SIERRA LEONE CIVIL AVIATION AUTHORITY

ADVISORY CIRCULAR

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Guidance on Safety Management System for Aerodrome Operators

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1 GENERAL

The Sierra Leone Civil Aviation Authority's Advisory Circulars contains information about standards, practices and procedures that the Authority has found to be an Acceptable Means of Compliance (AMC) with the associated Regulations.

An AMC is not intended to be the only means of compliance with a Regulation, and consideration will be given to other methods of compliance that may be presented to the Authority

Information considered directive in nature is described in this AC in terms such as "shall" and "must", indicating the actions are mandatory. Guidance information is described in terms such as "should" and "may" indicating the actions are desirable or permissive, but not mandatory

1.1 Purpose

This Advisory Circular provides methods, acceptable to the Authority, for showing compliance with the Safety Management System requirements of the SLCAR's Part 14A as well as explanatory and interpretative material to assist in showing compliance.

It also assures that safety data and safety information collected enables effective and valid decision-making

1.2 Applicability

The guidance provided in this AC is applicable to aerodrome operators and other services providers involved with the provision and maintenance of Safety Management System.

1.3 Description of Changes

This is the second AC to be issued on this subject.

1.4 Reference

(a) SLCAR's Part 14A - Aerodromes Design and Operations Standards

(b) SLCAR Part 19 – Safety Management

(c) ICAO Doc 9859 – Safety Management Manual

1.5 Cancelled Document

This document repeals and replaces the previous guidance prescribed in **SLCAA-AC-AATNS017 – SAFETY MANAGEMENT SYSTEM**

1.6 Definitions

Accident - An occurrence associated with the operations of an aircraft which, in the case of a manned aircraft, takes place between the time a person boards the aircraft with the intention of flight until such time as all such persons have disembarked, or in the case of an unmanned aircraft, takes place between the time the aircraft is ready to move with the purpose of flight until such time as it comes to rest at the end of the flight and the primary propulsion system is shut down, in which:

(a) a person is fatally or seriously injured as a result of:

(i) being in the aircraft, or

(ii) direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or

(iii) direct exposure to jet blast,

except, when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew; or

(b) the aircraft sustains damage or structural failure which:

(i) adversely affects the structural strength, performance or flight characteristics of the aircraft, and

(ii) would normally require major repair or replacement of the affected component,

except, for engine failure or damage, when the damage is limited to a single engine, (including its cowlings or accessories), to propellers, wing tips, antennas, probes, vanes, tires, brakes, wheels, fairings, panels, landing gear doors, windscreens, the aircraft skin (such as small dents or puncture holes), or for minor damages to main rotor blades, tail rotor blades, landing gear, and those resulting from hail or bird strike (including holes in the radome); or

(c) the aircraft is missing or is completely inaccessible.

Accountable executive - a single, identifiable person having responsibility for the effective and efficient performance of the Aerodrome Operator's SMS.

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

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

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

Hazard - a condition or an object with the potential to cause or contribute to an aircraft incident or accident.

Probability - the likelihood of a specific outcome.

Risk Level - the level of risk calculated as a function of likelihood and consequence.

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

Safety - the state in which risks associated with aviation activities, related to, or in direct support of the operation of aircraft, are reduced and controlled to an acceptable level.

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

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

(i) accident or incident investigations;
(ii) safety reporting;
(iii)continuing airworthiness reporting;
(iv) operational performance monitoring;
(v) inspections, audits, surveys; or
(vi) safety studies and reviews.

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

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

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

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

Safety performance - a State's or Aerodrome Operator´s safety achievement as defined by its safety performance targets and safety performance indicators.

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

Safety performance target - the State or Aerodrome Operator's planned or intended target for a safety performance indicator over a given period that aligns with the safety objectives.

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

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

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

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

2 ELEMENT OF A SAFETY MANAGEMENT SYSTEM

2.1 Introduction

(a) This chapter provides guidance for Aerodrome Operators on the implementation of an SMS framework in accordance with the SLCAR Part 19.

(b) The purpose of an SMS is to provide Aerodrome Operators with a systematic approach to managing safety. It is designed to continuously improve safety performances through:

i) the identification of hazards,

ii) the collection and analysis of safety data and safety information, and

iii) the continuous assessment of safety risks.

(c) The SMS seeks to proactively mitigate safety risks before they result in aviation accidents and incidents. It allows Aerodrome Operators to effectively manage their activities, safety performance and resources, while gaining a greater understanding of their contribution to aviation safety. An effective SMS demonstrates to the Authority the Aerodrome Operator's ability to manage safety risks and provides for effective management of safety at the State level.

2.2 Benefits of SMS

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

(a) ***Strengthened safety culture*** - An organization's safety culture can be strengthened by making visible the commitment of management, and actively involving personnel in the management of safety risk. When management actively endorses safety as a priority, it is typically well-received by personnel and becomes part of normal operations.

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

(c) ***Enhanced early detection of safety hazards*** - Improves the aerodrome operator's ability to detect emerging safety issues, which can prevent accidents and incidents through the proactive identification of hazards and management of safety risks.

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

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

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

2.3 SMS Framework

(a) The SLCAR Part 19 specifies the framework for the implementation and maintenance of an SMS. Regardless of the Aerodrome Operator's size and complexity, all elements of the SMS framework will apply. The implementation should be tailored to the size of the organization and its activities.

(b) The ICAO SMS framework is made up of the following four components and twelve elements:

Table 1. Components and elements of the ICAO SMS framework

COMPONENT	ELEMENT
Safety policy and objectives	1.1 Management commitment
	1.2 Safety accountability and responsibilities
	1.3 Appointment of key safety personnel
	1.4 Coordination of emergency response planning
	1.5 SMS documentation
Safety risk management	2.1 Hazard identification
	2.2 Safety risk assessment and mitigation
Safety assurance	3.1 Safety performance monitoring and measurement
	3.2 Management of Change
	3.3 continuous improvement of SMS
Safety promotion	4.1 Training and education
	4.2 Safety communication

2.4 Component 1: Safety Policy and Objectives

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

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

(c) The safety policy should be developed and endorsed by senior management, and is to be signed by the accountable executive. Key safety personnel, and where appropriate, staff representative bodies (employee forums, trade unions) should be consulted in the development of the safety policy and safety objectives to promote a sense of shared responsibility.

2.4.1 Management's commitment

2.4.1.1 Safety policy

(a) The safety policy should be visibly endorsed by senior management and the accountable executive. "Visible endorsement" refers to making management's active support of the safety policy visible to the rest of the organization. This can be done via any means of communication and through the alignment of activities to the safety policy.

(b) It is the responsibility of management to communicate the safety policy throughout the organization to ensure all personnel understand and work in accordance with the safety policy.

(c) To reflect the organization's commitment to safety, the safety policy should include a commitment to:

(i) continuously improve the level of safety performance;

(ii) promote and maintain a positive safety culture within the organization;

(iii) comply with all applicable regulatory requirements;

(iv) provide the necessary resources to deliver a safe product or service;

(v) ensure safety is a primary responsibility of all managers; and

(vi) ensure it is understood, implemented and maintained at all levels.

(d) The safety policy should also make reference to the safety reporting system to encourage the reporting of safety issues and inform personnel of the disciplinary policy applied in the case of safety events or safety issues that are reported.

(e) The disciplinary policy is used to determine whether an error or rule breaking has occurred so that the organization can establish whether any disciplinary action should be taken. To ensure the fair treatment of persons involved, it is essential that those responsible for making that determination have the necessary technical expertise so that the context of the event may be fully considered.

(f) A policy on the protection of safety data and safety information, as well as reporters, can have a positive effect on the reporting culture. The Aerodrome Operator should allow for the de-identification and aggregation of reports to allow meaningful safety analyses to be conducted without having to implicate personnel. Because major occurrences may invoke processes and procedures outside of the Aerodrome Operator's SMS, the Authority may not permit the early de-identification of reports in all circumstances. Nonetheless, a policy allowing for the appropriate de-identification of reports can improve the quality of data collected.

2.4.1.2 Safety objectives

(a) Taking into consideration its safety policy, the Aerodrome Operator should also establish safety objectives to define what it aims to achieve in respect of safety outcomes. Safety objectives should be short, high-level statements of the organization's safety priorities and should address its most significant safety risks. Safety objectives may be included in the safety policy (or documented separately), and defines what the organization intends to achieve in terms of safety. Safety performance indicators (SPIs) and safety performance targets (SPTs) are needed to monitor the achievement of these safety objectives.

(b) The Operators safety policy and safety objectives should be periodically reviewed to ensure they remain current (a change in the accountable executive would require its review for instance).

2.4.2 Safety accountability and responsibilities

2.4.2.1 Accountable executive

(a) The accountable executive, typically the chief executive officer, is the person who has ultimate authority over the safe operations of the organization. The accountable executive establishes and promotes the safety policy and safety objectives that instil safety as a core organizational value. He/she should:

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

(b) There might be challenges for the Aerodrome Operator to identify the most appropriate person to be the accountable executive, especially in large complex organizations with multiple entities and multiple certificates, authorizations or approvals. It is important the person selected is organizationally situated at the highest level of the organization, thus ensuring the right strategic safety decisions are made.

(c) The Aerodrome Operator is required to identify the accountable executive, placing the responsibility for the overall safety performance at a level in the organization with the authority to take action to ensure the SMS is effective. Specific safety accountabilities of all members of management should be defined and their role in relation to the SMS should reflect how they can contribute towards a positive safety culture. The safety responsibilities, accountabilities and authorities should be documented and communicated throughout the organization. The safety accountabilities of managers should include the allocation of the human, technical, financial or other resources necessary for the effective and efficient performance of the SMS.

Note - The term "accountability" refers to obligations which cannot be delegated. The term "responsibilities" refers to functions and activities which may be delegated.

(d) In the case where an SMS applies to several different certificates, authorizations or approvals that are all part of the same legal entity, there should be a single accountable executive. Where this is not possible, individual accountable executives should be identified for each organizational certificate, authorization or approval and clear lines of accountability defined; it is also important to identify how their safety accountabilities will be coordinated.

(e) One of the most effective ways the accountable executive can be visibly involved, is by leading regular executive safety meetings. As they are ultimately responsible for the safety of the organization, being actively involved in these meetings allows the accountable executive to:

(i) review safety objectives;

(ii) monitor safety performance and the achievement of safety targets;

(iii) make timely safety decisions;

(iv) allocate appropriate resources;

(v) hold managers accountable for safety responsibilities, performance and implementation timelines; and

(vi) be seen by all personnel as an executive who is interested in, and in charge of, safety.

(f) The accountable executive is not usually involved in the day-to-day activities of the organization or the problems faced in the workplace and should ensure there is an appropriate organizational structure to manage and operate the SMS. Safety management responsibility should be delegated to the senior management team and other key safety personnel. Although responsibility for the day-to-day operation of the SMS can be delegated, the accountable executive cannot delegate accountability for the system nor can decisions regarding safety risks be delegated. For example, the following safety accountabilities cannot be delegated:

(i) ensuring safety policies are appropriate and communicated;

(ii) ensuring necessary allocation of resources (financing, personnel, training, acquisition); and

(iii) setting of the acceptable safety risk limits and resourcing of necessary controls

(g) It is appropriate for the accountable executive to have the following safety accountabilities:

(i) provide enough financial and human resources for the proper implementation of an effective SMS;

(ii) promote a positive safety culture;

(iii) establish and promote the safety policy;

(iv) establish the organization's safety objectives;

(v) ensure the SMS is properly implemented and performing to requirements; and

(vi) see to the continuous improvement of the SMS

(h) The accountable executive's authorities include, but are not limited to, having final authority:

(i) for the resolution of all safety issues; and

(ii) over operations under the certificate, authorization or approval of the organization, including the authority to stop the operation or activity.

(i) The authority to make decisions regarding safety risk tolerability should be defined. This includes who can make decisions on the acceptability of risks as well as the authority to agree that a change can be implemented. The authority may be assigned to an individual, a management position or a committee.

(j) Authority to make safety risk tolerability decisions should be commensurate with the manager's general decision-making and resource allocation authority. A lower level manager (or management group) may be authorized to make tolerability decisions up to a certain level. Risk levels that exceed the manager's authority must be escalated for consideration to a higher management level with greater authority.

2.4.2.2 Accountability and responsibilities

(a) Accountabilities and responsibilities of all personnel, management and staff, involved in safety-related duties supporting the delivery of safe products and operations should be clearly defined. The safety responsibilities should focus on the staff member's contribution to the safety performance of the organization (the organizational safety outcomes). The management of safety is a core function; as such every senior manager has a degree of involvement in the operations of the SMS.

(b) All defined accountabilities, responsibilities and authorities should be stated in the Aerodrome Operator's SMS documentation and should be communicated throughout the organization. The safety accountabilities and responsibilities of each senior manager are integral components of their job descriptions. This should also capture the different safety management functions between line managers and the safety manager.

(c) Lines of safety accountability throughout the organization and how they are defined will depend on the type and complexity of the organization, and their preferred communication methods. Typically, the safety accountabilities and responsibilities will be reflected in organizational charts, documents defining departmental responsibilities, and personnel job or role descriptions.

(d) The Aerodrome Operator should aim to avoid conflicts of interest between staff members' safety responsibilities and their other organizational responsibilities. They should allocate their SMS accountabilities and responsibilities, in a way that minimizes any overlaps and/or gaps.

2.4.2.3 Accountability and responsibilities in respect to external organizations

The aerodrome operator is responsible for the safety performance of external organizations where there is an SMS interface. The aerodrome operator will be held accountable for the safety performance of products or services provided by external organizations supporting its activities even if the external organizations are not required to have an SMS. It is essential for the Aerodrome Operator's SMS to interface with the safety systems of any external organizations that contribute to the safe delivery of their product or services.

2.4.3 Appointment of key safety personnel

(a) Appointment of a competent person or persons to fulfil the role of safety manager is essential to an effective implemented and functioning SMS. The safety manager may be identified by different titles. For the purposes of this manual, the generic term "safety manager" is used and refers to the function, not necessarily to the individual. The person carrying out the safety manager function is responsible to the accountable executive for the performance of the SMS and for the delivery of safety services to the other departments in the organization.

