



Australian Government
Civil Aviation Safety Authority

**Safety Management Systems
for aviation: a practical guide**

SMS 7

Scaling for size and complexity

3rd Edition



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Size and complexity

The purpose of a safety management system (SMS) is to provide organisations with a systematic approach to managing safety. An SMS is designed to improve safety performance through the identification of hazards, collection and analysis of safety data and information, and the continuous assessment of safety risks. Regardless of an organisation's activities, size and complexity, all elements of the SMS framework apply and can be tailored to every organisation.

An SMS is just as relevant for rural and regional airports or smaller operators as it is for large metropolitan airports and large air transport operators.

This book is primarily written as guidance for smaller and relatively non-complex organisations. Smaller organisations tend to be more flexible in their application of the SMS. The final SMS content will depend on various factors including size, complexity and level of risk associated with your

aviation activities. Some factors to consider include but are not limited to:

- number of employees, particularly number of operational safety-critical personnel
- length of runways
- number of aircraft movements
- number and complexity of aircraft types operated or maintained
- number of bases
- number of approvals and ratings held
- instrument arrival or departure procedures
- environmental factors.

The SMS should also consider the complexity of the activities undertaken and the interfaces with external organisations (including contractors and third parties), such as ground handlers, refuelling providers, maintenance providers, data service providers and aerodrome operators.

Implementing an SMS may initially appear to be a daunting and costly task; however, it is likely some if not many of the elements that make up an SMS are already in place at your organisation, but perhaps they are not formalised or clearly documented.

It is important to realise that there is no one size fits all in terms of SMS development and implementation, what is important is to develop an SMS that works for your organisation that is effective in managing your safety performance.

Size and complexity are not a linear relationship.

What does 'small, non-complex' mean?

Small organisations are often more flexible and able to make critical decisions in a timelier fashion, without the complicated multiple layers of management and elaborate sign-off processes which often characterise larger organisations.

One safety management practitioner refers to an SMS as 'organised common sense'. There must be common sense, but equally those common-sense practices must be organised and systematic. Many small organisations may already have some SMS components in place, doing them informally, but for the system to be effective, these components must be documented, tracked, and tweaked where necessary.

Smaller organisations however do need to keep in mind that an SMS is a living system, not just a manual sitting on a shelf to be dusted off when CASA does an audit. Organisations need to make someone who is passionate about safety and not just

focusing on regulatory compliance their safety manager or safety officer. Then you need to document your safety policies and objectives, identify your potential 'gotchas', your hazards and risks, and what steps you are taking to remove or mitigate them and, importantly, check regularly whether these steps are working, and you are meeting your objectives. You will be managing your safety performance through an SMS.

No matter their size, all organisations, large or small, complex, or non-complex, share the same four basic SMS components.

These components are:

- safety policy and objectives
- safety risk management
- safety assurance
- safety promotion.

There are also two factors that are fundamental to the success of an SMS for all organisations regardless of size or complexity, these are:

- management commitment and responsibility for safety
- a positive safety culture or 'Just Culture'.



image: Civil Aviation Safety Authority

Management commitment and responsibility

For an SMS to be successful, the accountable manager, or chief executive officer (CEO), of the organisation must drive and champion it. This senior management commitment is the single most important factor determining whether your SMS will be effective and successful. This can be broken down into two key elements:

1. Management commitment:

- the organisation's senior management must be committed to develop, implement, and continuously improve the SMS
- a management team must be recruited, or in place, appropriate to the size and complexity of the organisation, to support the organisation's SMS
- senior management must take an active part in developing and disseminating the organisation's safety policy and safety objectives
- senior management must have documented and defined roles, responsibilities, and accountabilities to support the organisation's SMS.

2. Organisational structure:

- senior management must develop an organisational structure showing who is responsible and accountable for which roles to support the effective functioning of the SMS
- the organisational structure or organisational chart must have a clear line of communication from the safety manager or safety officer directly to the CEO.

Organisations need to carry out an analysis of their activities to determine the right level of resources they need to manage the SMS. This should include determining the organisational structure required to manage the SMS effectively, both during implementation and ongoing. This analysis should include considerations of who will be responsible for managing and maintaining the day-to-day activities of the SMS, what safety committees are needed, and any need for specific safety specialists.

Safety Culture

An effective SMS requires a positive safety culture to be in place, this includes what is known as a 'just culture'. A just culture encourages and supports people to provide essential safety-related information in a non-threatening environment but is clear about where the line is drawn between acceptable and unacceptable safety behaviours.

An organisation's safety culture is crucial to its safety achievement.

The ideal safety culture supports people and systems, recognises errors will be made and believes blaming individuals will not solve problems. A positive and supportive safety culture encourages open and honest reporting, seeks to learn from its failures and is open and fair in dealing with those involved.

