Safety Regulation Group

SAFETY MANAGEMENT SYSTEMS – GUIDANCE TO ORGANISATIONS

Contents

1	**Introduction**		3
2	**Management Systems**		3
	2.1	Introduction	3
	2.2	Quality Management System	3
	2.3	Safety Management System	3
	2.4	Safety Management System Implementation Plan	4
	2.5	Small Organisations	4
3	**The Components of a Safety Management System**		4
4	**Safety Policy and Objectives**		5
	4.1	Management Commitment and Responsibility	5
	4.2	Safety Accountabilities of Managers	5
	4.3	Appointment of Key Safety Personnel	6
	4.4	The Emergency Response Plan	7
	4.5	Documentation	8
	4.6	Small Organisations – Safety Policy and Objectives	9
5	**Safety Risk Management**		10
	5.1	Hazard Identification Processes	10
	5.2	Risk Assessment and Mitigation Processes	10
	5.3	Internal Safety Investigations	13
	5.4	Small Organisations – Safety Risk Management	14
6	**Safety Assurance**		14
	6.1	Safety Performance Monitoring and Measurement	14
	6.2	The Management of Change	15
	6.3	Continuous Improvement of the Safety System	15
	6.4	Small Organisations – Safety Assurance Processes	15
7	**Safety Promotion**		15
	7.1	Training and Education	15
	7.2	Safety Communication	16
	7.3	Small Organisations – Safety Promotion	16
Appendix	Management System Structure		17

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 and Maintenance Organisations. The guidance is designed to give the reader basic information on SMS concepts and the development of management polices and processes. The guidance assumes the reader has a sound understanding of SMS principles. There is a significant amount of information giving guidance on the structure and implementation of SMS in various publications, both dealing with aviation and other industries. While operators are encouraged to review this material, future legislation governing the mandating of SMS will be based upon *ICAO Document 9859 – Safety Management Manual*. Operators are therefore encouraged to use *ICAO Document 9859* as their principal source of guidance on SMS.

This guidance takes into account the developing European Aviation Safety Agency (EASA) Implementing Rules (IR) on Management Systems and will be updated as the IRs develop.

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

There is no 'one size fits all' model of an SMS that will cater for all types of operators. Complex SMS are likely to be inappropriate for small operators, and such operators should tailor their SMS to suit the size, nature and complexity of the operation and allocate resources accordingly. Guidance for small operators is specifically covered in this document.

2 Management Systems

2.1 Introduction

The management system of an organisation should ideally comprise two separate but complementary systems, the Quality Management System (QMS) and the SMS. The QMS and SMS should correspond to the size, nature and complexity of the organisation and take account of all of the hazards and risks associated with its activities.

A Management System should describe the structure of the organisation, available resources, staff accountabilities and responsibilities and how decisions are taken and managed throughout the organisation.

2.2 Quality Management System

The role of the QMS is to monitor compliance with and the adequacy of procedures required to ensure safe operational practices and airworthy aeroplanes. The QMS and SMS have complementary but independent functions with the QMS monitoring the SMS.

2.3 Safety Management System

An SMS is an organised approach to managing safety, including the necessary organisational structures, accountabilities, policies and procedures.

The complexity of the SMS should match the organisation's requirements for managing safety.

At the core of the SMS is a formal Risk Management process that identifies hazard and assesses and mitigates risk.

2.4 Safety Management System Implementation Plan

The first step, when introducing SMS into an organisation, is to develop an implementation plan. This will be a realistic strategy for the implementation of SMS that meets the needs of the organisation and defines the approach taken for managing safety. The contents of the plan should include:

(a) safety policy;

(b) safety planning objectives and goals;

(c) system description;

(d) gap analysis;

(e) SMS components;

(f) safety roles and responsibilities;

(g) safety reporting policy;

(h) means of employee involvement;

(i) safety communication;

(j) safety performance measurement;

(k) management review of safety performance; and

(l) safety training.

2.5 Small Organisations

For a small organisation a simplified SMS implementation plan should be developed that includes:

(a) the organisation's approach to managing safety in a manner that meets its safety needs;

(b) coordination with the SMS of other organisations with which it interfaces during the provision of services; and

(c) endorsement by senior management and communication throughout the organisation.

3 The Components of a Safety Management System

An SMS should comprise the following four components:

(a) Safety Policy and Objectives;

(b) Safety Risk Management;

(c) Safety Assurance; and

(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. The creation of a positive safety culture begins with a clear, unequivocal direction 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 that there is 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 of Managers;

(c) Appointment of Key Safety Personnel;

(d) The Emergency Response Plan; and

(e) Documentation.

4.1 Management Commitment and Responsibility

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

(a) corporate authority for ensuring all activities can be financed and that resources are allocated to manage the safety risks of the consequences of hazards that threaten the capabilities of the organisation;

(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; and

(e) final responsibility for all safety issues.