(b) The safety manager advises the accountable executive and line managers on safety management matters, and is responsible for coordinating and communicating safety issues within the organization as well as with external members of the aviation community. Functions of the safety manager should include, but are not limited to:

(i) manage the SMS implementation plan on behalf of the accountable executive (upon initial implementation);

(ii) perform/facilitate hazard identification and safety risk analysis;

(iii) monitor corrective actions and evaluate their results;

(iv) provide periodic reports on the organization's safety performance;

(v) maintain SMS documentation and records;

(vi) plan and facilitate staff safety training;

(vii) provide independent advice on safety matters;

(viii) monitor safety concerns in the aviation industry and their perceived impact on the organization's operations aimed at product and service delivery; and

(ix) Coordinate and communicate (on behalf of the accountable executive) with the Authority and other State authorities as necessary on issues relating to safety.

(c) Depending on the size, nature and complexity of the organization, the safety manager role may be an exclusive function or it may be combined with other duties. The organization must ensure any conflicts of interest is avoided. Where possible, the safety manager should not be directly involved in the product or service delivery but should have a working knowledge of these. The appointment should also consider potential conflicts of interest with other tasks and functions. Such conflicts of interest could include:

(i) competition for funding (e.g. financial manager being the safety manager);

(ii) conflicting priorities for resources; and

(iii) where the safety manager has an operational role and the ability to assess the SMS effectiveness of the operational activities the safety manager is involved in.

(d) In cases where the function is allocated to a group of persons, (e.g. when Aerodrome Operators extend their SMS across multiple activities) one of the persons should be designated as "lead" safety manager, to maintain a direct and unequivocal reporting line to the accountable executive.

(e) The competencies for a safety manager should include, but not be limited to, the following:

(i) safety/quality management experience;

(ii) operational experience related to aerodrome operations;

(iii) technical background to understand the systems that support aerodrome operations;

(iv) interpersonal skills;

(v) analytical and problem-solving skills;

(vi) project management skills;

(vii) oral and written communications skills; and

(viii) an understanding of human factors.

(f) Depending on the size, nature and complexity of the organization, additional staff may be needed to support the safety manager. The safety manager and supporting staff are

responsible for ensuring the prompt collection and analysis of safety data and appropriate distribution within the organization of related safety information such that safety risk decisions and controls, as necessary, can be made.

(g) Aerodrome Operators should establish appropriate safety committees that support the SMS functions across the organization. This should include determining who should be involved in the safety committee and frequency of the meetings.

(h) The highest-level safety committee, sometimes referred to as a safety review board (SRB), includes the accountable executive and senior managers with the safety manager participating in an advisory capacity. The SRB should be strategic and deals with high-level issues related to safety policies, resource allocation and organizational performance. The SRB monitors the:

(i) effectiveness of the SMS;

(ii) timely response in implementing necessary safety risk control actions;

(iii) safety performance against the organization's safety policy and objectives;

(iv) overall effectiveness of safety risk mitigation strategies;

(v) effectiveness of the organization's safety management processes which support:

(1) the declared organizational priority of safety management; and

(2) promotion of safety across the organization.

(i) Once a strategic direction has been developed by the highest-level safety committee, implementation of safety strategies should be coordinated throughout the organization. This may be accomplished by creating safety action groups (SAGs) that are more operationally focused. SAGs are normally composed of managers and front-line personnel and are chaired by a designated manager. SAGs are tactical entities that deal with specific implementation issues in accordance with the strategies developed by the SRB. The SAGs:

(i) monitor operational safety performance within their functional areas of the organization and ensure that appropriate SRM activities are carried out;

(ii) review available safety data and identify the implementation of appropriate safety risk control strategies and ensure employee feedback is provided;

(iii) assess the safety impact related to the introduction of operational changes or new technologies;

(iv) coordinate the implementation of any actions related to safety risk controls and ensure that actions are taken promptly; and

(v) review the effectiveness of specific safety risk controls.

2.4.4 Coordination of emergency response planning

(a) By definition, an emergency is a sudden, unplanned situation or event requiring immediate action. Coordination of emergency response planning refers to planning for activities that take place within a limited period of time during an unplanned aviation operational emergency situation. An emergency response plan (ERP) is an integral

component of an Aerodrome Operator's SRM process to address aviation-related emergencies, crises or events. Where there is a possibility of an Aerodrome Operator's aviation operations or activities being compromised by emergencies such as a public health emergency/pandemic, these scenarios should also be addressed in its ERP as appropriate. The ERP should address foreseeable emergencies as identified through the SMS and include mitigating actions, processes and controls to effectively manage aviation-related emergencies.

(b) The overall objective of the ERP is the safe continuation of operations and the return of the aerodrome to normal operations as soon as possible. This should ensure an orderly and efficient transition from normal to emergency operations, including assignment of emergency responsibilities and delegation of authority. It includes the period of time required to re-establish "normal" operations following an emergency. It further identifies actions to be taken by responsible personnel during an emergency. Most emergencies will require coordinated action between different organizations, possibly with other Aerodrome Operators and with other external organizations such as non-aviation-related emergency services. The ERP should be easily accessible to the appropriate key personnel as well as to the coordinating external organizations.

(c) Coordination of emergency response planning applies only to those Aerodrome Operators required to establish and maintain an ERP. This coordination should be exercised as part of the periodic testing of the ERP.

2.4.5 SMS Documentation

(a) The SMS documentation should include a top-level "SMS manual", which describes the Aerodrome Operator's SMS policies, processes and procedures to facilitate the organization's internal administration, communication and maintenance of the SMS. It should help personnel to understand how the organization's SMS functions, and how safety policy and objectives will be met. The documentation should include a system description that provides the boundaries of the SMS. It should also help clarify the relationship between the various policies, processes, procedures and practices, and define how these link to the Aerodrome Operator's safety policy and objectives. It should be adapted and written to address the day-to-day safety management activities that can be easily understood by personnel throughout the organization.

(b) The SMS manual also serves as a primary safety communication tool between the Aerodrome Operator and key safety stakeholders (e.g. the Authority for the purpose of regulatory acceptance, assessment and subsequent monitoring of the SMS). The SMS manual may be a stand-alone document, or it may be integrated in the Aerodrome Manual maintained by the Aerodrome Operator. Where details of the organization's SMS processes are already addressed in existing documents, appropriate cross-referencing to such documents is enough. This SMS document must be kept up to date. The Authority's consent and approval may be required before significant amendments are made to the SMS manual, as it is a controlled manual.

(c) The SMS manual should include a detailed description of the Aerodrome Operator's policies, processes and procedures including:

(i) safety policy and safety objectives;

(ii) reference to any applicable regulatory SMS requirements;

(iii) system description;

(iv) safety accountabilities and key safety personnel;

(v) voluntary and mandatory safety reporting system processes and procedures;

(vi) hazard identification and safety risk assessment processes and procedures;

(vii) safety investigation procedures;

(viii) procedures for establishing and monitoring safety performance indicators;

(ix) SMS training processes and procedures and communication;

(x) safety communication processes and procedures;

(xi) internal audit procedures;

(xii) management of change procedures;

(xiii) SMS documentation management procedures; and

(xiv) where applicable, coordination of emergency response planning.

(d) SMS documentation also includes the compilation and maintenance of operational records substantiating the existence and ongoing operation of the SMS. Operational records are the outputs of the SMS processes and procedures such as the SRM and safety assurance activities. SMS operational records should be stored and kept for a period of six (6) years. Typical SMS operational records should include:

(i) hazards register and hazard/safety reports;

(ii) SPIs and related charts;

(iii) record of completed safety risk assessments;

(iv) SMS internal review or audit records;

(v) internal audit records;

(vi) records of SMS/safety training records;

(vii) SMS/safety committee meeting minutes;

(viii) SMS implementation plan (during the initial implementation); and

(ix) gap analysis to support implementation plan.

2.5 Component 2: Safety Risk Management

(a) Aerodrome Operators should ensure they are managing their safety risks. This process is known as safety risk management (SRM), which includes hazard identification, safety risk assessment and safety risk mitigation.

(b) The SRM process systematically identifies hazards that exist within the context of the aerodrome operations. 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 Aerodrome Operator's operating environment. Careful analysis of these factors can often identify potential hazards at any point in the operation or activity life cycle.

(c) Understanding the system and its operating environment is essential for the achievement of high safety performance. Having a detailed system description that defines the system and its interfaces will help. Hazards may be identified throughout the operational life cycle from internal and external sources. Safety risk assessments and safety risk mitigations will need to be continuously reviewed to ensure they remain effective. Figure 2-1 provides an overview of the hazard identification and safety risk management process for an Aerodrome Operator.

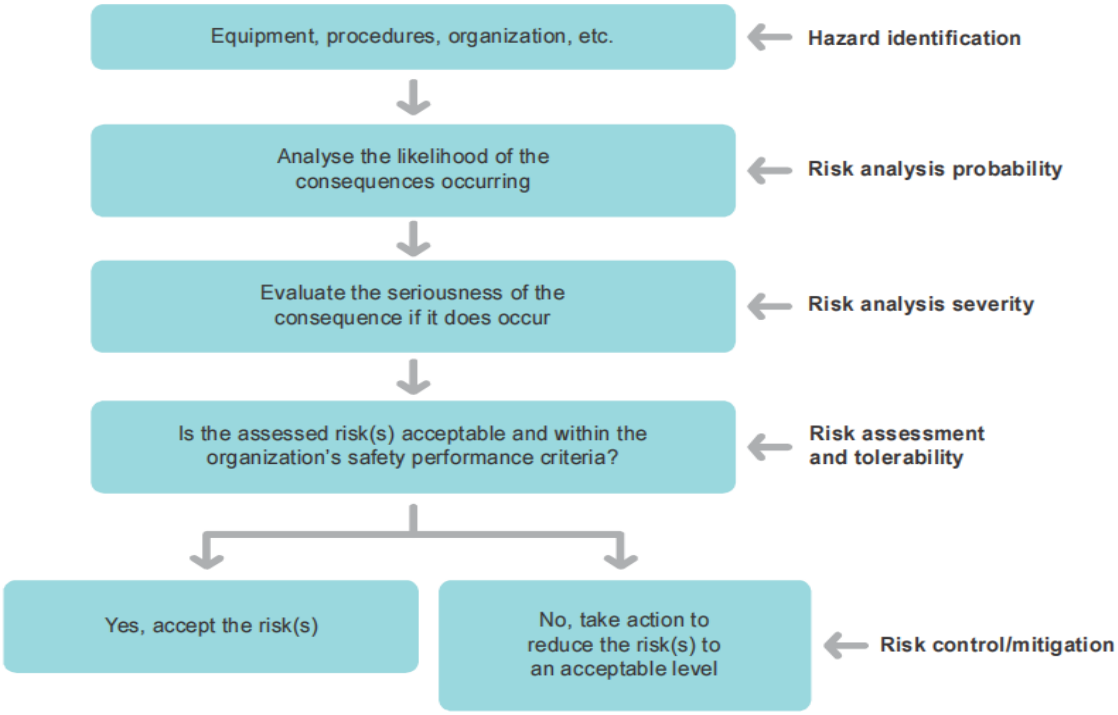

Figure 2-1: Hazard identification and risk management process

2.5.1 Hazard identification

Hazard identification is the first step in the SRM process. The Aerodrome Operator should develop and maintain a formal process to identify hazards that could impact aviation safety in all areas of operation and activities. This includes equipment, facilities and systems. Any aviation safety-related hazard identified and controlled is beneficial for the safety of the operation. It is important to also consider hazards that may exist as a result of the SMS interfaces with external organizations.

2.5.1.1 Sources for hazard identification

(a) There are variety of sources for hazard identification, internal or external to the organization. Some internal sources include:

(i) Normal operations monitoring; this uses observational techniques to monitor the day-to-day operations and activities such as operational safety audit.

(ii) Automated monitoring systems; this uses automated recording systems to monitor parameters that can be analysed.

(iii) Voluntary and mandatory safety reporting systems; this provides everyone, including staff from external organizations, with opportunities to report hazards and other safety issues to the organization.

(iv) Audits; these can be used to identify hazards in the task or process being audited. These should also be coordinated with organizational changes to identify hazards related to the implementation of the change.

(v) Feedback from training; training that is interactive (two way) can facilitate identification of new hazards from participants.

(vi) Aerodrome Operator safety investigations; hazards identified in internal safety investigation and follow-up reports on accidents/incidents.

(b) Examples of external sources for hazard identification include:

(i) Aviation accident reports; reviewing accident reports; this may be related to accidents in the same State, region or operational environment.

(ii) State mandatory and voluntary safety reporting systems; summaries of the safety reports received from other Aerodrome Operators.

(iii) SLCAA's oversight audits and third-party audits; external audits can sometimes identify hazards. These may be documented as an unidentified hazard or captured less obviously within an audit finding.

(iv) Trade associations and information exchange systems; many trade associations and industry groups are able to share safety data that may include identified hazards.

2.5.1.2 Safety reporting system

(a) One of the main sources for identifying hazards is the safety reporting system, especially the voluntary safety reporting system. Whereas the mandatory system is normally used for incidents that have occurred, the voluntary system provide an additional reporting channel for potential safety issues such as hazards, near misses or errors. They can provide valuable information to the Aerodrome Operator on lower consequence events.

(b) It is important that Aerodrome Operators provide appropriate protections to encourage people to report what they see or experience. For example, enforcement action may be waived for reports of errors, or in some circumstances, rule-breaking. It should be clearly stated that reported information will be used solely to support the enhancement of safety. The intent is to promote an effective reporting culture and proactive identification of potential safety deficiencies.

(c) Voluntary safety reporting systems should be confidential, requiring that any identifying information about the reporter is known only to the custodian to allow for follow-up action. The role of custodian should be kept to a few individuals, typically restricted to the safety manager and personnel involved in the safety investigation. Maintaining confidentiality will help facilitate the disclosure of hazards leading to human error, without fear of retribution or embarrassment. Voluntary safety reports may be de-identified and archived once necessary follow-up actions are taken. De-identified reports can support future trending analyses to track the effectiveness of risk mitigation and to identify emerging hazards.

(d) Personnel at all levels and across all disciplines are encouraged to identify and report hazards and other safety issues through their safety reporting systems. To be effective, safety reporting systems should be readily accessible to all personnel. Depending on the situation, a paper-based, web-based or desktop form can be used. Having multiple entry methods available, maximizes the likelihood of staff engagement. Everyone should be made aware of the benefits of safety reporting and what should be reported.

(e) Anybody who submits a safety report should receive feedback on what decisions or actions have been taken. The alignment of reporting system requirements, analysis tools and methods can facilitate exchange of safety information as well as comparisons of certain safety performance indicators. Feedback to reporters in voluntary reporting schemes also serves to demonstrate that such reports are considered seriously. This helps to promote a positive safety culture and encourage future reporting.

