Safety Regulation Group

SAFETY MANAGEMENT SYSTEMS – GUIDANCE TO ORGANISATIONS

Contents

1. INTRODUCTION

The purpose of this document is to provide guidance on the implementation of Safety Management Systems (SMS) for Air Operator's Certificate (AOC) holders, Continuing Airworthiness Management Organisations, Maintenance Organisations, Air Navigation Service Providers, Aerodromes and Approved Training Organisations. It has been developed to give sufficient understanding on SMS concepts and the development of management policies and processes to implement and maintain an SMS that meets ICAO requirements and future EASA implementing rules. Therefore, organisations are encouraged to refer to this document and ICAO Doc 9859 as their principal source of guidance on SMS.

Safety management goes beyond the traditional approach of compliance with prescriptive regulations to a systematic approach to managing safety where potential safety risks are identified and managed to a tolerable level as the industry develops and evolves. 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 provides for 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.

There is not a 'one size fits all' model for SMS that will cater for all types of organisations. A complex SMS is unlikely to be appropriate for small organisations, and all 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. Guidance for smaller non complex organisations is contained in a separate guidance document that can also be found on the CAA SMS Home page at www.caa.co.uk

Where an organisation is part of a group that has several approvals a single Group SMS may be developed provided that there is clear accountability between the group and the subsidiary companies.

2. SAFETY MANAGEMENT SYSTEM

2.1 Introduction

SMS is a proactive and integrated approach to Safety. It should be integrated into the management system of an organisation. It should describe the structure and scope of the organisation, available resources, staff accountabilities, authorities and responsibilities and how decisions are taken and managed throughout the organisation.

2.2 Safety Assurance
A key function of the SMS is assurance that the system is working and is effective. This involves:

- The setting and monitoring of the organisation's safety performance;
- Assessing the effectiveness of the SMS by confirming that the mitigations, controls and defences put in place are working and effective to ensure safe operational practices;
- Monitoring compliance with the appropriate regulations and standards.

2.3   **Safety Management System**

SMS is an organised approach to managing safety, including the necessary organisational structures, accountabilities, policies and procedures. It is more than a manual and a set of procedures and requires safety management to be integrated into the day to day activities of the organisation. It requires the development of an organisational culture that reflects the safety policy and objectives.

At the core of the SMS is a formal Risk Management process that identifies hazards and assesses and mitigates risk. As part of the risk management process it should consider risks generated by contracted activities. Therefore, when the organisation has a formal agreement with another organisation this should include provisions for the management of safety.

2.4   **Safety Management System Implementation**

The first step in the development of any successful SMS is to identify what elements currently exist within an organisation, this can be achieved by carrying out a thorough gap analysis of the current business, from which an implementation plan can be developed and delivered. A gap analysis in relation to this guidance material is available on the CAA website.   The contents of the implementation plan should include:

(a)   Safety policy;
(b)   Safety planning, objectives and goals;
(c)   System description;
(d)   SMS components;
(e)   Safety roles and responsibilities;
(f)   Safety reporting policy;
(g)   Means of employee involvement;
(h)   Safety communication;
(i)   Safety performance measurement;
(j)   Management review of safety performance;
(k)   Safety training.

3.   **THE KEY COMPONENTS OF A SAFETY MANAGEMENT SYSTEM**

The SMS should comprise of the following four key components:

(a)   Safety Policy and Objectives;
(b)   Safety Risk Management;
(c)   Safety Assurance;
(d)   Safety Promotion.

4.   **SAFETY POLICY AND OBJECTIVES**

The Safety Policy outlines the methods and processes that the organisation will use to achieve desired safety outcomes. It should declare the principles and philosophies that lay the foundation for the organisation's safety culture and be communicated to all staff throughout the organisation.   The creation of a positive safety culture begins with a clear, unequivocal direction and ownership from the Accountable Manager.

In preparing a safety policy, Senior Management should consult with key staff members in charge of safety critical areas. Consultation will ensure that the safety policy and stated objectives are relevant to all staff and generate a sense of shared responsibility for the safety culture in the organisation. A positive safety culture is one where all staff must be responsible for, and consider the impact of, safety on everything they do.

