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The Civil Aviation Authority of Thailand

Guidance Material on Safety Management System in Civil Aviation for Complex Organisations

CAAT-GM-SMO-SMSCO

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Approved by

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Foreword

The purpose of this document is to provide guidance on the implementation of Safety Management Systems (SMS). It has been developed to give sufficient understanding of SMS framework and the development of management policies and processes to implement and maintain an effective SMS. It applies to complex Civil Aviation Organisations (CAOs).

This document meets ICAO Annex 19 requirements and is a material for CAOs to refer alongside with Thailand Civil Aviation Regulations (TCARs).

A safety management system is a systematic and proactive approach for managing safety risks where potential safety risks are identified and managed to an acceptable level. SMS adopts a business-like approach to safety, similar to the way that finances are managed, with safety plans, safety performance indicators and targets and continuous monitoring of the safety performance of the organisation. It enables effective risk-based decision-making processes across the business.

It is important to recognise that SMS is a top down driven system, which means that the Accountable Manager of the organisation is responsible for the implementation and continuing compliance of the SMS. Without the wholehearted support and ownership of the Accountable Manager the SMS will not be effective. However, safety is a shared responsibility across the whole organisation and needs the involvement of all staff.

There is not a 'one size fits all' model for SMS that will cater for all types of organisations. Organisations should tailor their SMS to suit the size, nature and complexity of the operation, and the hazards and associated risks inherent with its activities.

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Abbreviations

Abbreviations	Meaning
AAIC	The Aircraft Accident and Incident Investigation Commission
ATS	Air Traffic Services
CAA	Civil Aviation Authority
CAAT	The Civil Aviation Authority of Thailand
CAO	Civil Aviation Organisation
Doc	Document
ERC	Event Risk Classification
ERP	Emergency Response Planning
FDA	Flight Data Analysis
FDM	Flight Data Monitoring
FTE	Full Time Equivalent(s)
HIRM	Hazard Identification and Risk Mitigation
ICAO	International Civil Aviation Organization
LOSA	Line Operation Safety Audits
MOR	Mandatory Occurrence Report
SAG	Safety Action Group
SDCPS	Safety Data Collection and Processing Systems
SMM	Safety Management Manual
SMS	Safety Management System
SPI	Safety Performance Indicator
SPT	Safety Performance Target
SRB	Safety Review Board
SRM	Safety Risk Management
SSP	State Safety Programme
TASAP	Thailand Aviation Safety Action Plan
TCAR	Thailand Civil Aviation Regulation
TNA	Training Need Analysis
VOR	Voluntary Occurrence Report

0. Introduction

0.1 Background

0.1.1 Why is a Safety Management System required for CAOs in Thailand?

Given the increasing complexity of the global and Thailand aviation system, there is a need to implement safety management systems that support the continued evolution of a proactive strategy to improve aviation safety. In this regard, ICAO Annex 19 requires every State to establish safety management system obligations for civil aviation organisations under their authority.

This will enhance the effectiveness of the Thailand State Safety Programme activities by improving the quantity and quality of the safety data and information collected from the SMS of the CAOs. This will improve the safety performance of each CAO as well as improving aviation safety in Thailand.

0.1.2 What is a SMS?

A Safety Management System (SMS) is a systematic approach to managing safety, it seeks to proactively mitigate risks before they result in aviation accidents and incidents. It can provide CAOs with the opportunity to manage activities in a more disciplined way and to have a greater understanding of their contribution to the safe operation of the aircraft. SMS includes the necessary organisational structures, accountability and responsibilities, policies and procedures. It is designed to continuously improve safety performance through the identification of hazards, the collection and analysis of safety.

SMS allows CAOs to effectively manage their activities safely and enable them to manage their safety performance, safety risks and resources, while gaining a greater understanding of their contribution to aviation safety.

Managing safety should be integrated into the day to day activities of the organisation including activities of contracted and other external organisations. The CAO should consider integrating the SMS with other management systems such as compliance monitoring, security etc. This ensures that a CAO considers the hazards, risks, interactions and interfaces throughout the whole system.

0.1.3 Why do organisations need an SMS?

Implementing an SMS will enable the Accountable Manager and other senior managers to gain a greater understanding of the hazards and risks faced by the organisation. This will improve the safety of staff, passengers and the public as well as the financial performance and reputation of the business.

SMS adopts a business-like approach to safety, similar to the way that finances are managed, with safety plans, safety performance indicators and targets and continuous monitoring of the safety performance of the organisation. It enables effective risk-based decision making based on a more comprehensive analysis of safety data and information.

The goal of SMS is to provide information that aids decisions of many kinds, ranging from those made by individuals, to those made by administrative bodies for the benefit of safety through structured and defined processes.

The SMS gives a meaningful input to aviation safety as it aims to proactively manage safety through:

- a) The proactive identification of hazards;
- b) The conduct of associated risks assessments;
- c) Actions taken to manage risks; and
- d) The measurement and monitoring of the effectiveness of risk controls.

Organisations with an effective SMS are normally as a result of strong safety leadership and a genuine management commitment to provide a safe working environment. Management lead by example and Staff are encouraged to engage in and contribute to the organisation's safety management processes by reporting safety issues and concerns. This is also enabled through an active Just Culture policy and good communication providing regular feedback on what has been done in response to safety reports, and actions being taken to manage any identified risks.

0.2 Purpose

The purpose of this document is to provide guidance on the implementation of SMS in Civil Aviation in accordance with relevant regulations. It has been developed to provide an understanding of SMS framework. It will support the development of the policies and processes needed to implement and maintain an effective SMS. It includes examples of good practices.

This document is intended to provide useful guidance to all CAOs. However, each CAO should tailor its SMS to the size and nature of organisation including the complexity of its activities.

Guidance for non-complex organisations is contained in Guidance Material on Safety Management Systems in Civil Aviation for Non-Complex Civil Aviation Organisations that can also be found on CAAT website.

0.3 Applicability

All CAOs, excluding non-complex CAOs, are stated in the relevant TCARs or any CAAT regulations.

0.4 How to implement an SMS?

CAO should implement and maintain an SMS that is commensurate with the size and nature of the organisation including the complexity of its activities.

This guidance document is aimed at all CAOs except those that have been defined as non-complex in the relevant TCARs.

Some CAO is not required to fully implement an SMS but apply specific safety risk management principles. This guidance should be applied and read in conjunction with the relevant TCAR that details the specific SMS requirements that are applicable.

0.5 Is my organisation complex or non-complex?

No criteria have been given by any regulation to classify the size of the organisations whether big or small. However, some TCAR have defined non-complex and complex organisations. CAOs should consider themselves to be complex unless they meet the non-complex definition in the relevant TCARs. This is to enable non-complex organisations to implement SMS with simpler processes than a complex organisation.

0.6 Additional documents and guidance

- ICAO Annex 19: Safety Management, 2nd edition.
- ICAO Doc 9859: Safety Management Manual 4th edition.
- ICAO Safety Management Implementation website www.icao.int/SMI
- CAP 795 Safety Management Systems (SMS) guidance for organisations, CAA UK, 2014
- SMS for Small Organisations, Safety Management International Collaboration Group, March 2015.
- CASA CAAP SMS-01 v1.1: Safety Management Systems for Regular Public Transport Operations, 2018

0.7 Definitions

Term	Definition
<i>Accountable Manager</i>	A single, identifiable person having responsibility for the effective and sufficient performance of the CAO
<i>Change management</i>	A formal process to manage changes in the organisation in a systematic manner, so that changes which may impact identified hazards and risk mitigation strategies are accounted for, before the implementation of such changes
<i>Errors</i>	An action or inaction by an operational person that leads to deviations from organisational or the operational person's intentions or expectations
<i>Hazard</i>	A condition or an object with the potential to cause or contribute to an aircraft incident or accident.
<i>Just Culture</i>	A culture in which front-line operators and others are not punished for actions, omissions or decisions taken by them which are commensurate with their experience and training, but where gross negligence, willful violations and destructive acts are not tolerated.
<i>Risk mitigation</i>	The process of incorporating defences, preventive controls or recovery measures to lower the severity and/or likelihood of a hazard's projected consequence.
<i>Safety</i>	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.
<i>Safety Culture</i>	The way safety is perceived, valued and prioritised in an organisation. It reflects the real commitment to safety at all levels in the organisation. It has also been described as "how an organisation behaves when no one is watching".
<i>Safety data</i>	A defined set of facts or set of safety values collected from various aviation-related sources, which is used to maintain or improve safety.
<i>Safety information</i>	Safety data processed, organized or analysed in a given context so as to make it useful for safety management purposes.
<i>Safety management system (SMS)</i>	A systematic approach to managing safety, including the necessary organizational structures, accountability, responsibilities, policies and procedures.
<i>Safety objective</i>	A brief, high-level statement of safety achievement or desired outcome to be accomplished by the State safety programme or CAOs' safety management system.
<i>Safety performance indicator</i>	A data-based parameter used for monitoring and assessing safety performance.
<i>Safety performance target</i>	The State or CAOs' planned or intended target for a safety performance indicator over a given period that aligns with the safety objectives.
<i>Safety risk</i>	The predicted probability and severity of the consequences or outcomes of a hazard.
<i>State safety programme (SSP)</i>	An integrated set of regulations and activities aimed at improving safety.

Term	Definition
<i>System</i>	An organised, 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.
<i>Trigger</i>	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).

1. Safety Management System Implementation

Many CAOs will already have implemented some elements of an SMS as a result of existing regulations, while others, particularly new applicants, may not have started implementing SMS. However, CAOs should carry out a gap analysis based on the SMS regulation to define if there are any gaps between what is required and what is already in place. This gap analysis should form the basis of the SMS implementation plan.

When implementing or maintaining the SMS, CAOs should ensure they have considered people, processes and technology, and, most importantly, how they will work together to enable the organisation to meet its safety objectives.

It is to be considered that CAOs do not work in isolation. There are many interactions that occur between CAOs in across different domains during the delivery of aviation related products and services. In addition, there are safety benefits of collaboration across CAOs in different domain as well as within the same domain within Thailand, regional and international level. Hence, SMS of the CAOs will also have to interact with the SSP.