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

(g) Safety reports are often filtered through the use of a taxonomy, or a classification system. Filtering information using a taxonomy can make it easier to identify common issues and trends. The Aerodrome Operator should develop taxonomies that cover their type(s) of operation. The disadvantage of using a taxonomy is that sometimes the identified hazard does not fit cleanly into any of the defined categories. The challenge then is to use taxonomies with the appropriate degree of detail; specific enough that hazards are easy to allocate, yet generic enough that the hazards are valuable for analysis.

(h) Other methods of hazard identification include workshops or meetings in which subject matter experts conduct detailed analysis scenarios. These sessions benefit from the contributions of a range of experienced operational and technical personnel. Existing safety committee meetings (SRB, SAG, etc.) could be used for such activities; the same group may also be used to assess associated safety risks.

(i) Identified hazards and their potential consequences should be documented. This will be used for safety risk assessment processes.

(j) The hazard identification process considers all possible hazards that may exist within the scope of the operator's aviation activities including interfaces with other systems, both within and external to the organization. Once hazards are identified, their consequences (i.e. any specific events or outcomes) should be determined.

2.5.1.3 Investigation of hazards

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

(i) instances where the organization experiences an unexplained increase in aviation safety-related events or regulatory non-compliance; or

(ii) significant changes to the organization or its activities.

2.5.2 Aerodrome Operator safety investigation

(a) Effective safety management depends on quality investigations to analyse safety occurrences and safety hazards, and report findings and recommendations to improve safety in the operating environment.

(b) There is a clear distinction between accident and incident investigations under the SLCAR Part 13 and service provider's safety investigations. Investigation of accidents and serious incidents under SLCAR Part 13 is the responsibility of the Sierra Leone Aircraft Accident and Incident Investigation Bureau (SLAAIIB) as defined in SLCAR Part 13. The operator's safety investigations are conducted as part of their SMS to support hazard identification and risk assessment processes. There are many safety occurrences that fall outside of the requirements of the SLCAR Part 13 that could provide a valuable source of hazard identification or identify weaknesses in risk controls. These problems might be revealed and remedied by a safety investigation led by the Aerodrome Operator.

(c) The primary objective of the Aerodrome Operator's safety investigation is to understand what happened, and how to prevent similar situations from occurring in the future by eliminating or mitigating safety deficiencies. This is achieved through careful and methodical examination of the event and by applying the lessons learned to reduce the probability and/or consequence of future recurrences.

(d) The benefits of conducting an internal safety investigation includes:

(i) gaining a better understanding of the events leading up to the occurrence;

(ii) identifying contributing human, technical and organizational factors;

(iii) identifying hazards and conducting risk assessments;

(iv) making recommendations to reduce or eliminate unacceptable risks; and

(v) identifying lessons learned that should be shared with the appropriate members of the aviation community.

2.5.2.1 Investigation triggers

(a) An Aerodrome Operator's safety investigation is usually triggered by a notification (report) submitted through the safety reporting system. Figure 2-2 outlines the safety investigation decision process and the distinction between when an Operator's safety investigation should take place and when an investigation under the SLCAR Part13 provisions should be initiated.

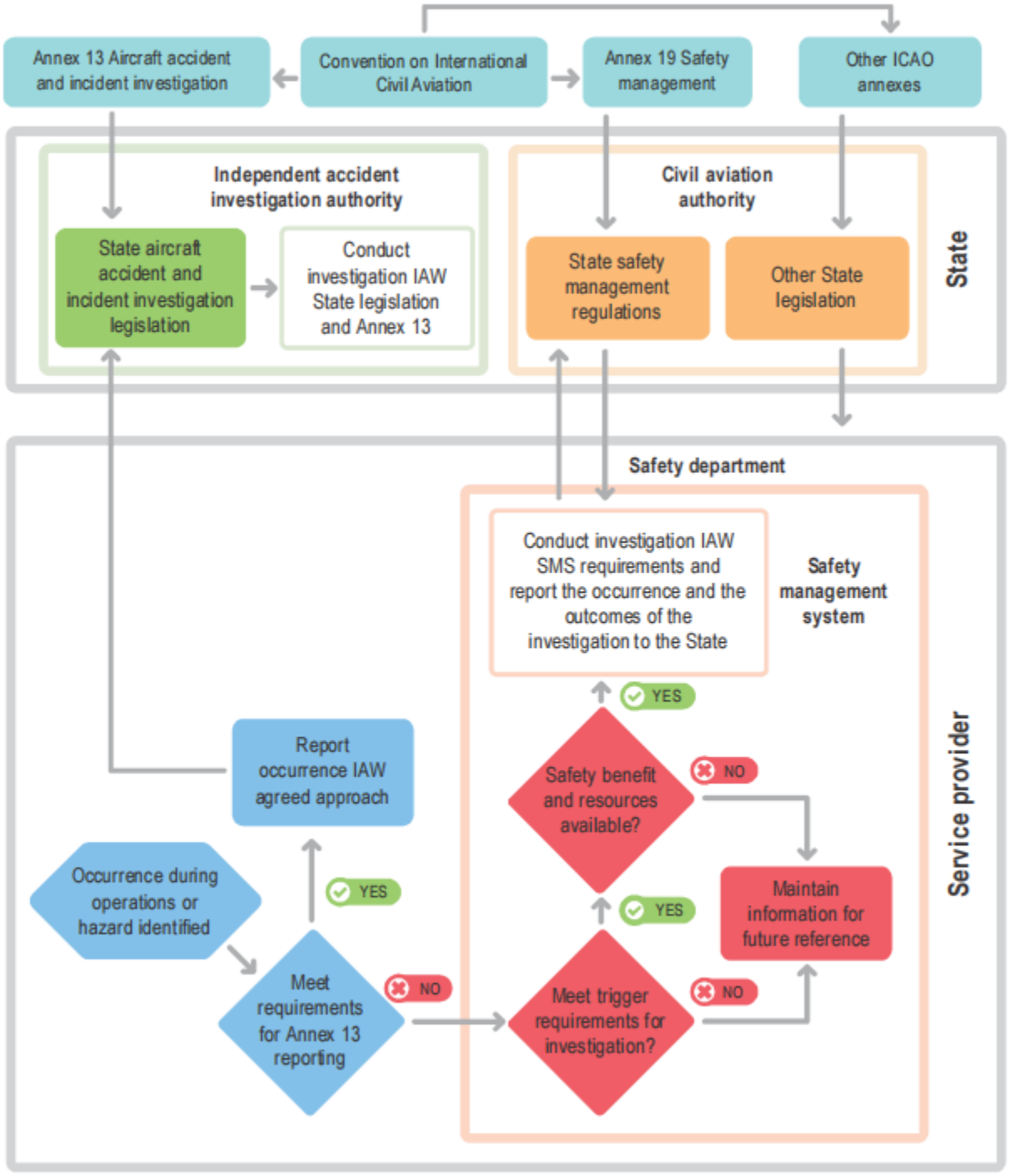

Figure 2-2. Safety investigation decision process

(b) Not all occurrences or hazards can or should be investigated; the decision to conduct an investigation and its depth should depend on the actual or potential consequences of the occurrence or hazard. Occurrences and hazards considered to have a high-risk potential are more likely to be investigated and should be investigated in greater depth than those with

lower risk potential. Aerodrome Operators should use a structured decision-making approach with defined trigger points. These will guide the safety investigation decisions: what to investigate and the scope of the investigation. This could include:

(i) the severity or potential severity of the outcome

(ii) regulatory or organizational requirements to carry out an investigation;

(iii) safety value to be gained;

(iv) opportunity for safety action to be taken;

(v) risks associated with not investigating;

(vi) contribution to targeted safety programmes;

(vii) identified trends;

(viii) training benefit; and

(ix) resources availability.

2.5.2.2 Assigning an investigator

(a) If an investigation is to commence, the first action will be to appoint an investigator or where the resources are available, an investigation team with the required skills and expertise. The size of the team and the expertise profile of its members depend on the nature and severity of the occurrence being investigated. The investigating team may require the assistance of other specialists. Often, a single person is assigned to carry out an internal investigation, with support from operations and safety office experts.

(b) These safety investigators are ideally organizationally independent from the area associated with the occurrence or identified hazard. Better results will be obtained if the investigator(s) are knowledgeable (trained) and skilled (experienced) in internal safety investigations. The investigators would ideally be chosen for the role because of their knowledge, skills and character traits, which should include: integrity, objectivity, logical thinking, pragmatism, and lateral thinking.

2.5.2.3 The investigation process

(a) The investigation should identify what happened and why it happened and this may require root cause analysis to be applied as part of the investigation. Ideally, the people involved in the event should be interviewed as soon as possible after the event. The investigation should include:

(i) establishing timelines of key events, including the actions of the people involved;

(ii) review of any policies and procedures related to the activities;

(iii) review of any decisions made related to the event;

(iv) identifying any risk controls that were in place that should have prevented the event occurring; and

(v) reviewing safety data for any previous or similar events.

(b) The safety investigation should focus on the identified hazards and safety risks and opportunities for improvement, not on blame or punishment. The way the investigation is conducted, and most importantly, how the report is written, will influence the likely safety impact, the future safety culture of the organization, and the effectiveness of future safety initiatives.

(c) The investigation should conclude with clearly defined findings and recommendations that eliminate or mitigate safety deficiencies.

2.5.3 Safety risk assessment and mitigation

(a) The Aerodrome Operator must develop a safety risk assessment model and procedures which will allow a consistent and systematic approach for the assessment of safety risks. This should include a method that will help determine what safety risks are acceptable or unacceptable and to prioritize actions.

(b) The SRM tools used may need to be reviewed and customized periodically to ensure they are suitable for the Aerodrome Operator's operating environment. The Aerodrome Operator may find more sophisticated approaches that better reflect the needs of their operation as their SMS matures.

(c) More sophisticated approaches to safety risk classification are available. These may be more suitable if the Aerodrome Operator is experienced with safety management or operating in a high-risk environment.

(d) The safety risk assessment process should use whatever safety data and safety information is available. Once safety risks have been assessed, the Aerodrome Operator will engage in a data-driven decision-making process to determine what safety risk controls are needed.

(e) Safety risk assessments sometimes have to use qualitative information (expert judgement) rather than quantitative data due to unavailability of data. Using the safety risk matrix allows the user to express the safety risk(s) associated with the identified hazard in a quantitative format. This enables direct magnitude comparison between identified safety risks. A qualitative safety risk assessment criterion such as "likely to occur" or "improbable" may be assigned to each identified safety risk where quantitative data is not available.

(f) It is the decision of the aerodrome operators to determine how they prioritize their safety risk assessments and adopt safety risk controls. As a guide, the Aerodrome Operator should find the prioritization process:

(i) assesses and controls highest safety risk;

(ii) allocates resources to highest safety risks;

(iii) effectively maintains or improves safety;

(iv) achieves the stated and agreed safety objectives and SPTs; and

(v) satisfies the requirements of the State's regulations with regard to control of safety risks.

(g) After safety risks have been assessed, appropriate safety risk controls can be implemented. It is important to involve the "end users" and subject matter experts in determining appropriate safety risk controls. Ensuring the right people are involved will maximize the

practicality of safety risk chosen mitigations. A determination of any unintended consequences, particularly the introduction of new hazards, should be made prior to the implementation of any safety risk controls.

(h) Once the safety risk control has been agreed and implemented, the safety performance should be monitored to assure the effectiveness of the safety risk control. This is necessary to verify the integrity, efficiency and effectiveness of the new safety risk controls under operational conditions.

(i) The SRM outputs should be documented. This should include the hazard and any consequences, the safety risk assessment and any safety risk control actions taken. These are often captured in a register so they can be tracked and monitored. This SRM documentation becomes a historical source of organizational safety knowledge which can be used as reference when making safety decisions and for safety information exchange. This safety knowledge provides material for safety trend analyses and safety training and communication. It is also useful for internal audits to assess whether safety risk controls and actions have been implemented and are effective.

2.6 Component 3: Safety Assurance

(a) The SLCAR Part 19, IS 4.1.1, section 3.1.1 requires that Aerodrome Operators develop and maintain the means to verify the safety performance of the organization and to validate the effectiveness of safety risk controls. The safety assurance component of the Aerodrome Operator's SMS provides these capabilities.

(b) Safety assurance consists of processes and activities undertaken to determine whether the SMS is operating according to expectations and requirements. This involves continuously monitoring its processes as well as its operating environment to detect changes or deviations that may introduce emerging safety risks or the degradation of existing safety risk controls. Such changes or deviations may then be addressed through the SRM process.

(c) Safety assurance activities should include the development and implementation of actions taken in response to any identified issues having a potential safety impact. These actions continuously improve the performance of the Aerodrome Operator's SMS.

2.6.1 Safety performance monitoring and measurement

To verify the safety performance and validate the effectiveness of safety risk controls requires the use of a combination of internal audits and the establishment and monitoring of SPIs. Assessing the effectiveness of the safety risk controls is important as their application does not always achieve the results intended. This will help identify whether the right safety risk control was selected and may result in the application of a different safety risk control strategy.

2.6.1.1 Internal audit

(a) Internal audits are performed to assess the effectiveness of the SMS and identify areas for potential improvement. Ensuring compliance with the standards through internal audit is a principle aspect of safety assurance.

(b) It is also necessary to ensure that any safety risk controls are effectively implemented and monitored. The causes and contributing factors should be investigated and analysed

where non-conformances and other issues are identified. The main focus of the internal audit is on the policies, processes and procedures that provide the safety risk controls.

(c) Internal audits are most effective when conducted by persons or departments independent of the functions being audited. Such audits should provide the accountable executive and senior management with feedback on the status of:

(i) compliance with regulations;

(ii) compliance with policies, processes and procedures;

(iii) the effectiveness of safety risk controls;

(iv) the effectiveness of corrective actions; and

(v) the effectiveness of the SMS.

(d) In the event where the Aerodrome Operator cannot ensure appropriate independence of an internal audit, they should consider engaging external auditors (e.g. independent auditors or auditors from another organization).

(e) Planning of internal audits should take into account the safety criticality of the processes, the results of previous audits and assessments (from all sources), and the implemented safety risk controls. Internal audits should identify non-compliance with standards and policies, processes and procedures. They should also identify system deficiencies, lack of effectiveness of safety risk controls and opportunities for improvement.

(f) Assessing for compliance and effectiveness are both essential to achieving safety performance. The internal audit process can be used to determine both compliance and effectiveness. The following questions can be asked to assess compliance and effectiveness of each process or procedure:

(i) Determining compliance

(1) Does the required process or procedure exist?