4.1.2 Senior Management should:

(a) develop the safety policy, which is endorsed 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; and

(d) establish safety objectives and performance standards for the SMS. The safety objectives and performance standards should be linked to the safety performance indicators, safety performance targets and safety requirements of the SMS.

4.2 Safety Accountabilities of Managers

The organisation should define the accountabilities of the Accountable Manager and the safety responsibilities of key personnel.

It is essential that safety management is seen as an integral strategic aspect 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, with the Senior Management team, sets the standard for the organisation's safety culture. Without this commitment, an 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, it should take into account the:

(a) appointment of a Safety Manager; and

(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) operational management experience and have a technical background sufficient to understand the systems that support the organisation;

(b) people skills;

(c) analytical and problem solving skills;

(d) project management skills; and

(e) oral and written communication skills.

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 an effective SMS.

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 any corrective action required in order to ensure accomplishment;

(d) provide periodic reports on safety performance;

(e) maintain safety documentation;

(f) plan and organise staff safety training;

(g) provide independent advice on safety matters;

(h) advise Senior Managers on safety matters;

(i) assist Line Managers;

(j) oversee hazard identification systems; and

(k) be involved in occurrence/accident investigations.

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 and is applicable to large organisations. The board should be chaired by the Accountable Manager and should normally include the Senior Management of the organisation. Directors of the organisation may be included in the SRB.

The SRB ensures that appropriate resources are allocated to achieve the established safety performance beyond that required for regulatory compliance and gives strategic direction to the Safety Action Group (SAG).

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) that necessary corrective or mitigating actions are being taken in a timely manner; and

(e) effectiveness of the organisation's safety management processes.

4.3.2.2 Safety Action Group

The SAG reports to and takes strategic direction from the SRB. It comprises managers, supervisors and staff from operational areas. The Safety Manager may also be included in the SAG.

4.3.2.3 The safety action group:

(a) oversees operational safety;

(b) resolves identified risks;

(c) assesses the impact on safety of operational changes;

(d) implements corrective action plans; and

(e) ensures that corrective action is achieved within agreed timescales.

4.3.2.4 The safety action group reviews:

(a) the effectiveness of previous safety recommendations; and

(b) safety promotion.

4.4 The Emergency Response Plan

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

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; and

(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.

4.4.2 An ERP should take into account such considerations as:

(a) governing policies;

(b) organisation;

(c) notifications;

(d) initial response;

(e) additional assistance;

(f) Crisis Management Centre (CMC);

(g) records;

(h) accident site;

(i) news media;

(j) formal investigations;

(k) family assistance;

(l) post-critical incident stress counselling; and

(m) post-occurrence review.

4.5 Documentation

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

(a) applicable regulations;

(b) SMS records;

(c) records management; and

(d) SMS manual.

4.5.2 The safety policy should include a commitment to:

(a) achieve the highest safety standards;

(b) observe all applicable legal requirements, standards and best practice;

(c) provide appropriate resources;

(d) enforce safety as one primary responsibility of all Managers; and

(e) ensure that the policy is implemented and understood at all levels both internally and externally.

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. 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) emergency response planning;

(i) management of change;

(j) safety promotion; and

(k) contracted activities.

4.6 Small Organisations – Safety Policy and Objectives

The SMS of a small organisation may address the following items in a simplified manner:

4.6.1 Safety Accountabilities of Managers and Staff

(a) The organisation should identify the Accountable Manager who, irrespective of other functions, should have ultimate responsibility and accountability, on behalf of the organisation, for the implementation and maintenance of the SMS.

(b) The organisation should also identify the safety accountabilities of all management and staff members, irrespective of other functions. Safety accountabilities and authorities should be documented and communicated throughout the organisation.

(c) In a small organisation one person may exercise both the Accountable Manager and senior management functions.

4.6.2 Appointment of Key Safety Personnel

(a) The organisation should identify a manager to be the responsible individual and focal point for the implementation and maintenance of an effective SMS.

(b) In a small organisation the functions of the SRB and SAG may need to be devolved to individuals rather than a committee.

4.6.3 Coordination of Emergency Response Planning

The organisation should develop, coordinate and maintain an ERP that ensures orderly and efficient transition from normal to emergency operations, and return to normal operations.

4.6.4 Documentation

(a) The organisation should develop and maintain SMS documentation to describe the safety policy and objectives, the SMS requirements, the SMS procedures and processes, the accountabilities, responsibilities and authorities for procedures and processes, and the SMS outputs.

(b) As part of the SMS documentation, the organisation should develop and maintain a Safety Management Manual (SMM), to communicate its approach to safety throughout the organisation.

(c) The SMM may be a chapter in the organisation manual.

5 Safety Risk Management

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

(a) hazard identification processes;

(b) risk assessment and mitigation processes; and

(c) internal safety investigation.

