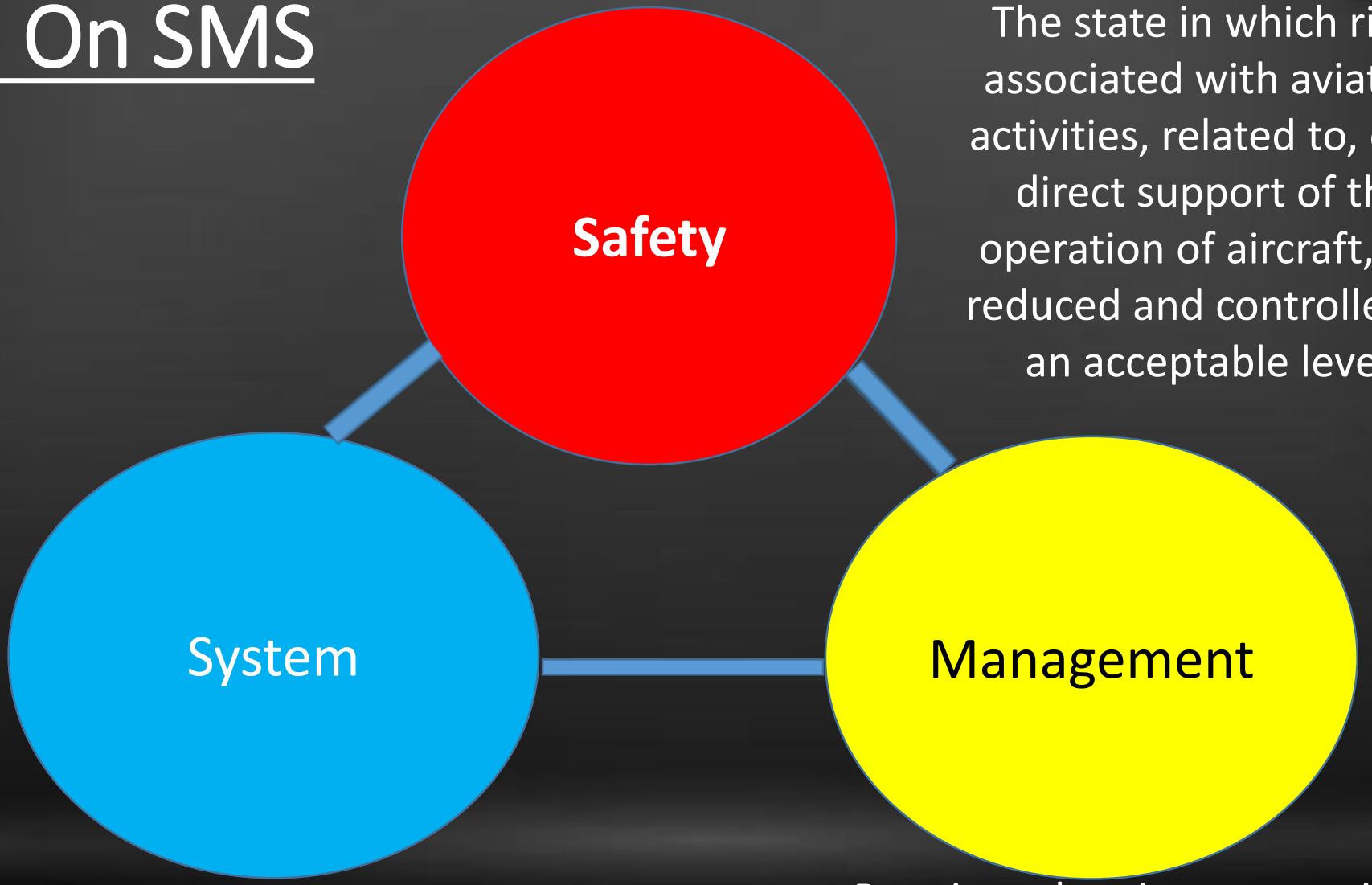
Chapter 05

SMS Framework

- Introduction to SMS
- SMS Stakeholder
- The SMS Framework
  - Safety Policy and Objective
  - Safety Risk Management
  - Safety Assurance
  - Safety Promotion

Recap On SMS



The state in which risks associated with aviation activities, related to, or in direct support of the operation of aircraft, are reduced and controlled to an acceptable level.

A coordinated plan of procedure

Requires planning, resourcing, directing and controlling.

Safety Management System

An SMS is a system to ensure the safe operation of aircraft through effective.

MANAGEMENT OF SAFETY RISK.

Safety Management System

- This system is designed to continuously improve safety by identifyimg hazards, collecting and analyzing data and continuously assessing safety risks.

- The SMS seeks to proactively contain or mitigate risks before they result in aviation accidents and incidents.

Safety Management System

- SMS is necessary for an aviation organization to identify hazards and manage safety risks encountered during the delivery of its products or services.

Safety Management System

- An SMS includes key elements that are essential for hazard identification and safety risk management by ensuring that:
  - the necessary information is available
  - The appreciate tools are available for the organization’s use

Safety Management System

- An SMS includes key elements that are essential for hazard identification and safety risk management by ensuring that:
  - The tools are appropriate to the task
  - The tools are commensurate with the needs and constraints of the of the organization

Safety Management System

- An SMS includes key elements that are essential for hazard identification and safety risk management by ensuring that:
  - decisions are made based on full consideration of the safety risk.

SMS Stakeholder

Who are the stakeholders?
(Who should be involved in SMS?)

- Aviation professionals (including support staff i.e. finance, HR, legal)
- Aircraft owners and operators Manufactures

SMS Stakeholder

Who are the stakeholders?
(Who should be involved in SMS?)

- Aviation regulatory authorities Industry trade associations
- Regional air traffic service providers
- Professional associations and federations

SMS Stakeholder

Who are the stakeholders?
(Who should be involved in SMS?)

- International aviation organizations investigative agencies
- The flying public

SMS Stakeholder

Why is it important to identify aviation system stakeholder?

- To ensure that stakeholder's inputs and knowledge related to safety risks decisions are taken into consideration before any decision is made.

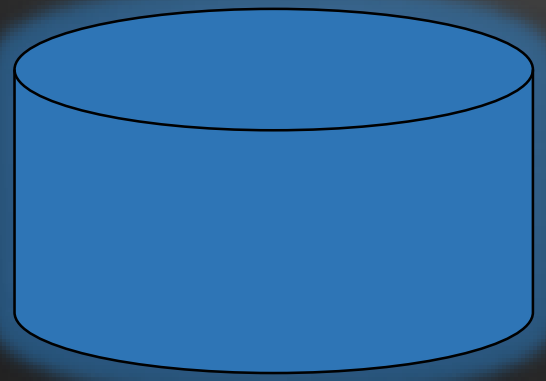
The SMS Framework

There are 4 components and 12 elements in the SMS system

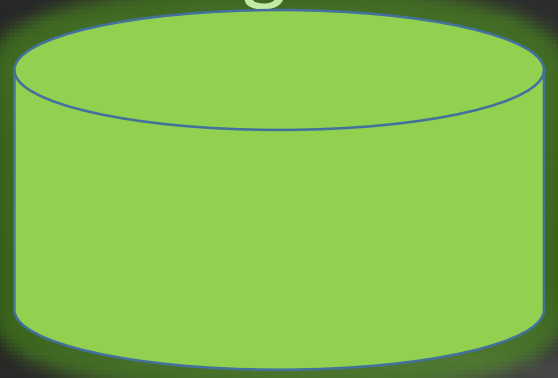
This is the fundamentals for an organization susyem to lead to achieving key business goals, enhancing safety performance and moving beyond compliance with regulatory requirements.

The SMS Framework

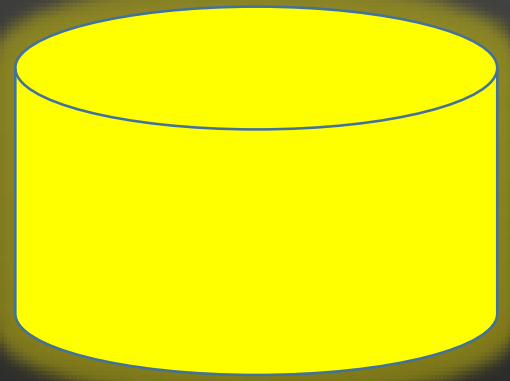
Safety Policy & Objective



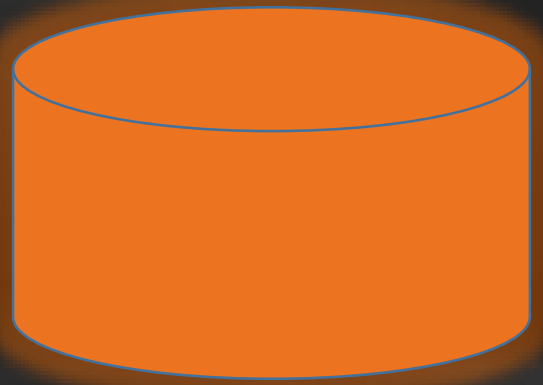
Safety Risk Management



Safety Assurance



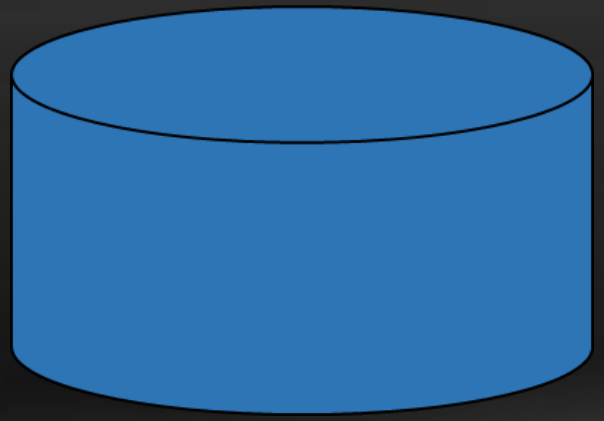
Safety Promotion



The SMS Framework

SMS Framework
Component No. 1

Safety Policy
& Objective

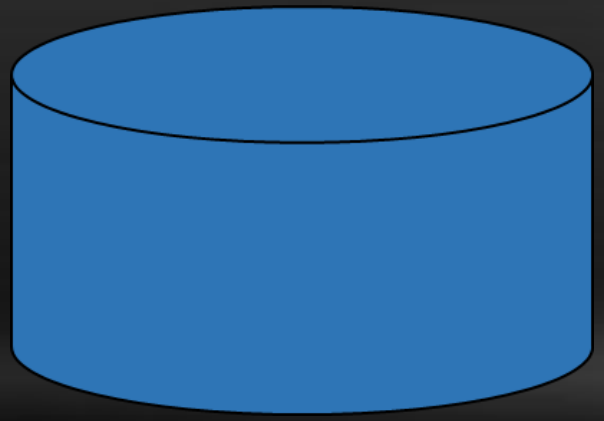


Outlines the principles, processes and methods of the organization's SMS to achieve the desired safety outcomes

The SMS Framework

SMS Framework Component No. 1

Safety Policy & Objective

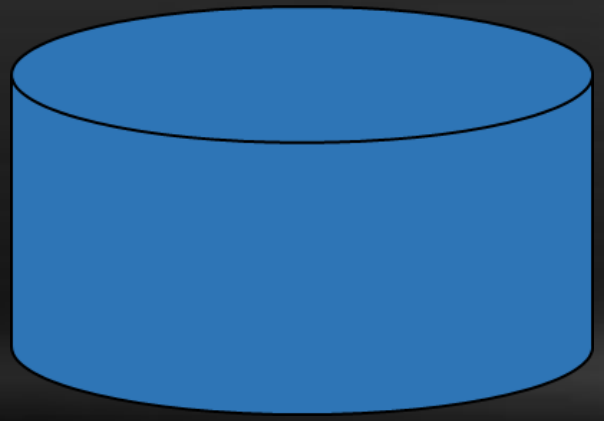


- Management commitment and responsibility
- Safety accou8notabilities
- Appointment key safety personnel
- Coordination of emergency response planning
- SMS documentation

The SMS Framework

SMS Framework
Component No. 1

Safety Policy
& Objective

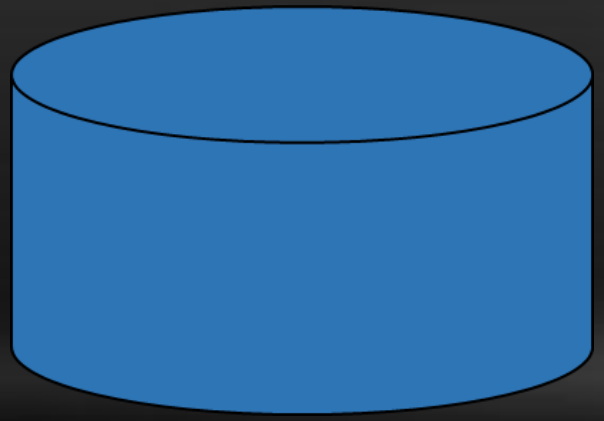


- The service provider shall define the organization's safety policy which shall be in accordance with international and national requirements, and which shall be signed by the accountable executive of the organization.