The Safety Policy and Objectives can be divided into the following five areas:

(a)   Management Commitment and Responsibility;
(b)   Safety Accountabilities;
(c)   Appointment of Key Safety Personnel;
(d)   Coordination of Emergency Response Planning;
(e)   SMS Documentation.

4.1   Management Commitment and Responsibility

4.1.1   The Accountable Manager should have full responsibility and accountability for the SMS and should have:

(a)   Corporate authority for ensuring all activities can be financed and carried out to the required standard;
(b)   Full authority for ensuring adequate staffing levels;
(c)   Direct responsibility for the conduct of the organisation's affairs;
(d)   Final authority over operational matters;
(e)   Final accountability for all safety issues.

4.1.2   Senior Management should:

(a)   Develop the safety policy, which is endorsed and actively supported by the Accountable Manager;
(b)   Continuously promote the safety policy to all staff and demonstrate their commitment to it;
(c)   Specify and allocate necessary human and financial resources;
(d)   Establish safety objectives and performance standards for the SMS. The safety objectives and performance standards should be linked to the safety performance indicators (SPIs), safety performance targets and regulatory safety requirements of the SMS. Organisations should review the UK State SPIs detailed in the CAA Safety Plan (CAP786) as these may provide ideas for organisational SPIs.

4.2   Safety Accountabilities

The organisation should clearly define the lines of safety accountability throughout the organisation. This should include the direct accountability for safety on the part of the Accountable Manager and senior management. There is also a need to define the safety responsibilities and expected behaviours of key personnel (e.g. Nominated Post-holders, Safety Manager, Safety Officers, Safety committee members). Safety is everyone's responsibility and all staff should be aware of their safety roles and responsibilities.

It is essential that safety management is seen as an integral strategic part of the organisation's business by assigning the highest priority to safety. With this in mind, there has to be a demonstrable Board level commitment to an effective SMS.

The Accountable Manager, together with the Senior Management team, set the standard for the organisation's safety culture. Without this commitment and leadership, SMS will be ineffective.

4.3   **Appointment of Key Safety Personnel**

Whilst the organisational structure of the SMS should reflect the size, nature and complexity of the organisation, consideration should be given to the:

(a)   Appointment of a Safety Manager;
(b)   Creation of safety committees.

4.3.1   **The Safety Manager**

The Safety Manager should be a Senior Management appointment in the organisation in order to provide the necessary degree of authority when dealing with safety matters and should report directly to the Accountable Manager of the organisation.

4.3.1.1 The Safety Manager should possess:

(a)   Broad operational knowledge and experience in the functions of the organisation and the supporting systems;
(b)   Sound people skills;
(c)   Analytical and problem solving skills;
(d)   Project management skills;
(e)   Effective oral and written communication skills;
(f)   An understanding of human and organisational factors;
(g)   Sound knowledge of safety management principles and practices.

It is important to note that accountability for the SMS lies with the Accountable Manager not the Safety Manager.

The Safety Manager is responsible for, and is the focal point for, the development, administration and maintenance of the SMS.

The Safety Manager should be a full-time employee although in a smaller less complex organisation it may be a part time role shared with other duties.

4.3.1.2 The Safety Manager should carry out at least the following functions:

(a)   Manage the SMS implementation plan on behalf of the Accountable Manager;
(b)   Facilitate the risk management process that should include hazard identification, risk assessment and risk mitigation;
(c)   Monitor corrective actions to ensure their accomplishment;
(d)   Provide periodic reports on safety performance;
(e)   Maintain safety documentation;
(f)   Ensure that there is safety management training available and that it meets acceptable standards;
(g)   Provide independent advice on safety matters;
(h)   Oversee hazard identification systems;
(i)   Involvement in occurrence / accident investigations;
(j)   To collate, understand and disseminate information from other similar organisations, the regulator and contracted organisations.

4.3.2   **Safety Committees**

4.3.2.1 **Safety Review Board**

The Safety Review Board (SRB) is a high level committee which considers strategic safety functions. The Board should be chaired by the Accountable Manager and should

normally include the senior management of the organisation. Membership of the Board and frequency of meetings should be defined. Directors of the organisation may be included in the SRB.

