Guidance Development on SMS for Industry

Subject: Safety Management Systems for Aviation Organizations

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1.0   INTRODUCTION

This Guidance Document (GD) is provided for information and guidance purposes. It may describe an example of an acceptable means, but not the only means, of demonstrating compliance with regulations and standards with respect to Safety Management Systems. This GD on its own does not change, create, amend or permit deviations from regulatory requirements, nor does it establish minimum standards.

1.1   Purpose

The purpose of this GD is to propose an implementation plan and provide guidance on the development process, format, and content of SMS for organisations.

1.2   Applicability

This document is applicable to South African Civil Aviation Authority (SACAA) personnel, and to its industry.

2.0   REFERENCES AND REQUIREMENTS

2.1   Reference Documents

It is intended that the following reference materials be used in conjunction with this document:

(a) Civil Aviation Regulations (CAR)
(b) Civil Aviation Technical Standards (CATS)
(c) ICAO SMM Document (Doc 9859 2nd edition)

2.2   Definitions

The following definitions are used in this document:

Safety. The state in which the possibility of harm to persons or of property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and safety risk management.
Hazard is defined as a condition or an object with the potential to cause injuries to personnel, damage to equipment or structures, loss of material, or reduction of ability to perform a prescribed function.
Safety risk is defined as the assessment, expressed in terms of predicted probability and severity, of the consequences of a hazard, taking as reference the worst foreseeable situation
Safety risk management is a generic term that encompasses the assessment and mitigation of the safety risks of the consequences of hazards that threaten the capabilities of an organization, to a level as low as reasonably practicable **(ALARP).**
Level of safety is the degree of safety of a system. It represents the quality of the system, safety-wise. It is expressed through safety indicators;
Safety indicators are the parameters that characterize and/or typify the level of safety of a system;
Safety targets are the concrete objectives of the level of safety;
Acceptable level of safety is the minimum degree of safety that must be assured by a system in actual practice;
Safety measurement refers to the quantification of the outcomes of selected high-level, high-consequence events, such as accident and serious incident rates.
Safety performance measurement refers to the quantification of the outcomes of selected low-level, low consequence processes. *It* is a non-stop activity, involving continuous monitoring and measurement, by an organization.
Safety Assurance means a process of examining an organization's SMS and evaluating its effectiveness, based on the SMS components and elements. This extends from an evaluation for regulatory compliance;
Organisation when used alone means all functions of service provision within the aviation industry. It refers to all certificate holders under Parts 121, 125, 127, 139, 141, 145, 148 and 172. Within the

organisation it includes all business and support functions, such as Operations, Maintenance, Manufacturing, Finance and Administration.

Regulation In-force Date means the date that the amendments to the CAR and CATS, incorporating the requirement for organisations to have an SMS, are implemented in South African, namely 1 January 2010.

Safety Management System (SMS) means documented processes for managing risk that integrates operations and technical systems with the management of financial and human resources as well as infrastructure and technology, to ensure aviation safety or the safety of the public.

3.0   BACKGROUND

3.1   This document serves as guidance for SMS implementation and outlines theories, principles, philosophies and practices related to it.

3.2   The overall aim is to improve safety through proactive management rather than exclusively through compliance with regulatory requirements. The goals of SMS are to increase industry Accountability, to instil a consistent and positive safety culture, and to help improve the safety performance of aviation organisations.

3.3   In all cases, the SMS shall apply to the organisation as a whole, and not to discrete entities within it. SMS should be tailored to the organisation. SMS is a tool with which to manage safety. It is not a substitute for compliance with regulations.

3.4   An organization may conduct multiple gap analyses while implementing their SMS. The Gap analysis must be supplied to SACAA inspectors when submitting the safety management manual for approval. However, there will be one SMS that encompasses all activities within that organisation.

3.5   The SMS shall require the organisation to integrate safety into written management and employee policies, practices and procedures. The identification of hazards and risk, and the strategies to mitigate them are the foundations of an SMS that will help an organization continually improve its safety record.

3.6   SACAA has created a website dedicated to SMS development and implementation and will post all relevant information on it for access by the industry.

4.0   PROPOSED IMPLEMENTATION TIMELINE

4.1   A mature SMS takes considerable time to develop, validate and expand. The development of SMS is progressive, but it must also remain relevant and sustainable. The regulatory requirements for SMS in Aviation organisations are anticipated to be implemented in four phases, extending over a three-year period. As the SMS matures, aviation organisations shall be required to verify and improve the policies, processes, documentation, etc. By the end of the implementation period, all components and elements should be in place, and should result in a comprehensive SMS in which stakeholders have confidence.

4.2   At the regulation in-force date, Aviation Organisations will be exempt from those regulatory requirements that are allowed to be implemented in one of the later phases, as described below in 5.0, upon request. Alternatively, Aviation Organisations that do not take advantage of the exemption must be in full compliance with the applicable SMS regulations. No extensions shall be granted, and not meeting the requirements may result in suspension of privileges.

5.0   A PHASED –IN APPROACH

The implementation of SMS involves a progressive development and a phased-in approach to implementation is allowed. The four phases extend over 3 years, and are specified below.

Regulation In force Date 1 Jan 2010	+90 days	+ 1 Year	+ 2 Years	+ 3 Years
	Initial Certification	1 Year Follow up	2 Year Follow up	3 Year Follow up

5.1   Phase 1: Initial Certification

At the latest within 3 months of the implementation date of the SMS regulation, SACAA requires that applicants that provide SACAA with the following documentation for initial certification:

a. A Structure indicating safety responsibilities within the organisation, including the names of the -,
    (i)   accountable executive;
    (ii)   the person at executive management level responsible for implementing the SMS that meets the safety manager qualifications requirements;
b. A statement of commitment to the implementation of SMS (signed by the accountable executive);
c. The Safety Policy;
d. The gap analysis conducted between the organization's existing system and the SMS regulatory requirements;
e. The SMS implementation project plan, based on the gap analysis;
f. Safety Objectives (Targets) as defined;
g. Training plan for all staff with safety responsibilities and for safety awareness of other staff,
h. Procedure/s for and means of hazard reporting,
i. Procedure/s for hazard and risk identification (at least re-active hazard identification methods), risk assessment, risk mitigation (control),
j. Procedure/s and means of communication of safety information,
k. Safety Assurance procedure/s for the assessment of the effectiveness of the policies and procedures that have been implemented, and
l. Procedure/s for management review of the effectiveness of the policies and procedures and for reviewing the measurement against achievement of targets;
m. Procedures for dealing with emergencies (ERP); and
n. Safety Committee procedures, if utilised.