(2) Is the process or procedure documented (inputs, activities, interfaces and outputs defined)?

(3) Does the process or procedure meet requirements (criteria)?

(4) Is the process or procedure being used?

(5) Are all affected personnel following the process or procedure consistently?

(6) Are the defined outputs being produced?

(7) Has a process or procedure change been documented and implemented?

(ii) Assessing effectiveness

(1) Do users understand the process or procedure?

(2) Is the purpose of the process or procedure being achieved consistently?

(3) Are the results of the process or procedure what the “customer” asked for?

(4) Is the process or procedure regularly reviewed?

(5) Is a safety risk assessment conducted when there are changes to the process or procedure?

(6) Have process or procedure improvements resulted in the expected benefits?

(g) In addition, internal audits should monitor progress in closing previously identified non-compliances. These should have been addressed through root cause analysis and the development and implementation of corrective and preventive action plans. The results from analysis of cause(s) and contributing factors for any non-compliance should feed into the Aerodrome Operator's SRM processes.

(h) The results of the internal audit process become one of the various inputs to the SRM and safety assurance functions. Internal audits inform the Aerodrome Operator's management of the level of compliance within the organization, the degree to which safety risk controls are effective and where corrective or preventive action is required.

2.6.1.2 Safety performance monitoring

(a) Safety performance monitoring is conducted through the collection of safety data and safety information from a variety of sources typically available to an organization. Data availability to support informed decision-making is one of the most important aspects of the SMS. Using this data for safety performance monitoring and measurement are essential activities that generate the information necessary for safety risk decision-making.

(b) Safety performance monitoring and measurement should be conducted observing some basic principles. The safety performance achieved is an indication of organizational behaviour and is also a measure of the effectiveness of the SMS. This requires the organization to define:

(i) safety objectives, which should be established first to reflect the strategic achievements or desired outcomes related to safety concerns specific to the organization's operational context;

(ii) SPIs, which are tactical parameters related to the safety objectives and therefore are the reference for data collection; and

(iii) SPTs, which are also tactical parameters used to monitor progress towards the achievement of the safety objectives.

(c) A more complete and realistic picture of the Aerodrome Operator's safety performance will be achieved if SPIs encompass a wide spectrum of indicators. This should include:

(i) low probability/high severity events (e.g. accidents and serious incidents);

(ii) high probability/low severity events (e.g. uneventful operational events, non-conformance reports, deviations etc.): and

(iii) process performance (e.g. training, system improvements and report processing).

(d) SPIs are used to measure operational safety performance of the Aerodrome Operator and the performance of their SMS. SPIs rely on the monitoring of data and information from

various sources including the safety reporting system. They should be specific to the individual Aerodrome Operator and be linked to the safety objectives already established.

(e) When establishing SPIs Aerodrome Operators should consider:

(i) Measuring the right things: Determine the best SPIs that will show the organization is on track to achieving its safety objectives. Also consider what are the biggest safety issues and safety risks faced by the organization, and identify SPIs which will show effective control of these.

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

(iii) Reliability of the data: Data may be unreliable either because of its subjectivity or because it is incomplete.

(iv) Common industry SPIs: It may be useful to agree on common SPIs with similar organizations so that comparisons can be made between organizations. The regulator or industry associations may enable these.

(f) Once SPIs have been established the Aerodrome Operator should consider whether it's appropriate to identify SPTs and alert levels. SPTs are useful in driving safety improvements but, implemented poorly, they have been known to lead to undesirable behaviours – that is, individuals and departments becoming too focused on achieving the target and perhaps losing sight of what the target was intended to achieve – rather than an improvement in organizational safety performance. In such cases it may be more appropriate to monitor the SPI for trends.

(g) The following activities can provide sources to monitor and measure safety performance:

(i) Safety studies analysis to gain a deeper understanding of safety issues or better understand a trend in safety performance.

(ii) Safety data analysis uses the safety reporting data to uncover common issues or trends that might warrant further investigation.

(iii) 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. This may require validation via data collection to determine if corrective action is required. Nonetheless, surveys may provide an inexpensive and valuable source of safety information.

(iv) Safety audits focus on assessing the integrity of the Aerodrome Operator's SMS and supporting systems. Safety audits can also be used to evaluate the effectiveness of installed safety risk controls or to monitor compliance with safety standards. Ensuring independence and objectivity is a challenge for safety audits. Independence and objectivity can be achieved by engaging external entities or internal audits with protections in place - policies, procedures, roles, communication protocols.

(v) Findings and recommendations from safety investigations can provide useful safety information that can be analysed against other collected safety data.

(vi) Operational data collection systems, radar information can provide useful data of events and operational performance.

(h) The development of SPIs should be linked to the safety objectives and be based on the analysis of data that is available or obtainable. The monitoring and measurement process involves the use of selected safety performance indicators, corresponding SPTs and safety triggers.

(i) The Aerodrome Operator should monitor the performance of established SPIs and SPTs to identify abnormal changes in safety performance. SPTs should be realistic, context specific and achievable when considering the resources available to the organization and the associated aviation sector.

(j) Primarily, safety performance monitoring and measurement provides a means to verify the effectiveness of safety risk controls. In addition, they provide a measure of the integrity and effectiveness of SMS processes and activities.

(k) The Authority may have specific processes for the acceptance of SPIs and SPTs that will need to be followed. Therefore, during development of SPIs and SPTs, the Aerodrome Operator should consult with the Authority or any related information that the State has published.

(l) For more information about safety performance management, refer to Chapter 4 of ICAO Doc 9859.

2.6.2 The management of change

(a) Aerodrome Operators experience change due to a number of factors including, but not limited to:

(i) organizational expansion or contraction;

(ii) business improvements that impact safety; these may result in changes to internal systems, processes or procedures that support the safe delivery of the products and services;

(iii) changes to the organization's operating environment;

(iv) changes to the SMS interfaces with external organizations; and

(v) external regulatory changes, economic changes and emerging risks.

(b) Change may affect the effectiveness of existing safety risk controls. In addition, new hazards and related safety risks may be inadvertently introduced into an operation when change occurs. Hazards should be identified and related safety risks assessed and controlled as defined in the organization's existing hazard identification or SRM procedures.

(c) The organization's management of change process should take into account the following considerations:

(i) Criticality. How critical is the change? The Aerodrome Operator should consider the impact on their organization's activities, and the impact on other organizations and the aviation system.

(ii) Availability of subject matter experts. It is important that key members of the aviation community are involved in the change management activities; this may include individuals from external organizations.

(iii) Availability of safety performance data and information. What data and information is available that can be used to give information on the situation and enable analysis of the change?

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

(e) The Aerodrome Operator should define the trigger for the formal change process. Changes that are likely to trigger formal change management include:

(i) introduction of new technology or equipment;

(ii) changes in the operating environment;

(iii) changes in key personnel;

(iv) significant changes in staffing levels;

(v) changes in safety regulatory requirements;

(vi) significant restructuring of the organization; and

(vii) physical changes (new facility or base, aerodrome layout changes etc.).

(f) The Aerodrome Operator should also consider the impact of the change on personnel. This could affect the way the change is accepted by those affected. Early communication and engagement will normally improve the way the change is perceived and implemented.

(g) The change management process should include the following activities:

(i) understand and define the change; this should include a description of the change and why it is being implemented;

(ii) understand and define who and what it will affect; this may be individuals within the organization, other departments or external people or organizations. Equipment, systems and processes may also be impacted. A review of the system description and organizations' interfaces may be needed. This is an opportunity to determine who should be involved in the change. Changes might affect risk controls already in place to mitigate other risks, and therefore change could increase risks in areas that are not immediately obvious;

(iii) identify hazards related to the change and carry out a safety risk assessment; this should identify any hazards directly related to the change. The impact on existing hazards and

safety risk controls that may be affected by the change should also be reviewed. This step should use the existing organization's SRM processes;

(iv) develop an action plan; this should define what is to be done, by whom and by when. There should be a clear plan describing how the change will be implemented and who will be responsible for which actions, and the sequencing and scheduling of each task;

(v) sign off on the change; this is to confirm that the change is safe to implement. The individual with overall responsibility and authority for implementing the change should sign the change plan; and

(vi) assurance plan; this is to determine what follow-up action is needed. Consider how the change will be communicated and whether additional activities (such as audits) are needed during or after the change. Any assumptions made need to be tested.

2.6.3 Continuous improvement of the SMS

(a) The SLCAR Part 19, IS 4.1.1, section 3.3 requires "the Aerodrome Operator monitors and assess its SMS processes to maintain or continuously improve the overall effectiveness of the SMS." Maintenance and continuous improvement of the Aerodrome Operator's SMS effectiveness is supported by safety assurance activities that include the verification and follow up of actions and the internal audit processes. It should be recognized that maintaining and continuously improving the SMS is an ongoing journey as the organization itself and the operational environment will be constantly changing.

(b) Internal audits involve assessment of the Aerodrome Operator's aviation activities that can provide information useful to the organization's decision-making processes. The internal audit function includes evaluation of all of the safety management functions throughout the organization.

(c) SMS effectiveness should not be based solely on SPIs; Aerodrome Operators should aim to implement a variety of methods to determine its effectiveness, measure outputs as well as outcomes of the processes, and assess the information gathered through these activities. Such methods may include:

(i) Audits; this includes internal audits and audits carried out by other organizations.

(ii) Assessments; includes assessments of safety culture and SMS effectiveness.

(iii) Monitoring of occurrences: monitor the recurrence of safety events including accidents and incidents as well as errors and rule-breaking situations.

(iv) Safety surveys; including cultural surveys providing useful feedback on staff engagement with the SMS. It may also provide an indicator of the safety culture of the organization.

(v) Management reviews; examine whether the safety objectives are being achieved by the organization and are an opportunity to look at all the available safety performance information to identify overall trends. It is important that senior management review the effectiveness of the SMS. This may be carried out as one of the functions of the highest-level safety committee.

(vi) Evaluation of SPIs and SPTs; possibly as part of the management review. It considers trends and, when appropriate data is available, can be compared to other Aerodrome Operators or State or global data.

(vii) Addressing lessons learnt; from safety reporting systems and Aerodrome Operator safety investigations. These should lead to safety improvements being implemented.

(d) In summary, the monitoring of the safety performance and internal audit processes contributes to the Aerodrome Operator's ability to continuously improve its safety performance. Ongoing monitoring of the SMS, its related safety risk controls and support systems assures the Aerodrome Operator and the State that the safety management processes are achieving their desired safety performance objectives.

2.7 Component 4: Safety Promotion

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

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

(c) The Aerodrome Operator should establish and implement processes and procedures that facilitate effective two-way communication throughout all levels of the organization. This should include clear strategic direction from the top of the organization and the enabling of "bottom-up" communication that encourages open and constructive feedback from all personnel.

2.7.1 Training and education

(a) The SLCAR Part 19 requires that "the Aerodrome Operator shall develop and maintain a safety training programme that ensures that personnel are trained and competent to perform their SMS duties." It also requires that "the scope of the safety training programme be appropriate to each individual's involvement in the SMS." The safety manager is responsible for ensuring there is a suitable safety training programme in place. This includes providing appropriate safety information relevant to specific safety issues met by the organization. Personnel who are trained and competent to perform their SMS duties, regardless of their level in the organization, is an indication of management's commitment to an effective SMS. The training programme should include initial and recurrent training requirements to maintain competencies. Initial safety training should consider, as a minimum, the following:

(i) organizational safety policies and safety objectives;

(ii) organizational roles and responsibilities related to safety;

(iii)basic SRM principles;

(iv) safety reporting systems;

(v) the organization's SMS processes and procedures; and

(vi) human factors

(b) Recurrent safety training should focus on changes to the SMS policies, processes and procedures, and should highlight any specific safety issues relevant to the organization or lessons learned.

(c) The training programme should be tailored to the needs of the individual's role within the SMS. For example, the level and depth of training for managers involved in the organization's safety committees will be more extensive than for personnel directly involved with delivery of the organization's product or services. Personnel not directly involved in the operations may require only a high level overview of the organization's SMS.

2.7.1.1 Training needs analysis

(a) For most organizations, a formal training needs analysis (TNA) is necessary to ensure there is a clear understanding of the operation, the safety duties of the personnel and the available training. A typical TNA will normally start by conducting an audience analysis, which usually includes the following steps:

(i) Every one of the Aerodrome Operator's staff will be affected by the implementation of the SMS, but not in the same way or to the same degree. Identify each staff grouping and in what ways they will interact with the safety management processes, inputs and outputs - in particular with safety duties. This information should be available from the position/role descriptions. Normally groupings of individuals will start to emerge that have similar learning needs. The Aerodrome Operator should consider whether it is valuable to extend the analysis to staff in external interfacing organizations;

(ii) Identify the knowledge and competencies needed to perform each safety duty and required by each staff grouping.

(iii) Conduct an analysis to identify the gap between the current safety skill and knowledge across the workforce and those needed to effectively perform the allocated safety duties.

(iv) Identify the most appropriate skills and knowledge development approach for each group with the aim of developing a training programme appropriate to each individual or group's involvement in safety management. The training programme should also consider the staff's ongoing safety knowledge and competency needs; these needs will typically be met through a recurrent training programme.

(b) It is also important to identify the appropriate method for training delivery. The main objective is that, on completion of the training, personnel are competent to perform their SMS duties. Competent trainers are usually the single most important consideration; their commitment, teaching skills and safety management expertise will have a significant impact on the effectiveness of the training delivered. The safety training programme should also specify responsibilities for development of the training content and scheduling as well as training and competency records management.

(c) The organization should determine who should be trained and to what depth, and this will depend on their involvement in the SMS. Most people working in the organization have some direct or indirect relationship with aviation safety, and therefore have some SMS duties. This applies to any personnel directly involved in the delivery of products and services, and personnel involved in the organization's safety committees. Some administrative and support personnel will have limited SMS duties and will need some SMS training, as their work may still have an indirect impact on aviation safety.

(d) The Aerodrome Operator should identify the SMS duties of personnel and use the information to examine the safety training programme and ensure each individual receives training aligned with their involvement with SMS. The safety training programme should specify the content of safety training for support staff, operational personnel, managers and supervisors, senior managers and the accountable executive.

(e) There should be specific safety training for the accountable executive and senior managers that includes the following topics:

(i) specific awareness training for new accountable executives and post holders on their SMS accountabilities and responsibilities;

(ii) importance of compliance with national and organizational safety requirements;

(iii) management commitment;

(iv) allocation of resources;

(v) promotion of the safety policy and the SMS;

(vi) promotion of a positive safety culture;

(vii) effective interdepartmental safety communication;

(viii) safety objective, SPTs and alert levels; and

(ix) disciplinary policy.

