Reports are managed in accordance with the organisation's disciplinary policy

Cross Reference Documents

8. Hazard Identification and Risk Assessment

Objective

Describe the hazard identification system and how such data are collated. Describe the process for any categorization of hazards/risks and their subsequent prioritisation for a documented safety assessment. Describe how the safety assessment process is conducted and how preventive action plans are implemented.

Criteria

- (a) Identified hazards are evaluated/ prioritized/ processed for risk assessment as appropriate.
- (b) There is a structured process for risk assessment, involving the evaluation of severity, likelihood, tolerability and preventive controls.
- (c) Hazard identification and risk assessment procedures do focus on aviation safety as its fundamental context.
- (d) The risk assessment process utilises worksheets/ forms or software which is appropriate to the complexity of the organisation and operations involved.
- (e) Completed safety assessments are approved by appropriate level of management.
- (f) There is a process for evaluating effectiveness of corrective, preventive and recovery measures that have been developed.
- (g) There is a process for periodic review of completed safety assessments and documenting their outcomes.

Cross Reference Documents

9. Safety Performance Monitoring and Measurement

Objective

Describe the safety performance monitoring and measurement component of the SMS. This includes the organisation's SMS safety performance indicators (SPIs).

Criteria

- (a) There is a formal process to develop and maintain a set of safety performance indicators and their associated performance targets.
- (b) Correlation of the SPIs to the organisation's safety objectives where applicable and the process of the CAA-B acceptance of the SPIs where required.
- (c) The process of monitoring the performance of these SPIs including remedial action procedure whenever unacceptable or abnormal trends are triggered.
- (d) Any other supplementary SMS or safety performance monitoring and measurement criteria or process.

Cross Reference Documents

10. Safety-related Investigations and Remedial Actions

Objective

Describe how accidents/incidents/ occurrences are investigated and processed within the organisation, including its correlation with the organisation's SMS hazard identification and risk management system.

Criteria

- (a) Procedure to ensure that reported accidents and incidents are investigated internally.
- (b) Dissemination of completed investigation reports internally as well as to the CAA-B as applicable.
- (c) Process for ensuring that corrective actions taken or recommended are carried out and evaluation of their outcomes/ effectiveness.
- (d) Procedure on disciplinary inquiry and actions associated with investigation report outcomes.
- (e) Conditions under which punitive disciplinary action would be considered (e.g. illegal activity, recklessness, gross negligence or wilful misconduct) are clearly defined.

- (f) Process to ensure that investigations include identification of active failures as well as contributing factors and hazards.
- (g) Investigation procedure and format provides for findings on contributing factors or hazards to be processed for follow-up action by the organisation's hazard identification and risk management system where appropriate.

Cross Reference Documents

11. Safety Training and Communication

Objective

Describe the type of SMS and other safety related training that staff receives and the process for assuring the effectiveness of the training. Describe how such training procedures are documented. Describe the safety communication processes/ channels within the organisation.

Criteria

- (a) Training syllabus, eligibility and requirements are documented.
- (b) There is a validation process that measures the effectiveness of training.
- (c) The training includes initial, recurrent and update training, where applicable.
- (d) The organisation's SMS training is part of the organisation's overall training program.
- (e) SMS awareness is incorporated into the employment or indoctrination program
- (f) Safety communication processes/ channels within the organisation

Cross Reference Documents

12. Continuous Improvement and SMS Audit

Objective

Describe the process for continuous improvement and review of the SMS.

Criteria

- (a) Process for regular internal audit/ review of the organisation's SMS to ensure its continuing suitability, adequacy and effectiveness.
- (b) Describe any other programs contributing to continuous improvement of the organisation's SMS and safety performance e.g. MEDA, safety surveys, ISO systems, etc.

Cross Reference Documents

13. SMS Records Management

Objective

Describe the method of storing all SMS related records and documents.