5.2   Phase 2: One-Year Follow-up

At one-year, certificate holders will have to demonstrate that their system is operational and that they have at least assessed its effectiveness with respect to the policies and processes implemented in Phase 1.

The following policies and processes should be implemented during this phase:

a. Year 1 documented safety management plan;
b. Additional documentation required to be developed and implemented:
c. A policy with respect to the reporting of safety information that indicates the circumstances under which individuals will and will not be punished for deviations and indicating when individuals will be rewarded,(18-20)
d. Procedure/s for hazard and risk identification (to include proactive identification methods), risk assessment, risk mitigation (control);
e. Procedures for trend analysis, and
f. Procedures for assessing that safety targets and measures have been achieved.

5.3   Phase 3: Two-Year Follow-up

Two years after initial certification, the certificate holder will demonstrate that, in addition to the components already demonstrated during Phase 2, they also have a process for the predictive identification of hazards and associated methods of collecting, storing and distributing data and a risk management process. The measurement of effectiveness of the system must now include a review of whether safety targets have been achieved.

Required components:

a. Year 3 documented safety management plan; and
b. Procedure/s for hazard and risk identification (to include predictive identification methods), risk assessment, risk mitigation (control).

5.4   Phase 4: Three-Year Follow-up

One year following phase 3, certificate holders will demonstrate that, in addition to the components already demonstrated during phases two and three, that they now have a fully operational system and that they are conducting regular assessments to measure its effectiveness.

6.0   GAP ANALYSIS

6.1   The gap analysis is completed to compare the current systems and processes within the organisation with the requirements as published in the CAR and CATS. The report of this analysis would highlight those areas that are already in place within the organisation versus those areas that would have to be developed and those areas that would have to be improved upon. See Appendix A for example of a gap analysis checklist.

6.2   The gap analysis report would for the basis for the implementation plan, which would cover those areas where development or improvement would be required.

6.3   The SACAA has adopted the SMS Framework defined by ICAO and the following components and elements are applicable:

1. *Safety policy and objectives*
    1.1 – Management commitment and responsibility
    1.2 – Safety accountabilities of managers
    1.3 – Appointment of key safety personnel
    1.4 – SMS implementation plan
    1.5 – Coordination of the emergency response plan
    1.6 – Documentation
2. *Safety risk management*
    2.1   Hazard identification processes
    2.2   Risk assessment and mitigation processes
3. *Safety assurance*
    3.1 Safety performance monitoring and measurement
    3.2 The management of change
    3.3 Continuous improvement of the safety system
4. *Safety promotion*
    4.1 Training and education
    4.2 Safety communication

6.4   The gap analysis should be completed at least 3 months before the start of Phase 1 to enable development of required documentation in time for application.

7.0   SAFETY POLICY AND OBJECTIVES

7.1   Management commitment and responsibility

7.1.1   Safety Policy

Acceptable means of compliance to this element would entail as a minimum, the development and approval of the commitment statement by the accountable executive and the development of a safety policy that contains at least the following commitments (The commitment statement can therefore be included in the safety policy or can be separate):
a. To develop, establish and continually improve the SMS for all facets of the organization;
b. To dedicate safety as a core value of the organization;

c. To make available the required human and financial resources for implementing and managing the SMS;
d. To stipulate that safety requirements are applicable to all employees, contractors, and partners of the organization;
e. To review the safety policy periodically;
f. To promote participation of employees, contractors and partners in the operation of the SMS;
g. To establish and practice formalized and interactive communication avenues;
h. To establish a reporting policy for all employees and stakeholders; and
i. To actively participate in and support the SMS.

The safety policy shall be in writing, and may be formatted in many ways. However, a simple statement is preferable to a complex one. The safety policy should address and integrate the entire organization.

The safety policy shall be signed by the accountable executive or the executive management team. It is an expression of the direction that management intends to take in accomplishing the organisational safety goals.

Once the safety policy is defined, procedures that are aligned to the policy should be developed to ensure its internalisation.

Management should demonstrate commitment to the SMS by:

a. Putting safety matters on the agenda of meetings at all levels;
b. Being actively involved in safety activities and reviews at both local and remote sites;
c. Allocating the necessary resources, such as time and money to safety matters;
d. Setting personal examples in day-to-day work;
e. Promoting the reporting of safety hazards
f. Implementing action to control risk highlighted in safety reports; and
g. Promoting safety through all means available.

7.1.2   Safety Objectives and Targets

Safety Objectives and Safety Performance Targets have to be established by the organisation and must be presented to the SACAA with the application for certification to enable acceptance by the Commissioner.

Multiple Safety Performance Targets will have to be determined within the various business areas of the organisation, based upon the areas of safety concern within that area. The organisation may consolidate its Safety Performance Targets and decide which of these targets will be submitted to the SACAA for acceptance.

The following method is proposed for determining the safety performance targets within the organisation.

Step 1: Determine the safety indicator for the organisation, in other words the measure that would be used to assess safety performance (It defines WHAT will be measured).
Step 2: Determine the baseline (current) performance against this safety indicator (based upon current available data or information OR a best estimate of the current situation) (It defines the CURRENT SITUATION in relation to the indicator)
Step 3: Agree on a Safety Performance Target that is specific, measurable, attainable, realistic and time based. (It defines what you want to ACHIEVE)
Step 4: Determine interventions (actions required to be taken) to assist achievement of the standard as well as who would be responsible to action them (by when).