1.1 Who is responsible for implementation and management of an SMS?

It is the responsibility of senior management to ensure that there are sufficient resources to implement and manage the SMS. It is also important to recognise that an effective SMS requires the participation of staff at every level of the organisation. This includes the front-line staff directly involved in the delivery of the product and services and support staff (technical and administrative). Therefore, CAO should clearly allocate safety accountabilities and responsibilities for all personnel.

1.2 Why safety accountability and responsibilities need to be defined?

Everyone needs to understand their own safety accountabilities and responsibilities. This includes their duties for the safe delivery of products and services and also for the implementation and operation of the SMS.

1.2.1 How to allocate safety accountabilities and responsibility?

The CAOs should identify the Accountable Manager who, irrespective of other functions, has ultimate responsibility and accountability, on behalf of the organisation, for the safe operation of the business and implementation and maintenance of the SMS. ***This safety accountability cannot be delegated.***

Safety responsibilities can be delegated, i.e. cascaded down, within the scope of the defined job responsibilities. These safety responsibilities should be clearly defined and individuals aware of their own safety responsibilities.

Then, the Accountable Manager should appoint a Safety Manager who is responsible for the implementation and maintenance of the SMS.

Furthermore, the CAOs should identify the safety accountabilities and responsibilities of all personnel, management and staff directly involved in or supporting the delivery of a safe business.

The CAOs should ensure all personnel, management and staff have the competence to perform their tasks including knowledge related to the SMS policies, processes and procedures.

1.3 What is the system description?

The CAOs should define a system description. A system description is a way for the CAOs to identify its organisational processes, activities including any interface to define the scope of SMS. The exercise provides an opportunity to identify gaps related to CAOs' SMS components and elements.

The system description is a starting point to identify organisational and operational hazards and risks related to the service or the activity so that safety risk management can be effective.

The system description should be included in the CAOs' SMS documentation. It should describe the aviation system within the organisation functions, various entities and authorities involved. A system description may include a list of activities and internal and external interfaces. A graphic depiction, such as a process flow chart or annotated organisation structure, may be suitable for some organisations.

1.4 What is interface management

The CAOs are responsible for managing and monitoring the interfaces to ensure the safe provision of their services and products. It is important to recognise that most CAOs rely on external organisations to support the safe delivery of a product or service. This means that there are interfaces between the SMS and external organisations. These interfaces should be identified and defined as part of their system description and included in the SMS documentation.

1.4.1 What is an interface?

Interfaces can be internal (e.g. between different departments and management systems within the same organisation (e.g. operations, maintenance, finance, security management systems, human resources or legal department). Interfaces can also be external (e.g. other CAOs, contracted or subcontracted services, outsourced work and suppliers, other State service providers).

The CAOs should focus on interfaces that support their business activities or affect the CAOs' safety risks. 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 resources and investment, as well as agreements and contracts with external organisations that may not consider safety risk.

1.4.2 How are interfaces managed?

The CAOs are responsible for management of their interfaces to ensure the safe operation of the business. There should be processes and procedures to manage the interfaces that include:

- a) Identification of the interfaces: CAOs should consider the safety critical nature of the interface. This enables the CAOs to prioritise the management of the more critical interfaces, and their potential safety risks. This procedure should consider:
 - i. what is being provided;
 - ii. why it is needed;
 - iii. whether the organisations involved have an SMS or another management system in place; and
 - iv. whether the interface involves the sharing of safety data/information.

- b) Assessing the safety impact of the interfaces: CAOs should consider working with the other organisation to identify any hazards related to the interfaces. This should include a risk assessment and agreeing an appropriate safety risk control strategy. The risk control could be carried out by either the CAO or the external organisation.
- c) Managing and monitoring interfaces: an effective approach to interface safety risk management is to establish formal agreements between interfacing organisations with clearly defined management and monitoring responsibilities. It is important to recognise the need for coordination between the organisations involved in the interface. Effective coordination should include:
 - i. clarification of each organisation’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; and
 - iv. how and when coordination should take place (regular meetings or just ‘as when required’,).

1.4.3 How to deal with outsourcing and sub-contract?

Outsourcing and sub-contracting that support the delivery of the services or products, are an external interface. However, there are additional recommendations to establish their management.

The CAO has the responsibility for ensuring that the contractor complies with the safety standards prescribed in the contract/agreement.

As a general guideline, an outsourcing and subcontracting contract/agreement should include the following as a minimum standard:

Any agreement for the provision of services/products should be supported by a written contract prior to commencing;

- a) The CAO should have a demonstrable process to assure themselves that the staff of the outsourcing or subcontracting organisation are aware of their responsibilities in respect of the agreement and the CAO’s SMS.;
- b) The outsourcing or subcontracting organisation should be able to demonstrate their ability to provide trained and competent staff (training could be provided by the CAO);
- c) The written contract/agreement should contain a schedule of oversight to monitor the outsourcing or subcontracting organisation’s performance;
- d) The contract or agreement should contain details on how safety reports are raised, investigated and addressed by both organisations;
- e) Where a service or product is being provided under a license or certificate approved by CAAT, the written agreement/contract should contain a statement requiring the outsourcing/contracting organisation to notify the CAO of any regulatory action undertaken by CAAT or any other CAA that may impact on their ability to provide the required services/products; and

- f) The agreement should also include access to be provided to CAAT to carry out oversight of the outsourced/subcontract activities, to ensure safety management is in place and comply with the related regulations.

1.5 Gap analysis and implementation plan

The implementation of an SMS requires a CAO to conduct an analysis of its system to determine which safety management processes and procedures are currently in place and which processes and procedures must be added or modified to meet the requirement. This analysis is known as a gap analysis, and it involves comparing the relevant regulations against the existing policies, processes and procedures of the CAO.

1.5.1 How to perform gap analysis

The implementation of SMS requires CAOs to conduct an analysis of its existing management, quality and other business systems to determine which components and elements of SMS are currently in place, and which components and elements have to be addressed.

A gap analysis is normally in a checklist format with additional guidance information to assist in the assessment of the expected requirements to be complied with. Once the gap analysis has been completed any missing or inadequate requirements will form the basis of the SMS implementation plan. CAOs may format their implementation plan to suit their individual needs.

Guidance Material on SMS assessment tool can be used as a gap analysis tool. This will also be used for evaluating the maturity and effectiveness of their own SMS. This tool is available on CAAT website.

1.5.2 How to establish the SMS implementation plan

Where gaps have been identified these should be included in an implementation plan. The plan should detail the gaps and the actions to be taken (what, when and by whom) to fully implement an SMS. The plan should be developed to allow prioritizing of the different elements over a period of time.

It should be realistic strategy for the implementation of SMS that will meet the organisation's safety objective while supporting effective and efficient delivery of services. It describes how an organisation will achieve its corporate safety objectives and how it will meet any new or revised safety requirements, regulatory or otherwise. Significant items in the plan will normally be included in the organisation's business plan.

The SMS implementation plan should be developed in consultation with the Accountable Manager and other senior managers, and should include who is responsible for the actions along with timelines. The plan should address coordination with external, outsourcing or subcontracting organisations where applicable including actions to be taken, by whom and in what timescale.

The SMS implementation plan may be documented in different forms, it may be a simple spreadsheet or specialized project management software. The plan should be monitored regularly and updated as necessary by the Safety Manager to manage the plan. It should also clarify when a specific element can be successfully implemented. [Appendix 3.4](#) provides an example of a simple SMS implementation plan.

Once complete, the Accountable Manager endorses the plan. The SMS implementation plan should provide a clear picture of the resources, tasks, and processes requires to implement the SMS. It should be reviewed regularly and updated as necessary.

1.6 Safety Culture

The organisational culture especially the Safety Culture can have a significant impact on the effectiveness of an organisation's SMS.

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

An organisation's culture is influenced from the top through the actions and behaviours of the Accountable Manager and senior management team which spreads throughout the organisation. It should be assessed at all levels of the organisation.

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

Managing safety within the aviation system therefore requires interaction, and management of culturally diverse personnel. However, when implementing safety management, managers should be capable of moulding their culturally-diverse team. Elimination differences in safety risk perceptions that may derive from different cultural interpretations and enhancing other safety-related aspects, such as communication, leadership styles and interaction between supervisors and subordinates is key.

1.6.1 Safety Culture and Safety Reporting

A good Safety Culture will also result in a healthy reporting culture. This will increase the level of reporting to improve the risk picture for the organisation and enable better decision making for the senior managers.

This requires the implementation of a Just Culture where people are comfortable reporting their own errors, mistakes and safety concerns without fear of punitive action except in the case of reckless acts.

CAOs' Just Culture policy and principles must clearly acceptable and unacceptable behaviours. Clearly defined conditions under which punitive disciplinary action would be considered (e.g. illegal activity, recklessness, gross negligence or wilful misconduct). The principles ensure that the policy can be applied consistently across the whole organisation. The Just Culture policy and principles are understandable and clearly visible throughout the organisation.

Staff must know that confidentiality will be maintained and the information they submit in a report will be acted upon, otherwise they will determine there is little or no benefit in submitting a report. And more importantly, how the report is written, will influence the likely safety impact, the future Safety Culture of the organisation, and the effectiveness of future safety initiatives.

Management needs to provide safety leadership that will create the right working environment and demonstrate the behaviours that will encourage the right safety behaviours in their staff. This can be enabled through having good safety policies and objectives.

1.6.2 Monitoring Safety Culture

The CAOs may choose to assess their Safety Culture to:

- a) Understand how people feel about the organisation and how importantly safety is perceived;
- b) Identify differences between various groups (subcultures) within an organisation;
- c) Identify strengths and weakness; and
- d) Exam changes over time (e.g. in response to significant organisational changes such as following an accident, a change in senior management or altered industrial relations arrangement;

There are a number of tools which are used to assess Safety Culture maturity, usually in combination:

- a) Questionnaires;
- b) Interviews and focus groups;
- c) Observation; and
- d) Document reviews.

Assessing the Safety Culture maturity can provide valuable insight, leading to actions by management that will encourage the desired safety behaviours.

It should be noted that there is a degree of subjectivity with such assessments and may reflect the views and perceptions of the people involved at a particular moment only. Also, scoring Safety Culture maturity can have unintended consequences by inadvertently encouraging the organisation to strive to achieve the “right” score, rather than working together to understand and improve the Safety Culture.