Trust and support are two key elements of an effective SMS:

- **Trust:** an atmosphere of trust needs to exist in the organisation. Personnel are to be encouraged, even rewarded, for providing safety-related information but are also clear about where the line must be drawn between acceptable and unacceptable safety behaviours.
- **Support:** senior management openly supports, promotes, and encourages an open and fair reporting culture, and a positive and supportive safety culture. This may be demonstrated by some of the following:
 - evidence of senior management leading by example: personnel see examples of senior management actions, decisions and behaviours encouraging an open and fair culture
 - evidence of support and encouragement for hazard reporting and not just mandatory safety reporting
 - the open and fair culture is included and endorsed in key documentation and communications to personnel
 - management continues to monitor the organisation's 'safety climate' through survey and audit functions
 - all personnel are involved in establishing and maintaining the organisation's safety culture.

SMS implementation planning

The SMS implementation plan details how you will put your SMS in place. It must be realistic and consider your safety strategy, safety objectives, resource issues, safety training, safety promotion and timelines. Depending on the size, complexity, and scope of work of the organisation, one person, such as the safety manager, or a group can develop the SMS implementation plan.

To implement your SMS you need to identify which SMS components and elements you already have, and what you need to add or modify to meet SMS requirements, as well as any regulatory requirements, in other words, you need to do a gap analysis.

Once you have completed and documented your gap analysis (the items identified as missing or deficient, those being your gaps) you can begin to flesh out your SMS implementation plan.

Your gap analysis is likely to identify deficiencies in your readiness to implement an SMS, so it makes more sense to have a phased approach to bringing it in. With a phased approach your implementation plan will need to include timelines for starting and completing each of the major SMS elements.

Your SMS implementation plan will need to detail the development of processes, such as hazard identification and risk assessments, reporting processes, and how you intend to implement the key SMS components and elements.

In Booklet 1: *SMS Basics* you will find more detailed information around SMS implementation planning and conducting a gap analysis. Also refer to Booklet 8: *SMS Resource Kit* for a copy of a comprehensive gap analysis tool and SMS implementation guidance.



Image: Civil Aviation Safety Authority

Rural and regional vs metropolitan airport

There is a significant difference between rural and regional airports compared to large metropolitan airports. These differences are not just in relation to the type of aircraft that you may have operating into your airport, but also organisational resources and the hazards and risks associated with your operations. Because of this your SMS elements will also be different, while you will still need all the elements, how these are developed and what they look like will vary.

While a small regional airport may not have the resources available to a capital city airport and gathering the breadth and depth of reporting data will not be possible for small organisations, there are advantages to being small.

For example, the below highlights just a few key areas where your SMS will differ in practise e.g. emergency response planning, confidential reporting, and safety communications.

Emergency response planning

A capital city airport's emergency response plan (ERP) is going to be different to a small local- government operated aerodrome's ERP. The capital city airport's document will detail all the actions to be taken and the relationships with stakeholders:

- emergency services (aircraft rescue and firefighting, ambulance etc.)
- the operational chain-of-command
- third-party contractors such as ground handling
- public relations and media protocols
- air traffic control (ATC).

On the other hand, a small, non-complex airport ERP might consist of a checklist of simple steps involving who to call when and what information to impart, and a regularly updated list of phone and contact details. Common sense must prevail, don't aim for a process that looks like the gold standard when it is just more complex because it is designed for a larger airport.

Confidential reporting

Another important element of an SMS and one that varies greatly with organisational size is the ability for confidential reports. Confidential reporting is an important part of encouraging a safety reporting culture in all organisations. Employees should know they can speak up because their personal information and reports are provided a level of protection. The practicality of this is obviously more difficult in a small organisation where often, everybody knows everybody's business.

Safety communication

Communication, one of the key parts of running an efficient business, and an effective SMS, is easier in smaller organisations with their direct lines of communication involving all personnel. Calling a meeting at a large airport, for example, can be a complicated process, requiring the bringing together of people from dispersed locations and across multiple departments. Whereas at your smaller airport it can be very easy to have all stakeholders in the room on a regular basis.

Because of this it is easier for small regional aerodromes to bring all interested parties together to discuss safety issues, including internal and external parties such as charter operators, maintenance organisations, aero clubs, emergency services, ATC, if relevant, and clients.

Smaller operators vs larger operators

Just as with airports there is a significant difference between smaller operators compared to a medium sized operators and a large commercial airline, for example, who may operate many scheduled operations throughout a much greater area. These differences can occur not just in relation to the number and type aircraft operated, the scheduled or non-scheduled nature of your operation and your flight frequencies, but also organisational resources and the hazards and risks associated with your operations. Because of this your SMS elements will also be different, while you will still need all elements how these are developed and what they look like will vary.

You also need to consider that your size might be small – with only one or two aircraft and a handful of personnel – but your operation can still be complex. This relates to the risks associated with your operations which can mean you are complex but small.

While a smaller operator obviously will not have the same resources available as a large commercial airline and gathering the breadth and depth of reporting data will not be possible for smaller operators, there are advantages to being small. For example, the below highlights just a few key areas where your SMS will differ in practise e.g., emergency response planning, confidential reporting, and safety communications.