Example of Safety Performance Targets:

Safety Indicator	Number of runway incursions per number of aircraft movements.
Baseline (current) Performance	10 runway incursions per 100 000 aircraft movements
Safety Performance Target	Reduce the runway incursions with 10% by 31 December 2010, OR Reduce number of runway incursions to 9 per 100 000 aircraft movements by 31 December 2010
Required interventions	1. Improve aerodrome signage at current critical areas (based on incursion information this could for example impact one area e.g. the outside the baggage loading area) 2. Identify training need and provide additional training to drivers involved 3. Institute inspections of the baggage handling area during loading and off-loading

Safety Performance Targets should ideally be linked to the company's overall business objectives. This requires two things: 1 - the development and implementation of a coherent set of safety performance measures or targets as explained above; and, 2 - a clear linkage between the safety performance measures or targets and the organization's business performance measures. Alignment of business and safety targets would create a balance between these normally conflicting objectives. A simple example is given in the table below.

Business Objective	Safety Objective
Increased cost-efficiency.	Improve safety record.
Business Indicator	Safety Indicator
Cost per flight	Number of events per flight
Baseline	Baseline
Cost of operation to (location) is $10 000 per flight	Operation to (location) records 10 events per flight currently
Business Performance Target	Safety Performance Target
Reduce cost of operation to (location) to $8 000 per flight by (date)	Reduce number of events to (location) to 8 per flight by (date)

Once the targets have been set, it is the duty of the organisation to monitor that
- the interventions have been actioned as required, and
- they achieve their targets (by recording appropriate data to enable measurement).

The organisation must retain records of their monitoring efforts (also refer to 9.1.1). The SACAA will also monitor performance against the targets accepted by the Commissioner during their oversight inspections.

7.2 Safety Accountabilities

Safety accountabilities have to be documented. Reporting relationships and lines of authority with respect to safety management should be clearly indicated for managers and all other staff within the organization. An organizational diagram may assist in clarifying the lines so that the function of safety may be realised. Specific responsibilities attached to each position holder are documented in the individual job or position description or profile.

Employees should have the opportunity to contribute to the development and implementation of an SMS, as they are ideally placed to provide initial identification of safety concerns in their particular areas of expertise.

Examples of responsibilities are provided below:
Accountable executive:
- Overall accountability and responsibility for establishing, maintaining and improving the SMS.
- Responsible to ensure that the safety function is treated as a business function in its own right and that it is properly resourced and managed.
- Chair safety review board.
- Ensure a good balance between business objectives and safety objectives.

Management:
- Responsible to identify the safety functions that are applicable to their areas of control and to incorporate it into their functions.
- Assign resources to manage safety as required.
- Perform cost benefit analysis when required.
- Participate in the safety review board meetings and decision making based on cost benefit analysis.
- Determine safety goals and objectives.

Safety Manager: (Example of JD for a SM Appendix B)
- Establish safety standards and procedures;
- Establish and maintain reporting system to collect and analyse safety related data;
- Manage hazard identification and risk management and analysis processes;
- Participate in periodic reviews to determine the effectiveness of the program;
- Evaluate the results of safety initiatives in terms of its appropriateness and effectiveness;
- Monitor aviation industry safety concerns that could affect the organisation;
- Monitor technological developments that could affect the organisation;
- Report directly to the accountable executive on serious safety concerns;
- Assess the adequacy of training programs; and
- Manage the sharing of safety information.

Safety officers:
- Record (log), verify information within and analyse safety reports.
- Identify the need for further (root cause) investigation and request this to be conducted by the line manager.
- Conduct trend analysis.
- Prepare information for review by safety action group and safety committee.
- Record decisions concerning risk assessment taken by committee and recommended risk control action.
- Assist with cost benefit analysis by managers, if required.
- Record decisions concerning risk control as approved by safety review board.
- Monitor and report on risk control measures taken.
- Conduct awareness training.
- Prepare safety communication and promotional material.

Other employees:
- Identify all hazards and
- Report all hazards.
- Investigate root cause of hazards and risks when assigned to do so.
- Take risk control (mitigation) action when assigned to do so.
- Attend awareness training as required.
- Take cognisance of safety consequences of operational actions taken.

Auditors: (Auditors must preferably not be part of the safety office)
- Perform independent audits of the soundness of the safety management system, namely, verifying that it is documented in accordance with legal requirements and has it been implemented throughout the organisation.
- Perform independent audits on the effective implementation of the safety management system to verify that all staff understand and act in accordance with the procedures,
- Verify that the safety performance targets that have been set have been achieved and that safety interventions has been implemented.

Figure 1 below demonstrates one possible example of a safety accountability chart that could be applied to medium to large organisations and is an overlay of organisational hierarchical structure.