The SRB ensures that appropriate resources are allocated to achieve the established safety performance and gives strategic direction to the safety action group.

The SRB monitors:

(a)   Safety performance against the safety policy and objectives;
(b)   Effectiveness of the SMS implementation plan;
(c)   Effectiveness of the safety oversight of sub-contracted organisations;
(d)   Necessary corrective or mitigating actions are being taken in a timely manner;
(e)   Effectiveness of the organisation's safety management processes.

4.3.2.2 **Safety Action Group**

A safety action group should be established as a standing group or as an ad-hoc group to assist or act on behalf of the SRB. The Safety Action Group (SAG) reports to and takes strategic direction from the SRB. It is comprised of managers, supervisors and staff from operational areas. Membership of the Group and frequency of meetings should be defined. The Safety Manager may also participate in the SAG.

4.3.2.3 The SAG oversees and reviews:

(a)   Operational safety of the safety risk management processes;
(b)   Appropriate resolution and mitigation of identified risks;
(c)   Assessment of the impact on safety of operational changes;
(d)   Implementation of corrective action plans;
(e)   Corrective action is achieved within agreed timescales;
(f)   The effectiveness of previous safety recommendations and safety promotion.

4.4   **Coordination of Emergency Response Planning**

An Emergency Response Plan (ERP) should be established that provides the actions to be taken by the organisation or individuals in an emergency. The emergency response plan should be integrated into the SMS and reflect the size, nature and complexity of the activities performed by the organisation.

Where organisations, such as aerodromes, are subject to other Emergency Planning and Response requirements these should be adhered to and may be cross referred to.

4.4.1   The ERP should ensure:

(a)   An orderly and efficient transition from normal to emergency operations;
(b)   Designation of emergency authority;
(c)   Assignment of emergency responsibilities;
(d)   Authorisation by key personnel for actions contained in the plan;
(e)   Coordination of efforts to resolve the emergency;
(f)   Safe continuation of operations or return to normal operations as soon as practicable.

The ERP should set out the responsibilities, roles and actions for the various agencies and personnel involved in dealing with emergencies. It may include checklists and contact details and the ERP should be regularly reviewed and tested. Key personnel should have easy access to the ERP at all times.

4.5 **SMS Documentation**

4.5.1 Documentation for a SMS should be representative of the nature, scale and complexity of the organisation and normally consists of:

(a) References to all applicable regulations;
(b) SMS records (e.g.Hazard logs, risk assessments, safety cases);
(c) Records management;
(d) SMS manual.

4.5.2 The safety policy should include a commitment to:

(a) Achieve the highest safety standards;
(b) Comply with all applicable legal requirements, meet all applicable standards and consider best practice;
(c) Provide appropriate resources;
(d) Enforce safety as a primary responsibility of all Managers;
(e) Ensure that the policy is implemented and understood at all levels, both internally and externally.

The safety policy should actively encourage effective safety reporting and, by defining the line between acceptable and unacceptable performance, provide fair and just protection to reporters.

4.5.3 The organisation's SMS manual should be the key instrument for communicating the approach to safety for the whole of the organisation and should document all aspects of the SMS, including the safety policy, objectives, procedures and individual safety accountabilities. The SMS should be constantly evolving and therefore the SMS manual should be a living document and should be reviewed regularly to ensure that it remains accurate and appropriate. The SMS manual may be incorporated into existing manuals or expositions. Contents should include:

(a) Scope of the SMS;
(b) Safety policy and objectives;
(c) Safety accountabilities;
(d) Key safety personnel;
(e) Documentation control procedures;
(f) Hazard identification and risk management schemes;
(g) Safety performance monitoring;
(h) Incident investigation and reporting
(i) Emergency response planning;
(j) Management of change processes;
(k) Safety promotion;
(l) Contracted activities;
(m) Just culture policy and culpability definition.

5. SAFETY RISK MANAGEMENT

The Safety Risk component of a SMS can be divided into three areas:

(a) Hazard identification processes;
(b) Risk assessment and mitigation processes;
(c) Internal safety investigation.