The SMS Framework

SMS Framework
Component No. 1

Safety Policy
& Objective

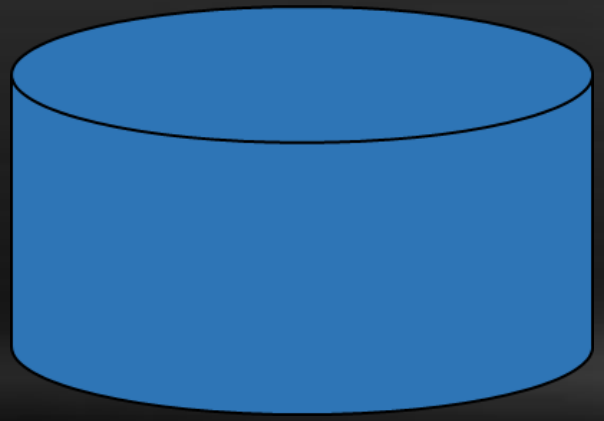


- The Safety Policy shall:
  - Reflect organizational commitment regarding safety
  - Include a clear statement about the provision of the implementation of the safety policy

The SMS Framework

SMS Framework
Component No. 1

Safety Policy
& Objective

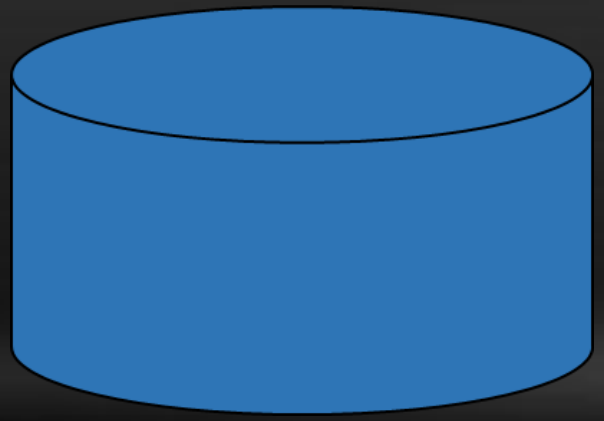


- The Safety Policy shall:
  - include safety reporting procedures
  - Indicate which types of behaviors are unacceptable related to the service provider's aviation activities and include the circumstances under which disciplinary action would not apply

The SMS Framework

SMS Framework
Component No. 1

Safety Policy
& Objective



- The Safety Policy shall:
  - Be communicated, with visible endorsement, throughout the organization
  - Periodically reviewed

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##

NEED TO ATTACHED SAFETY & QUALITY POLICY STATEMENT AND SAFETY MANAGEMENT SYSTEM COMMITMENT AND POLICY

The SMS Framework

ELEMENT No. 1.1
Management commitment and responsibility

In any organization, management controls the activities of personnel and the use of resources for the delivery of a product or service

The SMS Framework

ELEMENT No. 1.1

Management commitment and responsibility

The organization's exposure to safety hazards is a consequence of these activities:

Setting the organization priorities and tasking

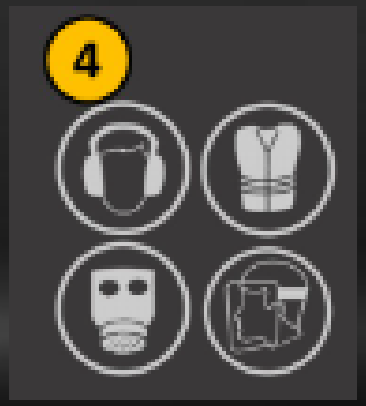
Allocating the necessary resources

The SMS Framework

ELEMENT No. 1.1
Management commitment and responsibility

The organization’s exposure to safety hazards is a consequence of these activities:

Hiring, training and supervising employees

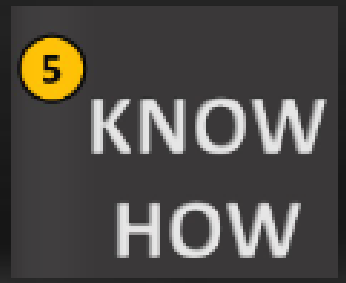


Procuring equipment to support the service – delivery activities

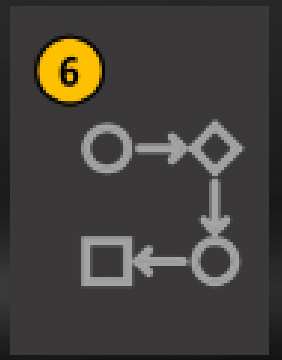
The SMS Framework

ELEMENT No. 1.1
Management commitment and responsibility

The organization’s exposure to safety hazards is a consequence of these activities:



Using the skills of its personnel



Prescribing procedures on how to perform activities or processes

The SMS Framework

ELEMENT No. 1.1
Management commitment and responsibility

Top Management Involvement:
Top management stimulates a healthy safety environment

- Visible , personal involvement of top management
- Setting safety goals and objectives as policy
- Allocation of resources to meet safety goals
- Clear communication

The SMS Framework

ELEMENT No. 1.1
Management commitment and responsibility

Management Functions:
Managers must be actively and personally involved in:

Planning

Setting clear goals, guidelines, standards, and timelines for safety

Organizing

Provides clear lines of management and supervisory responsibility, control and communication.

Directing

Allocation of resources needed for accomplishment of safety goals

Controlling

Personal involvement in assurance of safety goals and objectives

The SMS Framework

ELEMENT No. 1.2
Safety Accountabilities

The SMS department carries out four essential functions:

- **Manages and oversees the hazard identification system**
- **Monitors Safety Performance Of Operational Units Directly Involved In Service Delivery**
- **Advises senior management on safety management matters**
- **Assists line/operations/departmental managers with safety management matters**

The SMS Framework

ELEMENT No. 1.2
Safety Accountabilities

The service provider shall identify the accountable executive who, irrespective of other functions, shall have ultimate responsibility and accountability, on behalf of the organization, for the implementation and maintenance of the SMS.

The SMS Framework

ELEMENT No. 1.2
Safety Accountabilities

The organization shall also identify the accountabilities of all members of management, irrespective of other functions, as well as of employees, with respect to the safety performance of the SMS.

The SMS Framework

ELEMENT No. 1.2

Safety Accountabilities

Accountability

Being Responsible For Taking Corrective Actions

The SMS Framework

ELEMENT No. 1.2
Safety Accountabilities

Safety - Then

The safety office managed the entire safety process within the organization

Safety - Now

Accountable Executive at Management level appointed – have authority

The SMS Framework

ELEMENT No. 1.2
Safety Accountabilities

Safety - Then

The safety officer oversaw, identifying the safety issues, proposing solutions, participating in the implementation of the solutions, and monitoring the effectiveness of the solutions.

Safety - Now

Entire management team has accountability.

The SMS Framework

ELEMENT No. 1.2
Safety Accountabilities

Safety - Then

Safety problems 7 processes belonged to the safety office and the safety officer.
Other departments are removed from the safety decision making process.

Safety - Now

Safety responsibilities, accountabilities and authorities must be documented and communicated throughout the organization.

The SMS Framework

ELEMENT No. 1.2
Safety Accountabilities

The SMS Accountable Executive
The Accountable executive's authorities and responsibilities include, but are not limited to:

- Final authority over operations under its certificate/approval.
- Establishment and promotion of the safety policy.

The SMS Framework

ELEMENT No. 1.2
Safety Accountabilities

The SMS Accountable Executive
The Accountable executive's authorities and responsibilities include, but are not limited to:

- Authority for allocation of human, technical or financial resources.
- Direct responsibility for the conduct of the organizational affairs.

The SMS Framework

ELEMENT No. 1.2
Safety Accountabilities

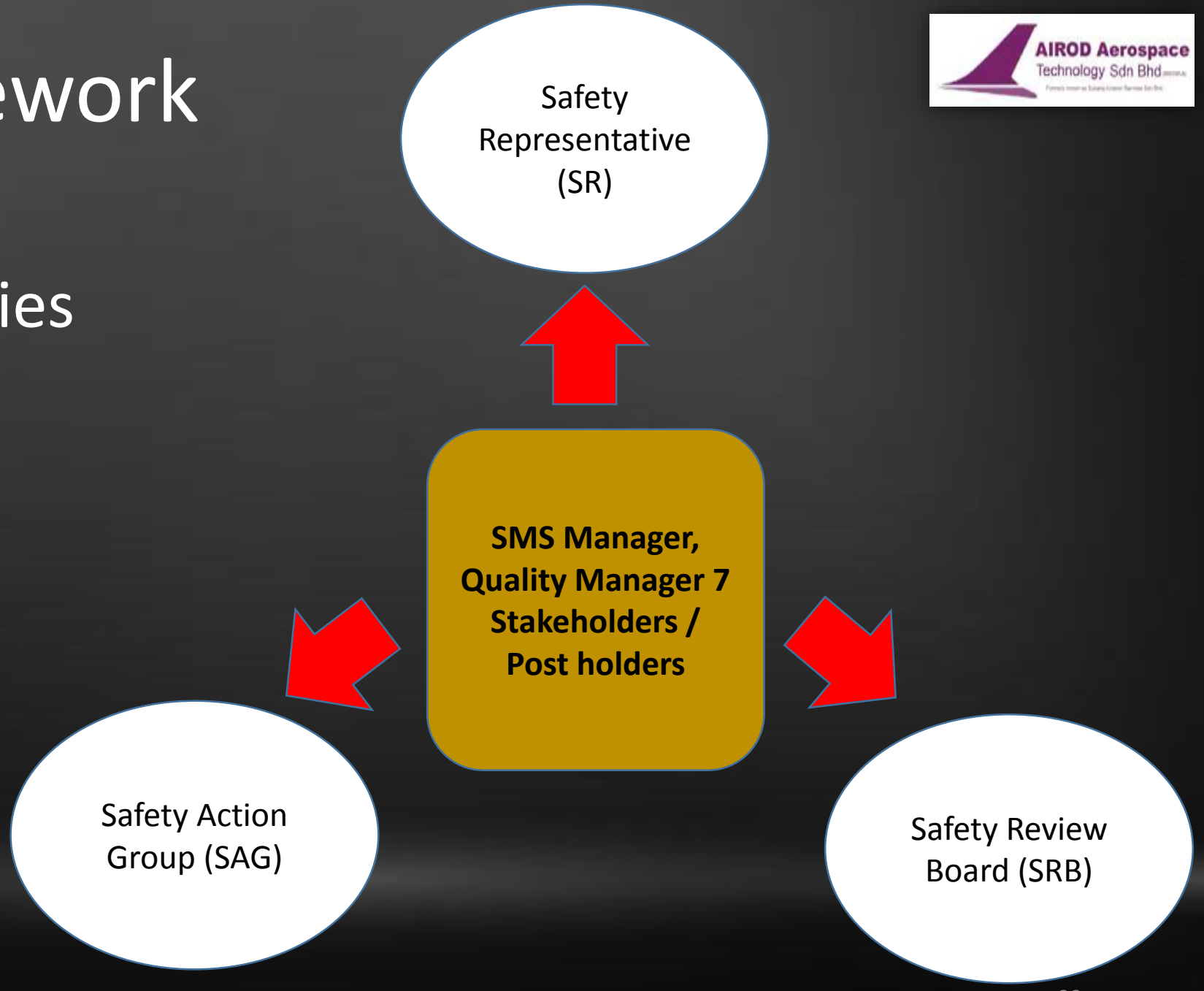
The SMS Accountable Executive
The Accountable executive's authorities and responsibilities include, but are not limited to:

- Establishment of the organization's safety objectives & targets.
- Having final responsibility for the resolution of all safety issues.

The SMS Framework

ELEMENT No. 1.2
Safety Accountabilities

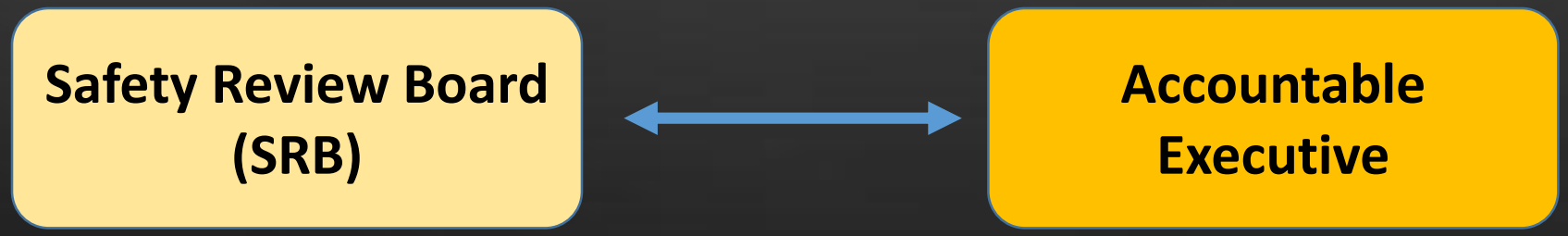
SAG, SRB & Safety Representative Relationship



The SMS Framework

ELEMENT No. 1.2
Safety Accountabilities

The Safety Review Board (SRB)



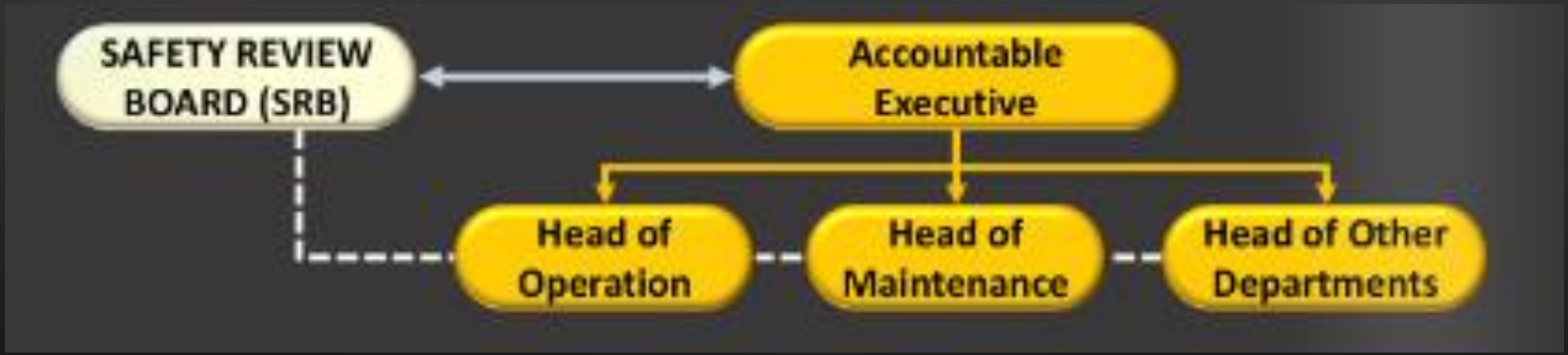
The Safety Review Board (SRB) is a high level committee which considers strategic safety functions.

The accountable executive should be actively involved in the SRB and normally chairs the meeting.

The SMS Framework

ELEMENT No. 1.2
Safety Accountabilities

The Safety Review Board (SRB)



The SRB should be normally include the senior management of the organization.

The SMS Framework

ELEMENT No. 1.2
Safety Accountabilities

The Safety Review Board (SRB)

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

The SMS Framework

ELEMENT No. 1.2
Safety Accountabilities

The Safety Review Board (SRB)

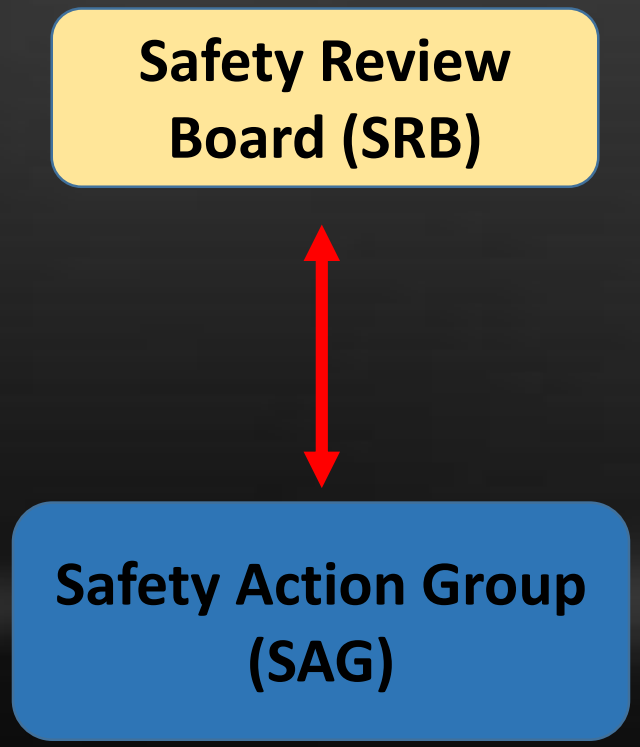
It should also look to the Safety Action Group (SAG) to highlight significant risk issues and provide an input to the high-level strategy

The SMS Framework

ELEMENT No. 1.2

Safety Accountabilities

Safety Action Group (SAG)



The Safety Action Group (SAG) reports to and takes strategic direction from the SRB.