Although there is no regulatory requirement to have a safety office or safety committees, it is recognised that larger organisations may choose to implement a safety office and various committees.
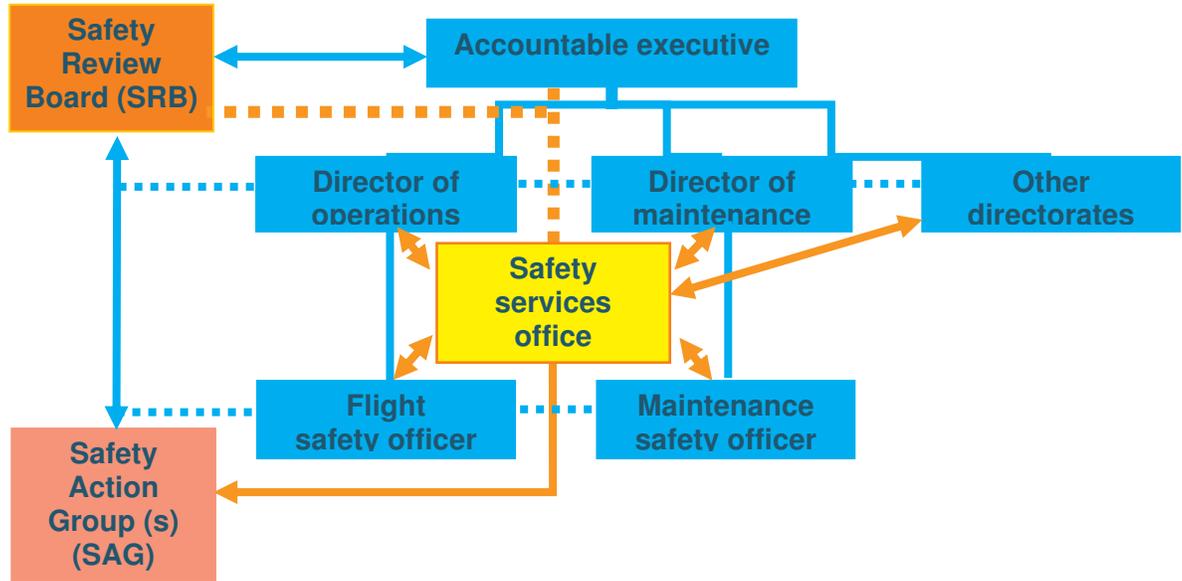
The Safety Review Board (SRB) is deemed to be a high level committee (members are high level management) and performs strategic functions and take high level business decisions concerning safety. The following responsibilities are normally assigned to the Safety review Board:

- The SRB usually monitors :
  • Safety performance against the safety policy and objectives
  • Effectiveness of the SMS implementation plan.
  • Effectiveness of the safety supervision of sub-contracted operations.
- SRB ensures that appropriate resources are allocated to achieve the established safety performance standards and targets, and
- SRB gives strategic direction to the Safety Action Group (SAG)

Safety Action group is usually responsible for:

- Overseeing operational safety within functional areas.
- Resolving of identified risks.
- Assessing the impact on safety of operational changes.
- Identifying corrective action to be taken,
- Ensuring corrective action is taken in a timely manner once approved.
- Review the effectiveness of previous safety actions taken and.
- Identifying the need for messages for Safety Promotion.

The Safety Office, if in place would normally act as a repository for safety related reports and information, as well as provide risk assessment and data analysis expertise to the functional managers. The safety office may provide data directly to the accountable executive regarding major safety issues identified through the system in the absence of alternative direct lines.

Figure 2 below indicates an acceptable hierarchical organisational structure which would encompass the philosophy of safety accountability for medium to large organisations
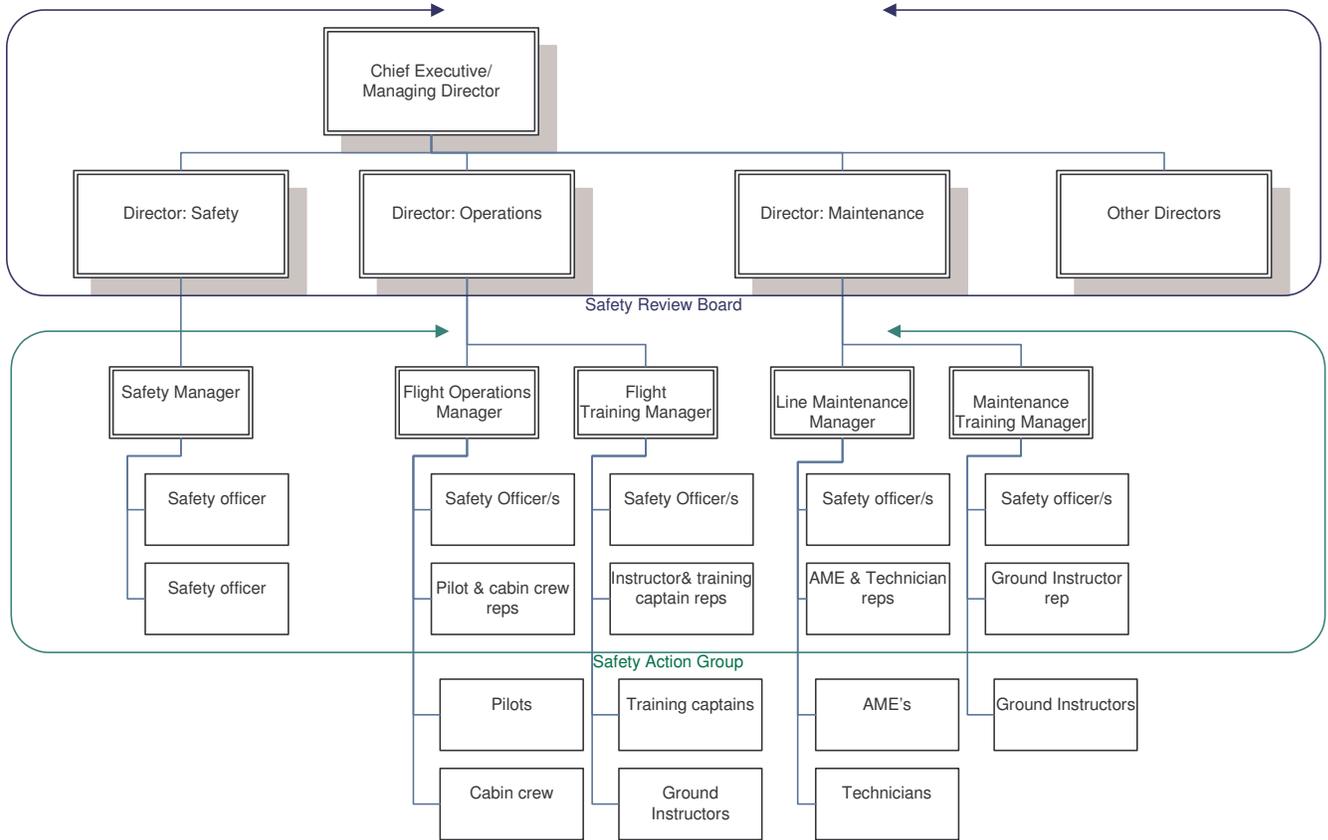
Figure 2:

Figure 3 below indicates an adaptation of the organisational structure to depict safety accountability for small organisations.
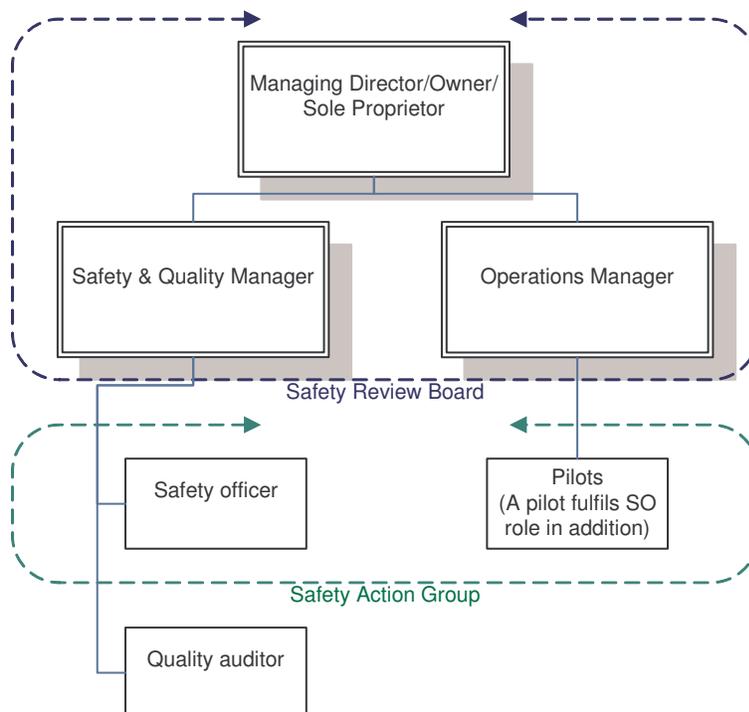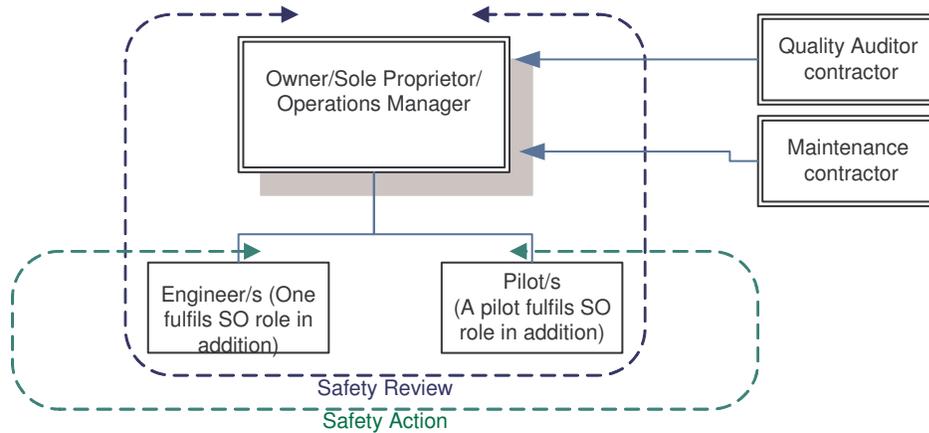
Figure 3:

Figure 4 below indicates an adaptation of the organisational structure to depict safety accountability for very small organisations.

Figure 4:

7.3 Appointment of key safety personnel

Appointment of the key personnel responsible for safety must be done in accordance with the current organisational recruitment practices, to ensure the incumbents are able to perform the tasks specified in the job descriptions/ job profiles.

The safety manager and safety officers must meet the published minimum regulatory qualification and experience requirements.

The Safety Manager must be acceptable to the Commissioner and therefore the CV for the Safety Manager must be presented for acceptance with the organisation's application for certification.

7.4 SMS implementation plan (and operational plan)

7.4.1 SMS Implementation Plan

The SMS implementation plan should be implemented based on the gaps identified in the gap analysis. The plan should address the 'what', 'who', 'where', 'when' and 'how' questions with respect to implementing any new components or improving existing ones.

The plan should contain information on:
a. Deliverables,
b. Progress evaluation,
c. Resource allocation,
d. Critical success factors,
e. Budget and cost analysis, and
f. Approvals. (Authority)

The plan should incorporate timelines and responsibilities for development of the 'missing' components and elements, including but not limited to every component listed in the SMS framework under 6.3. The plan should enable the phased implementation as described in 5.0 of this document.

7.4.2 SMS Operational Plan

Once the SMS has been implemented the SMS must be managed as an additional business function and the planning for safety must be integrated with the normal strategic and business planning cycle of the organisation. The annual safety plans will be reviewed by the authority.

7.5   Coordination of emergency response plan (More guidance is being developed. EH to Comment)

An emergency response plan (ERP) outlines in writing what should be done after an accident, and who is responsible for each action.

The purpose of an ERP is to ensure that there is:
- Orderly and efficient transition from normal to emergency operations.
    - Designation and delegation of emergency authority.
    - Assignment of emergency responsibilities.
    - Authorization by key personnel for actions contained in the plan.
    - Coordination of efforts to cope with the emergency to those organizations that they interface with.
    - Safe continuation of operations, or return to normal operations as soon as possible.

Plan contents:
- Governing policies and arrangements for delegation.
- Organization for the emergency.
- Public relations handling
- Record keeping
- Crisis Management Centre (CMC)
- Accident scene protection/investigation
- Notifications.
    - Initial response.
    - Additional assistance.
    - Care of survivors
    - Emergency call list
    - Next of kin

The response plan must be useful to those who might be on duty at the time, must contain key data and guidance and everyone must know where copies are located. Normally organisations are required to carry out simulated emergency exercises as part of staff training to ensure the plan works in practice (coordination with various agencies and stakeholders) and to provide everyone with a chance to practice their roles in a controlled situation.