The safety risk management process starts with identifying hazards affecting aviation safety and then assessing the risks associated with the hazards in terms of severity and likelihood. Once the level of risk is identified, appropriate remedial action or mitigation measures can be implemented to reduce the level of risk to as low as reasonably practicable. The implemented mitigation measures should then be monitored to ensure that they have had the desired effect. It is important to ensure a common standard and process for Hazard Identification Risk Assessment and Control is implemented throughout the organisation. Appropriate training and education will ensure a clear understanding on how to deliver this.

5.1   Hazard Identification

A hazard is any situation or condition that has the potential to cause adverse consequences. A hazard identification process is the formal means of collecting, recording, analysing, acting on and generating feedback about hazards that affect the safety of the operational activities of the organisation. In a mature SMS hazard identification is an ongoing process.

The scope of hazard identification is across the operational activities of the organisation with data derived from reactive and proactive schemes. Reactive schemes include data from accidents, incidents, flight data monitoring, voluntary and confidential reporting systems. Proactive schemes include open hazard reporting systems, LOSA (Line Operations Safety Audit) style normal operation assessments, safety surveys and safety assessments. Managed group sessions can also be used to proactively identify hazards. Organisations should carry out an initial hazard identification exercise on its current operations to create a baseline safety case / hazard log for the organisation and its activities that should be continuously reviewed and updated.

5.2   Risk Assessment and Mitigation

5.2.1   Risk
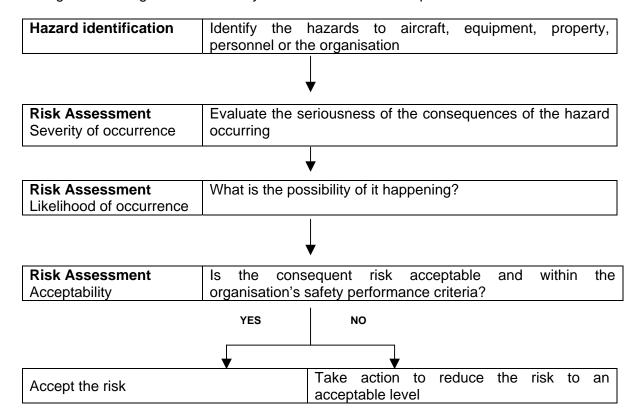
Risk is the assessed potential in terms of severity and likelihood of the consequences of a hazard considering the worst case scenario. A hazard has the potential to cause harm while risk is the likelihood of that harm being realised within a specific time-scale.

Following the identification of a hazard, a risk assessment is carried out to determine the potential for harm or damage. This involves the following considerations:

(a)   Severity: The severity of the possible consequences of an unsafe event or condition;
(b)   Likelihood: The likelihood that an unsafe event or condition will occur.

Risk Assessment and Mitigation Processes analyse and eliminate or mitigate to an acceptable level, risks that could threaten the capability of an organisation to undertake its activities in a safe manner.

A diagram showing the hazard analysis and risk assessment process is shown below:

Hazard identification	Identify the hazards to aircraft, equipment, property, personnel or the organisation

Risk Assessment Severity of occurrence	Evaluate the seriousness of the consequences of the hazard occurring

Risk Assessment Likelihood of occurrence	What is the possibility of it happening?

Risk Assessment Acceptability	Is the consequent risk acceptable and within the organisation's safety performance criteria?

YES   **NO**

Accept the risk	Take action to reduce the risk to an acceptable level

A system should be developed for assessing and analysing the data collected or derived from the actions outlined above. Information provided by the analysis should be distributed to those with a responsibility for operational safety in the organisation.

Confidential reporting systems should be based on a just culture providing appropriate protection for the reporter including an effective feedback process. This approach should encourage staff at all levels to proactively report near misses and hazards.

5.2.2 **Risk Assessment**

The risk assessment process requires a Risk Tolerability Matrix to be defined for assessing hazards and should be included in the SMS documentation. An example of a risk tolerability matrix and it's definitions is provided below, however for Air Navigation Service Providers reference should be made to the severity definitions in the Single European Sky Common Requirements. While the severity of the consequences can be defined, the likelihood of occurrence may be more subjective, based on the maturity of the organisation's operational activities. The assessment process should be recorded at each stage to form a substantive record.