Safety is a condition in which the risk of harm or damage is limited to an acceptable level. Safety management is centred on a systematic approach to hazard identification and risk management. The hazards creating risk can be identified through SMS processes. The process of moving from hazard identification to risk assessment and risk mitigation is a risk management process.

5.1 Hazard Identification Process

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 and flight data monitoring. Proactive schemes include voluntary incident reporting, confidential reporting schemes, safety surveys, operational safety audits and safety assessments. Managed group sessions can also be used to identify hazards.

5.2 Risk Assessment and Mitigation Process

Following the identification of a hazard a form of analysis is required to assess its potential for harm or damage. This involves two considerations:

(a) Probability: The probability of the hazard causing adverse consequences.

(b) Severity: The severity of the potential adverse consequences.

Risk Assessment and Mitigation Processes analyse and eliminate, or mitigate to an acceptable level, risks that could threaten the capabilities of an organisation.

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

Hazard Identification	Identify the hazards to equipment, property, personnel or the organisation.

↓

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

↓

Risk Assessment Probability 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 analysis should be distributed to those with a responsibility for operational safety in the organisation.

Confidential reporting systems should be based on established human factors principles including an effective feedback process.

5.2.1 Risk

Risk is the assessed potential for adverse consequences resulting from hazard if its potential to cause harm is realised. A hazard has the potential to cause harm, while risk is the likelihood of that harm being realised within a specific time-scale.

5.2.2 Risk Assessment

Risk Assessment involves taking into account the probability and severity of any adverse consequences resulting from an identified hazard. Mathematical models may give credible results, but typically these analyses are supplemented qualitatively by subjective critical and logical analysis of the inter-related facts. A Risk Matrix is useful for assessing hazard. While the severity of the consequences can be defined, the probability 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.

Example Risk Assessment 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	15 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

Probability

Severity of Consequences

Aviation Definition	**Meaning**	**Value**
Catastrophic	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

Probability of Occurrence

Qualitative 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

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 probability 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 probability and/or severity of the consequence is intolerable. Major mitigation will be necessary to reduce the probability and severity of the consequences associated with the hazard.

5.2.3 Risk Mitigation

Risks should be managed to be 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 probability 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.

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 that would only be revealed through a systematic investigation.

5.3.1 Scope of Safety Investigations

The scale and scope of any investigation should be suitable to determine and validate the underlying hazards. A systems approach is useful to provide a broad appreciation of the context of any occurrence. Effort expended should be proportional to the perceived benefit to the organisation in terms of identifying hazard and risk.

5.3.2 Investigation Methodology

Investigations follow an iterative process that may require going back and repeating steps as new data is acquired or new conclusions are reached. Information sources will include:

(a) documentation;

(b) operational data monitoring;

(c) interviews;

(d) simulations; and

(e) safety databases.

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.

5.4 Small Organisations – Safety Risk Management

Safety Risk Management for small organisations should include a hazard identification, risk analysis and mitigation process, but may do so in a simplified manner.

The Hazard Identification and Risk Analysis Process may involve a risk profiling process that has been developed for activities of the type being conducted, and that leads to commonly accepted mitigation strategies which in turn are tracked by the organisation to ensure that they are appropriate to the circumstances and that they are effective.

Safety Risk Management may also use hazard checklists or similar risk management processes, which are integrated into the activities of the organisation.

6 Safety Assurance

The three aspects of safety assurance are:

(a) safety performance monitoring, measurement and review;

(b) the management of change; and

(c) continuous improvement of the safety system.

6.1 Safety Performance Monitoring and Measurement

Safety performance monitoring and measurement should be 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 trending of data;

(d) safety audits; and

(e) surveys.

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; and

(c) level of competency and training to operate equipment and facilities and maintain their levels of performance.

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

(a) checklists;

(b) questionnaires; and

(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.

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 processes and services. It utilises the organisation's existing risk management process to 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 Safety System

Continuous Improvement:

(a) should determine the immediate causes of below-standard performance and their implications in the operation of the SMS; and

(b) should rectify situations involving below-standard performance identified through safety assurance activities.

6.3.1 Continuous Improvement should be achieved through:

(a) evaluation of 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; and

(d) tracking organisational changes to ensure that they are effective.

6.4 Small Organisations – Safety Assurance Processes

The Safety Assurance Process in a small organisation may consist of periodic external safety audits that assist the organisation in verifying safety performance and rectifying any identified instances of sub-standard SMS performance.

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 SMS duties.

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

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

Senior Managers - Senior Managers should understand organisational safety standards, safety assurance and the regulatory requirements for their organisation.