Emergency response planning

A large air transport operator's emergency response plan (ERP) is going to be different to that of a smaller operator's ERP. The larger operator's document will detail all the actions to be taken and the relationships with stakeholders:

- emergency services (aircraft rescue and firefighting, ambulance etc.)

- the operational chain-of-command
- third-party contractors such as ground handling and refuelers
- customer service agents
- public relations and media protocols
- air traffic control.

On the other hand, a smaller operator's ERP might consist of a set of checklists designed for certain scenarios, consisting of simple steps involving who to call when and what information to impart, and a regularly updated list of phone and contact details. Common sense must prevail, your processes need to be workable and tailored for your operation.

Confidential reporting

Another important element of an SMS and one that varies greatly with an organisation's size is the ability for confidential reports. Confidential reporting is an important part of encouraging a safety reporting culture in all organisations. Employees should know they can speak up because their personal information and reports are provided a level of protection. The practicality of this is obviously more difficult in a small organisation where often, everybody knows everybody's business.

Safety communication

Communication, one of the key parts of running an efficient business, and an effective SMS, is easier in smaller operations with their direct lines of communication with everybody involved. Calling a meeting in a large airline, for example, can be a complicated process, requiring the bringing together of people from various departments and often dispersed locations. It is often easier for smaller operators based at a regional aerodrome, for example, to bring all the interested parties together to discuss safety issues: other operators, maintenance organisations, local government aerodrome managers, aero clubs, emergency services, ATC, and clients.

Safety policy and objectives

Every organisation needs a safety policy, setting a clear, high-level direction so the organisation can manage safety effectively. This safety policy should be endorsed (signed) by the organisation's accountable manager and detail your safety reporting procedures; show clearly what constitutes unacceptable safety behaviours; and highlight conditions where disciplinary action would not apply to acceptable safety behaviours and human errors.

Key considerations for scalability in your safety policy should be reflective of your organisation. At a minimum you need to:

- outline your organisation's fundamental approach to safety
- show senior management commitment to safety
- show a commitment to provide adequate resources to manage safety effectively and to reduce risks to an acceptable level
- encourage all staff to actively participate in and fulfill all aspects of the SMS
- encourage a positive safety culture within the organisation.

A key consideration for scalability with your safety objectives is the relevance and achievability for the size and complexity of your organisation. The most effective safety objectives are those setting specific safety goals reflecting the organisation's safety vision and senior management's commitment to the systematic management of safety. Safety objectives should be SMART, that is they should be: specific, measurable, achievable, relevant, and timely so that you can measure their effectiveness.

Be realistic and ensure your objectives are relevant to your operation, the 'R' of SMART. For example, for an aerodrome operator there is no point in setting an objective of *a 25 per cent reduction in runway incursions over the next 12 months*. Certainly, that's a measurable and timely objective, but it is not relevant, or achievable. Why? Because aerodromes do not control when and how aircraft arrive, the times of day they arrive, the speed and profile used for aircraft approach or departure, or even the number of aircraft movements. This objective therefore is probably better suited to an aircraft operator's SMS than an aerodrome.

You can also document your safety objectives in terms of short-, medium- and/or long-term desired goals. For example:

- providing feedback to staff on safety reports within two weeks
- an increase in safety reporting by 20 per cent over the next 12 months
- a reduction in maintenance-related events by 15 per cent over the next 12 months
- a reduction in wildlife strikes by 15 per cent over the next 12 months.

To be able to achieve each specified safety objective, you need a documented action plan including an implementation planned phased approach. For example:

- Phase 1: short-term objectives to be addressed within six months
- Phase 2: medium-term objectives to be addressed within 12 months
- Phase 3: long-term objectives to be addressed within 24 months.

You will also need to review or revisit your safety objectives periodically to ensure they are still relevant and helping to achieve your safety goals.

Safety accountabilities and key personnel

The organisation must identify who will be responsible and accountable for implementing and maintaining the SMS (the accountable manager). The organisation also needs to document the key safety roles of 'who does what' and communicate these roles and responsibilities so everyone is aware.

For small organisations this structure may be very simple and consist of the person in charge, being the accountable manager (CEO or owner) and a few key staff members who have a role in how the organisation is managed on a day-to-day basis.

The organisation should have an organisational chart showing the key positions with their responsibilities and the lines of accountability. This should include a direct reporting line from the safety manager or safety officer, that is the person responsible for maintaining the SMS, to the accountable manager.

You can delegate responsibility for implementing safety actions; however, the accountable manager is always the one ultimately accountable for safety in the organisation. It is essential the accountable manager has the authority and budgetary control to make safety-related decisions and take any appropriate actions to maintain safety.



image: Adobe stock | Jacob Lund

Appointing key safety personnel

Having an appropriate safety manager or safety officer is critical to the success of your SMS. Depending on your organisation's size and complexity, the safety manager, safety officer, or safety representative should have some operational management experience, a background suitable for understanding the systems supporting operations, and a sound understanding of safety management principles.