The SMS Framework

ELEMENT No. 1.2
Safety Accountabilities

Safety Review Board (SRB)

Safety Action Group (SAG)

Head of Operation

Head of Maintenance

Head of Departments

It is comprised of managers, supervisors and staff from operational areas and will implement the strategies determined by the SRB.

Operation Safety Officer

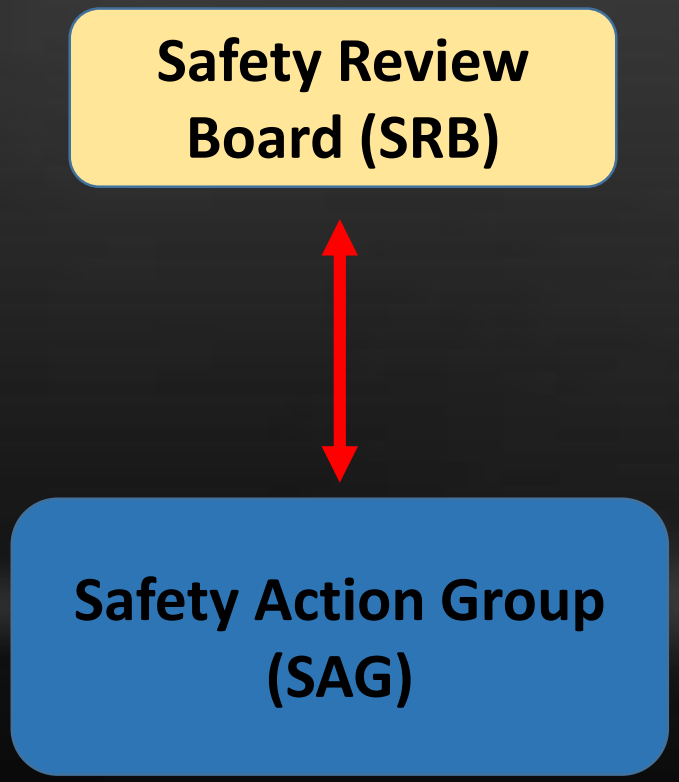
Maintenance Safety Officer

Safety Action Group (SAG)

Safety Services Office

The SMS Framework

ELEMENT No. 1.2
Safety Accountabilities



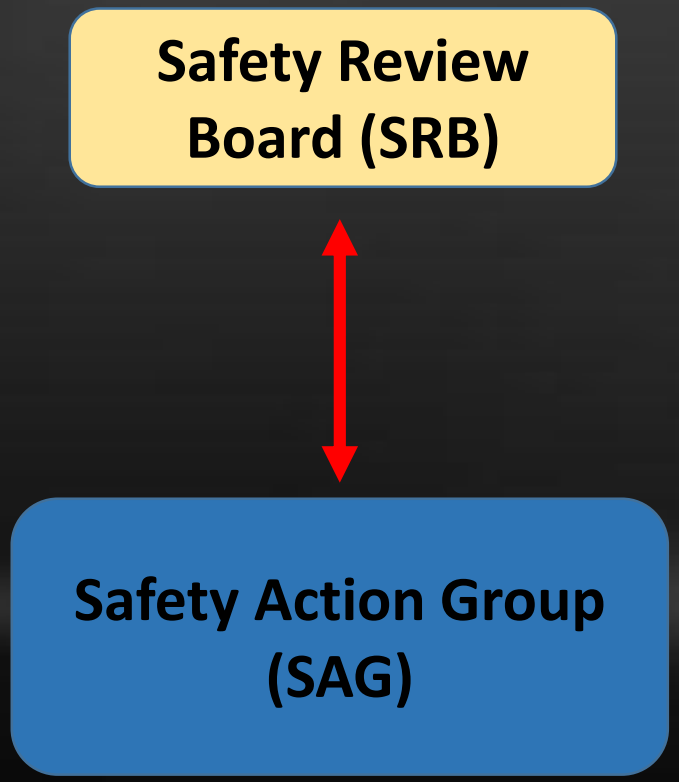
Safety Action Group (SAG)

The Safety Action Group (SAG) carries out these functions:

- Oversees operational safety performance within the functional areas and ensure that hazard identification and safety risk management performed, with staff involvement as necessary to build up safety awareness.

The SMS Framework

ELEMENT No. 1.2
Safety Accountabilities



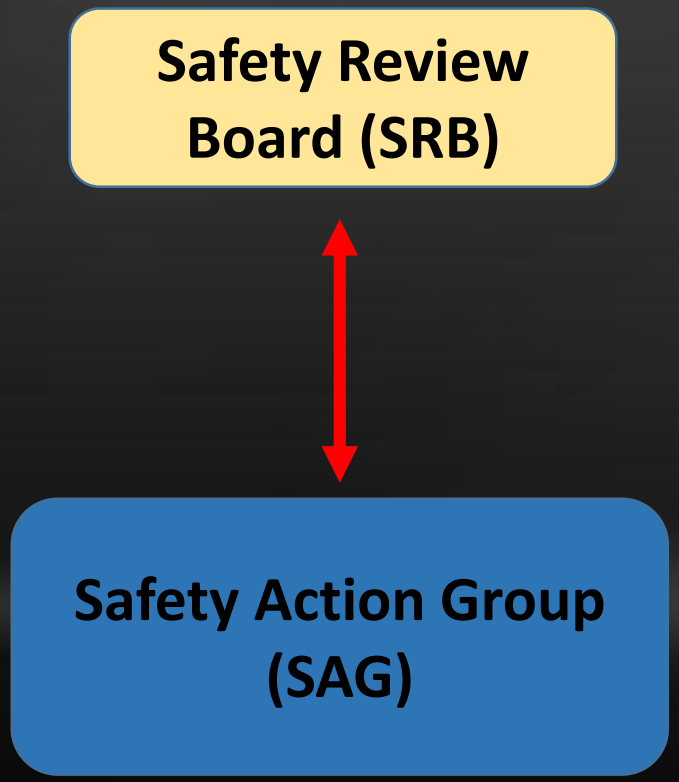
Safety Action Group (SAG)

The Safety Action Group (SAG) carries out these functions:

- Coordinates the resolution of mitigation strategies for the identified consequences of hazards and ensures that satisfactory arrangements exist for safety data capture and employee feedback.

The SMS Framework

ELEMENT No. 1.2
Safety Accountabilities



Safety Action Group (SAG)

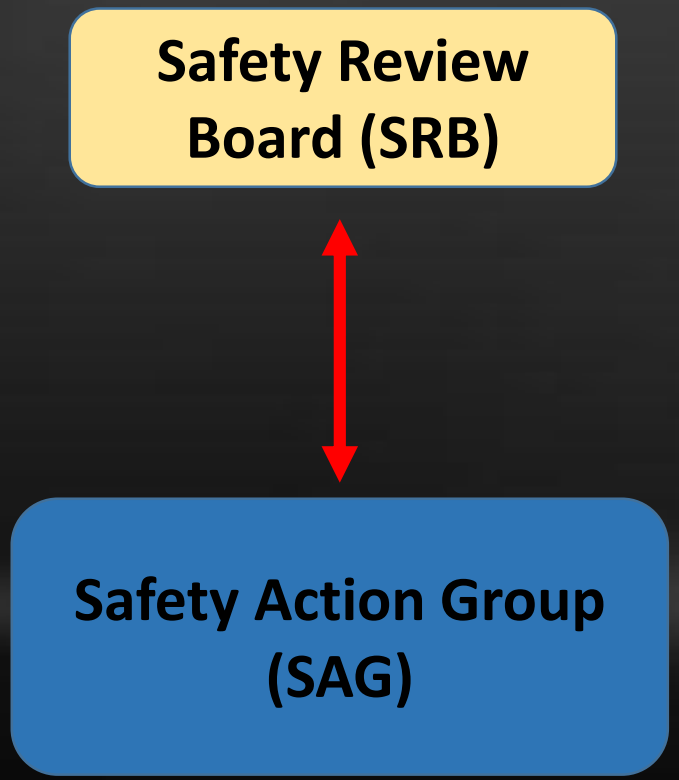
The Safety Action Group (SAG) carries out these functions:

- Coordinates the implementation of corrective action plans and convenes meetings or briefings as necessary to ensure that ample opportunities are available for all employees to participate fully in management for safety.

The SMS Framework

ELEMENT No. 1.2
Safety Accountabilities

Safety Action Group (SAG)



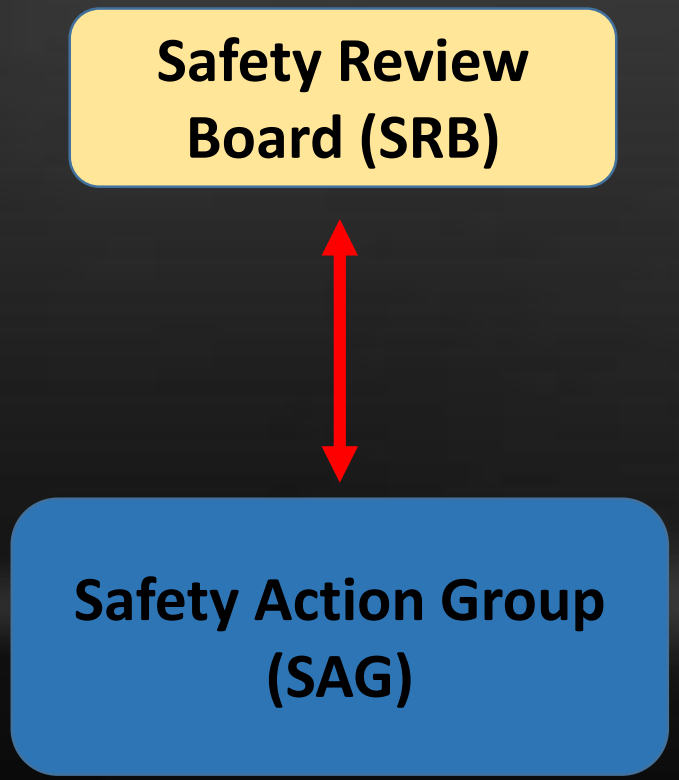
The Safety Action Group (SAG) carries out these functions:

- Ensure that corrective action is taken in a timely manner.
- Reviews the effectiveness of previous safety recommendations.

The SMS Framework

ELEMENT No. 1.2
Safety Accountabilities

Safety Action Group (SAG)



The Safety Action Group (SAG) carries out these functions:

- Oversees safety promotion and ensures that appropriate safety, emergency and technical training of personnel is carried out meets or exceeds minimum regulatory requirements.

The SMS Framework

ELEMENT No. 1.2

Safety Accountabilities

Let's Discuss… Do you know?

Some questions for SMS awareness:

1. Do you know where is the SMS form for reporting?
2. Do you know who is your department or section representative?
3. Do you know where is the SMS Manual?
4. Do you know what is the organizational Safety Policy and goals?

If the answer is ALL Yes! Then the organization is in the good health for SMS system success.

The SMS Framework

ELEMENT No. 1.3

Appointment of Key Safety Personnel

- The appointment are based on qualification, experience and are acceptable to Civil Aviation Authority of Malaysia (CAAM).

- This is through DCAM Form 4. An interview will be carried out to ascertain that the personnel is suitable for the appointment before acceptance.

The SMS Framework

ELEMENT No. 1.3

Appointment of Key Safety Personnel

SMS / Safety Manager

The functions of the Safety/SMS Manager:

- Managing the SMS implementation plan on behalf of the Accountable Executive.
- Performing/ facilitating hazard identification and safety risk analysis.

The SMS Framework

ELEMENT No. 1.3
Appointment of Key Safety Personnel

SMS / Safety Manager

The functions of the Safety/SMS Manager:

- Monitoring corrective actions and evaluating their results.
- Providing periodic reports on the organization's safety performance.
- Maintaining records and safety documentation.

The SMS Framework

ELEMENT No. 1.3
Appointment of Key Safety Personnel

SMS / Safety Manager

The functions of the Safety/SMS Manager:

- Planning and facilitating staff safety training.
- Providing independent advice on safety matters.

The SMS Framework

ELEMENT No. 1.3
Appointment of Key Safety Personnel

SMS / Safety Manager

The functions of the Safety/SMS Manager:

- Monitoring safety concerns in the aviation industry and their perceived impact on the organization’s operations aimed at service delivery.

The SMS Framework

ELEMENT No. 1.3
Appointment of Key Safety Personnel

SMS / Safety Manager

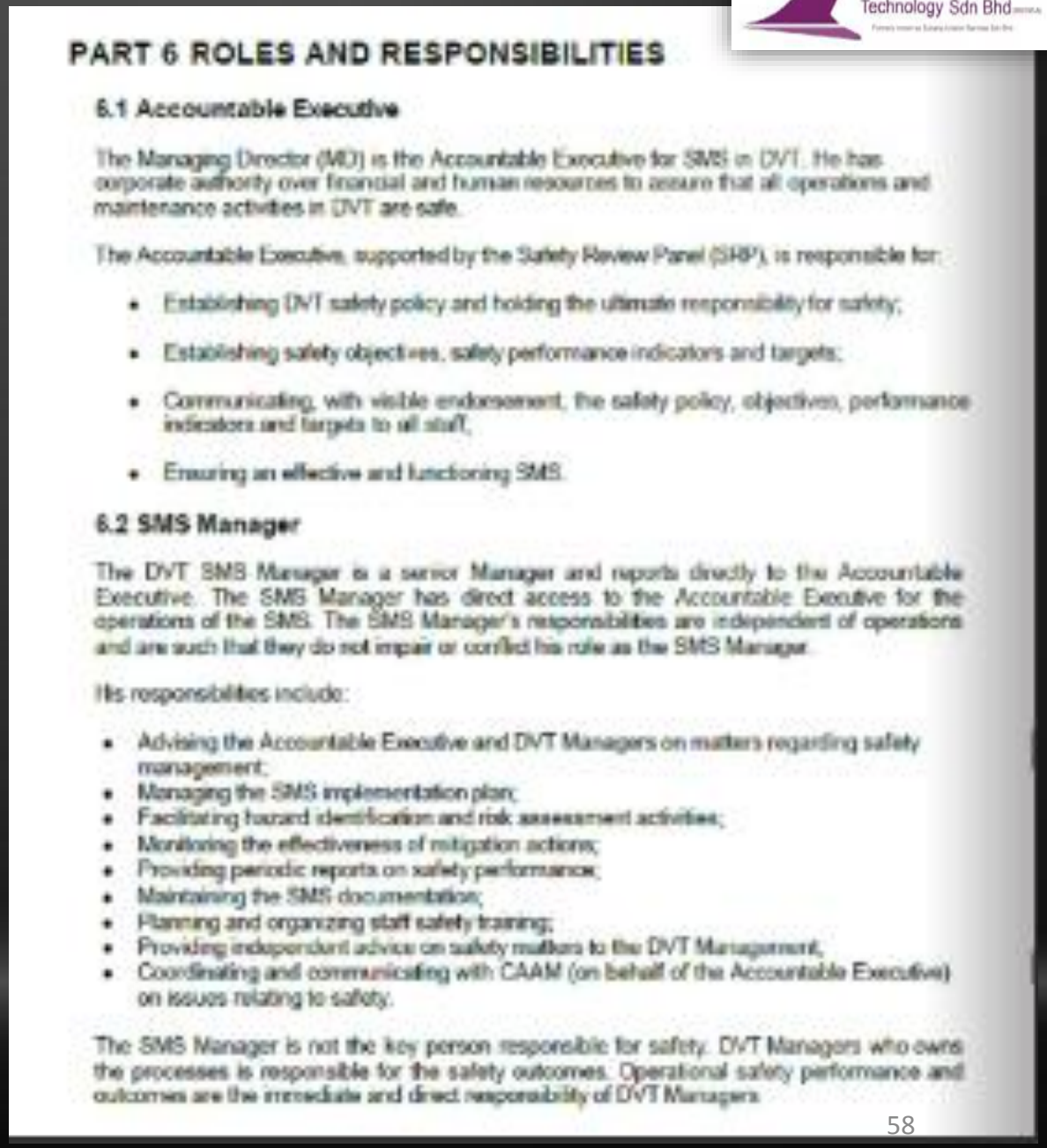
The functions of the Safety/SMS Manager:

- Coordinating and communicating (on behalf of the Accountable Executive) with the State's oversight authority and other State agencies as necessary on issues relating to safety.