2. SMS guidelines

This section provides step-by-step guidelines for implementing SMS to assist CAOs achieving their SMS implementation goals. The guidance is based on the ICAO framework, which includes the following key components:

- Safety Policy and Objectives;
- Safety Risk Management (SRM);
- Safety Assurance; and
- Safety Promotion.

2.1 Safety Policy and Objectives

An effective SMS is the result of visible safety leadership by the Accountable Manager and the senior management team and how this is communicated to everyone in the organisation. This is demonstrated and communicated through the safety policy and objectives. It also sets out the organisational structure and roles and responsibilities to deliver an effective SMS. The safety policy and objectives are created to provide a frame of reference for SMS by outlining the principles, processes and method of organisation's SMS to achieve the desired safety outcomes.

The safety policy and objectives can be divided into these elements:

- Management Commitment;
- Safety Accountability and Responsibilities;
- Appointment of Key Safety Personnel;
- Coordination of Emergency Response Planning (ERP);
- SMS documentation.

2.1.1 Management Commitment

a) Safety Policy

In general terms, the safety policy should include a commitment to:

- i. continuously improve the level of safety performance;
- ii. promote and maintain a positive Safety Culture;
- iii. comply with all applicable legal requirements and consider international standards, and best practices;
- iv. provide all appropriate resources;
- v. enforce safety as a primary responsibility of all managers;
- vi. ensure that the policy is understood, implemented and maintained at all levels;
- vii. apply Just Culture principles; and
- viii. ensure human factors principles are applied.

The safety policy shapes the objectives that the organisation expects to achieve. This establishes the overall principles and philosophies for safety. The Accountable Manager commitment should be included in the organisation's safety policy and signed by the senior management and the Accountable Manager. To confirm senior management's commitment regarding safety, the safety policy should be developed and should be

documented and communicated throughout the organisation to ensure all personnel understand. It is important that the safety policy is promoted to all of the staff. The safety policy will also influence the Safety Culture of the organisation.

The safety policy should include the Just Culture principles and encourages people to report safety issues and concerns. This should explain the line between acceptable and unacceptable behaviours and how people will be treated fairly when involved in occurrences or when reporting safety issues and concerns.

Senior management should consult with key personnel and staff representatives to ensure the safety policy and the desired objectives are relevant to all staff. This will create the shared responsibilities of Safety Culture in the organisation.

b) Safety Objectives

Safety objectives should be established as part of the development of the safety policy by the Accountable Manager and the senior management team. They may be included in the safety policy or documented separately as they may change more frequently than the safety policy.

Safety objectives are high level statements that define the long-term safety strategy for the organisation. It is important that the safety objectives are communicated to everyone in the organisation.

CAOs should consider developing safety objectives that are focused on improving the effectiveness of the SMS as well as objectives that focus on improving operational risks. [Appendix 3.1](#) provides some examples of safety policy and objectives

The safety policy and safety objectives should be periodically reviewed to ensure they remain current and relevant.

2.1.2 Safety Accountability and Responsibilities

The organisation has to identify an Accountable Manager who has ultimate authority over safe operations of the organisation to make decision on behalf of the organisation, including decisions related to financial and human resources.

This part describes the accountability and responsibilities of the senior management team including the key safety personnel. This includes the commitment to apply the principles detailed in the safety policy and to achieve the organisation's safety objectives.

This element also includes the need to documented and communicated safety accountability, responsibilities and authorities throughout the organisation, and define levels of management with authority to make decisions regarding safety risk tolerability. The different of terms can be described as:

- Line of Accountability

How the lines of safety accountability throughout the organisation are defined will depend on the type and complexity of the organisation, and their preferred communication methods. Typically, the safety accountabilities and responsibilities will be reflected in organisational structure charts, documents that define the departmental responsibilities and personnel job or role descriptions.

- Safety Responsibilities

Safety management should be everyone's responsibility. To extent possible, the safety responsibilities of all personnel – management and staff – should focus on the staff member's contribution to the safety performance of the organisation (the organisational safety outcomes), rather the individual's safety tasks (the individual safety inputs). Given that the management of safety is a core business function, every senior manager has a degree of involvement in the operations of the SMS.

- Authorities

The Authority to make safety risk tolerability decisions should be commensurate with the manager’s general decision-making level of authority, and their authority to allocate resources. A lower level manager (or management group) may be authorised to make tolerability decisions up to a certain level. Risk levels that exceed the manager’s authority must be escalated to a higher management level, with greater authority, for consideration.

Note: conflicts of interest should be avoided wherever possible between a staff member’s safety responsibilities and other organisational responsibilities. Further, CAOs should thoughtfully appoint their SMS accountabilities and responsibilities to minimise overlap and /or gaps in safety accountability and responsibility.

- a) The Accountable Manager

The Accountable Manager takes full responsibility and accountability for the safe operation of the organisation. This includes the overall accountability for SMS including:

- i. corporate authority for ensuring all activities can be financed and performed to the required standard;
- ii. ensuring there are sufficient resources to implement an effective SMS;
- iii. promoting a positive Safety Culture;
- iv. establishing and promoting the safety policy and safety objectives;
- v. ensuring SMS is effective and performing as desired including the continuous improvement of the SMS;
- vi. final accountability for all decisions related to safety issues and organisational changes;
- vii. the authority to stop the operation or activity when an unacceptable risk is identified; and
- viii. nominating the Safety Manager who is responsible for implementing and managing the SMS.

- b) Senior management

Senior management should visibly demonstrate their commitment to the safety policy by their decisions and actions. They should lead by example by promoting a positive Safety Culture, encouraging staff to report safety issues and applying Just Culture principles. They should:

- i. participate in the development of the safety policy, including reviewing the policy to ensure it remains relevant;
- ii. continuously promote a positive Safety Culture to all staff and demonstrate their commitment to the safety policy;
- iii. ensure there are sufficient human and financial resources;
- iv. participate in the establishment of safety objectives and safety performance standards; and

- v. actively participate in the relevant safety committees.
- c) Safety responsibilities

The organisation should also detail the safety responsibilities for everyone in the organisation. This should include:

- i. the lines of safety responsibility throughout the organisation;
- ii. responsibility and expected behaviours of key personnel;
- iii. recognition that safety is everyone’s responsibility and should be included in job descriptions; and
- iv. the responsibility to report safety occurrences and safety issues or concerns. This should include the reporting of hazards, errors and near miss events.

Everyone should be aware of their accountabilities and responsibilities and the expected behaviours and standards that they should meet.

2.1.3 Appointment of Key Safety Personnel

The Accountable Manager should ensure that there is an appropriate organisational structure and competent persons to manage and operate the SMS.

The organisational structure should reflect the size, nature, and scope of the organisation and include the appointment of a Safety Manager and if appropriate a safety office. It should also establish safety committees to manage and oversee the SMS.

a) Appointment of a Safety Manager

The Safety Manager should be appointed by the Accountable Manager to implement, maintain and promote the SMS. The Safety Manager should have a direct reporting line to the Accountable Manager to report any safety issues and risks. The Safety Manager should be given the appropriate status in the organisation in order to provide the necessary level of authority when dealing with safety matters.

The competencies of the Safety Manager should include as a minimum:

- i. relevant knowledge and experience in SMS and Compliance Monitoring Systems;
- ii. operational experience related to the product or service provided by the organisation;
- iii. knowledge and understanding of ICAO standards and Thai aviation safety law, regulations and requirements;
- iv. detailed knowledge and understanding of SMS and have completed appropriate SMS training;
- v. knowledge and practical skills of safety investigation techniques; and
- vi. knowledge and understanding of Human Factors.

However, CAOs should refer to relevant TCARs for additional Safety Manager competencies requirements.

Safety Manager responsibilities

- i. management of SMS implementation on behalf of the Accountable Manager;
- ii. facilitating the safety risk management process;
- iii. monitoring corrective action and assessing the implementation and effectiveness of safety risk controls.;
- iv. analysing the available safety data and information and providing periodic reports on safety performance;
- v. maintenance of safety management documentation;
- vi. ensuring that safety management training is available and meets acceptable standards;
- vii. providing independent advice on safety matters;
- viii. initiation and participation of occurrence or accident investigation and any follow up actions;
- ix. monitoring external events and reviewing accident reports that could have a safety impact on the CAO; and
- x. coordinating and communicating (on behalf of the Accountable Manager) with CAAT and other State agencies as necessary on issues relating to safety.

b) Safety Committees

The organisations should establish appropriate safety committees that support the SMS function. This should include Terms of Reference for each committee including who should be involved in the safety committee, who will chair the meeting and frequency of the meetings.

Safety Review Board (SRB)

The highest-level safety committee, sometimes referred to as the SRB, includes the Accountable Manager and senior managers with the Safety Manager participating in an advisory capacity. The SRB is strategic and deals with high-level issues related to policies, resource allocation and organisational performance. The SRB monitors the:

- i. safety performance against the safety policy and objectives;
- ii. effectiveness of the SMS;
- iii. effectiveness of the compliance monitoring system
- iv. effectiveness of the safety oversight of sub-contracted organisations
- v. corrective or mitigating actions are being taken in a timely manner;
- vi. effectiveness of the organisation’s safety management processes;
- vii. the Safety Culture of the organisation; and
- viii. resource levels to ensure there are sufficient resources to operate the business safely.

The SRB is accountable for the strategic decisions for the organisation and to resolve any safety issues or resource issues that cannot be resolved at a departmental level. The SRB determines the acceptable level of risk that the organisation is willing to tolerate.

Safety Action Group (SAG)

For complex organisations, a safety action group or groups can be established to assist the SRB. The SAG reports to and takes direction from the SRB. The Safety Manager should participate to provide advice, present safety performance reports and to monitor progress on actions.

SAGs are normally composed of managers and front-line personnel and are chaired by a designed manager. SAGs are tactical entities that deal with specific implementation issue per direction of SRB. The functions of the SAG should include:

- i. monitor the operational effectiveness of the SMS within all of the functional areas and departments;
- ii. agreeing on the appropriate actions to mitigate identified risks to an acceptable level;
- iii. assessing the safety impact of operational changes;
- iv. reviewing the implementation of corrective action plans;
- v. monitoring corrective actions are achieved within agreed timescales;
- vi. assessing the effectiveness of safety actions and recommendations and safety promotion;
- vii. reviewing the results of safety data analysis and identifying actions to improve the safety performance;
- viii. monitoring the performance of the safety reporting system;
- ix. ensuring risk assessments are regularly reviewed and remain valid;
- x. raising significant safety issues to the SRB that require or may require SRB decision making;
- xi. reviewing the outputs and recommendations from safety investigations and agreeing on corrective actions;
- xii. oversee operational safety performance within the functional areas of the organisation and ensures that appropriate safety risk management activities are carried out;
- xiii. reviews available safety data and identifies the implementation of appropriate risk control strategies and ensures employee feedback is provided;
- xiv. assesses the safety impact related to the introduction of operational changes or new technologies; Coordinate the implementation of any actions related to risk controls and ensure that actions are taken in a timely manner; and
- xv. reviews the effectiveness of the installed safety risk controls.