Severity of Consequences

Aviation Definition	Meaning	Value
Catastrophic	Aircraft / Equipment destroyed. Multiple deaths.	5
Hazardous	A large reduction in safety margins, physical distress or a workload such that organisations cannot be relied upon to perform their tasks accurately or completely. Serious injury or death to a number of people. Major equipment damage.	4
Major	A significant reduction in safety margins, a reduction in the ability of organisations to cope with adverse operating conditions as a result of an increase in workload, or as a result of conditions impairing their efficiency. Serious incident. Injury to persons.	3
Minor	Nuisance. Operating limitations. Use of emergency procedures. Minor incident.	2
Negligible	Little consequence.	1

Likelihood of Occurrence

Quantitative Definition	Meaning	Value
Frequent (1 to 10^{-3} per hour)	Likely to occur many times	5
Occasional (10^{-3} to 10^{-5} per hour)	Likely to occur sometimes	4
Remote (10^{-5} to 10^{-7} per hour)	Unlikely, but may possibly occur	3
Improbable ($<10^{-7}$ to 10^{-9} per hour)	Very unlikely to occur	2
Extremely improbable ($<10^{-9}$ per hour)	Almost inconceivable that the event will occur	1

Example Risk Tolerability Matrix

Severity

Catastrophic	5	5 Review	10 Unacceptable	15 Unacceptable	20 Unacceptable	25 Unacceptable
Hazardous	4	4 Acceptable	8 Review	12 Unacceptable	16 Unacceptable	20 Unacceptable
Major	3	3 Acceptable	6 Review	9 Review	12 Unacceptable	12 Unacceptable
Minor	2	2 Acceptable	4 Acceptable	6 Review	8 Review	10 Unacceptable
Negligible	1	1 Acceptable	2 Acceptable	3 Acceptable	4 Acceptable	5 Review
		Extremely improbable	**Improbable**	**Remote**	**Occasional**	**Frequent**
		1	2	3	4	5

Likelihood

Risk Classification

Acceptable	The consequence is so unlikely or not severe enough to be of concern; the risk is tolerable. However, consideration should be given to reducing the risk further to as low as reasonably practicable in order to further minimise the risk of an accident or incident.
Review	The consequence and/or likelihood is of concern; measures to mitigate the risk to as low as reasonably practicable should be sought. Where the risk is still in the review category after this action then the risk may be accepted, provided that the risk is understood and has the endorsement of the individual ultimately accountable for safety in the organisation.
Unacceptable	The likelihood and/or severity of the consequence is intolerable. Major mitigation will be necessary to reduce the likelihood and severity of the consequences associated with the hazard.

5.2.3 Risk Mitigation

Risks should be managed to as low as reasonably practicable. Risk must be balanced against the time, cost and difficulty of taking measures to reduce or eliminate the risk. The level of risk can be lowered by reducing the severity of the potential consequences, reducing the likelihood of occurrence or by reducing exposure to that risk. Corrective action will take into account any existing defences and their inability to achieve an acceptable level of risk. Corrective action should be subject to further risk assessment as outlined in paragraph 5.2.2 above, in order to determine that the risk is now acceptable and that no further risk has been introduced into operational activities. Risk mitigations and controls will need to be verified / audited to ensure that they are effective.

5.3 Internal Safety Investigations

The scope of internal safety investigations should include occurrences that are not required to be investigated or reported to the CAA. Though often of a supposed minor nature, they could be indicative of a potential hazard or trend that would only be revealed through systematic investigation and data analysis, ideally undertaken by trained investigators.

5.3.1 Scope of Safety Investigations

The scale and scope of any investigation should be suitable to determine why an event occurred and validate or identify the underlying hazards. The level of investigation should be proportional to the identified hazard and risk.

5.3.2 Investigation Methodology

The investigation process should take place as soon as possible after the event. The objective of the investigation is to understand why an event happened and the contributing causes and not to apportion blame. The investigation may include:

(a)   Review of documentation and processes;
(b)   Operational data monitoring;
(c)   Interviews;
(d)   Data analysis.