The SMS Framework

ELEMENT No. 1.3

Appointment of Key Safety Personnel



PART 6 ROLES AND RESPONSIBILITIES

6.1 Accountable Executive

The Managing Director (MD) is the Accountable Executive for SMS in DVT. He has corporate authority over financial and human resources to assure that all operations and maintenance activities in DVT are safe.

The Accountable Executive, supported by the Safety Review Panel (SRP), is responsible for:

- Establishing DVT safety policy and holding the ultimate responsibility for safety;
- Establishing safety objectives, safety performance indicators and targets;
- Communicating, with visible endorsement, the safety policy, objectives, performance indicators and targets to all staff;
- Ensuring an effective and functioning SMS.

6.2 SMS Manager

The DVT SMS Manager is a senior Manager and reports directly to the Accountable Executive. The SMS Manager has direct access to the Accountable Executive for the operations of the SMS. The SMS Manager's responsibilities are independent of operations and are such that they do not impair or conflict his role as the SMS Manager.

His responsibilities include:

- Advising the Accountable Executive and DVT Managers on matters regarding safety management;
- Managing the SMS implementation plan;
- Facilitating hazard identification and risk assessment activities;
- Monitoring the effectiveness of mitigation actions;
- Providing periodic reports on safety performance;
- Maintaining the SMS documentation;
- Planning and organizing staff safety training;
- Providing independent advice on safety matters to the DVT Management;
- Coordinating and communicating with CAAM (on behalf of the Accountable Executive) on issues relating to safety.

The SMS Manager is not the key person responsible for safety. DVT Managers who owns the processes is responsible for the safety outcomes. Operational safety performance and outcomes are the immediate and direct responsibility of DVT Managers.

The SMS Framework

ELEMENT No. 1.4

Coordination of Emergency Planning

The service provider shall ensure that an emergency response plan that provides for the orderly and efficient transition from normal to emergency operations and the return to normal operations is properly coordinated with the emergency response plans of those organizations it must interface with during the provision of its services.

The SMS Framework

ELEMENT No. 1.4
Coordination of Emergency Planning

Documents actions to be taken by all responsible personnel during aviation-related emergencies.

The SMS Framework

ELEMENT No. 1.5

SMS Documentation

The service provider shall develop an SMS implementation plan, endorsed by the senior management of the organization that defines the organization's approach to the management of the safety in the manner that meets the organization's safety objectives .

The SMS Framework

ELEMENT No. 1.5

SMS Documentation

The organization shall develop and maintain SMS documentation describing:

- Safety Policy & Objectives
- SMS Requirements
- SMS Processes and Procedures
- Accountabilities, responsibilities and authorities for SMS processes and procedures
- SMS Outputs

The SMS Framework

ELEMENT No. 1.5
SMS Documentation

Also as part of the SMS documentation, the organization shall develop and maintain a safety management system manual (SMSM), to communicate its approach to the management of safety throughout the organization.

The SMS Framework

ELEMENT No. 1.5
SMS Documentation

2 aspects of SMS Documentation:

SMS Manual

- Internal administration, communication and maintenance of SMS
- It serves as the organization's SMS declaration to CAAM

Records

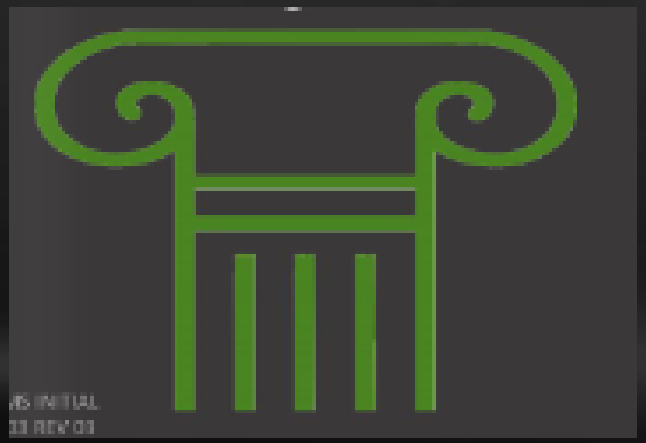
- Compilation and maintenance of records substantiating the existence and on-going operation of the SMS
- Example: hazard reports, safety performance indicators, SMS training records

The SMS Framework

SMS Framework Component No. 2

Safety Risk Management:

- Hazard identification
- Risk assessment and mitigation



The SMS Framework

SMS Framework Component No. 2

The SMS Framework

SMS Framework Component No. 2

What is Safety Risk Management?	**The identification, analysis and elimination, and/or mitigation to an acceptance level of risks that threaten the capabilities of an organization**
What is the Objective?	**Aims at a balanced allocation of resources to address all risks and variable risk control and mitigation.**
Why is it Important?	• **A key component of safety management systems.** • **Data-driven approach to safety resources allocation, thus defensible and easier to explain.**


A Safety Concern Is Perceived
Identify Hazards & Assess Risks
Define Level Of Severity
Define Level Of Probability
Define Level Of Risk
Is The Risk Level Acceptable
Yes
No
Can The Risk Be Eliminated?
Yes
No
Can The Risk Be Mitigated?
Yes
Can The Residual Risk Be Accepted? (If Any)
Yes
No
Cancel The Operation
Take Action and Continue The Operation
Feedback and Record The Hazard Identification & Assessment and/or Risk Mitigation

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

Hazard Identification is the first step in the Risk Management Process

A condition or an object with the potential to cause or contribute to an aircraft incident or accident.

Hazard identification shall be based on a combination of reactive, proactive and predictive methods of safety data collection.

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

Hazard Identification is the first step in the Risk Management Process

A condition or an object with the potential to cause or contribute to an aircraft incident or accident.

The service provider should develop and maintain a formal process to identify hazards that could impact aviation safety in all areas of operation and activities.

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

- Hazard Identification is a prerequisite to the safety risk management process
- Any incorrect differentiation between hazards and safety risks can be a source of confusion
- A clear understanding of hazards and their related consequences is essential to the implementation of sound safety risk management

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

A hazard is a concept that identifies:

- A condition, such as an object, situation circumstances, etc.
- A primary contributing factor to safety mishap
- An identifiable state of being that poses threat
- A hazardous state of being requires many moving parts that, when combined, produce threat
- Hazards do not automatically result in risks

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

The SMS Framework

ELEMENT No. 2.1

Hazard Identification

Hazard can be classified as;

1. Physical (tools, equipment, facilities)
2. Human behaviors
3. Political
4. Environment (weather)
5. Legal
6. Technological

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

- The key marker of risk is damages. You can separate these damages from “consequences”, whereby damages are what happens, and the consequences are the further ramifications of the damages
- Risk is documented with a risk matrix which involves severity and probability

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

VS

Generally, HAZARDS exist now, while RISKS associated with that hazard might occur in the future

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

VS

- There is a common tendency to confuse hazards with their consequences or outcomes.
- A consequence is an outcome that can ne triggered by a hazard
- Stating hazards as outcomes disguise their nature and interfere with identifying other important outcomes.

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

HAZARDS

Contaminated Runway

CONSEQUENCES

Runway Overrun

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

Understanding Hazards : Crosswind Example

- A 15kt wind, which is not necessarily a hazardous condition.
- In fact, a fifteen-knot wind blowing directly down the runway improves aircraft take-off and landing performance.

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

Understanding Hazards : Crosswind Example

- However, a 15kt wind blowing in a direction ninety degrees across a runway of intended take-off or landing creates a crosswind condition that may be hazardous.

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

<u>Understanding Hazards : Crosswind Example</u>

- An immediate outcome of the hazard could be loss of lateral control followed by a consequent runway excursion.

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

<u>Understanding Hazards : Crosswind Example</u>

- The ultimate consequence could be an accident
- The damaging potential of a hazard materializes through one or many consequences.

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

<u>Understanding Hazards</u>

Do you know the difference between Hazards and Risks?

In this picture:
What is the Hazard?
What is the Risk?

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

Understanding Hazards

Hazard:
The Mountain

Risk:
Running into the mountain and causing mission failure is the risk.

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

Sources for Hazard Identification

Normal Operations Monitoring

This uses observational techniques to monitor the day to day operations and activities such as line operations safety audit (LOSA).

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

Sources for Hazard Identification

Automated Monitoring Systems

This uses automated recording systems to monitor parameters that can be analyzed such as flight data monitoring (FDM).

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

Sources for Hazard Identification

Voluntary And Mandatory Safety Reporting Systems

This provides everyone, including staff from external organizations, with opportunities to report hazards and other safety issues to the organization.

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

Sources for Hazard Identification

Audits

These can be used to identify hazards in the task or process being audited. These should also be coordinated with organizational changes to identify hazards related to the implementation of the change.

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

Sources for Hazard Identification

Feedback From Training

Training that is interactive (two way) can facilitate identification of new hazards from participants.

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

Sources for Hazard Identification

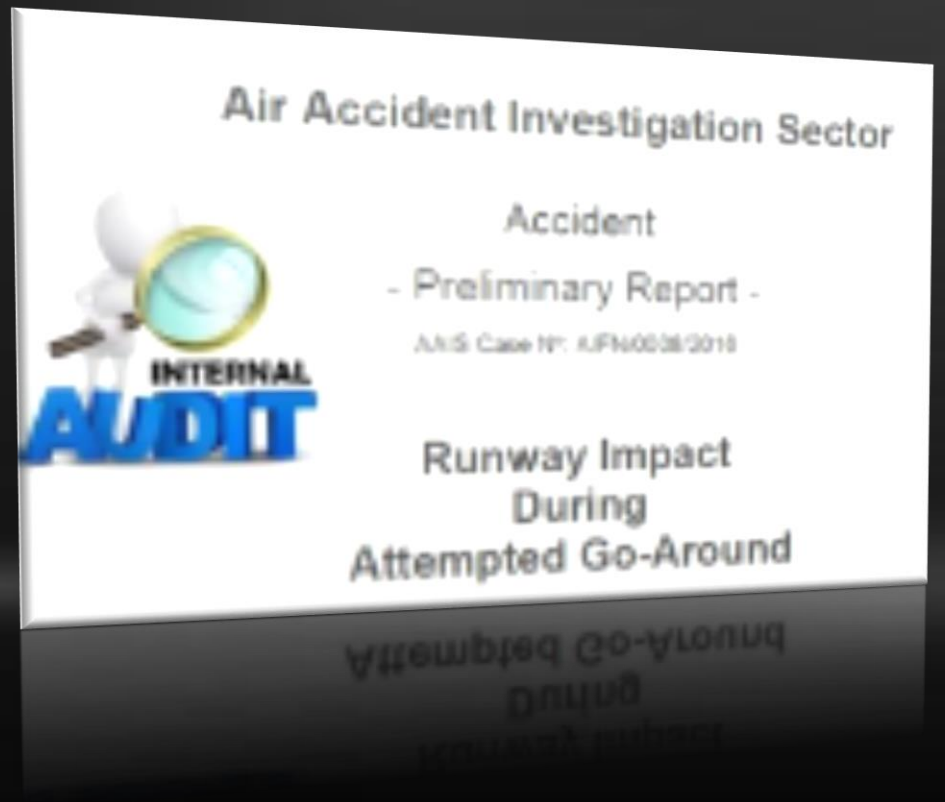
Service Provider Safety Investigation

Hazards identified in internal safety investigation and follow-up reports on accidents/incidents

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

Example of external sources for hazard identification include:



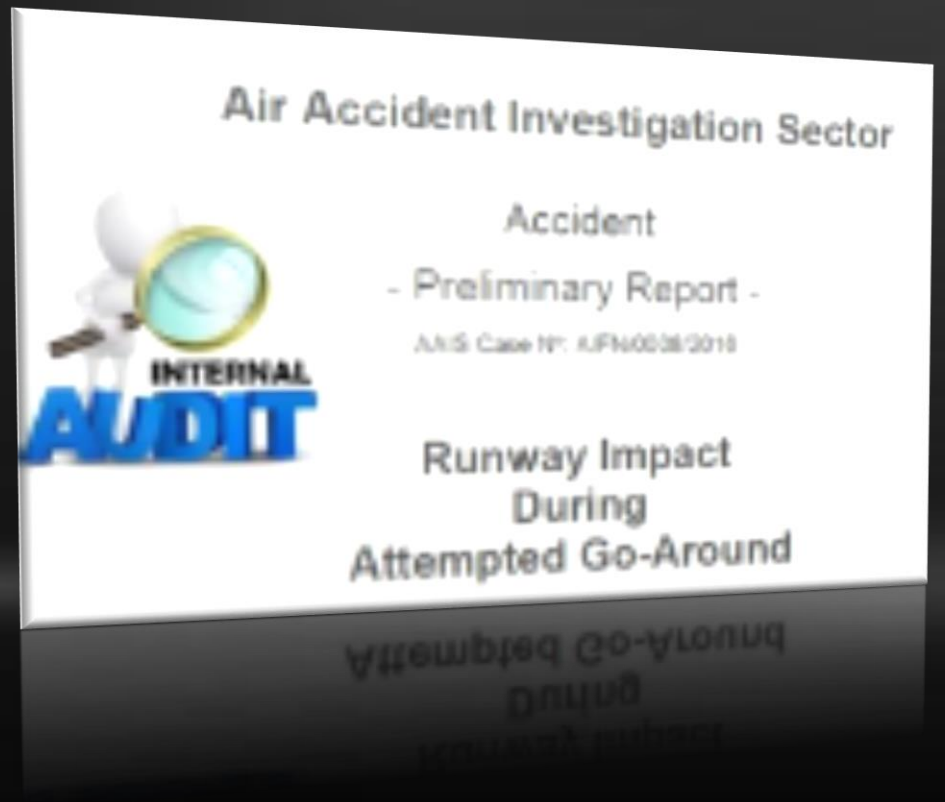
Aviation Accident Reports

Reviewing accident reports, this may be related to accidents in the same State or to a similar aircraft type, region or operational environment.