For small or non-complex organisations with less than 20 FTEs a SAG is not necessary and the functions of the SAG can be combined with the SRB meeting.

2.1.4 Coordination of Emergency Response Planning (ERP)

Emergency response planning (ERP) is not mandatory for all CAOs (refer to the relevant TCARs). For some organisations it will still need a process for how it coordinates with the ERP of other organisations. An ERP is intended to manage a crisis situation. The emergency response plan should be appropriate to the size and

complexity of the activities. This will help the CAOs to know actions to deal with the emergency and support the recovery and continuity of the operation. The plan should be appropriately coordinated with other external organisations including the emergency services.

The plan should:

- a) support an orderly and efficient transition from normal to emergency operations;
- b) include designation of emergency authority and responsibilities;
- c) include the authorization of key personnel for actions contained in the plan;
- d) detail the coordination with other organisations; and
- e) support the safe continuation of operations or return to normal operations as soon as practicable.

The ERP should be periodically tested for the adequacy of the plan and the results reviewed to improve its effectiveness.

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

However, CAOs should refer to relevant TCARs for additional ERP requirements.

2.1.5 SMS documentation

SMS documentation should be created and organized in an appropriate system. SMS documentation includes:

- a) Safety Management System manual (SMM)

The organisation's SMS manual is a key instrument for communicating the approach to safety for the whole organisation. It should include the policies, processes and procedures of the SMS. The SMS manual should be kept up to date and reviewed regularly to ensure that it remains current. The content should include:

- i. safety policy and objectives;
- ii. reference to any applicable regulatory SMS requirements;
- iii. system description;
- iv. safety accountabilities and responsibilities for 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 performances and communication;
- 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;
- xiv. process for the coordination of the emergency response plan when applicable; and
- xv. where applicable, coordination of emergency response planning.

The SMS policies, processes and procedures may be integrated into existing manuals rather than as a standalone SMS Manual. It may also be an electronic version available through the company intranet.

All relevant staff should have access to the SMM and be familiar with the relevant sections that relate to their roles and responsibilities.

b) SMS operational records

There is a need to ensure that records are kept of the SMS processes and activities. This is to ensure that actions and decisions are recorded for future reference. The records are also used to demonstrate that the SMS is operating and effective. SMS operational records should be stored and kept in accordance with existing retention periods in the relevant TCARs. SMS operational records include

- i. hazard / risk registers and hazard/safety reports;
- ii. SPIs and safety performance reports;
- iii. record of completed safety risk assessments;
- iv. SMS internal review or audit records;
- v. internal audits records;
- vi. records of SMS/safety training records;
- vii. Safety committee meeting minutes;
- viii. SMS implementation plan (during the initial implementation);
- ix. gap analysis;
- x. safety investigations; and
- xi. records of ERP tests.

2.2 Safety Risk Management (SRM)

Safety risk management is at the heart of the SMS. The main principle of the SMS is to improve the management of risk. The outcome being to eliminate or mitigate risks to an acceptable level. This starts with the identification of hazards affecting aviation safety. Once the hazards are identified, the potential consequences should be identified. It is important to recognise that there may be several consequences to each hazard.

This will be followed by a risk assessment focusing on the most credible and harmful consequences. The risk assessment normally considers the likelihood and severity of the consequences. The risk assessment will help to determine the significance of the risk and to prioritise actions to mitigate the risk. An alternative method commonly known as Event Risk Classification (ERC) is included in [Appendix 3.5](#)

Safety risk mitigation actions should be monitored to ensure that they achieve the desired effect. It also is essential for organisations to provide appropriate risk management training to ensure the processes are applied consistently and to maximise the benefits.

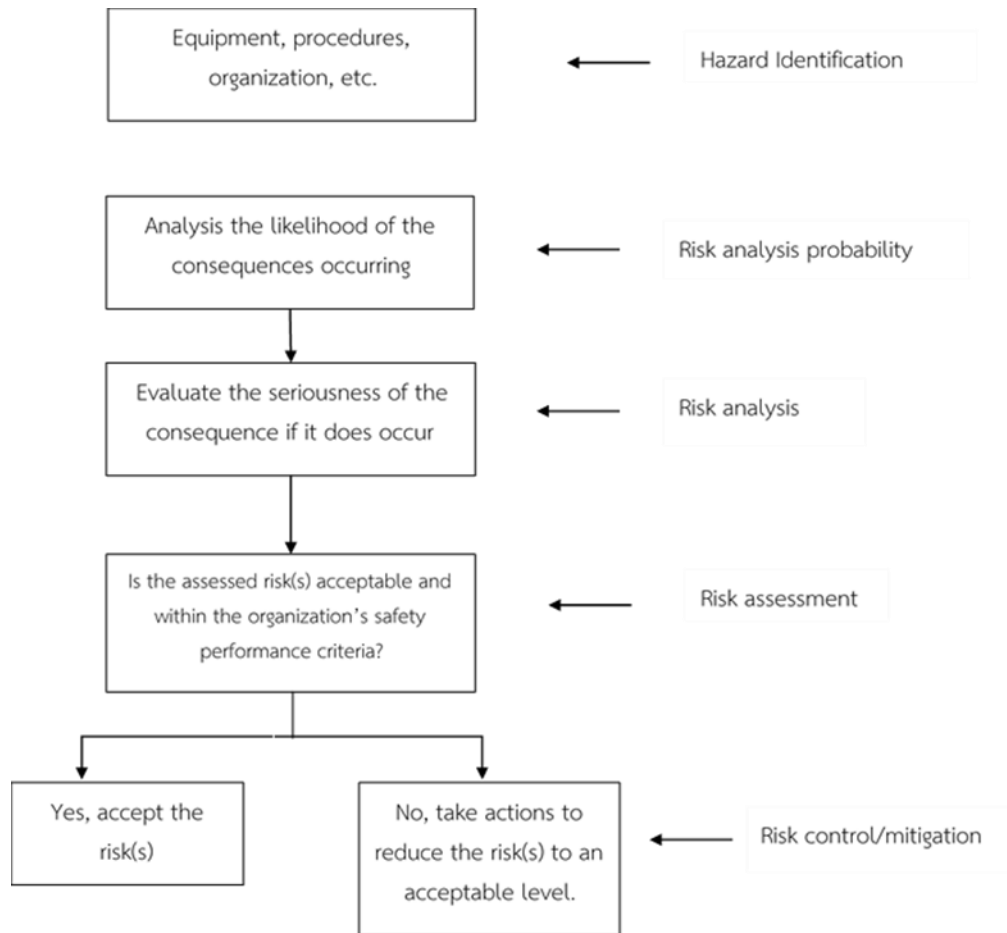


Figure 1: Hazard identification and risk mitigation process

This component will cover three important:

- Hazard Identification;
- Risk assessment and mitigation; and
- Internal safety investigation.

2.2.1 Hazard Identification

This is the first step in the SRM process. The CAOs should develop and maintain a formal process to identify hazards that could impact aviation safety in all areas of operation and activities. Organisations should also identify hazards related to their safety management interfaces.

- a) The hazard identification should consider:
 - i. system description;
 - ii. organisational factors (e.g. recruitment, training and retention of personnel, compatibility of production and safety goals, allocation of resources, operating pressures and corporate safety culture)
 - iii. the operational environment;
 - iv. human performance;
 - v. technologies;
 - vi. human-machine interface factors; and
 - vii. regulatory factors.
- b) Methodologies
 - i. **Reactive:** This involves the analysis of past events including occurrences, incidents and accidents. Hazards are also identified through safety investigations. The investigation should help to determine which hazards contributed to the event. Audit findings may also identify hazards.
 - ii. **Proactive:** This involves collecting and analysing safety data. This should include the analysis of safety reporting data (including voluntary reports), audit findings, errors, external events and accident reports and flight data analysis (FDA) programmes.

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

- c) Sources for hazard identification
 - i. Internal data resources for hazard identifications:
 - Normal operation monitoring – e.g. LOSA;
 - Automated monitoring systems – e.g. FDM;
 - Reporting systems – e.g. MOR, VOR;
 - Internal audits;
 - Feedback from training; and
 - Safety investigation.
 - ii. External data resources
 - Aviation accident reports;
 - Safety information sharing from state or other organisations; and
 - State oversight audit and third-party audits.

Hazard identifications can be based in a combination of reactive and proactive methods of safety data collection. There are a variety of data resources for hazard identification that may be both internal and external to the organisation.

Expert judgement can also be used to identify hazards and consequences through workshops, safety committee meetings and during the management of change process.

Organisations should carry out an initial hazard identification exercise on their current operations to create a baseline safety case or an initial risk register. In a mature SMS, hazard identification is an ongoing process as new hazards may occur or the foreseeable consequences may change

Workshops can be used with a range of experienced operational and technical personnel participating. The Safety Manager should be a part of this to facilitate the discussions and provide advice throughout the discussion.

d) Taxonomy

Safety data should ideally be categorized using taxonomies and supporting definitions so that the data can be captured and stored using meaningful terms. Common taxonomies and definitions establish a standard language, improving the quality of information and communication. 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.

Hazard taxonomies are especially important. Identification of a hazard is often the first step in the risk management process. Commencing with a commonly recognized language makes the safety data more meaningful, easier to classify and simpler to process. The structure of a hazard taxonomy may include a generic and specific component. CAOs should develop taxonomies that cover their type(s) of operation.

e) Hazard Prioritization

It is useful to consider the different outcomes from the most credible outcome to the worst-case scenario. However, priority should be given to the most credible outcomes rather than worst case scenario as the latter is nearly always catastrophic and therefore harder to prioritise:

- i. **Worst case:** The most unfavourable conditions expected, e.g. extremely high levels of traffic and extreme weather conditions.
- ii. **Most credible outcome:** This considers the most likely outcome from the hazard. It would not consider extreme conditions unless those conditions occur most of the time.