A small, non-complex organisation may add the safety manager duties to an existing role, for example your operations manager. Or alternatively you may appoint a part-time employee to the role of safety manager – this could be a new role where you hire part-time for, or you may have someone who already works part-time in another role that can take on the extra duties making them a full-time employee instead. For example, in a flight training school you may have a part-time flight instructor who only works a few days a week, or a couple of weeks a month, who has an interest or experience in safety management that could become your part-time safety manager or safety officer as well, with the additional safety days added to their employment.

There are two key considerations for scalability of key safety personnel:

- a person in your organisation must have the role of managing and maintaining the SMS and they need to report directly to the accountable manager
- it is important that the relevant people, both within your organisation and those that interface with it, meet to discuss safety-related issues on a regular basis.

Depending on the size of your organisation the SMS may need to be supported by a safety committee. For a small organisation your safety committee could consist of a few key personnel and appropriate people from other organisations or groups that your organisation interfaces with, such as third-party providers or contractors. These meetings may be regular planned monthly or bi-monthly committee meetings or could take the form of:

- management meetings with dedicated time allocated to safety on the agenda
- toolbox meetings
- safety stand-down days.

Emergency response planning (ERP)

Emergency response planning (ERP) is an integral part of your SMS and should facilitate management of a hazardous event or accident and mitigate the impact on normal operations. For organisations with more than one location you should have an ERP for all your operational locations and maintain a robust means of coordinating these with the main ERP coordination procedures.

The plan should:

- assign responsibilities to specific individuals
- provide emergency procedures
- control the notifications between outside agencies
- nominate channels and centres of communication
- provide for 'in-house' emergency response
- provide effective liaison with incident or accident investigators and emergency services
- include methods for communicating with the public in the event of a major incident.

Your ERP does not necessarily have to be contained within your SMS manual; however, your SMS should reference to your ERP regardless of where or how it is documented. Managing the risks associated with emergency or contingency responses forms a part of your broader safety performance. The way you respond and manage an emergency can create hazards and risks to safety, both during the emergency but also during your return to normal operations.

When looking at scalability for an ERP you should, at a minimum, have documented procedures for:

- the orderly transition from normal to emergency operations
- designation of your emergency coordinator or authorised emergency leader including considering who this person is for both within and outside of normal business hours
- assignment of emergency roles and responsibilities including:
 - Who will be performing which emergency response roles and what are their responsibilities?
 - Who is their backup or delegate in case they are absent?
- coordination of external communications during the event i.e. who is responsible for contacting and liaising with emergency services? This could be a time-consuming ongoing task, so consideration should be given as to what other duties they may also need to be managing or who can take over their other duties.
- the safe continuation of other operations, as not all your regular operations may be impacted during the emergency event so these still need to be managed safely, including the return to normal operations as soon as practicable.

Your ERP is scalable and could be as simple as a handful of basic checklists designed to be used in various emergency scenarios with a dedicated emergency contacts list. However regardless of your organisations size and complexity and the style of your ERP it should:

- be available to, and understood by, all key personnel
- practised periodically so that everyone is aware of what they need to do, and competent to do so during an emergency
- have easily accessible and routinely updated emergency contact numbers, both for internal and external contacts
- be coordinated with other interfacing organisations, such as emergency services and third-party contractors.

SMS documentation

Your SMS should be supported by robust, current, controlled and freely available documentation. Your safety documentation demonstrates to all personnel and third parties that your business is based on safety management principles.

If your procedures are in separate manuals, as can happen in larger organisations, this must be made clear, so everyone can find detailed information about your SMS procedures and processes simply and efficiently.

The organisation should have the following SMS documentation as a minimum:

- safety policy and objectives of the SMS
- responsibilities of the accountable manager and key safety personnel
- any safety-related processes, procedures, or checklists (including your ERP)
- results of, and subsequent actions from, any safety audits or assessments
- results of any risk assessments and mitigation measures (controls or defences) in place
- a hazard and risk register.

A smaller, less-complex organisation may have a separate SMS manual, or it may be easier to document the SMS within existing manuals. The SMS will contain other documents and not just your SMS manual – these include things like your hazard or safety reports, training records etc.

Your SMS manual and supporting documents may be held either as hard copies or electronically. However you keep a record of your SMS the system should be reliable and the records secure. For example, information technology systems should be backed up and protected from damage and enable easy access and retrieval of the information.

Contractors and third-party interfaces

Your SMS must ensure your organisation's safety is not adversely affected by the services and supplies external organisations provide – these are your third-party providers or contractors.

Some examples of third-party contractors and interfaces that smaller organisations typically have include:

Rural and regional airports	Smaller operators
<ul style="list-style-type: none"> • Airlines, charter operators, aero clubs • Maintenance providers • Refuelers • Contractors, i.e., pavement, lighting etc • Ground handlers 	<ul style="list-style-type: none"> • Maintenance providers • Contract flight instructors and pilots • Flight dispatch and flight following • Ground handlers • Refuelers

Managing these third-party relationships can at times be a significant area of risk for organisations. Your third-party providers or contractors could be a source of safety risks, a potential risk control and either an enabler or disabler of your organisation's safety culture.