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

Example of external sources for hazard identification include:



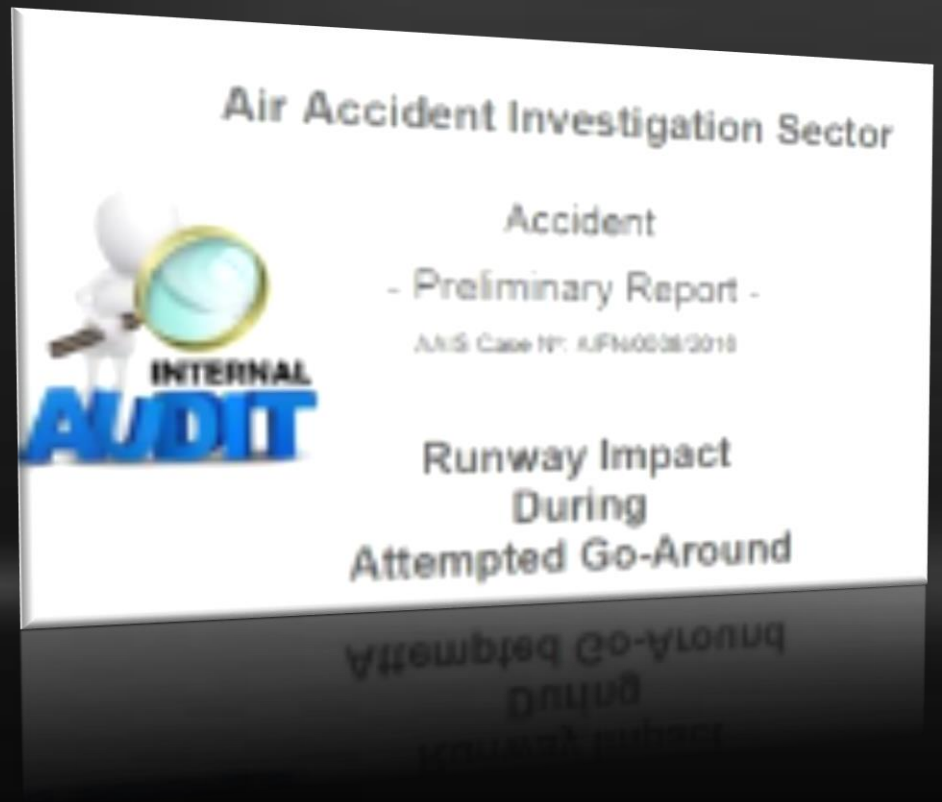
State Mandatory And Voluntary Safety Reporting Systems

Some States provide summaries of the safety reports received from service providers.

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

Example of external sources for hazard identification include:



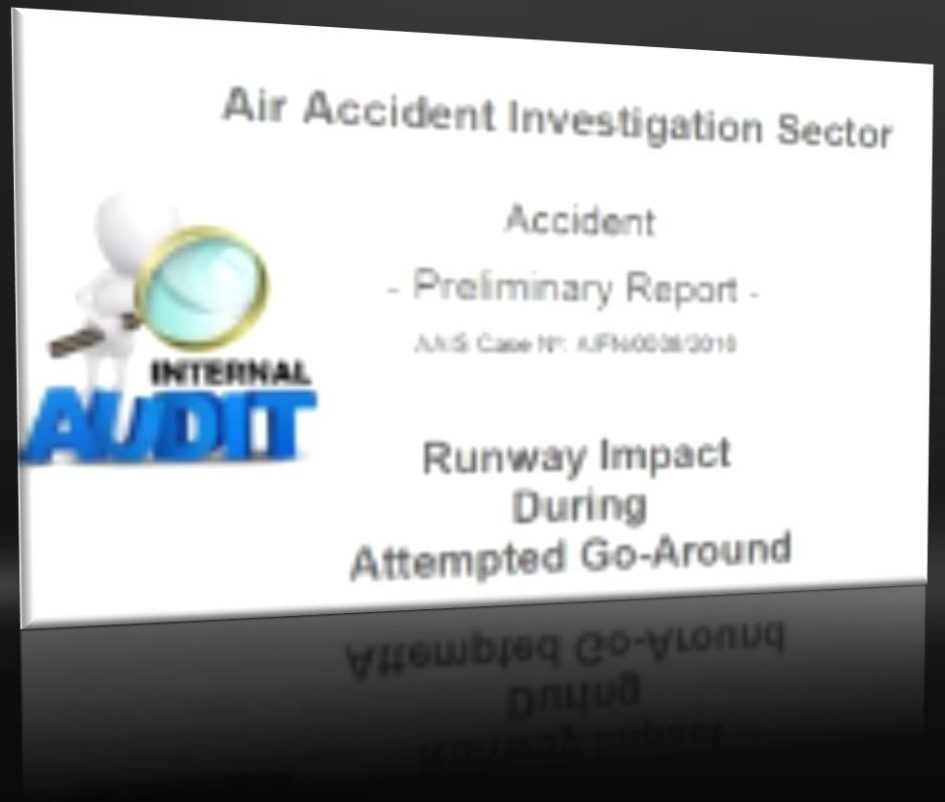
State Oversight Audits And Third-party Audits

External audits can sometimes identify hazards. These may be documented as an unidentified hazard or captured less obviously within an audit finding.

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

Example of external sources for hazard identification include:



Trade Associations And Information Exchange Systems

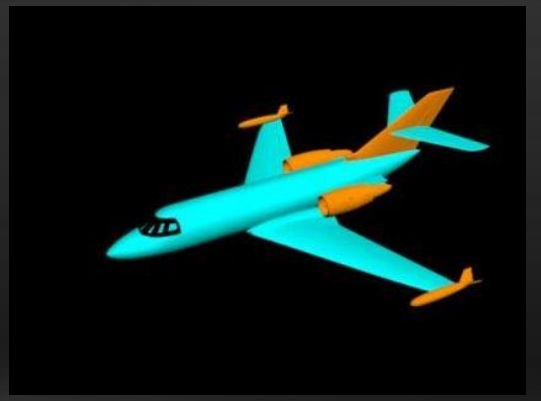
Information exchange by many trade associations

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

Example of external sources for hazard identification include:

Hazards may be related to the following scopes in aviation:

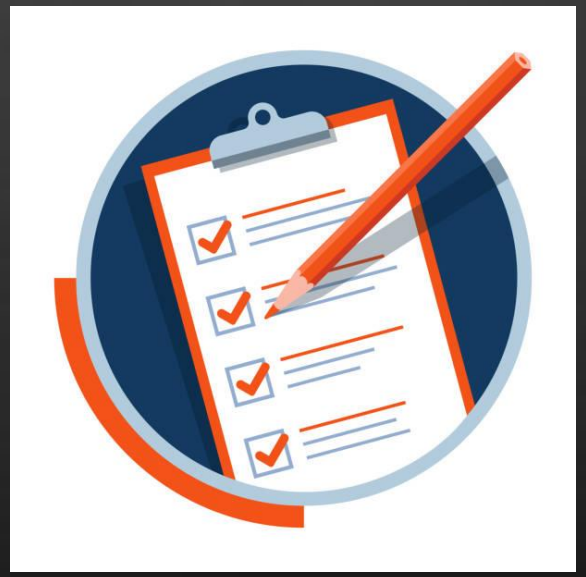


- Design Factors
  Including equipment and task design.

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

Hazards may be related to the following scopes in aviation:



- <u>Procedures And Operating Practices</u>
  Including documentation and checklists.

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

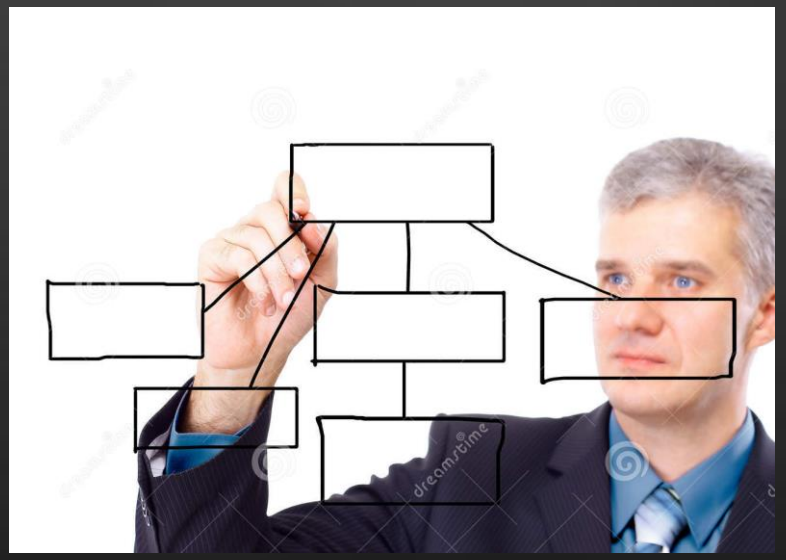
Hazards may be related to the following scopes in aviation:

- <u>Communication</u>
  Including meaning, terminology and language.

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

Hazards may be related to the following scopes in aviation:

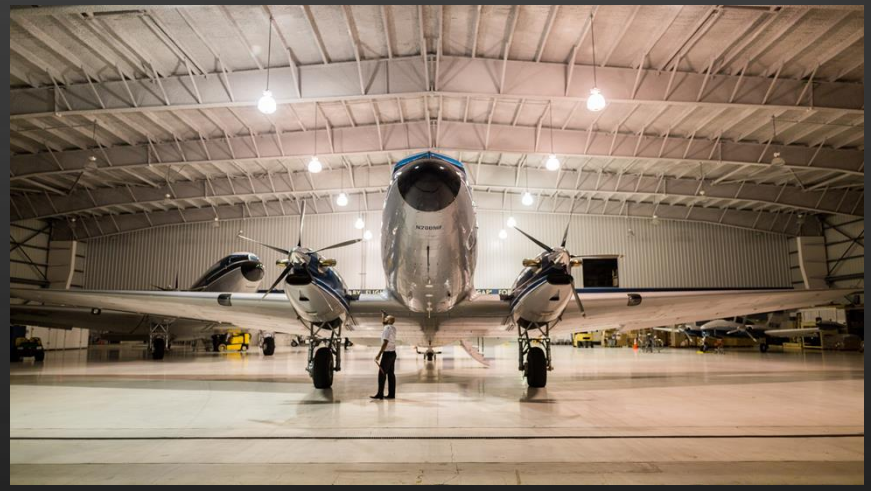


- <u>Organizational Factor</u>
  Such as company policies for recruitment, training, remuneration and allocation of resources.

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

Hazards may be related to the following scopes in aviation:



- <u>Work Environment Factors</u>
  Such as ambient noise and vibration, temperature, lighting and protective equipment and clothing

The SMS Framework

ELEMENT No. 2.1
Hazard Identification

Hazards may be related to the following scopes in aviation:

- <u>Human Performance</u>
  Including medical conditions and physical limitations.

The SMS Framework

ELEMENT NO. 2.1 – Hazard Identification

By Whom?
- By Anybody
- By designated personnel

How?
- Through formal processes
- Depend on the organization

When?
- Anytime
- Under specific condition

The SMS Framework

ELEMENT NO. 2.1 – Hazard Identification

Hazard identification processes – 3 methodologies to for identifying hazard :

The SMS Framework

ELEMENT NO. 2.1 – Hazard Identification

Safety Management Levels

Predictive	Proactive	Reactive	Reactive
System Analysis Design Assessment	Surveys Audit Performance Assessment	ASRS SDR	Accidents & Incidents Report
Highly Efficient	Very Efficient	Efficient	Insufficient

The SMS Framework

ELEMENT NO. 2.1 – Hazard Identification

1. On a pre- departure walk- around, the LAE found the fan cowl latches was not secured. He re-secured the latches and the aircraft departed without further incident. This was highlighted to the shift supervisor for onwards action to the management.

2. Because of this, maintenance procedures were revised to include a ‘reinspection’ step upon the closing of the fan cowl latches.

The SMS Framework

ELEMENT NO. 2.1 – Hazard Identification

1. Once a hazard has been identified, these must be prioritized.
2. Objective prioritization of hazards may require categorization s according to the severity/likelihood of their projected consequences.

The SMS Framework

ELEMENT NO. 2.1 – Hazard Identification

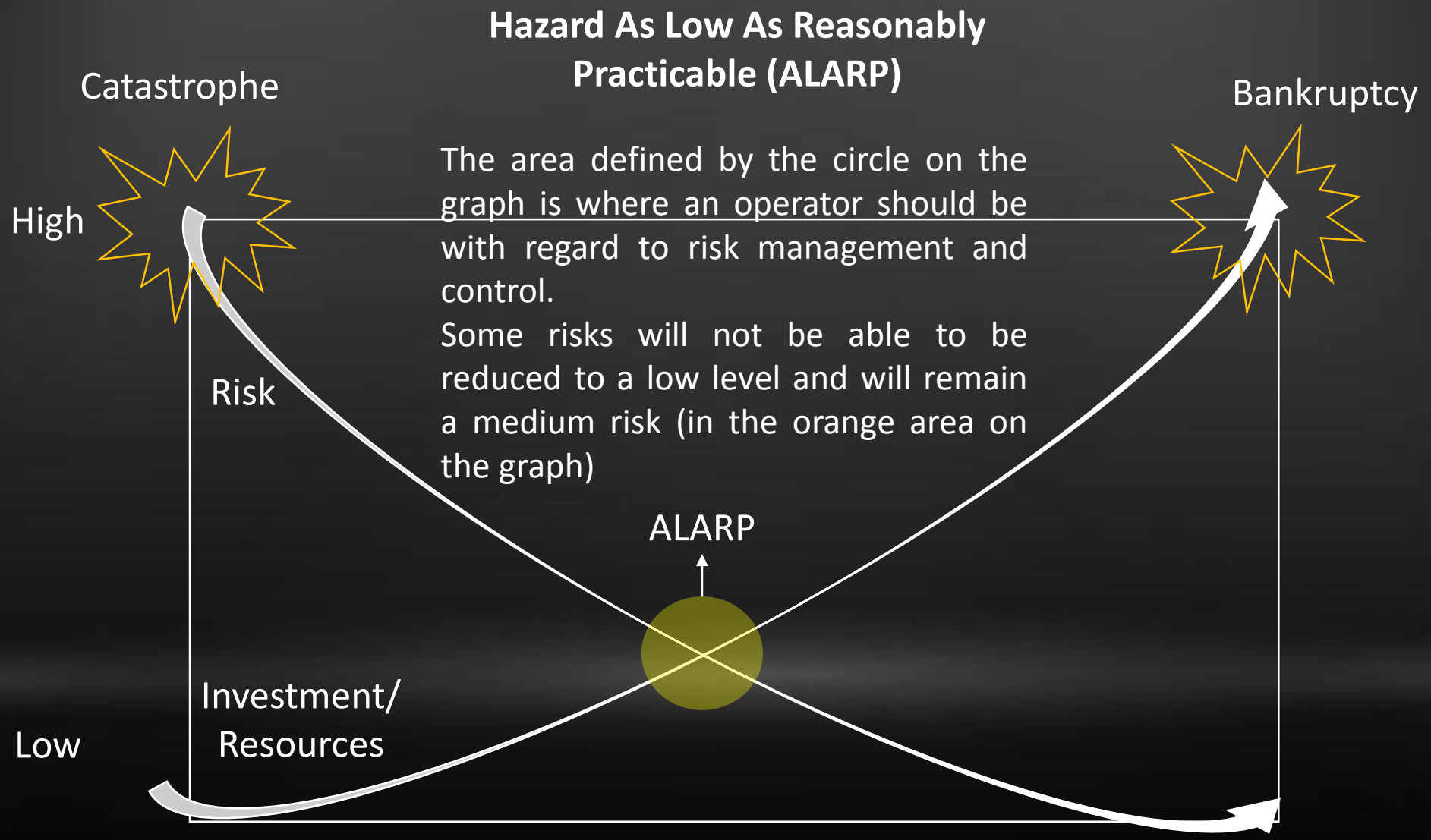
1. There is no such thing as absolute safety – in aviation it is not possible to eliminate all safety risks.