Defining the hazard and its consequences in as much detail as possible will make it easier when it comes to carrying out the risk assessment and determining the most appropriate risk mitigations.

f) Documenting the hazards

The hazards and any related risk assessments should be recorded so that they can be referred back to. This can be in the form of a spreadsheet or a database sometimes referred to as a hazard log.

A hazard log is normally a list of the different hazards and their consequences. This should include the assessed likelihood and severity, the required safety risk mitigation controls and the residual risk after the risk mitigations have been put in place. The log should be updated if there is a new hazard introduced. An example is shown in [Appendix 3.2](#)

2.2.2 Risk assessment and mitigation

Safety risk assessment and mitigation aims to analyse and reduce the risk to an acceptable level. The CAO needs to develop a risk assessment method and procedures to allow a systematic approach for the assessment of safety risks.

a) Risk assessment

This is an assessment of the likelihood and the severity of consequences taking into consideration any existing risk controls. The results are applied using a risk tolerability matrix that will help in the decision-making process to determine whether risk mitigation actions are required.

The risk assessment should record any assumptions or supporting data or information. As the risk assessment can be subjective, it should be verified by, at least, one other person or an appropriate safety committee. This should include the necessary subject matter experts which may involve people from different departments or even from external organisations.

The safety committees or decision makers need to recognise the subjective nature of the risk assessment. Risk will vary over time as the organisation and its activities change so the risk assessments should be reviewed regularly to ensure that they remain valid.

i. Safety risk probability

Safety risk probability is the likelihood of a potential event or outcome (consequence) occurring. When considering this, these are the questions to help evaluate the likelihood:

- Is there a history of occurrences similar to the one under consideration, or is this an isolated event?
- What other equipment or components of the same type might have similar concerns?
- What is the exposure of the hazard under consideration? For example, during what percentage of the operation is the equipment or activity in use? Are a lot of people exposed to the activity is frequently or only occasionally (aircraft loading compared to aircraft de-icing)

Example of a safety risk probability classification table

The table below presents a typical safety risk probability classification table. This tool uses qualitative terms but quantitative numbers could be defined where there is available data (e.g. Once every 1000 flights or 1000 aircraft movements). It includes the description of each category and an assignment of a value to each category.

Likelihood of Occurrences	Meaning	Value
Frequently	Like to occur many times (has occurred frequently)	5
Occasional	Likely to occur sometimes (has occurred infrequently)	4
Remote	Unlikely to occur, but possible (has occurred rarely)	3
Improbable	Very unlikely to occur (not known to have occurred)	2
Extremely Improbable	Almost unconceivable that the event will occur	1

Table 1: Safety risk probability classification

ii. Safety risk severity

Safety risk severity is the extent of harm that might reasonably be expected to occur. The assessment of severity should consider all possible consequences, related to a hazard, considering the worst foreseeable situation. The severity description should be customized according to the nature of the product or service providers operations. The severity classification should consider:

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

Example of a safety risk severity classification table

The table below presents a typical safety risk severity classification table. It provides different levels of severity to aid the CAO.

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

Table 2: Safety risk severity classification

iii. Safety risk tolerability

Safety risk tolerability is a safety risk index created by combining the ‘probability’ and ‘severity’ score. The safety risk index should then be applied against a safety risk tolerability table as shown in table below. This table provides the tolerability criteria for each particular index and whether it is “Intolerable”, “Tolerable” or “Acceptable”. This will also determine what additional actions may be required to reduce the risk to an acceptable level. Examples of a safety risk matrix and safety risk tolerability is shown in tables below.

Risk Probability	Risk Severity				
	Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequently 5	5A Intolerable	5B Intolerable	5C Intolerable	5D Tolerable	5E Tolerable
Occasional 4	4A Unacceptable	4B Unacceptable	4C Tolerable	4D Tolerable	4E Tolerable
Remote 3	3A Unacceptable	3B Tolerable	3C Tolerable	3D Tolerable	3E Acceptable
Improbable 2	2A Tolerable	2B Tolerable	2C Tolerable	2D Acceptable	2E Acceptable
Extremely Improbable 1	1A Tolerable	1B Acceptable	1C Acceptable	1D Acceptable	1E Acceptable

Table 3: Example of a safety risk matrix

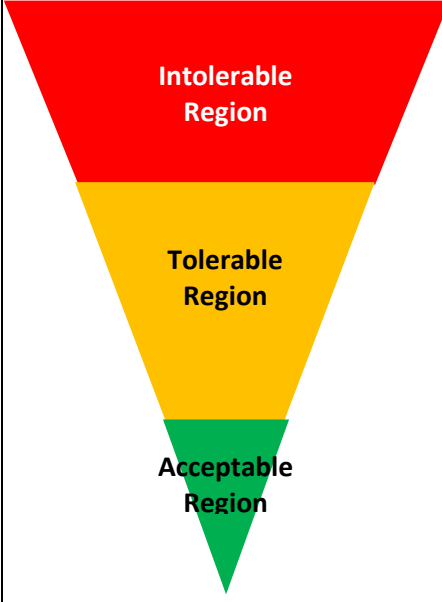
Suggested Criteria	Assessment Risk Index	Suggested Criteria
	5A 5B 5C 4A 4B 3A	“Intolerable” (under the existing circumstances) Take immediate action to stop the activity or implement action to reduce the risk to an acceptable level
	5D 5E 4C 4D 4E 3B 3C 3D 2A 2B 2C 1A	“Tolerable” It can be tolerated based on risk mitigation that reduces the risk to as low as reasonably practicable. It should require a management decision to accept the risk
	3E 2D 2E 1B 1C 1D 1E	“Acceptable” However, consideration should be given to reducing the risk further to as low as reasonably practicable

Table 4: The safety risk tolerability

Note: As low as reasonably practicable is when all further reasonable risk mitigations have been considered and implemented unless they are impractical. This includes following industry recommended practices and standards

For example, in one particular incident,

- where a safety risk probability has been assessed as “Frequently” = “5”
- safety risk severity has been assessed as “Hazardous” = “B”
- resulting in a safety risk index of “5B” which is intolerable.

iv. Risk mitigation

The implementation of risk mitigations (or risk controls) will reduce the risk. Most risk mitigations reduce the likelihood of an event rather than reducing the severity. Any decisions on risk mitigations, including decisions not to reduce the further risk, should be documented. This will enable the decisions to be reviewed at a later date as circumstances will change over time. It can be used as reference in organisational safety decision-making processes. Risk mitigations and controls should be verified or audited to ensure their effectiveness. This will be further detailed in safety assurance.

- Risk mitigation strategies

All possible risk mitigations should be identified and considered but this may be balanced against the time, cost and difficulty of implementing. CAOs must evaluate the effectiveness of each alternative strategy before decide. Each proposed safety risk mitigation alternative should be examined from the following perspective:

- **Effectiveness** – how mitigations can reduce or eliminate the safety risks.
- **Cost/ Benefit** – the perceived benefits of the mitigation outweigh the costs.
- **Practicality** – is the mitigation can be implemented? and how appropriate it is in terms of available technology, financial and administrative resources, legislation and regulations, political will, etc.
- **Acceptability** – the acceptability of the strategy in terms of the stake holder’s own standards.
- **Enforceability** –compliance with new rules, regulations or operating procedures can be monitored.
- **Durability** – sustainable and effective?
- **Residual Safety Risk** – do mitigations cause additional safety risks?
- **Unintended Consequences** – The introduction of new hazards and related safety risks associated with the implementation of any mitigation alternative.
- **Time** – Time required for implementation.

2.2.3 Internal safety investigation

The CAOs investigation process should describe how accidents/incidents/occurrences are investigated and processed within the organisation, including their correlation with the organisation’s SMS hazard identification and risk management system include procedures to ensure that reported accidents and incidents are investigated internally; process for ensuring that corrective actions taken or recommended are carried out and for evaluating their outcomes/effectiveness; procedure on disciplinary inquiry and actions associated with investigation report outcomes; Clearly defined conditions under which punitive disciplinary action would be considered (e.g. illegal activity, recklessness, gross negligence or wilful misconduct); process to ensure that investigations include identification of active failures as well as contributing factors and hazards; and Investigation procedure and format provides for findings on contributing factors or hazards to be processed for follow-up action by the organization’s hazard identification and risk management system where appropriate.

a) Investigation methodology

The primary objective of the investigation is to understand why the event happened and to prevent similar events from occurring. It can also provide opportunities to improve processes and procedures. Root cause analysis should be applied as part of the investigation process. This should identify and correct causal and contributing factors. The investigations should include:

- i. establishing timelines of key events including the actions of the people involved;
- ii. reviewing of any policies and procedures related to the activities;
- iii. reviewing of any decision 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) Assigning an investigator

It is important that anyone carrying out a safety investigation is trained and competent to carry out the investigation. This should include having a detailed understanding of human factors. The investigator may need the assistance of other specialists. Effective investigations are best carried out with two people although this may not always be possible.

2.3 Safety Assurance

Safety assurance consists of processes and activities undertaken by the organisation to determine whether the SMS is operating according to expectations and requirements. Internal SMS processes as well as the operating environment are continuously monitored and tested to detect changes or deviations that may introduce emerging safety risks or the degradation of existing risk controls. Such changes or deviations may then be addressed together with the safety risk management process.

There are three key elements in safety assurance that are:

- Safety Performance Monitoring and Measurement;
- Management of Change; and
- Continuous Improvement of SMS.

2.3.1 Safety performance monitoring and measurement

Safety performance monitoring is conducted through the collection of data information from variety of resources typically available to an organisation. Data availability to support informed decision making in one of the most important inputs of the SMS. To measure the organisation's safety performance, SPIs must be set up and monitored. The SPIs selected should be linked to the safety objectives and significant risks. The SPIs are used to verify the effectiveness of the risk mitigation controls and the organisation's SMS. The safety objective and corresponding SPIs should be regularly reviewed to ensure they remain current and suitable.