If you consider a regional airport, an aerodrome without any aircraft operations at all, and therefore no third parties, is inherently safe! While as an aerodrome operator you may not have direct control, through a contract or deed of agreement, with many third parties on an aerodrome, it is still important that aerodrome safety personnel and personnel generally, understand and manage third party expectations and interactions.



image: Civil Aviation Safety Authority

Whether you are a large or a small organisation, as the 'contracting authority', you hold the overall responsibility for the safety of services the third-party providers. Therefore, any contract between organisations and third parties should specify what safety standards must be met. The contracting authority is then responsible for guaranteeing the contractor complies with the safety standards specified in the contract.

Within your SMS documentation you should:

- keep and maintain a register of all third-party contractors and suppliers
- incorporate third-party contractors and suppliers into your safety assurance, including your safety audit program
- identify and mitigate any potential safety risks associated with third-party contractors and your risk-based procedures for managing your third-party relationships.

You also need to be able to demonstrate that all third-party service providers are providing trained, competent personnel with the relevant qualifications to carry out the work. Third parties need to understand your SMS and how they interact with it, especially for the identification and reporting of safety hazards and your expected acceptable and unacceptable safety behaviours.

Refer to Book 2: *Safety policy and objectives* for more detailed and in-depth information to assist you with scalability of these core elements.

Safety risk management

Traditional safety risk management emphasised the individual, focusing on unsafe acts and conditions, and often excluded the environment and organisational factors in the analysis. It was more reactive, often leading to constraints on operations, reduced training realism, and occasionally resulted in poor organisational morale.

The current SMS approach is proactive, seeking to identify factors contributing to an incident or accident before it occurs. This process uses the knowledge of those who fly, maintain, build, support, plan, or control to better inform the organisation.

Organisations pursuing a proactive strategy for safety risk management believe the risk of accidents and incidents can be minimised by identifying weaknesses and taking necessary action to reduce the risk of adverse consequences arising from them.

Therefore, safety risk management is the identification, analysis, and mitigation, or where possible elimination, of risks the organisation encounters. Systematically identifying and treating organisational risks and hazards is fundamental to an SMS, with ongoing monitoring and communication of the risk management process to improve its effectiveness.

Regardless of the size of your organisation, scalability of your SMS is also a function of the inherent safety risks of your operational activities. Even small organisations may be involved in activities that entail significant aviation safety risks. This means your safety risk management capability and activities should be commensurate with the risks you are trying to manage.

Safety risk management elements and their intended outcomes are the same regardless of the size and complexity of your organisation. However, the breadth and degree of the functions within the elements is where you can tailor to your size, complexity, and specific operating environment.

Hazard identification

A hazard is a source of potential harm, or a situation with the potential to cause loss. Hazard identification is fundamental to risk management: if a hazard cannot be identified, it cannot be controlled. At times people can be confused by the difference between a hazard and a risk. A risk is the potential outcome from the hazard and is usually defined in terms of the severity of the consequences and the likelihood of the harm occurring.

For example, bird activity in or around an aerodrome is a hazard to aircraft operations. One risk associated with this hazard is a bird strike on landing causing an engine to fail, resulting in an aircraft accident. Likewise, a thunderstorm is a hazard to aircraft operations. With the risk being an aircraft lightning strike, causing an electrical system failure resulting in an accident.

In general terms you can consider that a hazard exists in the present whereas the risk associated with it is the potential future outcome.

The starting point for safety risk management must be establishing the context and identifying your hazards. Hazard identification must be systematic and comprehensive because any hazards not identified will be excluded from risk analysis and mitigation. Meaning you will have uncontrolled safety risks within your operation.

At its core the hazard identification process is your formal means of collecting, recording, analysing, acting on and generating feedback about hazards that affect safety of operations within your organisation.

When looking at scalability for hazard identification you should be able to demonstrate the following as a minimum:

- hazard identification is used regularly to assess changes within the organisation. Changes can include:
 - an organisational (structural) change
 - rapid expansion or contraction
 - new equipment or procedures being introduced
 - changes to key personnel positions
 - whenever the organisation believes a new risk may be encountered
- to identify hazards, the organisation should have a simple, confidential (and open and fair) and convenient safety reporting process.

A key consideration to remember is that hazard identification is not a static one-off process. It needs to be performed whenever you plan internal or external changes within your operational environment.

There are various ways to identify hazards and depending on the size of your organisation some may be more useful and useable than others. Refer to Book 3: *Safety risk management* for more detailed and in-depth information regarding hazard identification sources.

Safety reporting systems

Through the use of a confidential hazard or safety reporting system, underlying situations or conditions that have potential to impact aviation safety can be identified. Safety reporting can be reactive, after an event has occurred, or proactive, trying to predict what might happen in the future.

Voluntary reporting of less serious incidents or non-reportable matters should be actively encouraged and promoted as they provide a useful source of hazard identification within your organisation. Higher numbers of reports, even if they are classified as minor or non-significant issues, allow you to monitor the overall safety performance of your organisation and to identify developing safety trends. This voluntary non-significant reporting also allows you to better identify those latent hazards within your organisation that could be related to organisational processes or human errors – which if left unmanaged could line up under some circumstances to result in a serious incident or accident.