Front line staff must have clear simple instructions and procedures to follow in the immediate aftermath of an accident but components of a plan for the management or for the person assigned the task of dealing with the media will include more detailed information for dealing with emergency authorities, insurance companies, media and next of kin.

7.6   Documentation

The documentation required for SMS should be contained in either a separate Safety Management Manual (SMM) or it should be incorporated into the existing system of manuals of the organisation.   If a separate manual is implemented, the manual must be integrated with the existing manual system in terms of numbering and document control principles.

Documentation required to be in place includes, but are not limited to: (Example job description attached as Appendix C)
- Structure that reflects safety accountabilities,
- Job descriptions/profiles for safety staff,
- Safety Policy,
- Documented safety performance targets,
- Safety training requirements (for safety staff and other staff)
- Procedures for:
    - Dealing with emergencies,
    - Hazard identification,
    - Risk management, (identification, classification, analysis and control)
    - Safety investigations of contractors,
    - Root cause investigations,

- Safety reporting, analysis and feedback,
- Confidential reporting,
- Safety assurance audits,
- Safety performance monitoring,
- Safety communication,
- Safety promotion and the sharing of safety information.

Well thought out and documented procedures help ensure that practices are consistent with the company's safety policy and to clarify management's intent.

8.0   SAFETY RISK MANAGEMENT

These processes form the core of the SMS system and the implementation of the reactive, proactive and predictive methods for hazard identification can be implemented in accordance with the phased approach described in 5.0 of this document.

8.1   Hazard Identification processes

Hazard identification is the act of identifying any condition with the potential of causing injury to personnel, damage to equipment or structures, loss of material, or reduction of the ability to perform a prescribed function.

Hazard identification is important and one means of compliance involves identifying failures in the organisational 'systems' against the five components of the organisational accident as described in the James Reason Model, (Components described below). All failures identified should be compared with the definition of 'hazard' to confirm that they are hazards.

Organisational factors: Factors that the organisation has a reasonable degree of control over and it includes policies, processes and procedures, management decisions, etc. A failure under this component is for example a flaw in the design of a procedure or policy or a hasty decision taken by a manager.

Workplace conditions: Factors that directly influence the efficiency of people in the workplace, such as noise, lighting, delays, technology.   A failure under this component is for example a design defect or a faulty piece of equipment.

Latent conditions: Conditions that are present in the system but are hidden and are only uncovered when triggered by an event. (Flaws in procedures or personal problems of staff may be hidden until then and are examples of latent conditions). A failure in this component might relate to any of the other components, e.g incorrect job card usage.

Active failures: This relates to any actions (or inactions) by people that have an immediate adverse effect. It includes errors and violations.

Defences: All resources or safeguards put in place to protect the organisation against risk involved with production activities can be seen as defences. This includes training, regulation, people placed in key positions, technology and controls. A failure under this component is for example an ineffective use of a checklist.

Once hazards have been identified, they need to be broken down to their lowest possible detail (specifics) **(ALARP)** to assist with risk identification, as shown in the example below:

Generic Hazard	Airport construction
Components (specifics) of hazard	• Construction equipment on runway • Signage at construction site
Generic Hazard	Crew/ATC communication
Components (specifics) of hazard	• Misunderstanding based on language proficiency • Incorrect/inaccurate information being communicated

Hazards can be identified from various sources within the organisation and the three following methods are required to be utilised. (Please see the Phased Approach in 5.0)

Reactive: Hazard information comes from occurrence and event reports, where this is kept. However even if these reports are reviewed and studied again after conclusion of the investigation, the intention would be to now identify additional failures within the organisational systems instead of just looking at the causal factors so that additional hazards could be identified.

Proactive: Hazards information comes from other sources of information in the organisation like audit reports, surveys, studies, safety monitoring reports. etc and the intention is to look for other failures within the organisational systems to prevent a major safety breach to occur.

Predictive: Hazard information comes from databases of information that records real time and historic information on operations. Trend analysis can be done and as a result safety concerns can be reviewed, investigated and acted upon.

Reporting systems will be required for the record keeping of data for SMS, but the need for and the type of reporting system required would depend upon the size and complexity of the organisation. (E.g. for a small organisation data and information in EXCEL or ACCESS may be sufficient if the data can be used for trend analysis, whilst medium to large organisations require more sophisticated reporting systems with additional analysis capabilities.

8.2   Risk assessment and mitigation processes

Risk assessment and control follows the identification of hazards. One hazard will have more than one risk attached to it. The consequence of each risk is assessed in terms of its probability and severity (within context) and a decision needs to be made with respect to acceptability of the risk in accordance with the risk matrix employed within the organisation.

Once the decision has been made, current 'defences' and its ability to control the risk must be investigated. If not sufficient, risk control strategies should be discussed with a view to reducing, avoiding or segregating the risk.

Any risk control strategy under consideration must include a cost-benefit analysis to ensure that risk control is done within current business constraints. **(ALARP)**

Assessing potential risk is often perceived as resource intensive and unduly cumbersome. It doesn't have to be. There are numerous sources of readily accessible information that can be utilized to better understand potential risk within an organization. The following are examples of some of the possible resources:

i.   **Company Experience** – Existing safety reports detailing events and near misses. Minutes of safety meetings and committee meetings can also reveal potential areas of concern.
ii.   **Workforce opinions** – Actively seek the input of the workforce. This can be achieved through focus groups, consulting employee representatives and conducting structured vulnerability analyses with subordinate managers and supervisors.
iii.   **Audit Reports** – The organizations internal audit system should contain a structured record of areas of concern in a prioritized format. A review of audit reports and remedial action plans (including an assessment of follow-up action completions) should be conducted. Corporate memories are often much shorter than the current incumbents realize and research beyond 5 to 10 years could reveal important information.
iv.   **Industry generic hazard register** – Hazards/risks identified by other organizations might trigger concerns that should be investigated and if required addressed by the company.
v.   **Industry Safety data recording systems –** Industry safety data exchange programs can be considered.