Safety performance monitoring and measurement should consist of the following four activities:

- safety data analysis;
- internal safety audits;
- SPIs and SPTs; and
- safety surveys.

a) Safety data analysis

Safety data analysis uses the available data to identify the common issues or trends that might indicate a safety issue or concern that needs further investigation. Safety data sources will vary between organisations but may include:

- i. Occurrence reports
- ii. Safety reports
- iii. Audit findings and recommendations
- iv. Safety surveys
- v. Operational data such as flight data analysis.

b) Internal safety audits

Internal safety audits assess the effectiveness of, and the compliance with procedures and processes. The main focus of internal audits is on the policies, procedures and processes providing safety risk controls. Effectiveness is achieved when the organisation routinely monitors the SMS to identify potential areas for improvement and the outcomes of this process lead to improvements to SMS. The following questions can be used to assess effectiveness and compliance:

- i. Assessing effectiveness
 - Do the users understand the process and procedures?
 - Is the purpose of the process or procedure being achieved consistently?
 - Is the process or procedure regularly reviewed and updated to continuously improve?
 - Are significant changes to processes or procedures being managed to ensure they do not have a negative impact on safety?
 - Is a safety risk assessment conducted when there are changes to the process or procedure?
 - Are the safety risk controls working and effective in achieving the expected benefits?
- ii. Determining compliance
 - Is the required process or procedure existing and documented?
 - Does the process and procedure meet the regulatory requirements?
 - Is the process or procedure being used?
 - Are all affected personnel aware of the process or procedure?
 - Are defined outputs being produced?
 - Has a process or procedure change documented and implemented?

The results obtained from internal safety audits should be reviewed against the existing risk register and may require the risk assessments to be further reviewed.

Internal audits inform CAOs' management of the level of compliance within the organisation, are safety risk controls effective? and where corrective or preventive action is required. The results from analysis of cause(s) and contributing factors for any non-compliance should feed into the service provider's SRM processes.

c) SPIs and SPTs

CAOs should consult their regulatory authority of its SMS and any process to set safety performance indicator and targets.

i. What are Safety Performance Indicators?

SPIs are parameters providing the organisation with a view of its safety performance, the effectiveness of its risk mitigations and whether it will achieve its safety objectives. SPIs should be:

- related to the safety objectives;
- selected or developed based on available data;
- consider the quality and reliability of the available data; and
- useful for the decision makers in the organisation.

ii. Qualitative and Quantitative SPIs

SPIs that are based on qualitative and quantitative data. Quantitative data is not always available and this is when qualitative data can be used.

iii. lagging or leading indicators

Lagging indicators: Lagging SPIs refer to anything that has already happened (an “**outcome – based**” indicator). Lagging indicators tend to be undesirable events such as a runway excursion.

Other less severe events can also be considered a lagging indicator which are often called precursor events. These are events that are close to the undesirable event such as an unstabilised approach that could have resulted in a runway excursion.

Lagging SPIs help the organisation understand what has happened in the past and it is highly useful for long term trending. Trends in lagging indicators are useful in monitoring the effectiveness of risk mitigations.

Leading indicators: Leading SPIs refer to “**activity or process SPIs**” measuring the input and processes being implemented to improve or maintain safety.

Leading indicators can be a “percentage” or “frequency” of the activities such as percentage of the staff members who have completed the training; or frequency of bird scaring activities.

In conclusion, ideally SPIs should be selected that use a combination of both lagging and leading SPIs.

iv. How to set up SPIs

The starting point should be the safety objectives and identify SPIs that would be helpful to monitor the achievement of those safety objectives. Although the CAO should consider the State Safety Objectives detailed in the TASAP. It should develop its own safety objectives that are specific to its own operation and activities. For each SPI there should be:

- a description of what the SPI measures;
- the purpose of the SPI (linked to the safety objective or significant risk);
- the units of measurement (e.g. rate of occurrence per 1000 flight hours or 1000 aircraft movements);
- who is responsible for collecting, validating, reporting and acting on the SPI (these people can be from different parts of the organisation);
- the sources of data being collected and used for the SPI; and
- the frequency of reporting, collecting, monitoring and analysis of the SPI data.

v. What are SPTs?

Safety performance targets (SPTs) define short term goals for the organisation. They act like “milestones” to track progress towards achievement of the organisation’s safety objectives.

Not all SPIs need to have SPTs. Rather than defining absolute targets, a direction of travel to targets (i.e. to increase/decrease 5%) may be more appropriate. Where there are adequate data for SPIs, the SPIs alert levels may be more suitable than a numerical target.

vi. Monitoring safety performance

CAOs should consider mechanisms for monitoring and measuring the organisation’s safety performance to support achievement of the targets and to identify if some actions or changes are required when the progress is unable to serve the CAOs’ expected commitment or safety objective. The mechanism can be varied depends on what CAOs would like to monitor such as:

- safety performance baseline

The baseline helps the organisation to know where they are on their travel to meet safety objectives and targets. It is the at the performance at the commencement of the safety performance measurement process. It is possible to learn their baseline through a period of monitoring.

- refining SPIs and SPTs

Safety performance management is an on-going activity. Also, there are several factors – such as some change in the safety objectives, increasing of data/information or duplication of SPIs) – that requires the organisation to review and revise their SPIs and SPTs to ensure that they remain current and suitable.

- safety triggers

A brief perspective on the notions of triggers is relevant to assist in their eventual role within the context of the management of safety performance by an organisation. A trigger is an established level or criteria value that serves to trigger (start) an evaluation, decision adjustment or remedial action related to the particular indicator.

vii. Safety surveys

Safety surveys are another means to monitor safety performance. The survey allows the organisation to learn about people’s views, attitudes and behaviours. It can involve:

- day-to-day observations;
- staff surveys and questionnaires;
- feedback from staff; or
- informal confidential interviews.

These surveys are considered subjective but they may still provide valuable information about human factors.

2.3.2 Management of change

Organisations are frequently going through change. These may be organisation or operational changes or changes driven by external influences. Typical changes include:

- a) the expansion or contraction of the operation;
- b) changes in aircraft or equipment;
- c) economic changes;
- d) changes in contracted services;
- e) organisational restructuring;
- f) external regulatory changes; and
- g) the introduction of new technology or procedures.

These changes can affect safety and the effectiveness of existing safety risk controls. So, there needs to be a management of change process to identify changes that could have an impact on safety, identify new hazards or impact existing hazards and to develop mitigation strategies. Any change should not have a negative impact on safety and the management of change process should enable this.

To manage change effectively there should be early communication and engagement with all staff to improve the way the change is perceived and implemented. The change management process should include these activities:

- a) a description of the change and why it is being implemented;
- b) determining who the change will affect and how (people, departments, organisations);
- c) identify new hazards as a result of the change and whether existing hazards or risk controls are affected;
- d) conduct a safety risk assessment and mitigate any unacceptable risks;
- e) sign off the change to confirm it is safe to implemented; and
- f) agree an assurance plan to monitor the implementation of the change and to ensure that it was implemented without a negative impact on safety.
- g) consider the impact of the change on its staff. This could affect the way the change is acceptable by those people affected. Communicating and engaging with staff at earliest opportunity will improve the way that change is accepted and implemented

2.3.3 Continuous improvement of SMS

The organisation should strive to continuously improve the SMS. Continuous improvement can be achieved through:

- a) internal and external audits;
- b) assessment of the Safety Culture and SMS effectiveness;
- c) monitoring the recurrence of safety events as well as errors and rule breaking situations;
- d) surveys (safety/cultural surveys);
- e) management reviews:
 - i. available safety performance information looks at the overall trends ensuring that safety objectives are being achieved;
 - ii. that the SMS is effective and remains fit for purpose;

- f) monitoring the overall safety performance of the organisation;
- g) the effectiveness of the compliance monitoring system;
- h) evaluation of SPIs and SPTs (may be a part of the management review); and
- i) addressing lessons learnt from safety reporting system and safety investigations.

2.4 Safety Promotion

It is important that staff are trained and competent to fulfil their roles and responsibilities. Safety promotion includes training and communication which encourages a positive Safety Culture and resulting in an effective SMS.

Effective training, communication and information-sharing will continuously enhance the competence of everyone in the organisation. This requires two-way communication throughout the organisation. The CAOs should establish and implement processes and procedure the facilitate effective two-way communication throughout all levels of the organisation. This should include clear strategic direction from the top of the organisation and enable “bottom-up” communication that encourages reporting and constructive feedback from all personnel. Safety promotion contains two key areas which are:

- training and education; and
- safety communication.

2.4.1 Training and education

All staff should be trained on the organisation's SMS policies, principles, processes and procedures. This training should provide the opportunity to reinforce the safety policy and the expected attitudes and behaviours for everyone in the organisation.

The training procedures should specify initial and recurrent training standards for operational personnel, managers and supervisors, senior manager and the Accountable Manager to maintain competencies. Obviously, not everyone plays the same role in the SMS therefore the scope of the safety training has to be appropriate to each individual's involvement. The amount of safety training should also be appropriate to the individual's responsibility in the SMS.

The SMS training documentation should be developed and maintained, the documentation should specify responsibilities for development of:

- a) Training content and scheduling;
- b) Training record management; and
- c) Training requirement for each area of activity.

Initial safety training should consider, as a minimum, the following:

- a) organisational safety policies and safety objectives;
- b) organisational roles and responsibilities related to safety;
- c) how safety risks are managed;
- d) the organisation's safety reporting systems what should be reported;
- e) the organisation's SMS processes and procedures; and
- f) human factors.

Recurrent safety training should focus on changes to the SMS policies, processes and procedures. It should also highlight any specific safety issues and risks and to share lessons learnt.

Safety training should be delivered in a facilitated way so that it encourages two-way communication and open discussion. Safety Trainers should be competent facilitators and maintain up to date knowledge on regulatory changes and SMS developments.

- a) Training needs analysis (TNA)

Organisations should carry out a training need analysis to design appropriate training for different roles within the organisation. this can be broken into different groups of personnel:

- i. The Accountable and Senior managers;
- ii. Operational and technical staff;
- iii. Administrative and technical support staff; and
- iv. Safety and Compliance Monitoring team members.

A TNA will usually include the usually includes these following steps:

- i. identify each staff grouping;
- ii. identify the knowledge and competencies needed to perform the roles and responsibilities required by each staff grouping; and
- iii. conduct an analysis to identify the gap between the current safety skills and knowledge and those needed to effectively perform their duties.