All your personnel and third-party interfaces need to actively participate in your safety reporting system, they need to understand what to report, how to report and who to report to. It is important everyone in your organisation understands that information from these reports is used to identify safety risks so appropriate action can be taken to maintain or improve overall safety performance.

It is important your safety reporting system uses the information provided to enhance safety rather than to apportion blame, especially if individuals are reporting instances of genuine errors or mistakes. The reasons for the errors should be analysed to understand what may have led them to occur and for safety lessons to be learnt.

Regardless of the size and complexity of your organisation you need to encourage reporting without fear of repercussions to the report author – it is imperative individuals feel there is an open and just culture within your organisation. It is also important that adequate feedback is given to individuals reporting an incident.

Systematically identifying and treating organisational risks and hazards is fundamental to an SMS: ongoing monitoring and communication of the risk management process will improve its effectiveness.

Risk assessment and mitigation

The purpose of the risk assessment process within your SMS is to allow you to assess the level of risk associated with your identified hazards. Risks should be assessed in terms of consequence, severity and likelihood. Then depending on the level of risk, appropriate mitigation or control measures can be taken to either eliminate the risk or reduce the risk to a lower level, in order to be acceptable to your organisation. Mitigating measures should be implemented to either reduce the likelihood of the risk occurring or reduce the severity of the outcome if it does occur.

Risk assessment and mitigation, the core of risk management, is an integral component of safety management and involves some essential steps:

- hazard and risk identification
- risk severity analysis
- risk probability analysis
- risk assessment and tolerability
- risk controls and mitigation.

The key to risk assessment and mitigation is to keep the process simple and related to your organisations operating environment.

When considering risk assessment and mitigation scalability you should be able to demonstrate the following as a minimum:

- any identified safety hazards, risk assessments and subsequent follow-up actions are clearly documented
- risks are being assessed in terms of consequence severity and likelihood
- risk assessments are being carried out to determine the level of risk
- appropriate measures are being taken to eliminate, or mitigate, the risks to be as low as reasonably practicable (ALARP) or so far as is reasonably practicable (SFAIRP)
- mitigations, controls, or defences are periodically reviewed to ensure they remain valid and relevant.

In smaller organisations you may already have a good idea of your core risks and any control measures that can easily be applied. You do not have to be, or employ a risk specialist, as you will most likely know the risks in your organisation already. They are often the stress points already causing you some concerns.

It is important to include people with relevant expertise and experience in the risk assessment process to ensure robustness as all risk assessments are reliant on the quality of the information used during the assessment and the knowledge of the people conducting it.

Smaller organisations may have a manager who feels confident they understand their hazards and risks, and that they can undertake a risk assessment on their own. But having another set of eyes crosschecking your assumptions is always the preferred method.

Refer to Book 3: *Safety risk management* for more detailed and in-depth information to assist you with scalability of these core elements.

Safety assurance

Safety assurance monitors the overall safety performance of your organisation and the effectiveness of your SMS. Your safety assurance element gives confidence that for all your identified hazards and risks the appropriate mitigation measures applied are implemented and achieving their intended outcomes.

Regardless of the size and complexity of your organisation you want to be able to monitor your safety performance and to be able to review the effectiveness of your SMS. However how you go about this and what functions you use will vary depending on your size and operating environment.

Safety performance monitoring and measurement

To be able to manage your safety performance you need to be able to measure it in some way and for that you will need safety data that can be used to track the achievement of your safety objectives.

The first step in monitoring your safety performance is to identify what safety performance indicators (SPIs) will be used. An SPI is a measure of how safe your organisation is. What SPIs you use will depend on your organisation, its size, complexity and especially your operating environment. Refer to Book 4: *Safety assurance* for more detailed information and examples of SPIs.



image: Civil Aviation Safety Authority

In smaller organisations low levels of safety data may mean it is more difficult to identify trends or changes in safety performance. This may require meetings to raise and discuss safety issues with appropriate experts. This tends to be more qualitative than quantitative, but it will help identify hazards and risks for your operation. In these instances, collaborating with other operators or industry associations can be helpful since they may have data that you do not, but as they operate in similar environments to you it is still relevant.

When you do have limited safety data available safety performance trends may be difficult to define and it will be more important to analyse and investigate individual events and look for trends even in small numbers.

SPIs do not always need to be based on events, for example consider safety reporting levels as an SPI. This can progress with sufficient data to a review of safety reports, which can include categorisation of safety reports into types of events, types of aircraft or equipment involved, and contributing factors (organisational and human factors). Another SPI example is the frequency and attendance at safety meetings of your staff.

As part of your SMS, you also need to monitor compliance of all personnel with your SMS policy and procedures. Ideally, this is achieved through an independent assessment to ensure you are managing safety in accordance with your documented SMS and that your SMS is working effectively.