9.0   SAFETY ASSURANCE

9.1   Safety performance monitoring and measurement

The safety performance of the operation needs to be monitored, proactively and reactively, to ensure that the key safety goals continue to be achieved. Monitoring achievement of safety performance targets through audit forms a key element of this activity and should include both a quantitative and qualitative assessment. The results of all safety performance monitoring should be documented and used as

feedback to improve the system. Audits are further intended to verify that the safety management system is documented and implemented effectively and in accordance with the CAR and CATS requirements, and that staff understands their role with respect to implementation. Audits of the system should not be conducted by the staff involved with managing the system, but should be carried out independently. (It can be incorporated into the Quality system audits.) The current internal auditors within the organisation may be used for this purpose or depending on the size of the organization, these functions may even be performed by external agents.

9.1.1   Performance measuring:

Measurement of performance against set targets should be based upon the targets that have been set by the organisation and as approved by the SACAA. The organisation must be able to present data as evidence of achievement of their targets. Monitoring of targets should ideally be done together with normal business performance monitoring on a quarterly basis.

9.1.2   Auditing:

There are several active monitoring methods that can be employed to assess the system's effectiveness. These include the following:

i.   **Inspections** - Determines adherence to requirements, plans and procedures by inspection of premises, plant and equipment or activities. Usually achieved through detailed inspection of actual specific target area activities against planned methods of procedures. Identifies whether the procedure in use is relevant and actively used and the practices employed are in line with the requirements of the procedures. Tends to be focused at the task level.

ii.   **Audits** – Verifies conformance with established guidelines and standards through representative samples that provides confidence. Usually achieved through systematic independent review of an organization's systems personnel, facilities, etc., using a predetermined targeted scope of coverage. Includes a verification of the commitment of management. Tends to be focused at the process level.

iii.   **Audits of suppliers and contractors -** Safety department assesses the safety levels of sub-contractors and suppliers before and during contracting. Safety deficiencies may impact contractual arrangements.

9.1.3   Safety Investigations

- The organization will have to investigate all accidents and incidents that are not being investigated by the Accident Investigation Authority.
- The aim of an investigation is to establish the root cause of an accident/ incident/ hazard, and to determine the most appropriate corrective/ preventive action.
- Investigations must be carried out within the constraints of the regulations.
- All evidence and documentation regarding the investigation must be treated as confidential and should only be released to those with a vested interest. This does not, however, override normal reporting procedures.
- A report on the investigation must be reviewed by the applicable safety committee.

9.2   Management of change

As the new approach to SMS confirms that every organisation will deal with a safe but inherently imperfect system, change is a constant factor to be taken into account. It is therefore required that the system is at least reviewed under the following circumstances:

i.   During implementation of the safety management system;
ii.   At regular intervals after implementation (auditing);
iii.   When major operational changes are planned (a safety investigation would be required to assess the safety implications of the change and to assist management taking the decision within the safety constraints highlighted);
iv.   If the organization is undergoing rapid change, such as growth and expansion, offering new training , cutting back on training, or introducing new equipment or procedures; and
v.   When key personnel change.

When changes occur this could affect the safety of the organisation as new hazards could be introduced, or risk control that has been taken could become ineffective or inappropriate. As a minimum, the organisation would therefore be required to conduct hazard identification and a risk assessment when changes occur. In their written process the organisation should include how they will address the following:

- Identification of changes that requires action (including but not limited to above);
- Assessment of the impact of these change on the organisation;
- Description of the appropriate action that will be taken when changes occur (e.g. conduct investigation, conduct hazard analysis, etc); and
- Records of decisions taken regarding the change as well as records indicating implementation of these decisions.

9.3 Continuous improvement of the safety system

The SMS should be regularly reviewed through audits (see 9.1) and audit feedback will indicate whether the system is effective and meet the required regulations and standards as defined.

Continuous improvement is heavily dependent upon regular reviews and audits of the system. The PDCA Cycle illustrated below is widely accepted as the best tool for ensuring continuous improvement as it is a mechanism for ensuring that deliverables and outcomes of processes and procedures consistently meet or exceed the organisations implied or stated needs.

A regular management review forms an integral part of continuous improvement and is the opportunity for the management to review the overall effectiveness of the safety management system. This should therefore be included in the organisation's continuous improvement processes.

The accountable executive shall actively participate in these reviews as it provides a means by which the accountable executive can determine what action needs to be taken to improve the system.. One of the results of the review should be to indicate whether the safety objectives in the SMS policy and the safety performance goals need revision.

SMS requires all of the individual processes within the organization to have effective communication, so part of the system review would include feedback on effective communication between different areas. For example: Have a pilot's concerns about his or her lack of currency on a particular aircraft (due to scheduling issues) been considered by the dispatch and shared with the training department and the Chief Pilot?

10.0   SAFETY PROMOTION

10.1   Training and education (Training Syllabus prepared as separate guidance)

In order for employees to comply with all safety requirements, they need the appropriate information, skills and training. To effectively accomplish this, the company should document the training requirements for each area of work within the organisation.

The type of training required may be mandated through regulation. This includes initial, recurrent and update training requirements and, where required, training specific to the operation of the safety management system. The Regulations will provide a good starting point to identify what required training.

It is recommended that a training file be developed for each employee, including management, to assist in identifying and tracking employee-training requirements and for record keeping of completed training. Where training files already exist, safety related training can be added to current training files.

All employees will require some level of SMS training; the extent to which they are trained will depend on their function and responsibilities with respect to the SMS. For example, a line employee will need to be trained how to report into the SMS reporting system. This would include how, where and what to report.