Criteria

- (a) The organisation has a SMS records or archiving system that ensures the retention of all records generated in conjunction with the implementation and operation of the SMS.
- (b) Records to be kept include hazard reports, risk assessments reports, Safety Action Group/Safety meeting notes, safety performance indicator charts, SMS audit reports, SMS training records, etc.
- (c) Records should be traceable for all elements of the SMS and be accessible for routine administration of the SMS as well as internal and external audits purposes.

Cross Reference Documents

15. Management of Change

Objective

Describe the organisation's process for managing changes that may have an impact on safety risks and how such processes are integrated with the SMS.

Criteria

- (a) Procedure to ensure that substantial organisational or operational changes do take into consideration any impact which they may have on existing safety risks.
- (b) Procedure to ensure that appropriate safety assessment is performed prior to introduction of new equipment or processes which have safety risks implications.
- (c) Procedure for review of existing safety assessments whenever there are changes to the associated process or equipment

Cross Reference Documents: *Company SOP relating to management of change, etc.*

16 Emergency Response Plan

Objective

Describe the organisation's intentions and commitment to dealing with emergency situations and their corresponding recovery controls. Outline the roles and responsibilities of key personnel. The Emergency Response Plan can be a separate document or it can be part of the SMS manual.

Criteria (as applicable to the organisation)

- (a) The organisation has an emergency plan that outlines roles and responsibilities in the event of a major incident, crisis or accident
- (b) There is a notification process that includes an emergency call list and an internal mobilization process
- (c) The organisation has arrangements with other agencies for aid and the provision of emergency services as applicable.
- (d) The organisation has procedures for emergency mode operations where applicable.
- (e) There is a procedure for overseeing the welfare of all affected individuals and for notifying next of kin.
- (f) The organisation has established procedures for handling media and insurance related issues.
- (g) There are defined accident investigation responsibilities within the organisation.
- (h) The requirement for preservation of evidence, securing affected area and mandatory/ governmental reporting is clearly stated.
- (i) There is emergency preparedness and response training for affected personnel
- (j) A disabled aircraft or equipment evacuation plan is developed by the organisation in consultation with aircraft/ equipment owners, aerodrome operators or other agencies as applicable.
- (k) A procedure exists for recording activities during an emergency response.

Cross Reference Documents: *ERP manual, etc.*

APPENDIX 4

EMERGENCY RESPONSE PLANNING

1. Perhaps because aviation accidents are rare events, few organisations are prepared when one occurs. Many organisations do not have effective plans in place to manage events during or following an emergency or crisis. How an organisation fares in the aftermath of an accident or other emergency can depend on how well it handles the first few hours and days following a major safety event. An emergency response plan (ERP) outlines in writing what should be done after an accident or aviation crisis and who is responsible for each action. In different product and service providers, such emergency planning may be known by different terms such as Contingency Plan, Crisis Management Plan, Continuing Airworthiness Support Plan, etc. In this manual, the generic term emergency response plan (ERP) is used to address the relevant contingency plans expected of aviation service providers whose product/service may have an impact on aviation safety.
2. While there is a tendency to think of emergency response planning with respect to aircraft or aerodrome operations, usually as a result of an aircraft accident, the expectation can equally be applied to other aviation service providers. In the case of ATS providers this may include a major power outage or loss of radar, communications or other major facilities. For a maintenance organisation it may involve a serious breach of airworthiness requirements resulting in a fleet AOG. For a design and manufacturing organisation, a serious design deficiency may result in a global AOG that requires emergency re-design, modification, production and retrofitting actions (Emergency Airworthiness Directives) to address such a crisis. Where there is a possibility of an organisation's aviation operations or activities being compromised by other crisis or emergencies originating from external sources, such as a public health emergency/ pandemic, these scenarios should also be addressed in its aviation ERP as appropriate. Hence, an ERP is essentially an integral component of an organisation's safety risk management procedure to address all possible safety or quality related emergency, crisis or event that its product or services could contribute to or be associated with. The ERP should address all possible/ likely scenarios and have appropriate mitigating actions or processes put in place so that the organisation, its customers, the public and/ or the industry at large may have a better level of safety assurance as well as service continuity.
3. Successful response to an emergency begins with effective planning. An emergency response plan (ERP) provides the basis for a systematic approach to managing the organisation's affairs in the aftermath of a significant unplanned event — in the worst case, a major accident.
4. The purpose of an emergency response plan is to ensure:
 - (a) delegation of emergency authority;
 - (b) assignment of emergency responsibilities;
 - (c) documentation of emergency procedures and processes;
 - (d) coordination of emergency efforts internally and with external parties;
 - (e) safe continuation of essential operations, while the crisis is being managed;