(f) The main purpose of the safety training programme is to ensure that personnel, at all levels of the organization, maintain their competence to fulfil their safety roles; therefore competencies of personnel should be reviewed on a regular basis.

2.7.2 Safety communication

(a) The Aerodrome Operator should communicate the organization’s SMS objectives and procedures to all appropriate personnel. There should be a communication strategy that enables safety communication to be delivered by the most appropriate method based on the individual’s role and need to receive safety related information. This may be done through safety newsletters, notices, bulletins, briefings or training courses. The safety manager should also ensure that lessons learned from investigations and case histories or experiences, both internally and from other organizations, are distributed widely. Safety communication therefore aims to:

(i) ensure that staff are fully aware of the SMS; this is a good way of promoting the organization’s safety policy and safety objectives.

(ii) convey safety-critical information; Safety critical information is specific information related to safety issues and safety risks that could expose the organization to safety risk. This could be from safety information gathered from internal or external sources such as lessons learned or related to safety risk controls. The Aerodrome Operator determines what information is considered safety critical and the timeliness of its communication.

(iii) raise awareness of new safety risk controls and corrective actions; The safety risks faced by the Aerodrome Operator will change over time, and whether this is a new safety risk that has been identified or changes to safety risk controls, these changes will need to be communicated to the appropriate personnel.

(iv) provide information on new or amended safety procedures; when safety procedures are updated it is important that the appropriate people are made aware of these changes.

(v) promote a positive safety culture and encourage personnel to identify and report hazards; safety communication is two-way. It is important that all personnel communicate safety issues to the organization through the safety reporting system.

(vi) provide feedback; provide feedback to personnel submitting safety reports on what actions have been taken to address any concerns identified.

(b) Aerodrome Operators should consider whether any of the safety information listed above needs to be communicated to external organizations.

(c) Aerodrome Operators should assess the effectiveness of their safety communication by checking personnel have received and understood any safety critical information that has been distributed. This can be done as part of the internal audit activities or when assessing the SMS effectiveness.

(d) Safety promotion activities should be carried out throughout the life cycle of the SMS, not only at the beginning.

2.8 Implementation Planning

2.8.1 System description

(a) System description helps to identify the organizational processes, including any interfaces, to define the scope of the SMS. This provides an opportunity to identify any gaps related to the Aerodrome Operator's SMS components and elements and may serve as a starting point to identify organizational and operational hazards. A system description serves to identify the features of the product, the service or the activity so that SRM and safety assurance can be effective.

(b) Most organizations are made up of a complex network of interfaces and interactions involving different internal departments as well as different external organizations that all contribute to the safe operation of the organization. The use of system description enables the organization to have a clearer picture of its many interactions and interfaces. This will enable better management of safety risk and safety risk controls if they are described, and help in understanding the impact of changes to the SMS processes and procedures.

(c) When considering a system description, it is important to understand that a "system" is a set of things working together as part of an interconnecting network. In an SMS, it is any of an organization's products, people, processes, procedures, facilities, services, and other aspects (including external factors), which are related to, and can affect, the organization's aviation safety activities. Often, a "system" is a collection of systems, which may also be viewed as a system with subsystems. These systems and their interactions with one another make up the sources of hazards and contribute to the control of safety risks. The important systems include both those which could directly impact aviation safety and those which affect the ability or capacity of an organization to perform effective safety management.

(d) An overview of the system description and the SMS interfaces should be included in the SMS documentation. A system description may include a bulleted list with references to policies and procedures. A graphic depiction, such as a process flow chart or annotated organization chart, may be enough for some organizations. An organization should use a method and format that works for that organization.

(e) Because each organization is unique, there is no "one size fits all" method for SMS implementation. It is expected that each organization will implement an SMS that works for its unique situation. Each organization should define for itself how it intends to go about fulfilling the fundamental requirements. To accomplish this, it is important that each organization prepare a system description that identifies its organizational structures, processes, and business arrangements that it considers important to safety management functions. Based on the system description, the organization should identify or develop policy, processes, and procedures that establish its own safety management requirements.

(f) When an organization elects to make a significant or substantive change to the processes identified in the system description, the changes should be viewed as potentially affecting its baseline safety risk assessment. Thus, the system description should be reviewed as part of the management of change processes.

2.8.2 Interface management

Safety risks faced by Aerodrome Operators are affected by interfaces. Interfaces can be either internal (e.g. between departments) or external (e.g. other Aerodrome Operators or contracted services,). By identifying and managing these interfaces the Aerodrome Operator will have more control over any safety risks related to the interfaces. These interfaces should be defined within the system description.

2.8.3 Identification of SMS interfaces

(a) Initially Aerodrome Operators should concentrate on interfaces in relation to its business activities. The identification of these interfaces should be detailed in the system description that sets out the scope of the SMS and should include internal and external interfaces.

(b) Figure 2-3 is an example of how an Aerodrome Operator could map out the different organizations it interacts with to identify any SMS interfaces. The objective of this review is to produce a comprehensive list of all interfaces. The rationale for this exercise is that there may be SMS interfaces which an organization is not necessarily fully aware of. There

may be interfaces where there are no formal agreements in place, such as with the power supply or building maintenance companies.

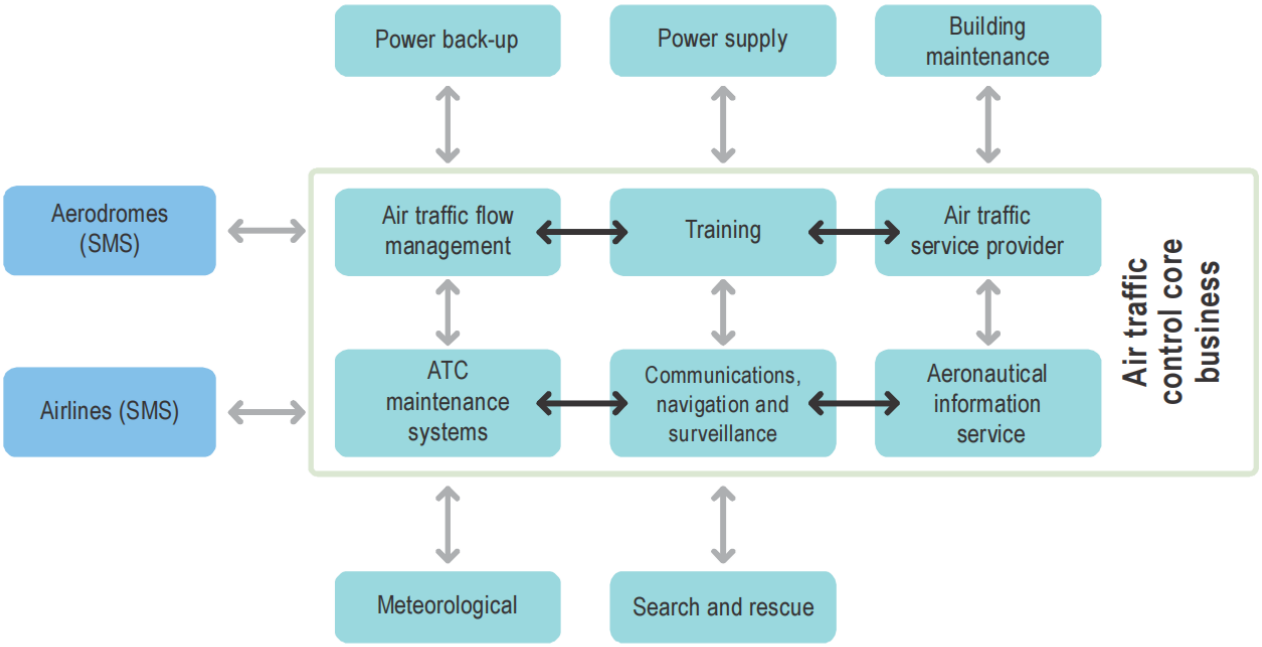

Figure 2-3. Example of air traffic Aerodrome Operator SMS interfaces

(c) Some of the internal interfaces may be with business areas not directly associated with safety, such as marketing, finance, legal and human resources. These areas can impact safety through their decisions which impact on internal resources and investment, as well as through agreements and contracts with external organizations, and may not necessarily address safety.

(d) Once the SMS interfaces have been identified, the Aerodrome Operator should consider their relative criticality. This enables the Aerodrome Operator to prioritize the management of the more critical interfaces, and their potential safety risks. Things to consider are:

(i) what is being provided;

(ii) why it is needed;

(iii) whether the organizations involved has an SMS or another management system in place; and

(iv) whether the interface involves the sharing of safety data / information.

2.8.3.1 Assessing safety impact of interfaces

(a) The Aerodrome Operator should then identify any hazards related to the interfaces and carry out a safety risk assessment using its existing hazard identification and safety risk assessment processes.

(b) Based on the safety risks identified, the Aerodrome Operator may consider working with the other organization to determine and define an appropriate safety risk control strategy. By involving the other organizations, they may be able to contribute to identifying hazards, assessing the safety risk as well as determining the appropriate safety risk control. This collaborative effort is needed because the perception of safety risks may not be the same for each organization. The risk control could be carried out by either the Aerodrome Operator or the external organization.

(c) It is also important to recognize that each organization involved has the responsibility to identify and manage hazards that affect their own organization. This may mean the critical nature of the interface is different for each organization as they may apply different safety risk classifications and have different safety risk priorities (in term of safety performance, resources, time, etc.).

2.8.3.2 Managing and monitoring interfaces

(a) The Aerodrome Operator is responsible for managing and monitoring the interfaces to ensure the safe provision of their services and products. This will ensure the interfaces are managed effectively and remain current and relevant. Formal agreements are an effective way to accomplish this as the interfaces and associated responsibilities can be clearly defined. Any changes in the interfaces and associated impacts should be communicated to the relevant organizations.

(b) Challenges associated with the Aerodrome Operator's ability to manage interface safety risks include:

(i) one organization's safety risk controls are not compatible with the other organizations';

(ii) willingness of both organizations to accept changes to their own processes and procedures;

(iii) insufficient resources or technical expertise available to manage and monitor the interface; and

(iv) number and location of interfaces.

(c) It is important to recognize the need for coordination between the organizations involved in the interface. Effective coordination should include:

(i) clarification of each organization's roles and responsibilities;

(ii) agreement of decisions on the actions to be taken (e.g. safety risk control actions and timescales);

(iii) identification of what safety information needs to be shared and communicated;

(iv) how and when coordination should take place (task force, regular meetings, ad hoc or dedicated meetings); and

(v) agreeing on solutions that benefit both organizations but that do not impair the effectiveness of the SMS.

(d) All safety issues or safety risks related to the interfaces should be documented and made accessible to each organization for sharing and review. This will allow the sharing of lessons learned and the pooling of safety data that will be valuable for both organizations. Operational safety benefits may be achieved through an enhancement of safety reached by each organization as the result of shared ownership of safety risks and responsibility.

2.8.4 SMS Scalability

(a) The organization's SMS, including the policies, processes and procedures, should reflect the size and complexity of the organization and its activities. It should consider:

(i) the organizational structure and availability of resources;

(ii) size and complexity of the organization (including multiple sites and bases); and

(iii)complexity of the activities and the interfaces with external organizations

(b) The Aerodrome Operator should carry out an analysis of its activities to determine the right level of resources to manage the SMS. This should include the determination of the organizational structure needed to manage the SMS. This would include considerations of who will be responsible for managing and maintaining the SMS, what safety committees are needed, if any, and the need for specific safety specialists.

2.8.4.1 Safety risk considerations

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

2.8.4.2 Safety data and safety information and its analysis

(a) For small organizations, the low volume of data may mean that it is more difficult to identify trends or changes in the safety performance. This may require meetings to raise and discuss safety issues with appropriate experts. This may be more qualitative than quantitative but will help identify hazards and risks for the Aerodrome Operator. Collaborating with other Aerodrome Operators or industry associations can be helpful, since these may have data that the Aerodrome Operator does not have. For example, smaller Aerodrome Operators can exchange with similar organizations/operations to share safety risk information and identify safety performance trends. Aerodrome Operators should adequately analyse and process their internal data even though it may be limited.

(b) Aerodrome Operators with many interactions and interfaces will need to consider how they gather safety data and safety information from multiple organizations. This may result in large volumes of data being collected to be collated and analysed later. These Aerodrome Operators should utilize an appropriate method of managing such data. Consideration should also be given to the quality of the data collected and the use of taxonomies to help with the analysis of the data.

2.8.5 Integration of management systems

(a) Safety management should be considered as part of a management system (and not in isolation). Therefore an Aerodrome Operator may implement an integrated management system that includes the SMS. An integrated management system may be used to capture multiple certificates, authorizations or approvals or to cover other business management systems such as quality, security, occupational health and environmental management systems. This is done to remove duplication and exploit synergies by managing safety risks across multiple activities. For example, where an Aerodrome Operator holds multiple certificates it may choose to implement a single management system to cover all of its activities. The Aerodrome Operator should decide the best means to integrate or segregate its SMS to suit its business or organizational needs.

(b) A typical integrated management system may include a:

(i) quality management system (QMS);

(ii) safety management system (SMS);

(iii) security management system (SeMS), further guidance may be found in the Aviation Security Manual (Doc 8973 — Restricted);

(iv) environmental management system (EMS);

(v) occupational health and safety management system (OHSMS);

(vi) financial management system (FMS);

(vii) documentation management system (DMS); and

(viii) fatigue risk management system (FRMS).

(c) An Aerodrome Operator may choose to integrate these management systems based on their unique needs. Risk management processes and internal audit processes are essential features of most of these management systems. It should be recognized that the risks and risk controls developed in any of these systems could have an impact on other systems. In addition, there may be other operational systems associated with the business activities that may also be integrated, such as supplier management, facilities management, etc.

(d) An Aerodrome Operator may also consider applying the SMS to other areas that do not have a current regulatory requirement for an SMS. Aerodrome Operators should determine the most suitable means to integrate or segregate their management system to suit their business model, operating environment, regulatory, and statutory requirements as well as the expectations of the aviation community. Whichever option is taken, it should still ensure that it meets the SMS requirements.

2.8.5.1 Benefits and challenges of management system integration

(a) Integrating the different areas under a single management system will improve efficiency by:

(i) reducing duplication and overlapping of processes and resources;

(ii) reducing potentially conflicting responsibilities and relationships;

(iii) considering the wider impacts of risks and opportunities across all activities; and

(iv) allowing effective monitoring and management of performance across all activities.