There should be the specific training for the Accountable Manager, nominated persons and Safety Managers which includes the following topics:

- i. Safety accountabilities and responsibilities for senior managers;
- ii. management commitment;
- iii. the importance of allocating sufficient resources to operate the business safely;
- iv. promotion of the safety policy and a positive Safety Culture; and
- v. Just Culture principles and how they are applied.

CAOs should refer to relevant TCARs for additional training requirements.

2.4.2 Safety communication

Safety communication is to ensure that the right safety information reaches the right people in a timely manner. It can be used to keep people updated with changes and to pass on safety critical information. Safety communication can be done through any accessible channel such as:

- a) Safety policies and procedures;
- b) Newsletters, safety bulletins, and notices;
- c) Presentations;
- d) Organisation's website or emails; and
- e) Informal staff meetings and briefings between managers and supervisors and their departments or teams.

Safety communication should also encourage people to report safety issues and concerns through the safety reporting system. If there is a potential hazard or safety issue that is not reported the management is not aware of it and it won't get fixed.

CAOs should consider whether the safety information needs to be communicated to external organisations. It is also important to assess the effectiveness of safety communication.

The safety risk management documentation also a very important source of safety knowledge which provides material for safety training and communication. For instance, lessons learnt from the safety reporting system and safety investigation may be a good source of information for organisation's safety communication activities.

3. Appendix

3.1 Example of safety policy

Safety is a prime consideration at all times within (your organisation).

As the Accountable Manager, it is my responsibilities to ensure the safety of all our operations and services. I will ensure that adequate resources and training are provided to manage safety effectively. We encourage all our staff and stakeholders to report safety events or potential hazards, however, insignificant they may consider them at the time.

We have an open reporting culture that encourages free and frank reporting through a Just Culture.

We strive to achieve:

- A fatal accident-free environment;
- An effective safety management system and continuous improvement;
- Full compliance with the Air Navigation Act and all Thai Civil Aviation Requirement that apply to us.

These objectives are for the benefit of the company, its employees and its customers. To this end, we have a shared responsibilities to achieve these aims.

Safety is everyone's responsibility.

(Signed by Accountable Manager)

Mr./Ms. xxx

Accountable Manager

Company X

3.2 Example of a Hazard log

Example 1

Hazard Description What is the issue?	Consequence What will happen as a result?	What are the existing risk controls?	Initial Risk Score			Additional Mitigation Required (who, what and when)	Residual Risk			Risk Owner	Monitoring and next review date
			Probability	Severity	Risk		Probability	Severity	Risk		

Example 2

Operation/System	
Hazard no.	
Hazard Description	
Safety Event (Causes or threats)	
Potential Consequences	

Risk Controls (Barriers and Mitigations)		
No.	Description	Responsible Persons
1		
2		

Risk Assessment			
Hazard Frequency			
Overcome Likelihood			
Consequence Severity			
Risk			
Management Approval	Name:		Signature:

Safety Performance Monitoring Requirements		
No.	Description	Responsible Persons
1		
2		

3.3 SMS assessment tool

CAAT's SMS Assessment Tool

To be completed by the Accountable Manager, Safety Manager or Compliance Monitoring Manager of the organisation:

<p>Organisation: Click here to enter text.</p>	<p>Approval/Certificate Reference(s): Click here to enter text.</p>
<p>SMS Manual Revision: Click here to enter text.</p>	<p>Evaluator(s): Name: Click here to enter text. Department: Click here to enter text. Position: Choose an item.</p>
<p>Scope of Evaluation: Click here to enter text.</p>	<p>Date of completion of the assessment by organisation: Click here to enter a date.</p>

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More details and references of SMS assessment tools can be found in CAAT Guidance Material on SMS Assessment tool.

3.4 Example of SMS implementation plan

The initial gap analysis checklist in Table 6 can be used as a template to conduct the first step of an SMS gap analysis. This format with its overall “Yes/No/Partial” responses will provide an initial indication of the broad scope of gaps and hence overall workload to be expected. The questionnaire may be adjusted to suit the needs of the organisation and the nature of the product or service provided. This initial information should be useful to senior management in anticipating the scale of the SMS implementation effort and hence the resources to be provided. This initial checklist would need to be followed up by an appropriate implementation plan as per Tables 7 and 8.

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

No.	Aspect to be analysed or question to be answered	SMM 4th edition reference	State regulations reference	Answer	Status of implementation
Component 1 — SAFETY POLICY AND OBJECTIVES					
Element 1.1 — Management commitment					
1.1-1	Is there a safety policy in place?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.1-2	Does the safety policy reflect senior management’s commitment regarding safety management?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.1-3	Is the safety policy appropriate to the size, nature and complexity of the organisation?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.1-4	Is the safety policy relevant to aviation safety?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.1-5	Is the safety policy signed by the Accountable Manager?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.1-6	Is the safety policy communicated, with visible endorsement, throughout the [Organisation]?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.1-7	Is the safety policy periodically reviewed to ensure it remains relevant and appropriate to the [Organisation]?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
Element 1.2 — Safety accountability and responsibilities					

No.	Aspect to be analysed or question to be answered	SMM 4th edition reference	State regulations reference	Answer	Status of implementation
1.2-1	Has [Organisation] identified an Accountable Manager who, irrespective of other functions, shall have ultimate accountability, on behalf of the [Organisation], for the implementation and maintenance of an effective SMS?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.2-2	Does the Accountable Manager have full control of the financial and human resources required for the operations authorized to be conducted under the operations certificate?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.2-3	Does the Accountable Manager have final authority over all aviation activities of his organisation?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.2-4	Has [Organisation] identified and documented the safety accountabilities of management as well as operational personnel, with respect to the SMS?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.2-5	Is there a safety committee or review board for the purpose of reviewing SMS and safety performance?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.2-6	Is the safety committee chaired by the Accountable Manager or by an appropriately assigned deputy, duly substantiated in the SMS manual?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.2-7	Does the safety committee include relevant operational or departmental heads as applicable?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.2-8	Are there safety action groups that work in conjunction with the safety committee (especially for large/complex organisations)?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	

No.	Aspect to be analysed or question to be answered	SMM 4th edition reference	State regulations reference	Answer	Status of implementation
Element 1.3 — Appointment of key safety personnel					
1.3-1	Has [Organisation] appointed a qualified person to manage and oversee the day-to-day operation of the SMS?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.3-2	Does the qualified person have direct access or reporting to the Accountable Manager concerning the implementation and operation of the SMS?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.3-3	Does the manager responsible for administering the SMS hold other responsibilities that may conflict or impair his role as SMS manager?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.3-4	Is the SMS manager's position a senior management position not lower than or subservient to other operational or production positions?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
Element 1.4 — Coordination of emergency response planning					
1.4-1	Does [Organisation] have an emergency response/contingency plan appropriate to the size, nature and complexity of the organisation?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.4-2	Does the emergency/contingency plan address all possible or likely emergency/crisis scenarios relating to the organisation's aviation product or service deliveries?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.4-3	Does the ERP include procedures for the continuing safe production, delivery or support of its aviation products or services during such emergencies or contingencies?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.4-4	Is there a plan and record for drills or exercises with respect to the ERP?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.4-5	Does the ERP address the necessary coordination of its emergency response/contingency procedures with the emergency/response contingency procedures of other organisations where applicable?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	

No.	Aspect to be analysed or question to be answered	SMM 4th edition reference	State regulations reference	Answer	Status of implementation
1.4-6	Does [Organisation] have a process to distribute and communicate the ERP to all relevant personnel, including relevant external organisations?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.4-7	Is there a procedure for periodic review of the ERP to ensure its continuing relevance and effectiveness?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
Element 1.5 — SMS documentation					
1.5-1	Is there a top-level SMS summary or exposition document which is approved by the Accountable Manager and accepted by the CAA? [5.3.36 to 5.3.38]			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.5-2	Does the SMS documentation address the organisation's SMS and its associated components and elements?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.5-3	Is [Organisation] SMS framework in alignment with the regulatory SMS framework?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.5-4	Does [Organisation] maintain a record of relevant supporting documentation pertinent to the implementation and operation of the SMS?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.5-5	Does [Organisation] have an SMS implementation plan to establish its SMS implementation process, including specific tasks and their relevant implementation milestones?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.5-6	Does the SMS implementation plan address the coordination between the service provider's SMS and the SMS of external organisations where applicable?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
1.5-7	Is the SMS implementation plan endorsed by the Accountable Manager?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
Component 2 — SAFETY RISK MANAGEMENT					
Element 2.1 — Hazard identification					

No.	Aspect to be analysed or question to be answered	SMM 4th edition reference	State regulations reference	Answer	Status of implementation
2.1-1	Is there a process for voluntary hazards/threats reporting by all employees?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
2.1-2	Is the voluntary hazard/threats reporting simple, available to all personnel involved in safety-related duties and commensurate with the size of the service provider?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
2.1-3	Does [Organisation] SDCPS include procedures for incident/accident reporting by operational or production personnel?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
2.1-4	Is incident/accident reporting simple, accessible to all personnel involved in safety-related duties and commensurate with the size of the service provider?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
2.1-5	Does [Organisation] have procedures for investigation of all reported incident/accidents?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
2.1-6	Are there procedures to ensure that hazards/threats identified or uncovered during incident/accident investigation processes are appropriately accounted for and integrated into the organisation's hazard collection and risk mitigation procedure?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
2.1-7	Are there procedures to review hazards/threats from relevant industry reports for follow-up actions or risk evaluation where applicable?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
Element 2.2 — Safety risk assessment and mitigation					
2.2-1	Is there a documented hazard identification and risk mitigation (HIRM) procedure involving the use of objective risk analysis tools?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
2.2-2	Is the risk assessment reports approved by departmental managers or at a higher level where appropriate?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
2.2-3	Is there a procedure for periodic review of existing risk mitigation records?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	

No.	Aspect to be analysed or question to be answered	SMM 4th edition reference	State regulations reference	Answer	Status of implementation
2.2-4	Is there a procedure to account for mitigation actions whenever unacceptable risk levels are identified?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
2.2-5	Is there a procedure to prioritize identified hazards for risk mitigation actions?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
2.2-6	Is there a programme for systematic and progressive review of all aviation safety-related operations, processes, facilities and equipment subject to the HIRM process as identified by the organisation?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	