2. Safety risks must be managed to a level ‘as a low as reasonably practicable’ (ALARP).

3. ALARP is commonly defined in Risk Management as the point where limited decreases in Risk can only be gained through major and unacceptable increases in investment.

The SMS Framework

ELEMENT NO. 2.1 – Hazard Identification

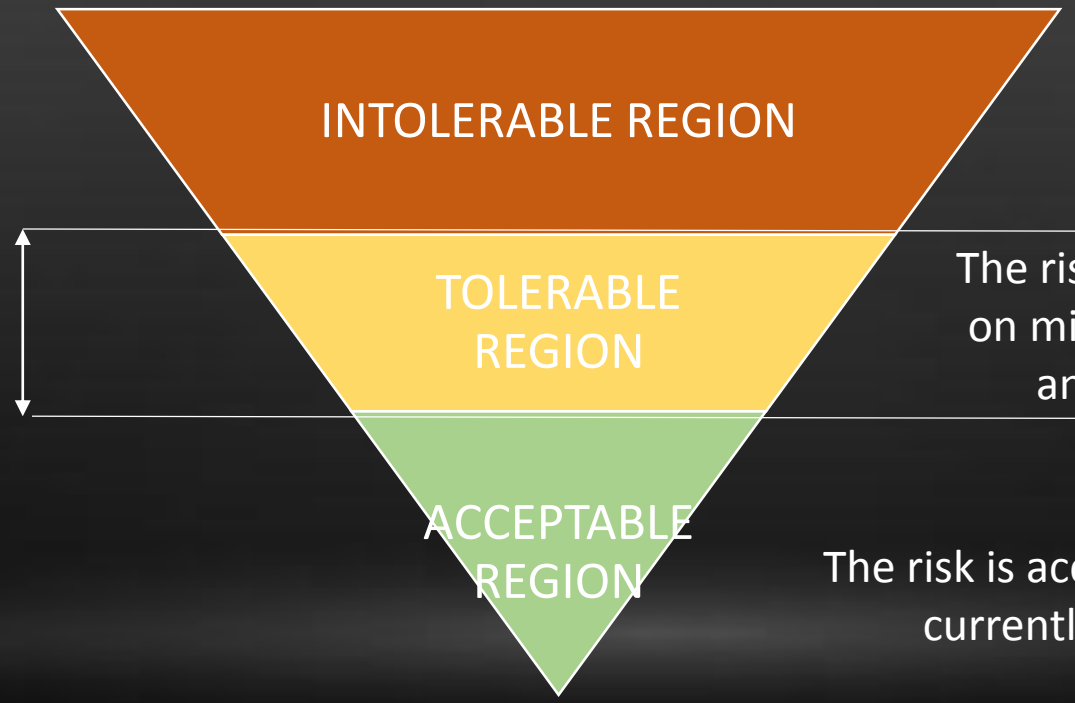


The SMS Framework

ELEMENT NO. 2.1 – Hazard Identification

Hazard Management As Low As Reasonably Practicable (ALARP)

As
Low
As
Reasonably
Practicable



The risk is unacceptable at any level.

The risk is acceptable based on mitigation. Cost benefit analysis is required.

The risk is acceptable as its currently stands.

The SMS Framework

ELEMENT NO. 2.1 – Hazard Identification

The fundamental importance of appropriate documentation management :

- A formal procedure to translate operational safety data into hazard-related information.
- The ‘safety library’ of an organization.

The SMS Framework

ELEMENT NO. 2.1 – Hazard Identification

The fundamental importance of appropriate documentation management :

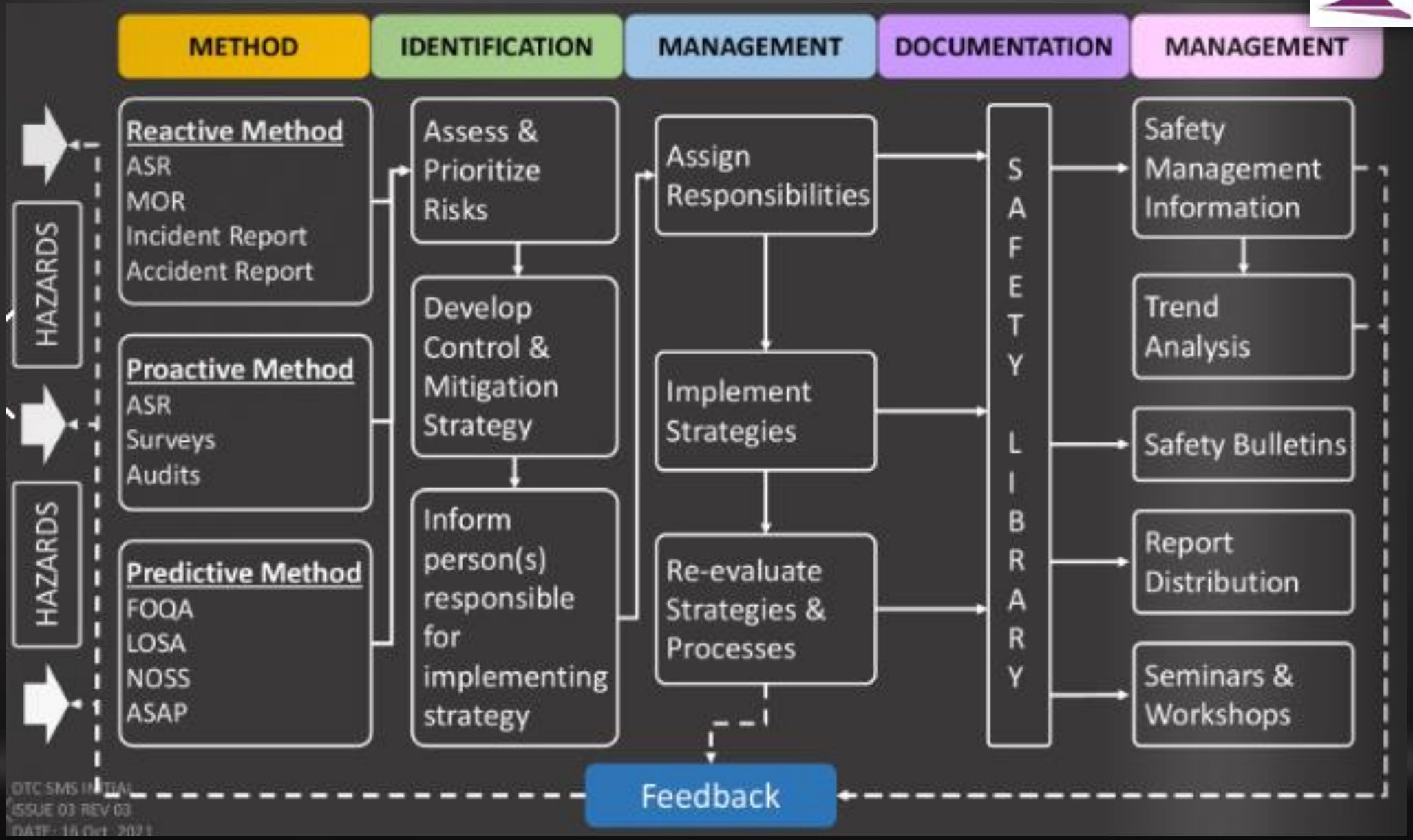
- The reporting of occurrences will only be effective with a system to document these details. It can be in:
  - Electronic
  - Hardcopy

The SMS Framework

ELEMENT NO. 2.1 – Hazard Identification

The fundamental importance of appropriate documentation management :

- Allocate responsibility for the process and review of these reports. Determine whether any actions need to be taken and whether any safety trends (good or bad) are apparent.


METHOD
IDENTIFICATION
MANAGEMENT
DOCUMENTATION
MANAGEMENT
HAZARDS
HAZARDS
HAZARDS
Reactive Method
ASR
MOR
Incident Report
Accident Report
Proactive Method
ASR
Surveys
Audits
Predictive Method
FOQA
LOSA
NOSS
ASAP
Assess & Prioritize Risks
Develop Control & Mitigation Strategy
Inform person(s) responsible for implementing strategy
Assign Responsibilities
Implement Strategies
Re-evaluate Strategies & Processes
SAFETY LIBRARY
Safety Management Information
Trend Analysis
Safety Bulletins
Report Distribution
Seminars & Workshops
Feedback

The SMS Framework

ELEMENT NO. 2.1

Hazard Identification – Safety Reporting System

One of the main sources for identifying hazards is the safety reporting system

Mandatory Reporting:

Normally used for incidents that have occurred.

Voluntary Reporting:

Provide an additional reporting channel for potential safety issues such as hazards, near misses or errors.

The SMS Framework

ELEMENT NO. 2.1

Hazard Identification – Safety Reporting System

It is important that service providers provide appropriate protections to encourage people to report what they see or experience:

- Enforcement action may be waived for reports of errors.
- Reported information will be used solely to support the enhancement of safety.
- Voluntary reporting system should be confidential.

The SMS Framework

ELEMENT NO. 2.1

Hazard Identification – Investigation of Hazards

Hazard identification should be continuous and part of the service provider's ongoing activities. Some conditions may merit more detailed investigation.

These may include:

- Instances where the organization experiences an unexplained increase in aviation safety-related events or regulatory non-compliance; or
- Significant changes to the organization or its activities.

The SMS Framework

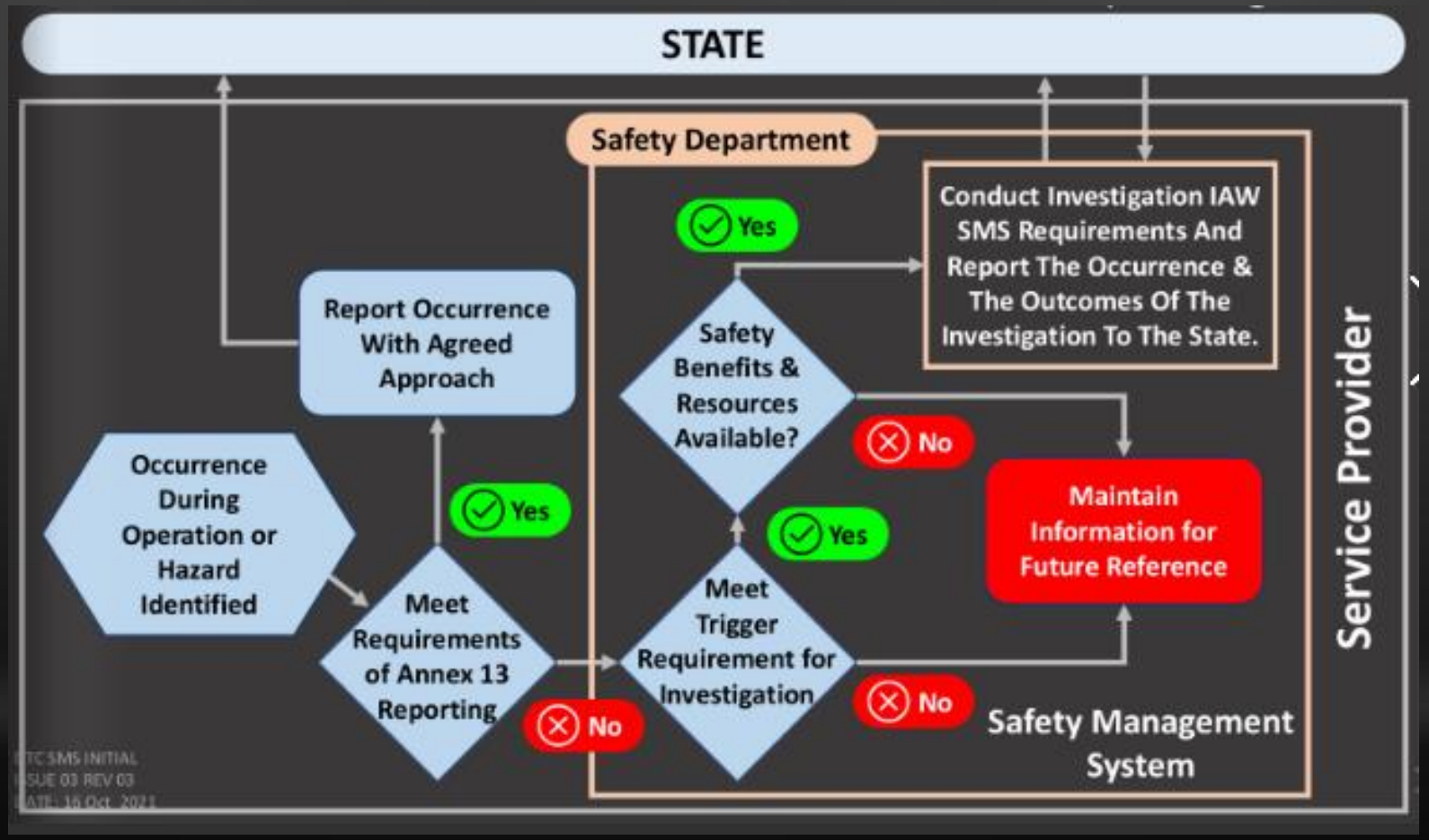
ELEMENT NO. 2.1

Hazard Identification – Service Provider Safety Investigation

The SMS Framework

ELEMENT NO. 2.1

Hazard Identification – Service Provider Safety Investigation



The SMS Framework

ELEMENT NO. 2.2

Risk assessment and Mitigation

The service provider shall develop and maintain a formal process that ensures analysis, assessment and control of the safety risks in operations.

The assessment, expressed in terms of predicted probability and severity , of the consequence(s) of a hazard taking as reference the worst foreseeable situation.

The SMS Framework

ELEMENT NO. 2.2

Risk assessment and Mitigation

Think about it…

- A wind of 15 knots blowing directly across the runway is a **HAZARD**
- A pilot may not be able to control the aircraft during takeoff or landing is one of the **CONSEQUENCE** of the hazard.
- The assessment of the consequence of the potential loss of control of the aircraft by the pilot expressed in terms of probability severity is the **RISK**.

The assessment, expressed in terms of predicted probability and severity , of the consequence(s) of a hazard taking as reference the worst foreseeable situation.

Once the hazards are identified, the safety risks are then assessed in terms of probability and severity, to define the level of safety risk (safety risk index)

Identify the hazard to the equipment, property or the organization.

HAZARDS IDENTIFICATION

What are the chances of it happening?

RISK ASSESSMENT

Probability

Evaluate the SERIOUSNESS of the hazard occurring .

RISK ASSESSMENT

Severity

Is the consequence risk acceptable and within the organization's safety criteria.

RISK ASSESSMENT

Acceptability

YES

Accept the risk

NO

Take action to reduce the risk to an acceptable level

RISK CONTROL / MITIGATION

A typical safety risk probability classification table, which includes five categories to denote the probability related to an unsafe event or condition, the description of each category and an assignment of a value to each category.

Likelihood	Meaning	Value
Frequent	Likely to occur many times (has occurred frequently)	5
Occasionally	Likely to occur sometimes (has occurred infrequently)	4
Remote	Unlikely to occur, but possible (has occurred rarely)	3
Improbable	Very unlikely to occur (not known to have occurred)	2
Extremely improbable	Almost inconceivable that the event will occur	1

The SMS Framework

ELEMENT NO. 2.2

Risk assessment and Mitigation

The severity assessment should consider all possible consequences related to a hazard, taking into account the worst foreseeable situation.

A typical safety risk severity table should includes five categories to denote the level of severity, the description of each category and the assignment of a value to each category.

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

The SMS Framework

ELEMENT NO. 2.2

Risk assessment and Mitigation

- Once risks have been assessed, a decision-making process is used to determine the need to implement risk mitigation measures.
- This decision-making process involves the use of a risk categorization tool that may be in the form of an assessment matrix.

Safety Risk	Severity				
Probability	Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent	5A	5B	5C	5D	5E
Occasionally	4A	4B	4C	4D	4E
Remote	3A	3B	3C	3D	3E
Improbable	2A	2B	2C	2D	2E
Extremely Improbable	1A	1B	1C	1D	1E

The SMS Framework

ELEMENT NO. 2.2

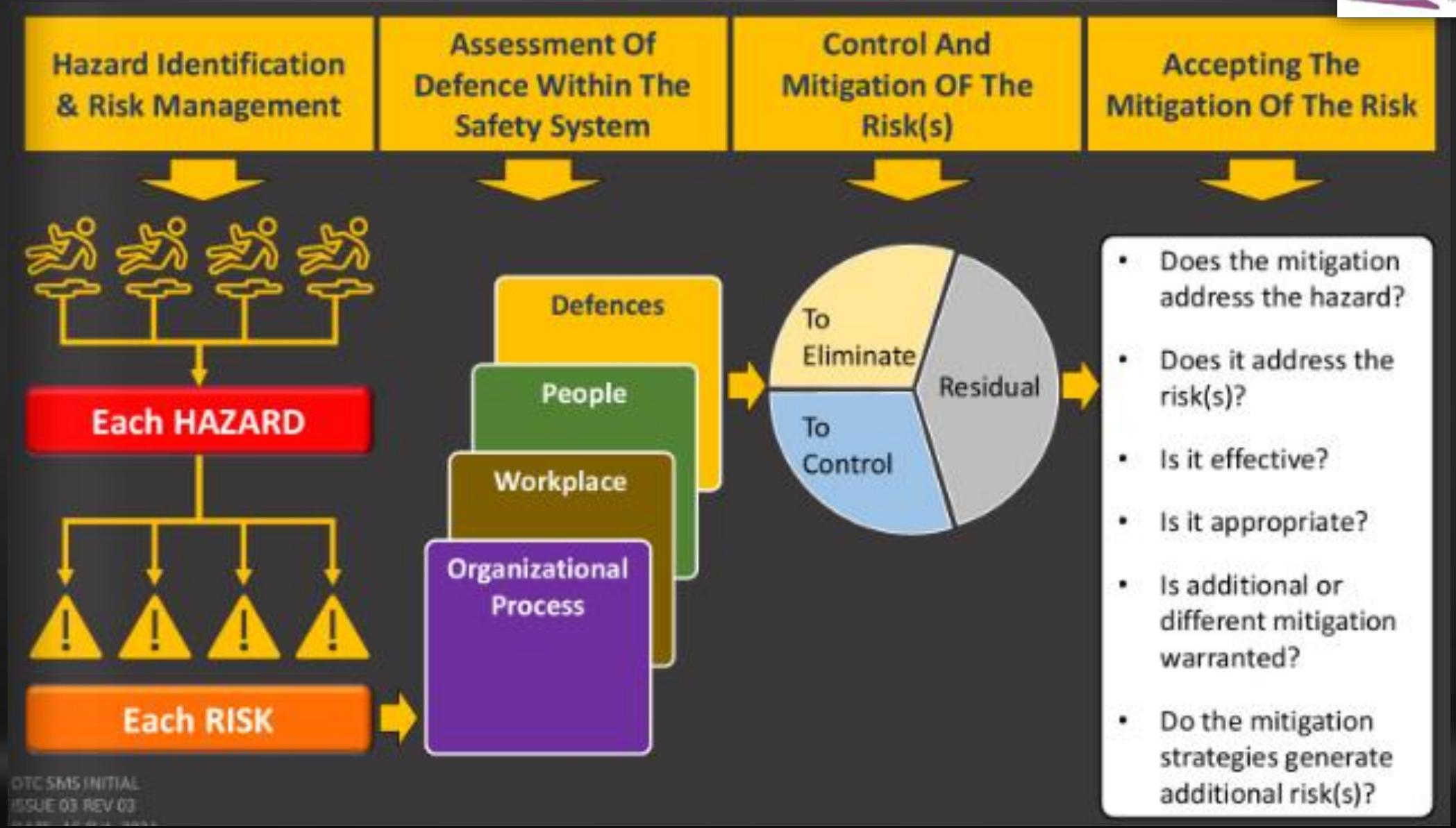
Risk assessment and Mitigation

- The index obtained from the safety risk assessment matrix should then be exported to a safety risk tolerability table that describes – in a narrative form – the tolerability criteria for the particular organization.

Safety Risk Index Range	Safety Risk Description	Recommended Action
5A, 5B, 5C, 4A, 4B, 3A	INTOLERABLE	Take immediate action to mitigate the risk or stop the activity. Perform priority safety risk mitigation to ensure additional or enhance preventive controls are in place to bring down the safety risk to tolerable.
5D, 5E, 4C, 4D, 4E, 3B, 3C, 3D, 2A, 2B, 2C, 1A	TOLERABLE	Can be tolerated based on the safety risk mitigation. It may require management decision to accept the risk.
3E, 2D, 2E, 1B, 1C, 1D, 1E	ACCEPTABLE	Acceptable as it is. No further safety risk mitigation required.

After safety risks have been assessed, appropriate mitigation measures can be implemented. The three generic safety risk mitigation approaches include:

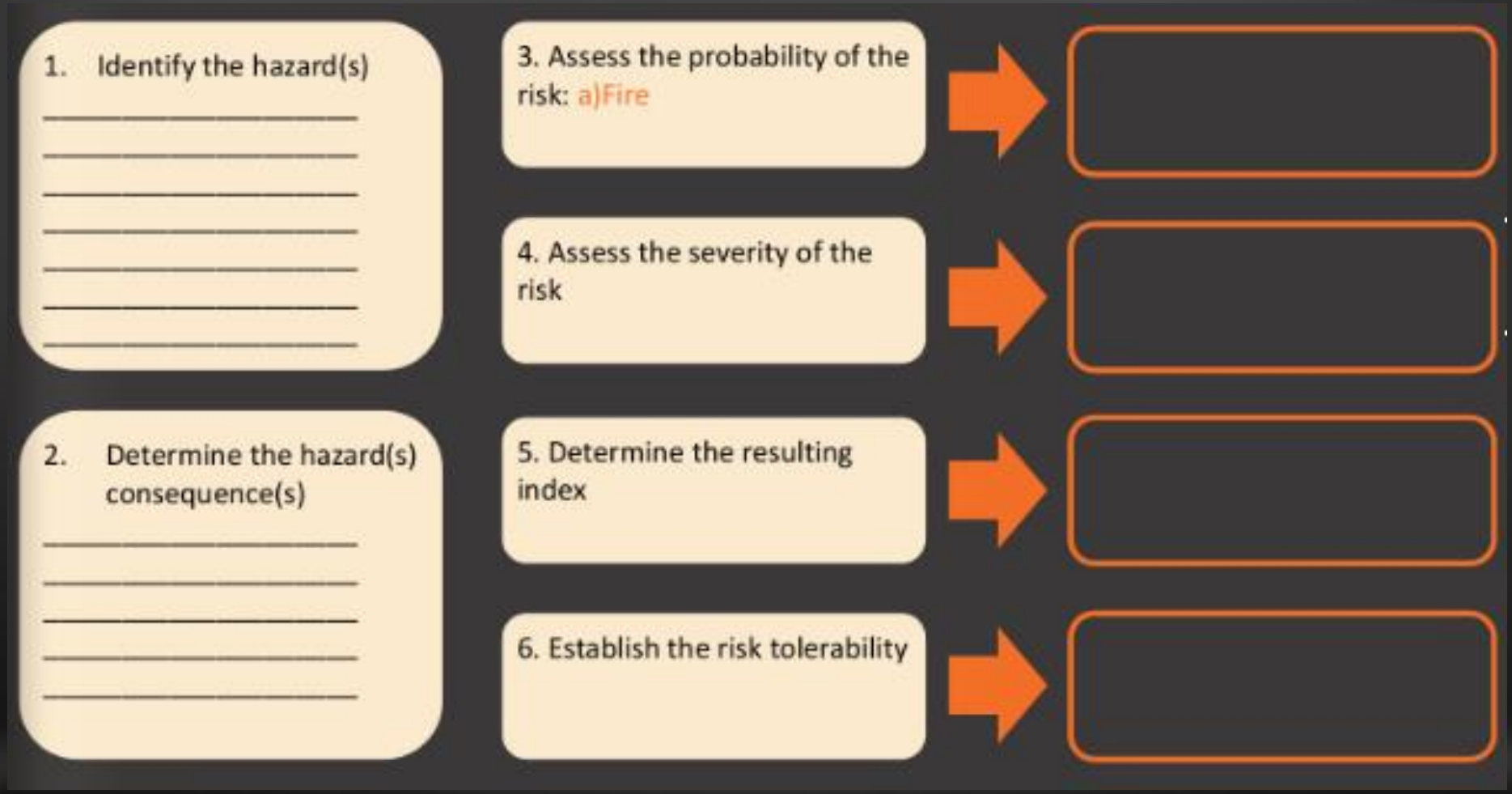
Avoidance	The activity is suspended, either because the associated safety risks are intolerable or deemed unacceptable vis-à-vis the associated benefits.
Reduction	Some safety risk exposure is accepted, although the severity or probability associated with the risks are lessened, possibly by measures that mitigate the related consequences.
Segregation of exposure	Action is taken to isolate the potential consequences related to the hazard or to establish multiple layers of defenses to protect against them.


Hazard Identification & Risk Management
Assessment Of Defence Within The Safety System
Control And Mitigation OF The Risk(s)
Accepting The Mitigation Of The Risk
Each HAZARD
Each RISK
Defences
People
Workplace
Organizational Process
To Eliminate
To Control
Residual
Does the mitigation address the hazard?
Does it address the risk(s)?
Is it effective?
Is it appropriate?
Is additional or different mitigation warranted?
Do the mitigation strategies generate additional risk(s)?
OTC SMS INITIAL
ISSUE 03 REV 03

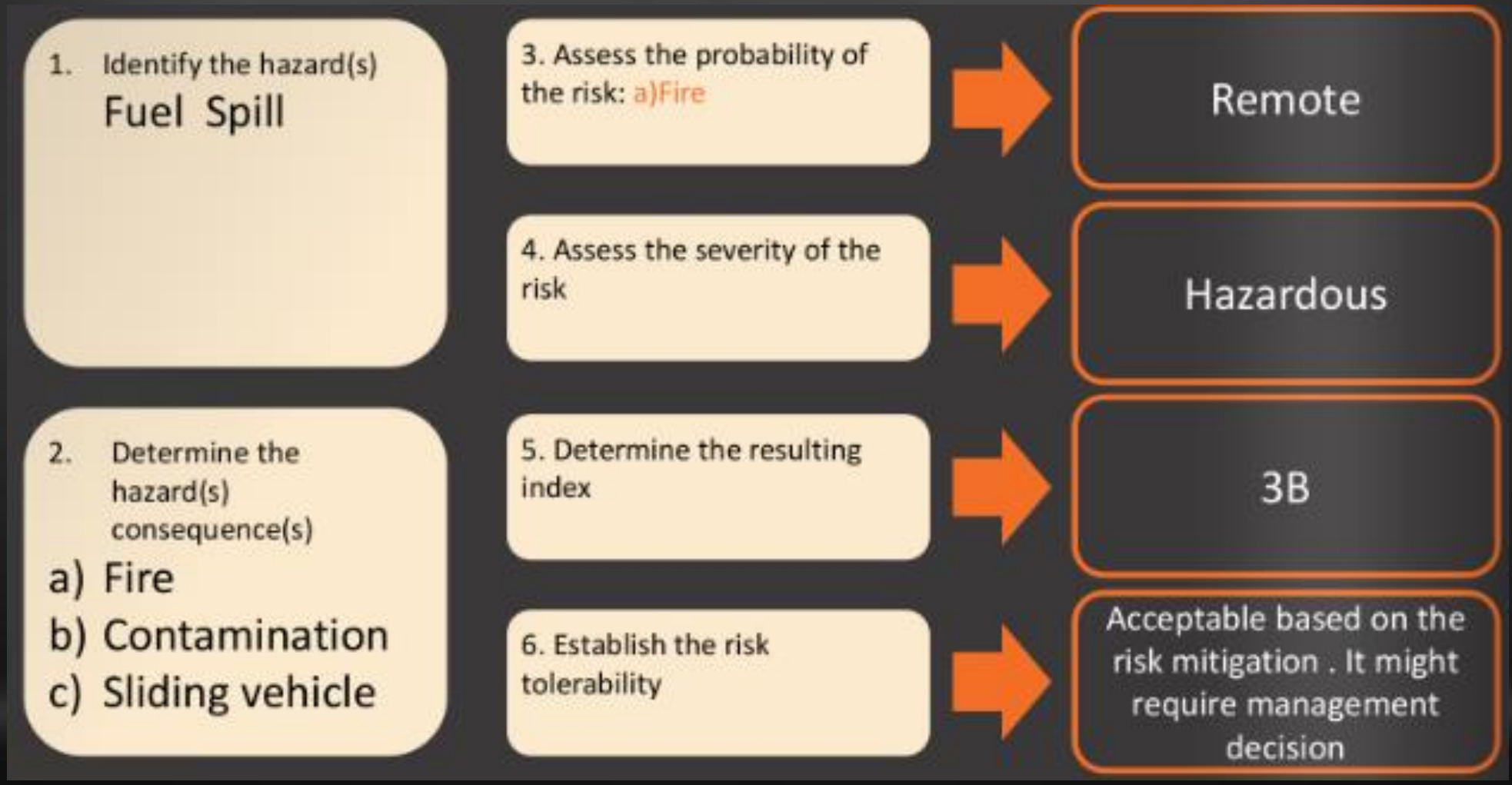
Scenario :

Fuel spill on the apron area surface of approximately 25m (75 ft) length and 5m (15 ft) width, produced by an aircraft ready to pushback and taxi for departure.

Now try this :


1. Identify the hazard(s)
2. Determine the hazard(s) consequence(s)
3. Assess the probability of the risk: a)Fire
4. Assess the severity of the risk
5. Determine the resulting index
6. Establish the risk tolerability

Now try this :


1. Identify the hazard(s)
Fuel Spill
2. Determine the hazard(s) consequence(s)
a) Fire
b) Contamination
c) Sliding vehicle
3. Assess the probability of the risk: a)Fire
4. Assess the severity of the risk
5. Determine the resulting index
6. Establish the risk tolerability
Remote
Hazardous
3B
Acceptable based on the risk mitigation . It might require management decision

So what can we learn?

This event is not out of date and the root causes are still of interests in the aviation domain:

Human Factors

Piling pressure from shareholders, safety culture, organizational and human factors…

So what can we learn?

Safety management applies to any domain:

a) Nuclear, railways etc. …even your private life…
b) Rules, design, certification, manufacturing, operations, navigation services, infrastructure…

Safety management is not a novelty:

a) Clinical approach started in the 90's
b) ICAO started to adopt SARPs in 2003
c) Accident investigation boards have been repeatedly highly recommended to implement it A.S.A.P.

SMS Framework Component No.3

The SMS Framework

SMS Framework Component No.3

- Safety performance monitoring and measurement
- The management of change
- Continuous improvement of the SMS

SAFETY ASSURANCE

SMS Framework Component No.3

Process and activities undertaken by the service provider to determine whether the SMS is operating according to expectations and requirement.

The ***safety assurance*** process complements that of ***quality assurance***, with each having requirement for analysis, documentation, auditing, and management reviews to assure that certain performance criteria are met.

Quality is essentially looking at Compliance, and Safety is looking at Risk.

Difference of Quality Assurance & Safety Assurance

Quality Assurance

- Determining gaps based on non-compliance with regulatory/organizational requirements.
- Rearward looking process.

Safety Assurance

- Determining weakness in the organizations' processes/procedures which raises the exposure to risk.
- Forward looking process.

Both have requirement for analysis, documentation, auditing and management reviews to assure that certain performance criteria are met.

SAFETY ASSURANCE

SMS Framework Component No.3.1

Safety performance monitoring and measurement

The service provider shall develop and maintain the means to verify the safety performance of the organization an to validate the effectiveness of safety risk controls.
The safety performance of the organization shall be verified in reference to the safety performance indicators and safety performance targets of the SMS.

Do you know your organization targets?

Reporting System

There are two types of reporting systems:

a) Mandatory incident reporting systems

b) Voluntary incident reporting systems

Mandatory Reporting

- Serious incident
- Hazards safety of aircraft
- MOR
- Regulatory requirements tend to collect more information related to high consequence technical failures than on other aspects of operational activities

Voluntary Reporting

- Not a regulatory requirement
- For enhancement of safety
- Non punitive

We have so many incidents, accidents, near misses happening daily in aviation maintenance. When was the last time you reported a hazard?

PART 7 NON PUNITIVE CONFIDENTIAL SAFETY REPORTING POLICY

Safety is core value of DVT. DVT is committed to make it top priority. To ensure this commitment, we must encourage uninhibited reporting of hazards, maintenance errors, safety issues, health concerns, safety deficiencies in organisation safety rules, policies and procedures including occurrences that may compromise the airworthiness, safety, health, and property of our operations.

DVT personnel feedback is encouraged as it will help DVT identify the root cause and take the necessary corrective actions and avoid repeating the same errors or non-conformances. This will improve our health, safety, and the reliability of the operation and reduce cost.

Source of Safety Performance

a) **Safety studies** are analyses to gain a deeper understanding of safety issues or better understand a trend in safety performance.

b) **Safety data** analysis uses the safety reporting data to uncover common issues or trend that might warrant further investigation.

c) **Safety surveys** examine procedures or process related to a specific operation. Safety surveys may involve the use of checklist, questionnaires and informal confidential interviews. Safety surveys generally provide qualitative information. This may require validation via data collection to determine if corrective action is required. Nonetheless, surveys may provide an inexpensive and valuable source of safety information.

Source of Safety Performance

d) **Safety audits** focus on assessing the integrity of the service provider's SMS and supporting systems. Safety audits can also be used to evaluate the effectiveness of installed safety risk controls or to monitor compliance with safety regulations. Ensuring independence and objectivity is a challenge for safety audits. Independence and objectivity can be achieved by engaging external entities or internal audits with protections in place – policies, procedures, roles, communication protocols.

Source of Safety Performance

e) **Findings and recommendations** from safety investigations can provide useful safety information that can be analyzed against other collected safety data.

f) **Operational data collection systems** such as FDA, radar information can provide useful data of events and operational performance.

SMS Framework ELEMENT No.3.2

Management of Change

- Service providers shall develop and maintain a formal process to identify changes within the organization which may affect established processes and services.
- To describe the arrangements to ensure safety performance before implementing changes

SMS Framework ELEMENT No.3.2

Management of Change

- To eliminate or modify safety risk controls that are no longer needed or effective due to changes in the operational environment.
- New hazards, and related safety risks may be inadvertently introduced into an operation whenever change occurs.

SMS Framework ELEMENT No.3.2

Management of Change

Changes to consider:

Organizational expansion or contraction

Changes to internal systems, processes or procedures that support delivery of the product and services.

Changes to the organization's operating environment

Management of Change Process should consider the following:

Criticality

- Criticality assessments determine the systems, equipment or activities that are essential to the safe operation of aircraft.
- Systems, equipment and activities that have higher safety criticality should be reviewed following change to make sure that corrective actions can be taken to control potentially emerging safety risks.

Stability

- Consider the planned and unplanned changes that can affect the organization.

  a) Planned: Growth, new product
  b) Unplanned: Economy, political

Past Performance

- Past performance of critical systems and trend analyses in the safety assurance process should be employed to anticipate and monitor safety performance.
- To ensure effectiveness of corrective actions.

SMS Framework ELEMENT No.3.3

Continuous improvement of the SMS

The service provider shall develop and maintain a formal process to identify the causes of substandard performance of the SMS, determine the implications of standard performance of the SMS in operations, and eliminate or mitigate such causes.

Continuous improvement is measures through the monitoring of an organization’s safety performance indicators and is related to the maturity and effectiveness of an SMS.

SMS Framework ELEMENT No.3.3

Continuous improvement of the SMS

Continuous improvements are achieved by:

1. **Internal Evaluations** – by doing Hazard Identification Risk Mitigation activities

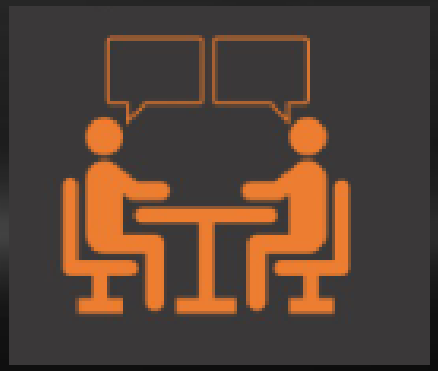
2. **Internal Audits** – performed by persons or departments independent of the functions being evaluated

3. **External Audits** – performed by the authorities (CAAM) for the acceptance of the organization's SMS

The SMS Framework

SMS Framework
Component No.4

- Training and education
- Safety communication



Safety Promotion

- Safety promotion encourages a positive safety culture and creates an environment that is conductive to the achievement of the services provider's safety objectives.

- A positive safety culture is characterized by values, attitudes and behavior that are committed to the organization's safety efforts.

- This is achieved through the combination of technical competence that is continually enhanced through training and education, effective communications and information sharing.

Safety Promotion

- Senior management provides the leadership to promote the safety culture throughout an organization.
- The service provider must establish and implement processes and procedures that facilitate effective communication throughout all levels of the organization.

SMS Framework Component No. 4.1

Training & Education

The service provider shall develop and maintain a safety training programme that ensures that personnel are trained and competent to perform the SMS duties.

The scope of the safety training shall be appropriate to each individual's involvement in the SMS.

Safety training and education curricula should consist of the following :

- Organizational safety policies, goals & objectives
- Organizational safety roles and responsibilities related to safety
- Basic safety risk management principles
- Safety reporting systems
- Safety management support (including evaluation and audit programmes)
- Lines of communication for dissemination of safety information
- A validation process that measures the effectiveness of training
- Documented initial indoctrination and recurrent training requirements

SMS Framework Component No. 4.1

Training & Education

Training includes both **Initial & Recurrent** for your staff:

- To educate, inform, increase the level of safety awareness, promote your objective.
- Develop and maintain the level of “safety culture”
- It includes the accountable executive, senior management, front-line management, staff in the field, decision-makers etc.

SMS Framework Component No. 4.1

Training & Education

- Safety culture is the set of enduring values and attitudes regarding safety issues, shared by every member at every level of an organization.

SMS Framework Component No. 4.1

Training & Education

- Refers to the extent to which every individual of the organization is aware of the risks unknown hazards induced by their activities

Objective:
Raising and maintaining the level of awareness

Case study:

Concorde & The Safety Culture

Concorde F-BTSC accident, 25 July 2000, France.

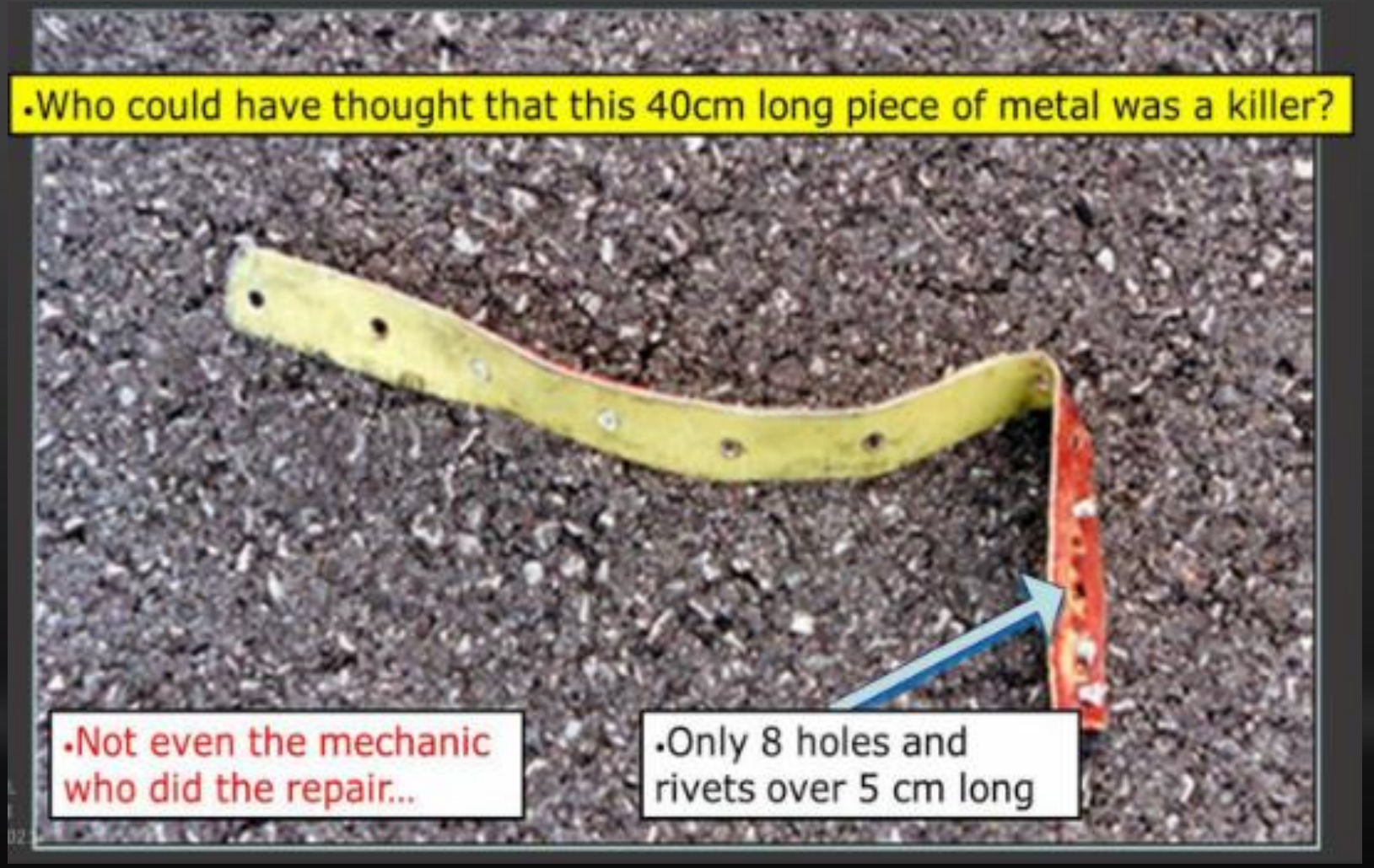
109 casualties, aircraft was destroyed.

Case study:
Concorde & The Safety Culture

The French BEA concluded in 2002 that a wear strip of metal, fallen off from a DC-10 that took off 4 minutes earlier, had punctured a tire of the Concorde, sending shards of rubber into the fuel tanks, leading to flames pouring from its plane crashing into a hotel few kilometers away.

Case study:

Concorde & The Safety Culture



Case study:

Concorde & The Safety Culture

The strip was attached with rivets close to other previous existing holes (reverser of the engine) and was improperly attached.

Case study:

Concorde & The Safety Culture

- The engine cowl support was drilled with 37 holes whereas the installation of the strip required only 12.
- Therefore the strip was attached with rivets close to other previous existing holes and was improperly attached, resulting in it falling onto the runway.

Case study:

Concorde & The Safety Culture

- The mechanic (a metal sheet worker, not a certifying staff) used titanium, rather than aluminum (higher resistance), to construct a replacement piece (deviation to the maintenance repair as prescribed by the engine manufacture).

- The mechanic who did the repair and the certifying staff who released to service the aircraft were charged with negligence (just culture)

Case study:

Concorde & The Safety Culture

- This part had been replaced during a C check 6 weeks before the accident took place.
- 3 weeks after the C check, the part detached again and was replaced by another part (the one fell off on 25 July 2000).

Case study:

Concorde & The Safety Culture

- These signals should have alerted the maintenance organization that improper maintenance had been carried out and that the trouble shooting was poor. The organization was charged with negligence.

SMS Framework Component No. 4.2

Safety Communication

1. Develop and maintain formal means for safety communication that ensures that all personnel are fully aware if the SMS.

2. Conveys safety-critical information.

3. Explain why particular safety actions are taken and why safety procedures are introduced or changed.

SMS Framework Component No. 4.2

Safety Communication

Communication Initiatives

Dissemination of the SMS manual

Safety processes and procedures

Safety newsletters, notices and bulletins

Websites or email

Summary:

1. There are 4 components and 12 elements in the SMS framework.

2. All stakeholders, from management to trainees, should play heir role in the SMS for safety assurance.