- (f) proactive identification of all possible emergency events/ scenarios and their corresponding mitigation actions; etc.

5. To be effective, an ERP should:

- (a) be appropriate to the size, nature and complexity of the organisation;
- (b) be readily accessible to all relevant personnel and other organisations where applicable;
- (c) include checklists and procedures relevant to different or specific emergency situations;
- (d) have quick reference contact details of relevant personnel;
- (e) be regularly tested through exercises;
- (f) periodically reviewed and updated when details change, etc.

6. ERP Contents

An emergency response plan (ERP) would normally be documented in the format of a manual. It should set out the responsibilities and roles and actions for the various agencies and personnel involved in dealing with specific emergencies. An ERP should take account of such considerations as:

- (a) **Governing policies.** The ERP should provide direction for responding to emergencies, such as governing laws and regulations for investigations, agreements with local authorities, company policies and priorities.
- (b) **Organisation.** The ERP should outline management's intentions with respect to the responding organisations by:
 - (1) designating who will lead and who will be assigned to the response teams;
 - (2) defining the roles and responsibilities for personnel assigned to the response teams;
 - (3) clarifying the reporting lines of authority;
 - (4) setting up an emergency management centre (EMC);
 - (5) establishing procedures for receiving a large number of requests for information, especially during the first few days after a major accident;
 - (6) designating the corporate spokesperson for dealing with the media;
 - (7) defining what resources will be available, including financial authorities for immediate activities;

- (8) designating the company representative to any formal investigations undertaken by State officials; 9) defining a call-out plan for key personnel, etc.
 - (9) An organisation chart could be used to show organisational functions and communication relationships.
- (c) **Notifications.** The plan should specify who in the organisation should be notified of an emergency, who will make external notifications and by what means. The notification needs of the following should be considered:
- (1) management;
 - (2) State authorities (search and rescue, CAA-B, accident investigation authority, etc.);
 - (3) local emergency response services (aerodrome authorities, fire fighters, police, ambulances, medical agencies, coastguard etc.);
 - (4) relatives of victims (a sensitive issue that, in many States, is handled by the police);
 - (5) company personnel;
 - (6) media; and
 - (7) legal, accounting, insurers, etc.
- (d) **Initial response.** Depending on the circumstances, an initial response team may be dispatched to the accident or crisis site to augment local resources and oversee the organisation's interests. Factors to be considered for such a team include:
- (1) Who should lead the initial response team?
 - (2) Who should be included on the initial response team?
 - (3) Who should speak for the organisation at the accident site?
 - (4) What would be required by way of special equipment, clothing, documentation, transportation, accommodation, etc.?
- (e) **Additional assistance.** Employees with appropriate training and experience can provide useful support during the preparation, exercising and updating of an organisation's ERP. Their expertise may be useful in planning and executing such tasks as:
- (1) acting as passengers or customers in exercises;
 - (2) handling survivors or external parties;
 - (3) dealing with next of kin, authorities, etc.