(b) Possible challenges of management system integration include:

(i) existing systems may have different functional managers who resist the integration; this could result in conflict;

(ii) there may be resistance to change for personnel impacted by the integration as this will require greater cooperation and coordination;

(iii) impact on the overall safety culture within the organization as there may be different cultures in respect of each system; this could create conflicts;

(iv) regulations may prevent such an integration or the different regulators and standards bodies may have diverging expectations on how their requirements should be met; and

(v) integrating different management systems (such as QMS and SMS) may create additional work to be able to demonstrate that the separate requirements are being met.

(c) To maximize the benefits of integration and address the related challenges, senior management commitment and leadership is essential to manage the change effectively. It is important to identify the person who has overall responsibility for the integrated management system.

2.8.6 SMS and QMS integration

(a) Some Aerodrome Operators have both an SMS and QMS. These sometimes are integrated into a single management system. The QMS is generally defined as the organizational 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.

(b) Both systems are complementary; the SMS focuses on managing safety risks and safety performance while the QMS focuses on compliance with prescriptive regulations and requirements to meet customer expectations and contractual obligations. The objectives of an SMS are to identify hazards, assess the associated safety risk and implement effective safety risk controls. In contrast, the QMS focuses on the consistent delivery of products and services that meet relevant specifications. Nonetheless, both the SMS and the QMS:

(i) should be planned and managed;

(ii) involve all organizational functions related to the delivery of aviation products and services;

(iii) identify ineffective processes and procedures;

(iv) strive for continuous improvement; and

(v) have the same goal of providing safe and reliable products and services to customers.

(c) The SMS focuses on:

(i) identification of safety-related hazards facing the organization;

(ii) assessment of the associated safety risk;

(iii) implementation of effective safety risk controls to mitigate safety risks;

(iv) measuring safety performance; and

(v) maintaining an appropriate resource allocation to meet safety performance requirements.

(d) The QMS focuses on:

(i) compliance with regulations and requirements;

(ii) consistency in the delivery of products and services;

(iii) meeting the specified performance standards; and

(iv) delivery of products and services that are "fit for purpose" and free of defects or errors.

(e) Monitoring compliance with regulations is necessary to ensure that safety risk controls, applied in the form of regulations, are effectively implemented and monitored by the Aerodrome Operator. The causes and contributing factors of any non-compliance should also be analysed and addressed.

(f) Given the complementary aspects of SMS and QMS, it is possible to integrate both systems without compromising each function. This can be summarized as follows:

(i) an SMS is supported by QMS processes such as auditing, inspection, investigation, root cause analysis, process design, and preventive actions;

(ii) a QMS may identify safety issues or weaknesses in safety risk controls;

(iii) a QMS may foresee safety issues that exist despite the organization's compliance with standards and specifications;

(iv) quality principles, policies and practices should be aligned with the objectives of safety management; and

(v) QMS activities should consider identified hazards and safety risk controls for the planning and performance of internal audits.

(g) In conclusion, in an integrated management system with unified goals and decision-making that considers the wider impacts across all activities, quality management and safety management processes will be highly complementary and will support the achievement of the overall safety goals.

2.8.7 SMS gap analysis and implementation

(a) Before implementing an SMS, the Aerodrome Operator should carry out a gap analysis. This compares the Aerodrome Operator's existing safety management processes and procedures with the SMS requirements as determined by the State. It is likely that the Aerodrome Operator already has some of the SMS functions in place. The development of an SMS should build upon existing organizational policies and processes. The gap analysis identifies the gaps that should be addressed through an SMS implementation plan that defines the actions needed to implement a fully functioning and effective SMS.

(b) The SMS implementation plan should provide a clear picture of the resources, tasks and processes required to implement the SMS. The timing and sequencing of the implementation plan may depend on a variety of factors that will be specific to each organization, such as:

(i) regulatory, customer and statutory requirements;

(ii) multiple certificates held (with possibly different regulatory implementation dates);

(iii) the extent to which the SMS may build upon existing structures and processes;

(iv) the availability of resources and budgets;

(v) interdependencies between different steps (a reporting system should be implemented before

(vi) establishing a data analysis system); and

(vii) the existing safety culture.

(c) The SMS implementation plan should be developed in consultation with the accountable executive and other senior managers, and should include who is responsible for the actions along with timelines. The plan should address coordination with external organizations or contractors where applicable.

(d) The SMS implementation plan may be documented in different forms, varying from a simple spread sheet to specialized project management software. The plan should be monitored regularly and updated as necessary. It should also clarify when a specific element can be considered successfully implemented.

(e) Both the State and the Aerodrome Operator should recognize that achieving an effective SMS may take several years. Aerodrome Operators should refer to their State as there may be requirements for a phased approach for SMS implementation.

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(ii) multiple certificates held (with possibly different regulatory implementation dates);

(iii) the extent to which the SMS may build upon existing structures and processes;

(iv) the availability of resources and budgets;

(v) interdependencies between different steps (a reporting system should be implemented before establishing a data analysis system); and

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monitored regularly and updated as necessary. It should also clarify when a specific element can be considered successfully implemented.

(c) In some cases, achieving an effective SMS may take several years, therefore the aerodrome operators should refer to the Authority as there may be requirements for a phased approach for SMS implementation.

3 SAFETY DATA COLLECTION AND PROCESSING SYSTEMS (SDCPS)

3.1 Introduction

(a) The effective management of safety is highly dependent on the effectiveness of safety data collection, analysis and overall management capabilities. Having a solid foundation of safety data and safety information is fundamental for safety management, since it is the basis for data-driven decision-making. Reliable safety data and safety information is needed to identify trends, make decisions and evaluate safety performance in relation to safety targets and safety objectives, and to assess risk.

(b) The SLCAR Part 19 requires that Aerodrome Operators develop and maintain a formal process to collect, record, act on and generate feedback on hazards in their activities, based on a combination of reactive and proactive methods of safety data collection.

(c) Aerodrome Operators are also required to develop and maintain the means to verify their safety performance with reference to their SPIs and SPTs, in the distinction between safety data and safety information is made in the definitions found in SLCAR Part 19. Safety data is what is initially reported or recorded as the result of an observation or measurement. It is transformed to safety information when it is processed, organized, integrated or analysed in a given context to make it useful for management of safety. Safety information may continue to be processed in different ways to extract different meanings.

(d) Support of their safety objectives by means of SDCPS. They may be based on reactive and proactive methods of safety data and safety information collection.

(e) Organizations should ensure they have personnel qualified to collect and store safety data, and the competencies needed to process safety data. This usually requires individuals with strong information technology skills as well as knowledge of data requirements, data standardization, data collection and storage, data governance and the ability to understand potential queries that may be needed for analysis. Additionally, the organization should ensure that each SDCPS has a designated custodian to apply the protection to safety data, safety information and related sources in accordance with IS 5.3 of the SLCAR Part 19.

3.2 Safety Data and Safety Information Collection

3.2.1 Determining what to collect

(a) Each organization needs to determine what safety data and safety information it must collect to support the safety performance management process and make safety decisions. Safety data and safety information requirements can be determined using a top-down and/or a bottom-up approach. The chosen approach can be influenced by different considerations, such as national and local conditions and priorities, or the need to provide the data to support the monitoring of the SPIs.

(b) Identifying and collecting the safety data should be aligned with the organization's need to effectively manage safety. In some cases, the SRM process will highlight the need for additional safety data to better assess the impact (the level of probability and severity) and determine the associated risks. Equally, the safety performance management process may

highlight a need for additional information for a more comprehensive understanding of a particular safety issue or to facilitate the establishment or refinement of SPIs.

(c) Possible bias needs to be taken into account when collecting and using safety data and safety information. For example, the language used in voluntary reports can sometimes be emotive or aimed at achieving the objectives of an individual, which may not necessarily be in the best interests of the whole organization. In these cases, the information should be used judiciously.

(d) The Authority will ensure Aerodrome Operators consider taking an integrated approach to the collection of safety data that come from different sources, both internal and external. Integration allows organizations to get a more accurate view of their safety risks and the organization's achievement of its safety objectives. It is worth noting that safety data and safety information that initially seems to be unrelated may later turn out to be critical for identifying safety issues and supporting data-driven decision-making.

(e) It is advisable to streamline the amount of safety data and safety information by identifying what specifically supports the effective management of safety within their organization. The safety data and safety information collected should support the reliable measure of the system's performance and the assessment of known risks, as well as the identification of emerging risks, within the scope of the organization's activities. The safety data and safety information required will be influenced by the size and complexity of the organization's activities.

3.2.2 Mandatory safety reporting systems

(a) The SLCAR Part 19 requires aerodrome operators to establish a mandatory safety reporting system that includes, but is not limited to, the reporting of incidents. The reporting systems developed should be made as simple as possible to access, generate and submit mandatory reports. Mandatory safety reporting systems should aim to capture all of the valuable information about an occurrence, including: what happened, where, when and to whom the report is addressed. In addition, mandatory safety reporting systems should provide for the capture of some specific hazards which are known to contribute to accidents, the timely identification and communication of which is considered valuable (e.g. routine meteorological conditions, volcanic activity, etc.).

(b) Regardless of the scope of the mandatory reporting system(s), it is recommended that all mandatorily collected reports be protected as per the principles detailed in Chapter 7 of ICAO Doc 9859 (SMS). Mandatory occurrence reporting systems tend to collect more technical information (e.g. hardware failures) than human performance aspects.

3.2.3 Voluntary safety reporting systems

(a) Voluntary safety reporting systems should be established to collect safety data and safety information not captured by the mandatory safety reporting system. These reports go beyond typical incident reporting. Voluntary reports tend to illuminate latent conditions, such as inappropriate safety procedures or regulations, human error, etc. One way to identify hazards is through voluntary reporting.

Note - *further guidance on safety data collection and reporting is found in ICAO Doc 9859 (SMS)*

3.3 Safety Data Processing

Safety data processing refers to the manipulation of safety data to produce meaningful safety information in useful forms such as diagrams, reports, or tables. There are a number of important considerations related to safety data processing, including: data quality, aggregation, fusion, and filtering.

3.3.1 Data quality

(a) Data quality relates to data that is clean and fit for purpose. Data quality involves the following aspects:

(i) cleanliness;

(ii) relevance;

(iii) timeliness; and

(iv) accuracy and correctness

3.4 Safety Data and Safety Information Management

(a) Safety data and safety information management is the development, execution and supervision of plans, policies, programmes and practices that ensure the overall integrity, availability, usability and protection of the safety data and safety information used by the organization.

(b) Safety data and safety information management which addresses the necessary function will ensure that the organization's safety data and safety information is collected, analysed, retained and archived, as well as governed, protected and shared, as intended. Specifically, is should identify:

(i) What data will be collected

(ii) Data definitions, taxonomy and formats;

(iii) How the data will be collected, collated and integrated with other safety data and safety information sources;

(iv) How the safety data and safety information will be stored, archived and backed up, for example, data structure, and if an IT system, supporting architecture

(v) How the safety data and safety information will be used;

(vi) How the information is to be shared and exchanged with other parties

(vii) How the safety data and safety information will be protected, specified to the safety data and information type and source; and

(viii) How quality will be measured and maintained

(c) Without clearly defined processes to produce safety information, an organization cannot achieve defensible, reliable and consistent information upon which data-driven decisions are confidently made

4 SAFETY ANALYSIS

4.1 Introduction

(a) Safety analysis is the process of applying statistical or other analytical techniques to check, examine, describe, transform, condense, evaluate and visualize safety data and safety information in order to discover useful information, suggest conclusions and support data-driven decision-making. Analysis helps to generate actionable safety information in the form of statistics, graphs, maps, dashboards and presentations. Safety analysis is especially valuable for large and/or mature organization with rich safety data. Safety analysis relies on the simultaneous application of statistics, computing and operations research. The result of a safety analysis should present the safety situation in ways that enable decision makers to make data-driven safety decisions.

(b) Safety analysis may be a new function the Aerodrome Operator may need to establish. It should be noted that the required competencies to conduct effective safety analysis might be outside the purview of a traditional safety personnel. Aerodrome Operators should consider the skills necessary to analyse safety information and decide whether this role, with appropriate training, should be an extension of an existing position or whether it would be more efficient to establish a new position, outsource the role, or use a hybrid of these approaches. The decision will be driven by the plans and circumstances of each Aerodrome Operator.

(c) In parallel with the human resourcing considerations should be an analysis of the existing software, and business and decision-making policies and processes. To be effective, the safety analysis should be integrated with the organization's existing core tools, policies and processes. Once amalgamated, the ongoing development of safety intelligence should be seamless and part of the organization's usual business practice.

(d) Safety data and safety information analysis can be conducted in many ways, some requiring more robust data and analytic capabilities than others. The use of suitable tools for analysis of safety data and safety information provides a more accurate understanding of the overall situation by examining the data in ways that reveal the existing relationships, connections, patterns and trends that exist within.

(e) An organization with a mature analysis capability is better able to:

(i) establish effective safety metrics;

(ii) establish safety presentation capabilities (e.g. safety dashboard) for ready interpretation of safety information by decision makers;

(iii) monitor safety performance of a given sector, organization, system or process;

(iv) highlight safety trends, safety targets;

(v) alert safety decision makers, based on safety triggers;

(vi) identify factors that cause change;

(vii) identify connections or "correlations" between or among various factors;

(viii) test assumptions; and

(ix) develop predictive modelling capabilities

(f) Organizations should include a range of appropriate information sources in their safety analysis, not just "safety data". Examples of useful additions to the data set include: weather, terrain, traffic, demographics, geography, etc. Having access to and exploiting a broader range of data sources will ensure analysts and safety decision makers are aware of the bigger picture, within which the safety decisions are made.

4.2 Types of Analysis

Analysis of safety data and safety information also allows decision makers to compare information to other groups (i.e. a control or comparison group) to help draw conclusions from the safety data. Common approaches include descriptive analysis (describing), inferential analysis (inferring) and predictive analysis (predicting), as illustrated in Figure 4-1.

Collect Data		
Descriptive analysis	**Inferential analysis**	**Predictive analysis**
What is happening?	What is the possible explanation for what is happening now	How can future decisions be made (and how can finite resources be allocated) based upon what is happening now?

Figure 4-1. Common statistical analysis types

4.3 Reporting of Analysis Results

(a) Results of safety data analysis can highlight areas of high safety risk and assist decision makers and managers to:

(i) take immediate corrective actions;

(ii) implement safety risk-based surveillance;

(iii) define or refine safety policy or safety objectives;

(iv) define or refine SPIs;

(v) define or refine SPTs;

(vi) set SPI triggers;

(vii) promote safety; and

(viii) conduct further safety risk assessment.