Accountable Manager - The Accountable Manager should have an awareness of SMS roles and responsibilities, safety policy, 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. The modes of communication may include:

(a) safety policies and procedures;

(b) newsletters;

(c) presentations;

(d) safety notices; and

(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) convey safety-critical information;

(c) explain why certain actions are taken;

(d) explain why safety procedures are introduced or changed;

(e) complement and enhance the organisation's safety culture; and

(f) contain a process for assessing the suitability of safety communication and its effect on the organisation.

7.3 Small Organisations – Safety Promotion

7.3.1 Training

(a) All staff should receive safety training as appropriate for their safety responsibilities.

(b) The safety training programme may consist of e-learning or similar training provided by training service providers.

7.3.2 Communication

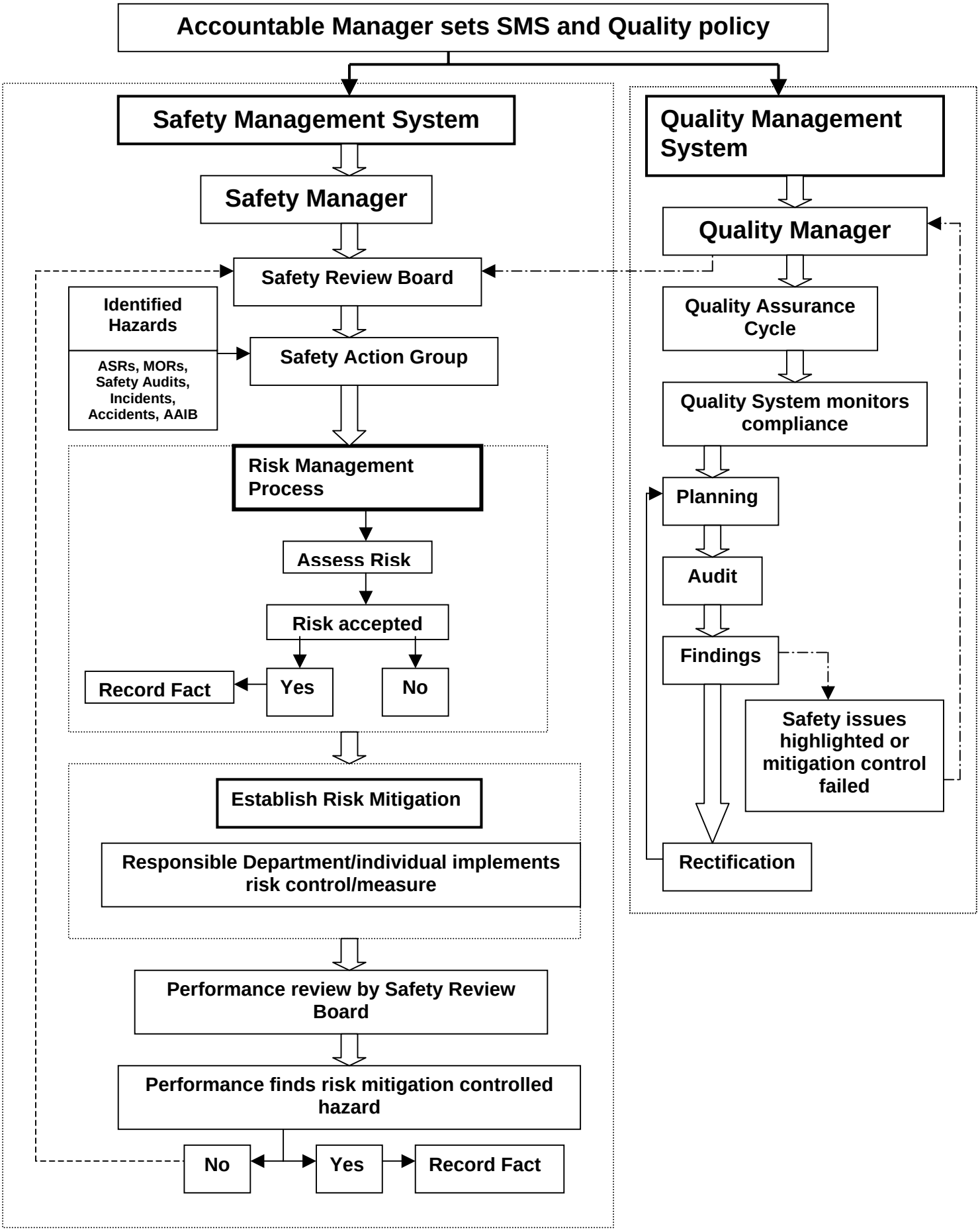
(a) The organisation should establish communication about safety matters that:

(i) ensures that all staff are fully aware of the SMS;

(ii) conveys safety-critical information, and especially that related to assessed risks and analysed hazards;

(iii) explains why particular actions are taken; and

(iv) explains why safety procedures are introduced or changed.

(b) Regular staff meetings where information, actions and procedures are discussed may be used for the purpose of communications on safety matters.

Appendix Management System Structure