(f) **Emergency management centre (EMC).** A EMC (normally on standby mode) may be established at the organisation's headquarters once the activation criteria have been met. In addition, a command post (CP) may be established at or near the crisis site. The ERP should address how the following requirements are to be met:

- (1) staffing (perhaps for 24 hours a day, 7 days per week, during the initial response period);
- (2) communications equipment (telephones, fax, Internet, etc.);
- (3) documentation requirements, maintenance of emergency activity logs;
- (4) impounding related company records;
- (5) office furnishings and supplies; and
- (6) reference documents (such as emergency response checklists and procedures, company manuals, aerodrome emergency plans and telephone lists).

The services of a crisis centre may be contracted from an airline or other specialist organisation to look after the service provider's interests in a crisis away from home base. Company personnel would normally supplement such a contracted centre as soon as possible.

(g) **Records.** In addition to the organisation's need to maintain logs of events and activities, the organisation will also be required to provide information to any State investigation team. The ERP should address the following types of information to investigators:

- (1) all relevant records about the concerned product or service, including FDR and CVR recordings, as appropriate;
- (2) lists of points of contact and any personnel associated with the occurrence;
- (3) notes of any interviews (and statements) with anyone associated with the event;
- (4) any photographic or other evidence.

(h) **Accident site.** For a major accident, representatives from many jurisdictions have legitimate reasons for accessing the site, for example, police, fire fighters, medics, aerodrome authorities, coroners (medical examining officers) to deal with fatalities, State accident investigators, relief agencies such as the Red Cross and even the media. Although coordination of the activities of these stakeholders is the responsibility of the State's police and/or investigating authority, the service provider should clarify the following aspects of activities at the accident site:

- (1) nominating a senior company representative at the accident site if:
 - at home base;

- away from home base;
 - offshore or in a foreign State.
- (2) management of surviving victims;
 - (3) needs of relatives of victims;
 - (4) security of wreckage;
 - (5) handling of human remains and personal property of the deceased;
 - (6) preservation of evidence;
 - (7) provision of assistance (as required) to the investigation authorities;
 - (8) removal and disposal of wreckage; etc.
- (i) **News media.** How the company responds to the media may affect how well the company recovers from the event. Clear direction is required. For example:
- (1) what information is protected by statute (FDR data, CVR and ATC recordings, witness statements etc.);
 - (2) who may speak on behalf of the parent organisation at head office and at the accident site (public relations manager, chief executive officer or other senior executive, manager, owner);
 - (3) direction regarding a prepared statement for immediate response to media queries;
 - (4) what information may be released (what should be avoided);
 - (5) the timing and content of the company's initial statement;
 - (6) provisions for regular updates to the media.
- (j) **Formal investigations.** Guidance for company personnel dealing with State accident investigators and police should be provided.
- (k) **Family assistance.** The EPR should also include guidance on the organisation's approach to assisting crisis victims or customer organisations. This guidance may include such things as:
- (1) State requirements for the provision of assistance services;
 - (2) travel and accommodation arrangements to visit the crisis site;
 - (3) programme coordinator and point(s) of contact for victims/ customers;

- (4) provision of up-to-date information;
- (5) temporary assistance to victims or customers;

Note: ICAO Circular 285, Guidance on Assistance to Aircraft Accident Victims and Their Families, provides further guidance on this subject.

- (l) **Post-occurrence review.** Direction should be provided to ensure that, following the emergency, key personnel carry out a full debrief and record all significant lessons learned which may result in amendments to the ERP and associated

7. Checklists

Everyone involved in the initial response to a major aviation event will be suffering from some degree of disorientation. Therefore, the emergency response process lends itself to the use of checklists. These checklists can form an integral part of the company's operations manual or emergency response manual. To be effective, checklists must be regularly:

- (a) reviewed and updated (for example, currency of call-out lists and contact details); and
- (b) tested through realistic exercises.

8. Training and Exercises

An emergency response plan is a paper indication of intent. Hopefully, much of an ERP will never be tested under actual conditions. Training is required to ensure that these intentions are backed by operational capabilities. Since training has a short shelf life, regular drills and exercises are advisable. Some portions of the ERP, such as the call-out and communications plan can be tested by desktop exercises. Other aspects, such as on-site activities involving other agencies, need to be exercised at regular intervals. Such exercises have the advantage of demonstrating deficiencies in the plan, which can be rectified before an actual emergency. For certain service providers such as airports, the periodic testing of the adequacy of the plan and the conduct of full scale emergency exercise may be mandatory.