The organisation should have the following at a minimum:

- review how the organisation complies with your documented SMS through internal audits
- verify that safety performance indicators are linked to safety objectives through management reviews
- assess how effectively the SMS procedures and processes described in the SMS manual (or SMS documentation) are implemented and practised through management reviews and periodic safety committee reviews.

In a small, non-complex organisation where everyone may be involved in the SMS it will be challenging to establish an independent review or audit. In this case, you could use external auditors, or consult with other similar organisations or industry bodies which may provide information against which you can benchmark your organisation's performance.

Safety investigations

Safety investigations are conducted as part of your SMS to support hazard identification and risk assessment processes; however, they also provide a mechanism for monitoring safety performance. Investigations provide valuable sources of hazard identification and to identify weaknesses in risk controls for corrective actions to be taken.

Your internal safety investigations should include occurrences which you do not have to report to the Australian Transport Safety Bureau (ATSB) or CASA. While these safety occurrences may often appear minor, including them in a systematic investigation may reveal potentially hidden hazards.

The size and scope of the investigation needs to be appropriate, sufficiently detailed, and big enough to identify and validate any potential hazards. The effort you put in should be in keeping with the benefit your organisation will gain from identifying hazards and risks. Your investigations should include what happened, when, where, how and who was involved. With the key focus being to understand why it happened, that is to identify the contributing factors, to prevent it reoccurring rather than finding someone to blame for the event.

Your safety committee should review the findings from all incident analysis or investigations and any identified recommended improvements. It is imperative any safety lessons learned are shared both within your organisation and with relevant third-party organisations.

The organisation should have the following as a minimum:

- a simple, user-friendly reporting system which can be based on a simple Excel spreadsheet, accessible to all relevant personnel
- objective internal investigations with the focus being on the 'what' and 'how' rather than on 'who' was to blame
- a review of all findings from incidents and recommendations for improvements, changes, or amendments to the SMS, if required, by the safety committee
- dissemination of any lessons arising from investigations throughout the organisation, and where possible other similar organisations. You can communicate these by:
 - toolbox meetings
 - meetings with other operators or industry bodies
 - email
 - company intranet
 - safety bulletins.

Management of change

Regardless of the size and complexity of your organisation, your operation and the aviation environment are dynamic, and changes will frequently occur. As such you will need a process to help identify potential hazards and safety impacts of any changes.

The management of change should be a formal process to identify external and internal changes that may affect established processes and services. It uses the organisation's existing risk management processes to ensure there is no adverse effect on safety. Change can also introduce new hazards that could affect the appropriateness and effectiveness of any existing risk mitigation.

Whether change is brought about through changes in your operating environment, new projects, or through modifications to operating procedures, it will involve risks.

There is a very strong link between change management and risk management, the two processes support each other and should be used together.

Management of change within an SMS should focus on hazard identification and controls or defences related to the safety of operations. Other potential risk factors, such as lack of business growth, may also be considered, as while they are additional to the scope of SMS change management, they may affect operational safety.

The organisation should do the following as a minimum:

- have a process or procedures in place to be able to recognise an upcoming change to your operation, either through internal changes or external operating environment changes, to trigger your management of change process
- the management of change process should follow the same structured approach you use for normal risk assessment.

Management of change within your SMS is a different process to management of change in the regulatory context. Regulatory change management is aimed at organisations that are required to have a change process outside of the scope of an SMS. The regulatory context includes consideration of significant changes which require CASA mandatory notifications and approvals. Under your SMS, management of change is a process that occurs regardless of any regulatory requirements for notification and approvals. Regulatory change management is directly linked to your CASA regulatory authorisations, these may leverage off or have implications for your SMS, but your SMS change management should always be occurring regardless.

SMS continuous improvement

Your SMS should be an integral part of your organisation. It should be dynamic rather than static and it needs to continuously improve the safety performance of your organisation.

All organisations, large or small, complex, or simple, need a way to regularly review whether they are achieving their SMS aims and objectives. A safety review validates the SMS and paves the way for continuous improvement, ensuring the SMS remains effective and relevant to the organisation's operations.

You should be able to demonstrate continuous improvement of your SMS by:

- periodically monitoring and reviewing the risk management process
- implementing recommendations from incident investigations and audit reports
- involving all personnel in safety meetings
- networking with other similar organisations and sharing safety information.

Refer to Book 4: *Safety assurance* for more detailed and in-depth information to assist you with scalability of these core elements.

Safety promotion

Your SMS must include safety promotion, which includes safety training and education, and safety communication. Safety promotion communicates the organisations expected safety behaviours, safety lessons learned, safety information, safety procedures, and key safety messages from senior management to foster improved safety performance.

Organisations must ensure that their personnel are trained and competent to perform their roles within the SMS, and that the training programs are tailored to suit the needs and complexity of the organisation. Safety communication assists in setting the safety tone for the organisation and helps to build a robust safety culture.