Component 3 — SAFETY ASSURANCE

Element 3.1 — Safety performance monitoring and measurement

3.1-1	Are there identified safety performance indicators for measuring and monitoring the safety performance of the organisation's aviation activities?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
3.1-2	Are the safety performance indicators relevant to the organisation's safety policy as well as management's high-level safety objectives/goals?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
3.1-3	Do the safety performance indicators include alert/target settings to define unacceptable performance regions and planned improvement goals?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
3.1-4	Is the setting of alert levels or out-of-control criteria based on objective safety metrics principles?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
3.1-5	Do the safety performance indicators include quantitative monitoring of high-consequence safety outcomes (e.g. accident and serious incident rates) as well as lower-consequence events (e.g. rate of non-compliance, deviations)?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
3.1-6	Are safety performance indicators and their associated performance settings developed in consultation with, and subject to, the civil aviation authority's agreement?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	

No.	Aspect to be analysed or question to be answered	SMM 4th edition reference	State regulations reference	Answer	Status of implementation
3.1-7	Is there a procedure for corrective or follow-up action to be taken when targets are not achieved and alert levels are exceeded/breached?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
3.1-8	Are the safety performance indicators periodically reviewed?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
Element 3.2 — The management of change					
3.2-1	Is there a procedure for review of relevant existing aviation safety-related facilities and equipment (including HIRM records) whenever there are pertinent changes to those facilities or equipment?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
3.2-2	Is there a procedure for review of relevant existing aviation safety-related operations and processes (including any HIRM records) whenever there are pertinent changes to those operations or processes?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
3.2-3	Is there a procedure for review of new aviation safety-related operations and processes for hazards/risks before they are commissioned?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
3.2-4	Is there a procedure for review of relevant existing facilities, equipment, operations or processes (including HIRM records) whenever there are pertinent changes external to the organisation such as regulatory/industry standards, best practices or technology?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
Element 3.3 — Continuous improvement of the SMS					
3.3-1	Is there a procedure for periodic internal audit/assessment of the SMS?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
3.3-2	Is there a current internal SMS audit/assessment plan?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
3.3-3	Does the SMS audit plan include the sampling of completed/existing safety risk assessments?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	

No.	Aspect to be analysed or question to be answered	SMM 4th edition reference	State regulations reference	Answer	Status of implementation
3.3-4	Does the SMS audit plan include the sampling of safety performance indicators for data currency and their target/alert settings performance?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
3.3-5	Does the SMS audit plan cover the SMS interface with subcontractors or customers where applicable?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	
3.3-6	Is there a process for SMS audit/assessment reports to be submitted or highlighted for the Accountable Manager's attention where appropriate?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial	

Table 5: Gap analysis checklist

Note: The references to the SMM 4th edition in the third column will be provided once the document is finalized and published.

The initial gap analysis checklist in Table 5 should then be followed up by using the detailed “SMS gap analysis and implementation task identification plan” in Table 6. Once completed, Table 6 will provide follow-up analysis on details of the gaps and help translate these into actual required tasks and subtasks in the specific context of the organisation’s processes and procedures. Each task will then accordingly be assigned to appropriate individuals or groups for action. It is important that correlation of individual element/task development with their descriptive placeholders in the SMS document be provided for in Table 6 in order to trigger progressive updating of the draft SMS document as each element is implemented or enhanced. (Initial element write-ups in SMS documents tend to be anticipatory rather than declaratory.)

Table 7 will show the milestones (start-end dates) scheduled for each task/action. For a phased implementation approach, these tasks/actions will need to be sorted according to the phase allocation of their related elements. Table 7 can be a separate consolidation of all outstanding actions/tasks or, if preferred, be a continuation of Table 6 in the form of a spreadsheet. Where it is anticipated that the actual number of tasks/actions and their milestones are sufficiently voluminous and complex so as to require utilizing a project management software to manage them, this may be done by using software such as MS project/Gantt chart as appropriate. Table 8 is an illustration of a Gantt chart.

Question Ref #	Gap analysis question	Answer (Yes/No/Partial)	Description of gap	Action/task required to fill the gap	Assigned task group/person	SMS document reference	Status of action/task (Open/WIP/Closed)
1.1-1	Is there a safety policy in place?	Partial	The existing safety policy addresses OSHE only.	<ul style="list-style-type: none"> a) enhance the existing safety policy to include aviation SMS objectives and policies or develop a separate aviation safety policy; b) have the safety policy approved and signed by the Accountable Manager. 	Task Group 1	Chapter 1, Section 1.3.	Open
etc.							

Table 6: Example SMS gap analysis and implementation task identification plan

Action/task required to fill the gap	SMS document ref.	Assigned task group/person	Status of action/task	Schedule/timeline													
				1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q		
				17	17	17	17	18	18	18	18	19	19	19	19	etc.	
1.1-1 a) Enhance the existing safety policy to include aviation SMS objectives and policies or develop a separate aviation safety policy.	Chapter 1, Section 1.3.	Task Group 1	Open														
1.1-1 b) Require the safety policy to be approved and signed by the Accountable Manager.																	
etc.																	

Table 7: Example SMS implementation schedule

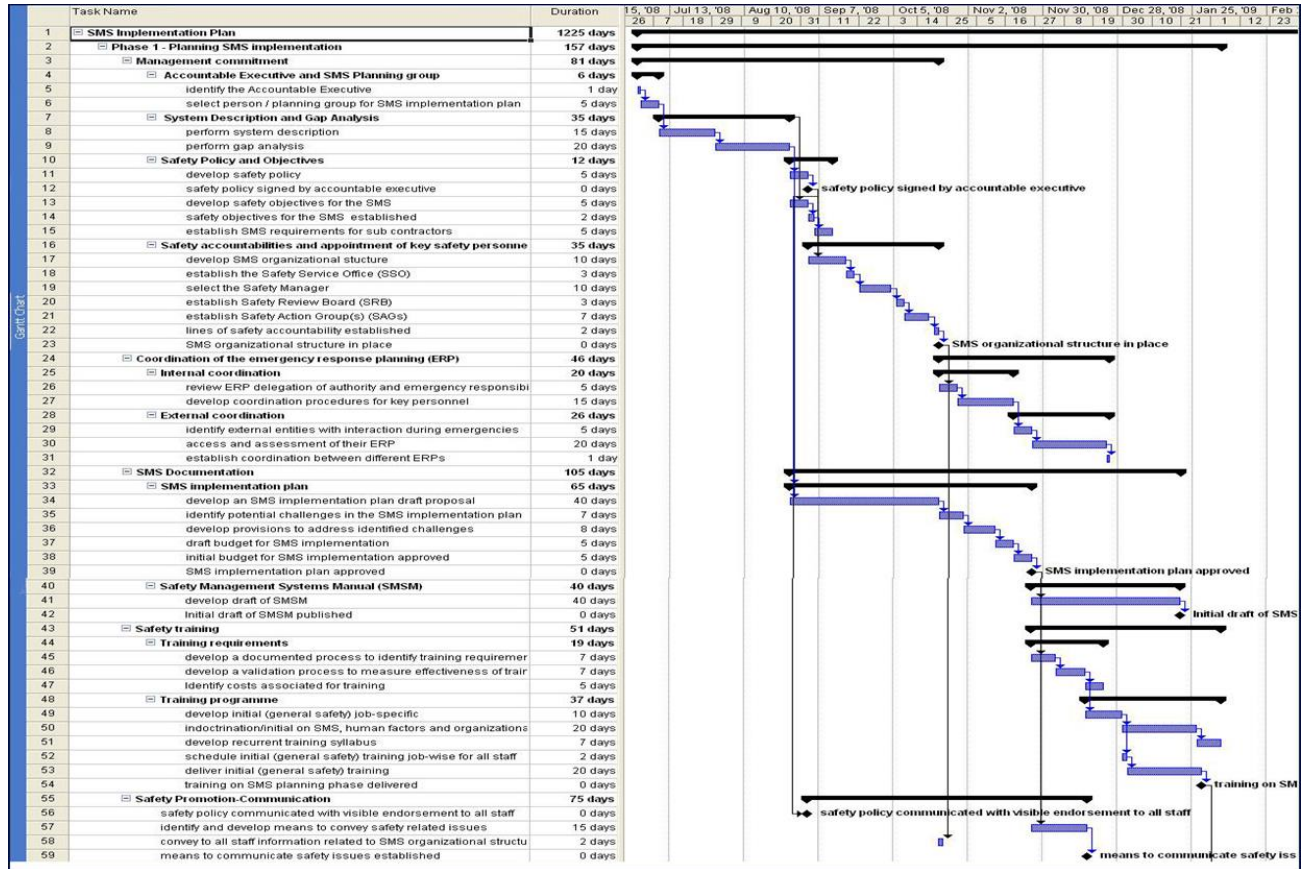


Table 8: Sample SMS implementation schedule (Gantt chart)

3.5 Event Risk Classification (ERC)

The initial risk classification of operational safety events, using the ERC matrix. It aims at the reported event in terms of prioritisation and a risk allocation. ERC value based on the answer to two questions:

Question 1: If this event had escalated into an accident, what would have been the most probable outcome?

This question looks to identify the accident outcome that is the most concerned when this type of event occurs.

Question 2: What was the effectiveness of the remaining barriers between this event and the most probable accident scenario?

This question only considers remaining barriers to estimate the probability of further escalation into the most probable accident scenario.

ERC application is a 4x4 matrix, where risk estimation corresponds to the area of intersection of the two questions.

Question 2: What was the effectiveness of the remaining barriers between this event and the most probable accident scenario?			
Effective	Limited	Minimal	Not effective
50	102	502	2500
10	21	101	500
2	4	20	100
1			

Question 1: If this event had escalated into an accident, what would have been the most probable outcome?	
Catastrophic Accident	Loss of aircraft or multiple fatalities.
Major Accident	1 or 2 fatalities, multiple serious injuries, major damage to the aircraft.
Minor injuries or damages	Minor injuries, minor change to the aircraft.
No accident outcome	No potential damage or injury could occur.

Typical accident scenarios

Catastrophic Accident e.g., Loss of control, mid-air collision, uncontrollable fire on board, explosions, total structural failure of the aircraft, collision with terrain.

Major Accident e.g., High speed taxiway collision, major turbulence injuries.

Minor injuries or damages e.g., Pushback accident, minor weather damage.

No accident outcome e.g., Any event which could not escalate into an accident, even if it may have operational consequences (e.g., diversion, delay, individual sickness)