APPENDIX 5

EXAMPLE RISK LOG

Hazard Identified	Associated Risk (consequences)	Existing Mitigation Measures in Place	Current Level of Risk	Mitigation Measures	Revised Level of Risk	Action by and When
<p>Incorrect maintenance action:</p> <p>Wire locking missing from aileron system connecting rod.</p> <p>(Safety report form number 046)</p>	<p>Connecting rod detaches causing loss of control of aircraft.</p>	<p>Aircraft Maintenance Manual instruction to wire lock the connecting rod bolt.</p> <p>Duplicate engineering inspection required</p>	<p>Probability 3</p> <p>Severity A</p> <p>Unacceptable</p>	<p>Reiterate adherence to Aircraft Service Manual and independent inspections.</p> <p>Introduction of staged worksheets for breakdowns</p>	<p>Probability 2</p> <p>Severity A</p> <p>Review</p>	<p>A Smith</p> <p>(by Aug 2020)</p>



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APPENDIX 6

EXAMPLE OF SAFETY OBJECTIVES AND SAFETY PERFORMANCE INDICATORS

Performance Indicator	Objectives	Performance											
		1	2	3	4	5	6	7	8	9	10	11	12
		Qtr 1			Qtr 2			Qtr3			Qtr 4		
Number of major risk incidents (as defined in SMM)	1 or less Per 1000 flt hrs												
Number of Mandatory Occurrence Reports	3 or less per 1000 flt hrs												
Number of internal audits	4 per year												
Number of audit findings per audit	2 or less												
Number of safety committee meetings	6 per year												
Safety committee attendance of key personnel	Minimum 80%												
Number of ERP drills	1 per year												
Number of hazard / safety reports	20 or more per year												
Number of safety newsletters issued	2 per year												
Number of formal risk assessments	5 or more per year												
Number of safety surveys	1 per year												
Number of airworthiness incidents (as defined in SMM).	1 per 1000 flights												
Number of Operational incidents (as defined in SMM)	1 per 1000 flights												
Number of Ground Operational incidents (as defined in SMM)	1 per 1000 flights												
Number of flights flown with operational MEL restrictions.	3 or less												

Note: Objectives are an example and sample only. Organisations should set objectives that are relevant to their particular type of operation and size of fleet.



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APPENDIX 7

EXAMPLE SAFETY REPORTING FORM

Part A: to be completed by the person identifying the event or hazard

Date of event: Local time: Location:.....
Name of reporter: Section / Organisation:

Please fully describe the event or identified hazard:

What are your suggestions on how to prevent similar occurrences?

In your opinion, what is the likelihood or probability of such an event or similar happening again? Please tick one of the following.

- Frequent:** Likely to occur many times (has occurred frequently)
- Occasional:** Likely to occur sometimes (has occurred infrequently)
- Remote:** Unlikely, but may possibly occur (has occurred rarely)
- Improbable:** Very unlikely to occur (not known to have occurred)
- Extremely improbable:** Almost inconceivable that the event will occur

What do you consider could be the worst possible consequences if this event or situation happened again? Please tick one of the following

- Catastrophic:** Aircraft / Equipment destroyed. Multiple deaths.
- Hazardous:** A large reduction in safety margins, physical distress or a workload such that organisations cannot be relied upon to perform their tasks accurately or completely. Serious injury or death to a number of people. Major equipment damage.
- Major:** A significant reduction in safety margins, a reduction in the ability of organisations to cope with adverse operating conditions as a result of an increase in workload, or as a result of conditions impairing their efficiency. Serious incident. Injury to persons.



Minor: Nuisance. Operating limitations. Use of emergency procedures. Minor incident.