Safety training

Everyone within your organisation has a responsibility for aviation safety. Providing appropriate safety training to all personnel highlights management's commitment to providing an effective SMS. The purpose of safety training is to ensure all personnel are competent to carry out their safety roles and responsibilities. The core outcome of safety training is creating awareness of the organisation's safety objectives and the importance of creating a positive safety culture.

Your safety training needs to focus on identifying and reducing hazards in the system, and why the 'human factor' is significant in achieving this.

Training should be tailored not only to your organisation but also to the individuals' roles.



image: Civil Aviation Safety Authority

Your safety training should include the following topic areas:

- your organisation's SMS
- your safety policy and objectives
- hazard and safety reporting procedures
- safety responsibilities, including acceptable and unacceptable safety behaviours
- how individuals can contribute to safety across all levels of the organisation.

The organisation should do the following as a minimum:

- ensuring all personnel have undertaken initial and ongoing refresher safety training, including training assessments
- maintain records of all personnel's safety training
- make all personnel aware of the safety hazards and risks associated with their duties
- lessons arising from investigations should be disseminated effectively.

Safety communication

An ongoing safety communication program should ensure your personnel benefit from safety lessons learned and continue to understand the organisation's SMS. Safety communication is essential to maintaining two-way communication, ensuring that all personnel are informed, and that feedback is captured and acted upon where appropriate.

At a minimum safety communication should:

- ensure all staff are aware of the organisation's SMS
- convey safety-critical information
- explain why particular actions are taken
- assist in change management, by keeping staff informed of the process
- explain why safety procedures are introduced or changed.

It is also valuable to communicate 'good-to-know' safety principles and information to personnel. Efforts should be made to share best practice and relevant safety-related information with other similar organisations, as a two-way street by passing on your learnings as well as gathering theirs.

The organisation should do the following as a minimum:

- promote your SMS so that everyone is aware of their safety roles and responsibilities. You can achieve this through regular safety communications including:
 - meetings: regular staff and toolbox meetings
 - visuals: signs, posters, visual cues like high-vis vests when undertaking safety-critical work
 - written: safety newsletters, safety bulletin, note with pay slip, email, company intranet etc.
- ensure safety-critical information related to analysed hazards and assessed risks is disseminated
- ensure relevant safety information is distributed to contractors and third-party providers for your organisation.

Refer to Book 5: *Safety promotion* for more detailed and in-depth information to assist you with scalability of these core elements.

Human factors integration

Consideration of human factors (HF) has particular importance in safety management as people can be both a source and solution to safety risks through:

- contributing to an incident or accident through variable performance due to human limitations
- anticipating and taking appropriate actions to avoid hazardous situations
- solving problems, making decisions, and taking actions to mitigate risks.

Integrating HF into your SMS gives you a framework to ensure you systematically identify and analyse any HF issues and fix them. Assessing risks associated with human performance is more complex than risk factors associated with technology or environment. This is because:

- human performance is highly variable, with a wide range of interacting influences, internal and external to the individual. Many of the effects of the interaction between these influences are difficult or impossible to predict
- the consequences of variable human performance will differ according to the task being performed and the context.

The organisation should have the following as a minimum:

- be able to demonstrate that HF has been integrated into the organisation's SMS, for example:
 - ensuring organisational processes and actions are transparent, staff know and understand who does what, and why
 - involving staff by respecting and valuing their input; especially important in risk management and management of change

- encouraging timely, relevant, and clear two-way communication, by giving, for example, feedback from audits, safety reviews or safety reports
- ensuring fair treatment, with an open, safety reporting culture, demonstrated in, for example, timely incident follow-up and investigation findings
- be able to demonstrate that HF training is being adopted by the organisation
- ensure HF and human performance limitations have been assessed as potential contributing factors during safety investigations.

Identification and analysis of HF issues

As a minimum, you should be able to show that your organisation understands why human factors issues are important, and that human factors considerations are part of your reporting and investigation processes. Examples of some typical HF issues may include:

- communication breakdowns, leading to lack of understanding, incomplete briefings, or lack of information sharing
- fatigue impairment
- stress
- time pressures
- environmental hazards (lighting, noise, weather etc).

These may all be a part of daily operations for your organisation, and your HF training should reflect this. Although these may not be completely avoidable you can assist in managing them through knowledge and development of HF risk controls.

Refer to Book 6: *Human factors and human performance* for more detailed and in-depth information.

Final thoughts

According to ICAO, an SMS is a systematic approach to managing safety, including the necessary organisational structures, accountabilities, responsibilities, policies, and procedures. As with all management systems, it involves goal setting, planning, documentation, and the measuring of performance goals.

SMS is scalable, so your system needs to reflect what you do, your specific risks, and what you are doing about them. Above all, the way you manage safety needs to be systematic.

Regardless of the size and complexity of your organisation all elements of the SMS framework are required, however they should be tailored to your organisation. Although this may seem a daunting task, especially for some smaller organisations, breaking the system down into discrete elements will help you to recognise what you already have in place and what you may still need to develop.

Safety management involves managing your aviation business activities in a systematic and coordinated way to minimise risks.



image: Flying the outback | Shelley Ross



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