5.3.3 Safety Recommendations

An organisation should have procedures to communicate the results of any safety investigations and where appropriate to address hazards as outlined in paragraph 5.2 above. This should include incorporating lessons learnt into policies and procedures.

6. SAFETY ASSURANCE

Safety assurance assesses the safety performance of the organisation and enables continuous improvement. The three aspects of safety assurance are:

(a)   Safety performance monitoring, measurement and review;
(b)   The management of change;
(c)   Continuous improvement of the safety system.

6.1 Safety Performance Monitoring and Measurement

Safety performance monitoring and measurement is the process by which the safety performance of the organisation is verified in comparison to its safety policies and objectives. This process should include:

(a)   Safety reporting;
(b)   Safety studies;
(c)   Safety reviews including trend analysis;
(d)   Internal safety audits;
(e)   Surveys;
(f)   Internal safety investigations.

6.1.1   Safety audits are used to ensure that the structure of the SMS is sound in terms of:

(a)   Adequate staff levels;
(b)   Compliance with approved procedures and instructions;
(c)   Levels of competency and training to carry out specific roles;
(d)   Maintaining required levels of performance;.
(e)   Achievement of the safety policy and objectives;
(f)   Effectiveness of interventions and risk mitigations.

6.1.2   Safety and cultural surveys examine particular elements or processes of a specific operation and may involve the use of:

(a)   Checklists;
(b)   Questionnaires;
(c)   Informal confidential interviews.

Survey information is subjective and should therefore be verified before any corrective action is initiated but may provide an inexpensive source of safety information. Cultural surveys allow an organisation to identify behaviours and attitudes of staff that may help determine latent conditions that can affect an organisation's SMS.

6.2 The Management of Change

The Management of Change should be a formal process that identifies external and internal change that may affect established cultures, processes and services. It utilises the organisation's existing risk management process to identify potential hazards that will

ensure that there is no adverse effect on safety. Change can introduce new hazards that could impact the appropriateness and effectiveness of any existing risk mitigation.

6.3 **Continuous Improvement of the SMS**

The organisation should continually seek to improve their safety performance. Continuous improvement should be achieved through:

(a)   Proactive evaluation of day to day operations, facilities, equipment, documentation and procedures through safety audits and surveys;
(b)   Evaluation of an individual's performance to verify the fulfilment of their safety responsibilities;
(c)   Reactive evaluations in order to verify the effectiveness of the system for control and mitigation of risk e.g. incidents, accidents and investigations;
(d)   Tracking organisational changes to ensure that they are effective.

7.   SAFETY PROMOTION

7.1 **Training and Education**

All staff should receive safety training as appropriate for their safety responsibilities. In particular all Operational Staff, Managers, Supervisors, Senior Managers and the Accountable Manager should be trained and be competent to perform their duties. This provides an opportunity to reinforce the safety policy, gain the necessary management buy-in and for establishing the expected attitudes and behaviours for all levels of staff in the organisation. This should involve initial training as well as continued maintenance of competence. Training should include human and organisational factors

Operational Staff should have an understanding of the organisation's safety policy and principles and an overview of the fundamentals of SMS.

In addition, Managers and Supervisors should understand the safety process, hazard identification, risk management and the management of change.

In addition to the above, Senior Managers should understand organisational safety standards, safety assurance and the regulatory requirements for their organisation.

The Accountable Manager should have an awareness of SMS roles and responsibilities, safety policy, safety culture, SMS standards and safety assurance.

7.2 **Safety Communication**

Safety communication is an essential foundation for the development and maintenance of an adequate safety culture. Types of communication may include:

(a)   Safety policies and procedures;
(b)   News letters, safety bulletins and notices;
(c)   Presentations;
(d)   Websites and e-mails;
(e)   Informal workplace meetings between staff and the Accountable Manager or Senior Managers.

7.2.1   Safety communication should:

(a)   Ensure that all staff are fully aware of the SMS and the organisation's safety culture;
(b)   Disseminate safety critical information internally and externally;
(c)   Explain why certain actions are taken;
(d)   Explain why safety procedures are introduced or changed;
(e)   Compliment and enhance the organisation's safety culture;
(f))   Contain a process for assessing the suitability of safety communication and its effect on the organisation.