(b) The results of a safety analysis should be made available to aviation safety stakeholders in a way that can be easily understood. The results should be presented with the audience, such as organizational decision makers, external Aerodrome Operators, the Authority and other States, in mind. Safety analysis results may be presented several ways; the following are some examples:

(i) Imminent safety alerts: for the transmittal to other Aerodrome Operators of safety hazards with potential outcomes that could be catastrophic, and which require immediate actions.

(ii) Safety analysis reports: usually present quantitative and qualitative information with a clear description of the degree and source of the uncertainty involved in the analysis findings. These reports may also include relevant safety recommendations.

(iii) Safety conferences: for the Authority and Aerodrome Operators to share safety information and safety analysis results that can promote collaborative initiatives.

(c) It is helpful to translate recommendations into action plans, decisions and priorities that decision makers in the organization must consider and, if possible, to outline who needs to do what about the analysis results and by when.

(d) Visualization tools such as charts, graphs, images and dashboards are simple yet effective means of presenting results of data analysis.

4.3.1.1 Safety dashboards

(a) The safety performance of the organization should be demonstrable and should clearly indicate to all interested parties that safety is being managed effectively. One approach to demonstrating this is through a "safety dashboard", which is a visual representation that enables senior executives, managers, and safety professionals a quick and easy way to view the organization's safety performance.

(b) In addition to a real time display of the organization's SPIs and SPTs, dashboards may also include information relating to category, cause and severity of specific hazards. Ideally, the information presented on the dashboard can be customized to display the information required to support the decision-making at varying levels of the organization. The use of triggers is useful for providing basic visuals to highlight if there are any issues to be addressed for a specific indicator. Analysts and decision makers will want the ability to configure the dashboard to display their top indicators as well as a feature which allows them to delve deeper into the metrics.

(c) Collecting and analysing the data required for effective management and decision-making is an ongoing process. The results of data analysis may reveal that more and better data must be collected and analysed in support of the actions and decisions that the organization needs to take. Figure 4-2 shows how reporting of analysis results may determine further requirements for data to be collected.

4.4 Safety Information Sharing and Exchange

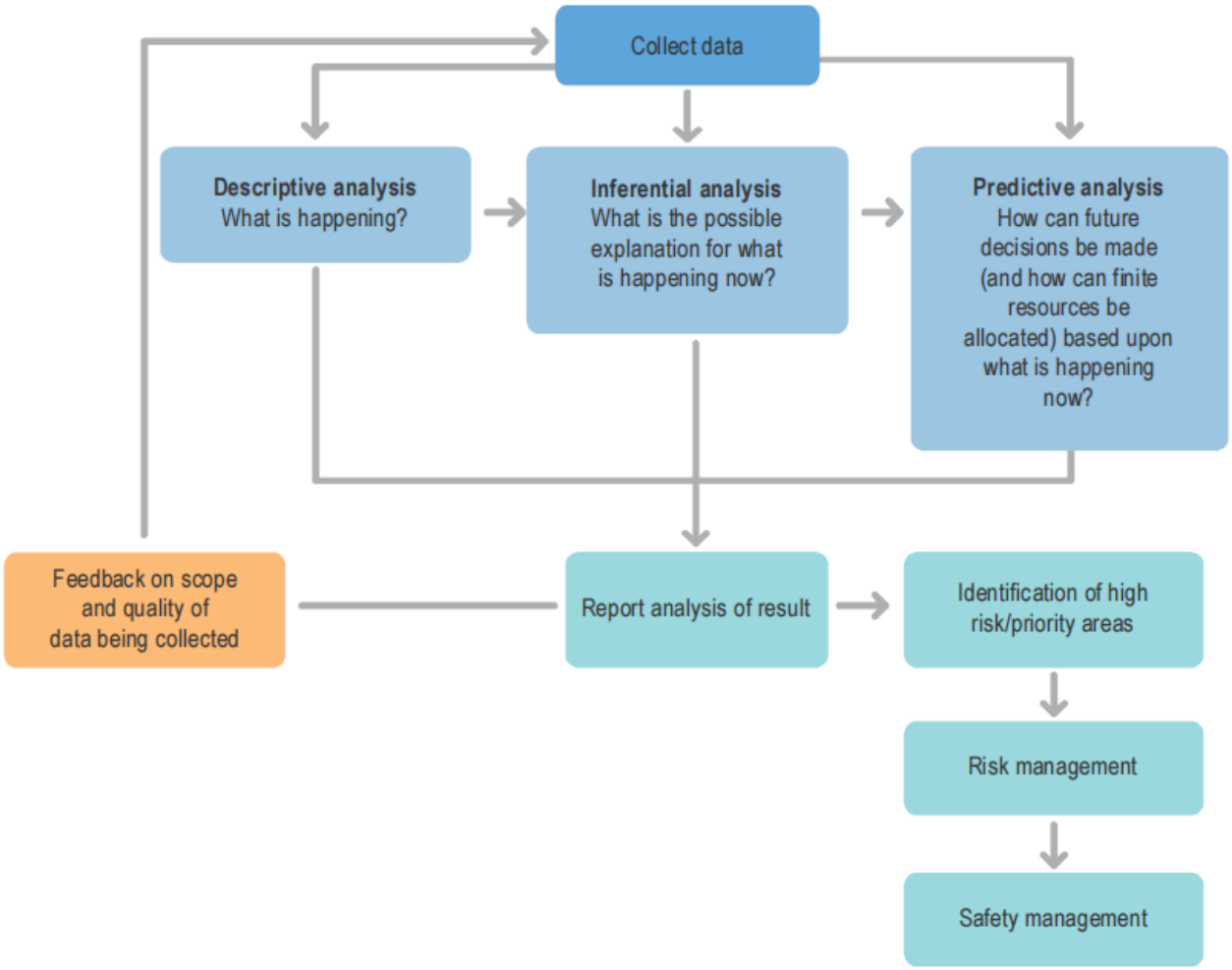

Figure 4-2. D3M integration with safety management

4.5 Data-Driven Decision-Making

(a) The primary purpose of safety analysis and safety reporting is to present a picture of the safety situation to decision makers which will empower them to make decisions based on the data presented. This is known as data-driven decision-making (also referred to as DDDM or D3M), a process-driven approach to decision-making.

(b) Many aviation occurrences have resulted, at least in part, from poor management decisions, which can result in wasted money, labour and resources. The goal of safety decision makers is, in the short term, to minimize poor outcomes and achieve effective results, and in the long term, to contribute to the achievement of the organization's safety objectives.

(c) The intent of D3M is not necessarily to make the "perfect" or ideal decision, but rather to make a good decision that achieves the short-term objective (about which the actual

decision is being made) and works towards satisfying the longer-term objective (improved organizational safety performance). Good decisions meet the following criteria:

(i) **Transparent:** the aviation community should know all the factors that influence a decision, including the process used to arrive at the decision.

(ii) **Accountable:** the decision maker "owns" the decision and the associated outcomes. Clarity and transparency also bring about accountability – it's not easy to hide behind a decision where roles and responsibilities are defined in detail and where expectations associated with the new decision are clearly outlined.

(iii) **Fair and objective**: the decision maker is not influenced by considerations that are not relevant (e.g. monetary gain or personal relationships).

(iv) **Justifiable and defendable**: the decision can be shown to be reasonable given the inputs to the decision and the process followed.

(v) **Reproducible:** given the same information that was available to the decision maker, and using the same process, another person would arrive at the same decision.

(vi) **Executable:** the decision is clear enough and that clarity minimizes uncertainty.

(vii) **Pragmatic:** humans are creatures of emotion, which means eliminating emotion from a decision isn't feasible. However, what can be eliminated are self-serving emotional biases. A healthy question to ask in the face of difficult decisions is: whom does the decision serve?

4.5.1 Advantages of data-driven decision-making

(a) D3M enables decision makers to focus on desired safety outcomes which align with the safety policy and objectives, and address various aspects related to change management, safety risk assessments, etc. D3M can assist with decisions related to:

(i) changes that can be expected in statutory and regulatory requirements, emerging technologies or resources which may affect the organization;

(ii) potential changes in the needs and expectations of the aviation community and interested parties;

(iii) various priorities that need to be established and managed (e.g. strategic, operational, resources);

(iv) new skills, competencies, tools and even change management processes that may be needed to implement new decision(s);

(v) risks that must be assessed, managed or minimized;

(vi) existing services, products and processes that currently provide the most value for interested parties; and

(vii) evolving demands for new services, products and processes.

(b) A structured approach such as D3M drives decision makers to decisions that are aligned with what the safety data is indicating. This requires trust in the safety performance

management framework; if there is confidence in the SDCPS, there will be trust in any decisions derived from them.

4.5.2 Common challenges with data-driven decision-making

(a) It is harder to build trust in data than it is to trust an expert's input and opinion. Adopting the D3M approach requires a shift in the culture and mind set of the organization where decisions are based upon reliable SPIs and the results of other safety data analysis.

(b) In some cases the decision-making process may become bogged down in an attempt to find the "best possible" solution, also known as "analysis paralysis". Strategies that can be used to avoid this include:

(i) setting a deadline;

(ii) having a well-defined scope and objective; and

(iii) not aiming for a "perfect" decision or solution the first time, but rather coming up with a "suitable" and "practical" decision and improving further decisions.

4.5.3 Data-driven decision-making process

(a) The D3M process can be a critical tool that increases the value and effectiveness of the SMS. Effective safety management depends on making defendable and informed decisions. In turn, effective D3M relies on clearly defined safety data and information requirements, standards, collection methods, data management, analysis and sharing, all of which are components of a D3M process. Figure 4-3 illustrates shows the D3M process.

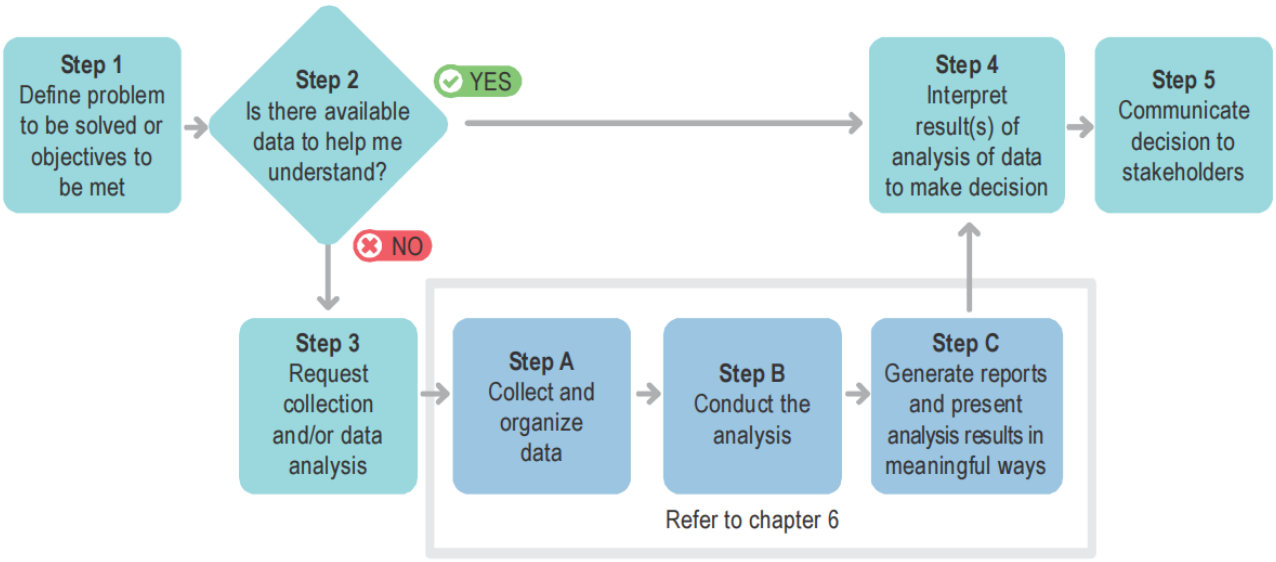

Figure 4-3. Data-driven decision-making phases

4.5.3.1 Step 1 - Defining the problem or objective

(a) The first step in planning and establishing the D3M process is to define the problem that needs to be solved or the safety objective that must be achieved. What is the question

that needs to be answered? What decision must the safety decision makers make? How will it align with the more strategic organizational objectives? In the process of defining the problem statement, decision makers should ask themselves the following questions:

(i) Does the collection and analysis of data support and relate to the organization's safety objectives or safety targets?

(ii) Is the required data available? Or can it be obtained in a reasonable manner?

(iii) Is it practical and feasible to collect and analyse the data?

(iv) Are the required resources (people, equipment, software, funds) available?

(b) In the safety management context, the main problem statements within the organization are related to evaluating and selecting safety priorities – in alignment with the safety objectives – and establishing measures for safety risk mitigation.

4.5.3.2 Step 2 - Access to data to support the decision-making

The next step is to identify what data is needed to answer the problem (taking into account the provisions on information protection). No data is any more valuable than other data. Focus should be on whether the available data is appropriate to help answer and resolve the problem. If the data required is available, proceed to step 4. If the right data is not available, the organization will need to collect, store, analyse and present new safety data and safety information in meaningful ways.

4.5.3.3 Step 3 - Request data to support the decision-making

(a) If the data isn't already available, the organization needs to find ways of collecting it. This may mean establishing another SPI and perhaps aligned SPTs. Establishing additional indicators can come at a cost. Once the cost is known, the organization should estimate if the benefits outweigh those costs. The focus should primarily be on identifying, monitoring and measuring safety data that is needed to make effective data-driven safety decisions. If the costs outweigh the benefits, consider alternative data sources and/or indicators.

(b) In the planning phase of the D3M process, the organization must define what it wants to achieve by establishing the SPTs and SPIs, and analysing the data. Why does the organization need to address the identified problem? What is a reasonable target? And how and where will safety decision makers use the results of data collection and analysis? Having a clear understanding of why the organization needs to collect, analyse, share and exchange safety data and information is fundamental for any SDCPS.

(c) The following elements combine to enable an organization to identify trends, make informed decisions, evaluate the safety performance in relation to defined objectives, assess risks or fulfil its requirements:

(i) safety performance management - as the safety data and safety information governance framework;

(ii) SDCPS - as the safety data collection and processing functionality; and

(iii) D3M as a dependable decision-making process.