Employees who directly works with the safety management system and is required to implement its procedures should receive more in-depth training.   The training syllabus published by SACAA specifies the areas to be covered.

10.2   Safety Communication

Good communication between management and staff is an essential element of an effective SMS. The ideal safety culture embodies a spirit of openness and demonstrates support for staff and the systems of work. Senior management should be accessible and dedicated to making the changes necessary to enhance safety. They should be available to discuss emerging trends and safety issues that are identified through the SMS.

Management should communicate established safety policies to all employees. Communication of policies should be timely, comprehensive, relevant and clear. The most effective and efficient means of communication depends upon the size and nature of the organization and the message itself, but all safety related information should be disseminated to all personnel.

All safety related information should be disseminated throughout the organization. Keeping current on safety issues provides better background for understanding aspects of the organization's safety condition and developing novel solutions to difficult problems. This can be accomplished by subscribing to safety related programs, making relevant safety reports available, and encouraging staff to participate in safety related training, seminars and workshops.

10.2.1 Communication with respect to SMS implementation

Executive management are the ideal team to explain the 'need for change' and to take the lead.   A kick-off Communication Session (verbal – big staff and/or contractor meetings and/or user/operator consultative meetings) works well for this purpose.   The management can indicate at this forum/foray who the responsible individuals for each aspect of the SMS implementation would be and discuss the intent, major concepts and time lines.

A team of individuals should be assigned in each operational area to make up the 'Communications' team. This team will plan and roll out communication at all levels within the organisation.

Successful Communication will at least have to cover:

1. <u>Awareness communication,</u> which explains the following:
    - What is happening,
    - Why it is happening (stressing the importance and value of implementing SMS),
    - Who is taking the lead (is responsible for what),
    - What is expected of employees,
    - What is expected of contractors,
    - What is expected of users & operators,
    - How the project will pan out,
    - The project timelines (especially milestones),
    - The expected outcomes of the project (and SMS implementation), e.g. the changes at this stage anticipated in the Mission, Vision, Objectives, Values, Organizational Structure, Performance System etc)
    - Potential rewards for participation (this could potentially be the forerunner for rewards under the non-punitive reporting system and if small but real term rewards are attached to project implementation, this will assist with overall motivation and reduction in resistance to change, which is difficult to manage in short term projects)

2. <u>Progress reporting</u>, which informs all stakeholders of the following:
    - Progress against the milestones,
    - Any challenges being dealt with,
    - New expectations, if any,
    - Changes affected to current documents, policies and procedures (e.g. Mission, etc),
    - New policies, procedures and documentations being introduced and what it is intended for, and
    - Feedback on participation by all groups (including any rewards granted- Budgeted for).

3. <u>Implementation success' communication</u>**,** which informs all users of the following:
    - Any changes successfully introduced into policies, procedures and documentation as a result of project implementation, including its benefits, and
    - The expectation of all users of the documentation, including any rewards that might be applicable to successful implementation.

10.2.2. Safety Information Dissemination

The most critical factor for the success of the SMS's operation is the feedback provided on safety report submissions. Employees should be notified when a safety report is received or when a potential safety threat is discovered. Further information should be provided pursuant to investigation, analysis and corrective action on what actions have been taken to resolve the safety concern as well as the lessons learnt and its potential implications for the future.

Communication should go out to those who reported the concern, to those directly impacted by the concern, but also to all staff as this will give them the evidence that the system is working as intended and would give them more confidence to report.

11.0   ADDITIONAL GUIDANCE

11.1   <u>Non-Punitive Reporting Policy (Protection of Sources of Safety Information)</u>

Although not required in Phase 1, it is important to encourage safety reporting and to protect safety information sources. It is therefore recommended that in the early stages of deployment, the organisation considers the development of a written policy to set the parameters for the circumstances in which safety reporting would be rewarded versus the circumstances in which safety reporting could lead to possible punitive action against individuals.

An effective safety reporting system (and positive organisational safety culture) allows employees the freedom (and protection) to report safety concerns without apportioning blame or affect punishment to those involved.

However, in instances where the safety reports filed indicate the existence of gross negligence or repeat violations in a certain area, a thorough investigation is required to establish the root cause of the behaviour. Depending on the outcome of the investigation, based on the facts involved that explained the 'why' and 'how' questions behind the specific behaviour, the organisation might decide to take punitive action against the individuals involved.

An error-tolerant SMS requires appropriate responsibility and accountability from all involved to safe-guard the abuse of the system for personal gain.   Even within a non-punitive reporting environment there are certain acts that should require disciplinary action (for example, wilful gross negligence, criminal intent or use of illicit substances).

The following examples of policy considerations can be taken into account:

Recognition & Reward
Any hazard that was reported and assisted the organisation to act on the hazard in time to prevent an incident or accident from happening may be recognised or rewarded by means of one or more of the following ways:
• Recognition in the form of a safety award, or
• Awarding of a weekend prize, or
• Monetary reward.
• Monetary reward equal to 10% percent of the amount saved by preventing an accident or incident.

Root cause analysis:
A root cause analysis or investigation will be required in all instances where an unsafe act has been identified as a hazard. The root cause analysis or investigation must uncover the following;
• What happened (facts of what went wrong),
• What caused the unsafe act (situation analysis of contributing factors),
• Why the unsafe act was performed/conducted (any reasons listed to be investigated further),
• Any systemic (underlying hidden) factors that played a role.

Information uncovered in the root cause analysis or investigation must be used in risk analysis and assessment.

Human Error:
All unsafe acts indicating human error will be logged into a database including the root cause (main reason) and other reasons that contributed to the errors being made.

The following errors should not be punished:
• Errors made as a result of deficiencies in procedures, requirements or standards;
• Errors made as a result of poor or ineffective supervision;
• Errors induced by the environment;
• Errors induced by the organizational culture; and
•

Violations:
All unsafe acts indicating violations will be logged into a database including the root cause (main reason) and other reasons that contributed to the violations being made.