Negligible: Little consequence.

.....
Part B: to be completed by the Safety Officer

The report has been dis-identified and entered into the company database.

Report reference

Feedback has been provided to the reporter

Signature Date

Name
.....

Part C: to be completed by the Safety Committee

Rate the likelihood of the event occurring or reoccurring:

- Frequent,** Cat 5
- Occasional,** Cat 4
- Remote:** Cat 3
- Improbable:** Cat 2
- Extremely improbable:** Cat 1

Rate the worst-case consequences?

- Catastrophic,** Cat A
- Hazardous,** Cat B
- Major,** Cat C
- Minor,** Cat D
- Negligible,** Cat E

What action or actions are required to ELIMINATE, MITIGATE or CONTROL the hazards to an acceptable level of safety?

What resources are required?

Who is responsible for completing the Actions?

Agreed and Accepted by the Safety Manager: Date:

Responsible Manager: Date:

Accountable Manager: Date:

Appropriate feedback given to staff by the Safety Manager:

Signed:..... Date:.....



APPENDIX 8

EXAMPLE SEVERITY OF CONSEQUENCES – AIR NAVIGATION SERVICES

Severity Level	Severity Descriptor	SEVERITY DESCRIPTIONS					
		ATC / AIS	Physical Injury	Damage to Assets	Potential Revenue Loss	Damage to /Effect on the Environment	Damage to Corporate Reputation
1	Negligible No safety effect	1. No significance to ATC / AIS related operational safety	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
2	Minor Ability to provide safe but degraded ATM &/or AIS services	1. A deviation from an ATC clearance 2. Unauthorised action(s) that could have caused a more severe outcome 3. A situation which might result in confusion or non-optimal performance 4. Use of emergency procedures 5. Nuisance TCAS (False Alert) 6. Nuisance (Projects HAZID)	Minor	Minor	Minor	Minor	Limited Localized Implication



<p>3</p>	<p>Major Partial inability to provide safe ATM &/or AIS services</p>	<ol style="list-style-type: none"> 1. Losses of separation possible (Greater than ½ the required minima) 2. Safety margins not achieved (Greater than ½ the required minima) 3. An effective recoverable situation 4. TCAS (TA) 5. Increased Workload – such that there is an inability of operators being able to cope with adverse working conditions. 6. Conditions that could result Impaired Efficiency 	<p>Medium Injury to persons</p>	<p>Medium</p>	<p>Medium</p>	<p>Contained</p>	<p>Regional Implication</p>
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<p>4</p>	<p>Hazardous Serious inability to provide safe ATM &/or AIS services</p>	<ol style="list-style-type: none"> 1. Information or instructions which may result in a critical near collision between aircraft or between aircraft and obstacle(s) i.e. an AIRPROX or critical near collision with the ground. 2. A large reduction in safety margins & physical distress. 3. ATC separation provided to aircraft that are airborne is suddenly, and for a significant period of time, completely unavailable. 4. Safety margins not achieved (Equal to or less than ½ the required minima) 5. A potentially effective recoverable situation 6. TCAS (RA) 7. Major equipment damage 8. A workload such that Operators cannot perform their tasks accurately or completely. 9. Critical AIS data has been used to an extent the continued safe flight and landing of an aircraft is severely at risk 	<p>Single Fatality or Serious Injury</p>	<p>Major or Major Equipment damage</p>	<p>Major</p>	<p>Major</p>	<p>National Implication</p>
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<p>5</p>	<p>Catastrophic Total Inability to provide safe ATM &/or AIS services</p>	<ol style="list-style-type: none"> 1. Collision between aircraft or between aircraft and obstacle(s) 2. Loss of an aircraft 3. Loss of life 4. An unrecoverable situation 5. Equipment destroyed 6. Unacceptable situation 	<p>Multiple Fatalities</p>	<p>Massive</p>	<p>Massive</p>	<p>Catastrophic</p>	<p>International Implication</p>
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