4.5.3.4 Step 4 - Interpret results of data analysis and make data-driven decision

(a) The data gathered must be presented to the decision makers at the right time and in meaningful ways. The appropriateness and size of the data sets, the sophistication of the analytics and the skills of the data analysts will only be effective if the data is presented when needed and in formats that make it easy for decision makers to comprehend. The insights gained from the data should inform decision-making, and ultimately, improve safety performance.

(b) There are many decision-making models available. Using an agreed and standardized approach will maximize consistency and effectiveness of the organization's data-driven decisions, most include the following steps:

(i) assemble a team/group with the necessary skills and experience (e.g. safety action group (SAG));

(ii) clearly define the safety problem or objective and the context;

(iii) review the organization's SPTs and safety objectives to ensure continued alignment;

(iv) review and interpret the safety data to understand what it is indicating;

(v) consider and analyse the viable alternatives;

(vi) consider the risk of feasible actions (or inactions);

(vii) gain consensus among the decision-making group;

(viii) commit to the data-driven decision and act on the decision (turning data into action); and

(ix) monitor and evaluate the outcomes

4.5.3.5 Step 5 - Communicate the decision

(a) For the safety decision to be effective, it needs to be communicated to stakeholders, these include:

(i) staff required to enact the necessary actions;

(ii) person who reported the situation (if required);

(iii) all personnel, to ensure they are kept informed of safety improvements (safety promotion; refer to chapter 2); and

(iv) organizational knowledge managers to ensure the safety decision is incorporated into the learning of the organization.

(b) For more information on safety communications, refer to section 2.6 above.

APPENDIX 1 - HAZARD CHECKLIST

Aerodrome Name ……

Hazard Checklist for Aerodromes SMS			
No	**Hazard**	**Cause of Hazard**	**Consequence of Hazard**
F	**Aerodrome Facility**		
F-1	Facilities do not meet legislated or safety requirements	• Applicable standard not been adopted. • Current legislation or standard references not available. • Inadequate checklist and inspection schedules. • Poor quality of material and maintenance. • Poor design, construction and installation. • Inadequate training to assess deficiencies.	Aircraft Accident/ Incident
A	**Aerodrome Administration**		
A-1	Unsafe or poor operated aerodrome environment	• No formal structure. • Lack of human and other resources. • Lack of staff and management commitment. • Poor understanding of responsibilities. • Lack of training. • No clear lines of reporting • Out-dated contact details	

E	**Aerodrome Emergency Plan**		
E-1	In ability to adequately response to an emergency	• Lack of appropriate documented procedures • Poor distribution of current procedures • Lack of appropriate communication • Lack of review of existing procedures through regular meetings, on after actual accident or incident • Lack of testing of the procedures through exercises • Lack of availability of equipment and personnel to combat an emergency situation • Response agencies not being familiar with the aerodrome environment • Remoteness of the aerodrome for response from agencies • Contact details out of date	• Loss of life/Damage to infrastructure • Enforced closure of aerodrome
L	**Aerodrome Lighting**		
L-1	Failure of lighting system	• Inadequate lighting for activity • Lack of knowledge of standards applicable • Below standard non-conforming facilities provided • Poor maintenance • Lack of appropriate checklist and maintenance schedules • Unqualified or untrained personnel conducting maintenance • Environmental conditions deteriorating equipment lenses, cables, sensitive equipment • Infrequent serviceability inspections and poor reporting and remedial action arrangements • Inadequate maintenance of records to detect trends	• Aircraft Accident/Incident • Restriction to operations • Full or partial closure of aerodrome • Diversion of flights

R	**Aerodrome Reporting**		
R-1	Aircraft operations being exposed to unreliable conditions	• Incomplete or incorrect information relating to the published aerodrome information • Lack of review of the documented information • Information not reported • Inadequate training of personnel responsible for the reporting arrangements • Contact details outdated	• Accidents/Incidents • Operational restrictions • Diversions
U	**Unauthorized Entry to Aerodrome**		
U-1	Potential movement area incursion	• Poor documented procedures • Lack of adequate availability of facilities to prevent access either by humans or animals • Lack of adequacy and suitability of resources • No follow-up actions taken where security breaches are detected • Poor surveillance procedures	• Accident/Incident • Disruption to operations • Infrastructure damage
S	**Aerodrome Inspection**		

S-1	Potential unsafe aerodrome facilities and conditions	• Inadequate timing of inspections • Poor inspection serviceability checklist • Inadequate training of personnel responsible for the inspection process • Poor record availability of inspections to detect trends • Outdated contact arrangements • Lack of communication • Inappropriate training • Lack of commitment by personnel responsible for the inspection function • Lack of appropriate equipment to carry out the inspection • Lack of remedial action and follow-up	• Accident/Incident • Disruption to operations • Closure of movement area/s
W	**Aerodrome Works Safety**		
W-1	Unsafe aviation operations. Potential accidents/ incidents	• Lack of training of personnel associated with the works function • Poor planning of works • Heavy aircraft schedules • Poor communications • Potential runway/ runway incursions • Facilities not left in a safe condition after a completed session of works • Inadequate procedures for the marking of the designated works site • Poor markings of the works equipment • Poor identification of the works safety officer	

P	**Apron Management**		
P-1	Potential aircraft damage	• Congestion due to poor apron parking planning and layout • Inappropriate provision of wingtip clearances for aircraft type • Poorly maintained apron markings • Non distribution of apron parking arrangements to operators • Lack of training to ground staff	
P-2	Ground services equipment damage	• Lack of adequate ground markings • Poor design • Poor Training	
P-3	Passenger Safety	• Lack of adequate ground markings • Lack of supervision • Poor design • Lack of consultation with the aircraft operators	
P-4	Jet Blast	• Poor Design • Inadequate protection to passenger and public	
V	**Airside Vehicle Control**		
V-1	Vehicle/mobile equipment Accidents	• Lack of knowledge • Excessive speed • Poor visibility • Unsafe vehicle • Complacency • Poor documented procedures • Lack of supervision • Lack of training	• Injury/ loss of life • Damage/cost
V-2	Incursions	• Lack of knowledge • Lack of/ fault in communication equipment • Lack of supervision	• Aircraft Accidents • Disruption to operations

V-3	Unsafe vehicles operating airside	• Lack of maintenance • Conspicuity • Non standard • Uncontrolled authority to control airside	
V-4			
B	**Bird and Animal Hazard Management**		
B-1	Bird/ Animal strikes	• Lack of adequate surveillance procedures • Poor harassment procedures/techniques • Lack of appropriately trained staff • Lack of appropriate harassment equipment • Unidentified problem sites	
O	**Obstacle Control**		
O-1	Protected Airspace penetration	• Lack of knowledge of protected airspace requirement • Lack of adequate planning • Lack of appropriate surveillance • Lack of, or poor communication with industry of height limitations	
O-2	Accident	• Lack of information about the location of structure • Lack of marking or lighting structure • Lack of monitoring and maintenance of penetrating structure	
D	**Disabled Aircraft Removal**		
D-1	Hazard on the movement area	• Lack of equipment to remove the aircraft (Obstacle) • Insufficient remaining runway for continued operations • Non reporting of the obstacle on the runway	

H	**Handling of Hazardous material Materials**		
H-1	Hazardous material not contained	• Fuel spill • Biological fuel escape • Toxic chemical leakage • Lack of/poor procedures • Non adherence to procedures	• Fire • Contamination of environment by hazardous material
H-2	Fire	• Fuel spill • Lack of/ poor procedures • Non-adherence to procedures	Death/ injury Damage to plant/ equipment
R	**Protection of RADAR and Navigational Aids**		
R-1	Unserviceable equipment for aircraft operations	• Encroaching into restricted areas • Unauthorized maintenance or digging in vicinity of aid • Lack of appropriate security measures-fencing, signs • Excessive vegetation growth or other obstacle	
LV	**Low Visibility Operations**		
LV-1	Aircraft accident	• Lack of adequate documented procedures • Lack of appropriate training for personnel conducting assessment • Poor communication between assessor and ATC	
	Runway incursions	• Lack of adequate procedures • Poor communication • Poor or lack of supervision	

N	**Notified in AIP Supplement**		
N-1	Unsafe aircraft operation, potential damage to aerodrome facilities	• Incorrect published operational data • Inadequate training of personnel • Inadequate reporting arrangements • Inadequate documented procedures/checklist	
OH	**Other Hazards**		
OH-1			
SMS	**Safety Management System Hazards**		
SMS-1	SMS does not identify or treat Safety risks	• Poorly documented SMS • Poor understanding of SMS	

APPENDIX 2 – SAMPLE HAZARD REPORT FORM

Hazard Report Form

Note - *The information supplied in this form will only be used to enhance safety. You may choose to not provide your name. If you do provide your name, upon receipt of this form your name and position will be removed and discarded. Under no circumstances will your identity be disclosed to any person in the airport or to any other organisation, agency or person without your express permission.*

When you have completed your part of the form, it should be given to the Aerodrome Safety Manager or any member of the Aerodrome Safety Committee.

Name of Aerodrome Operator _____

Name of Submitter
(do not include if Safety Manager is completing a confidential hazard report) _____

Position held
(do not include if Safety Manager is completing a confidential hazard report) _____

Date of Report _____

Type of information to be collected for this Hazard Report	Record details here	Procedural Hazard	Physical Hazard	Probability[Likelihood of recurrence]	Severity of Consequences
Aerodrome Facility					
Aerodrome Administration					
Aerodrome Emergency Plan					
Aerodrome Lighting					
Aerodrome Reporting					
Unauthorized Entry to Aerodrome					

Type of information to be collected for this Hazard Report	Record details here	Procedural Hazard	Physical Hazard	Probability[Likelihood of recurrence]	Severity of Consequences
Aerodrome Inspection Programme					
Aerodrome Works Safety					
Apron Management					
Aircraft Vehicle Control					
Bird and Animal Hazard Management					
Obstacle Control					
Disabled Aircraft Removal					
Handling of Hazardous Materials					
Protection of Radar and Navigational Aids					
Low Visibility Operations					
Particular of the Aerodrome to be notified in AIP					
Safety Management System					

Note 1 - *Please indicate in the table, as per your opinion, what is the likelihood of a similar occurrence happening again, e.g.:*

Likely Rare
1 2 3 4 5

Note 2 - *Please indicate in the table, what you consider could be the worst possible consequence if this occurrence did happen again, e.g.:*

Catastrophic Minor damage
A B C D E

Recommendation as to how this hazard may be dealt with:

APPENDIX 3 – SAMPLE HAZARD ASSESSMENT FORM

Hazard Assessment Form

[TOBE COMPLETED BY THE AERODROME SAFETY MANAGER]

The hazard report has been de-identified and entered into the Aerodrome database

Signature: _____Date: _____

Name_____

<table>
<tr><td>Assessment Requirement</td><td colspan="2">Record details here</td></tr>
<tr><td>Cause of Hazard (See Hazard checklist For suggested causes)</td><td colspan="2">•</td></tr>
<tr><td>Consequence of Hazard/Risk Description</td><td colspan="2">•</td></tr>
<tr><td rowspan="2">Current measures to reduce risks (Risk Treatments in place)</td><td colspan="2"></td></tr>
<tr><td>Consequence Level (Use Risk Severity Table)</td><td>Likelihood (Use Risk Probability Table)</td></tr>
<tr><td colspan="2">Risk Index (Use Risk Assessment Matrix)</td><td>Risk Tolerability(Use Risk Acceptability Table)</td></tr>
<tr><td rowspan="2">Further actions to reduce risks (Proposed Risk mitigation measures)</td><td colspan="2"></td></tr>
<tr><td>Consequence Level (Use Risk Severity Table)</td><td>Likelihood (Use Risk Probability Table)</td></tr>
<tr><td colspan="2">Risk Index (Use Risk Assessment Matrix)</td><td>Risk Tolerability/Residual Risk (Use Risk Acceptability Table)</td></tr>
</table>

What action is required to ELIMINATE or CONTROL the hazard and PREVENT injury?

_____

_____

_____

Resources Required:_____

Responsibility for action:_____

Referred to _____ for further action.

Signature:_____ Date:_____

Forwarded to the Aerodrome Safety Committee for review.

Signed:_____ Date:_____

Appropriate Feedback given to staff.

Signed:_____ Date:_____

APPENDIX 4 – SAMPLE HAZARD REPORT LOG

Hazard Report Log

Name of the Aerodrome Operator

(This Log contains a summary of data from Hazard Assessment Form, Appendix - 3)

Risk by Hazard No. (see Hazard Checklist) (1)	Possible Risk treatment Option(see Risk Assessment Matrix) (2)	Preferred Option's (3)	Risk Tolerability Rating (Residual Risk) after new Treatment (Use Risk Acceptability Table) (4)	Result of Cost benefit analysis (5)	Person responsible for implementation of option (6)	Time table for implementation (7)	Short Term Corrective Action (Y or N) (8)	How will risk and treatment option be monitored (9)

1. The data to go under this heading is the Hazard number and Residual Risk Source for each Risk (data from Hazard Checklist).
2. The data to go under this heading is a description of the optional actions which might be taken to treat the identified risk. (etc. for all headings)
3. The data to go under this heading is the identity of the most preferable option to treat the risk identified.
4. The data to go under this heading is a re-assessment of the residual risk after the preferred risk treatment option has been introduced.
5. In many cases the preferred treatment option has been selected after a formal or informal cost benefit analysis. Record the results here.
6. Identify the responsible manager who would be in the best position to treat the risk identified.
7. Insert here a proposed completion data for the preferred risk option, and any relevant stage. This may be based on practical consideration or on the residual risk associated with a particular hazard.
8. Is it expected data the actions will be completed within 2 months of the occurrence? If so mark "Yes" in this box, otherwise "No".
9. Who and how will feedback be provided to the Aerodrome Safety manager about the results of action undertaken to treat risk?

APPENDIX 5 - ACCIDENT AND INCIDENT REPORT

Accident and Incident Report Form

To be completed by the Aerodrome Safety Manager or senior representative of the Airside Operator for all accidents and incidents that would likely seriously endanger people, aircraft, vehicles, or equipment.

Name of person that completed this report:

_____

_ Organisation and Position:

_____

Telephone number:

_____

Date of Accident/Incident:

_____

Time:

_____

Location:_____

Date of Report:_____

Names of Witnesses

Witness1

Name:_____

Address:_____

Telephone:_____

Witness2

Name:_____

Address:_____

Telephone:_____

Witness3

Name:_____

Address:_____

Telephone:_____

Details

Details of the accident/incident: (Include details of people involved, aircraft, vehicles, and equipment. Include details of what took place that contributed to the accident/incident)

Details of any injuries:

Details of damage to aircraft/vehicles/equipment/facilities: