



Safety Management Systems

A structured introduction to the four-component SMS framework as defined in **ICAO Annex 19** and **Doc 9859** — the international standard for aviation safety management.

Why SMS Structure Matters

The Problem with Ad Hoc Safety

Without a defined framework, safety initiatives become reactive, inconsistent, and difficult to audit. Critical gaps go undetected until an incident occurs — often too late.

The ICAO Solution

ICAO Annex 19 and Doc 9859 establish a universal, four-component SMS structure that integrates safety into every level of an organization — from policy to day-to-day operations.

This presentation follows that exact structure. Each component is presented in sequence, as intended by ICAO — ensuring your SMS training is fully aligned with international standards.

The Four-Component SMS Framework

ICAO Annex 19 organizes every SMS into four interdependent components. Together, they form a closed-loop system for continuous safety improvement.

1

Safety Policy, Objectives & Resources

Establishes leadership commitment, accountability structures, and the foundational safety goals of the organization.

2

Safety Risk Management

Identifies hazards, assesses likelihood and severity, and implements controls to reduce risk to acceptable levels.

3

Safety Assurance

Monitors the effectiveness of risk controls through audits, performance measurement, and continuous evaluation.

4

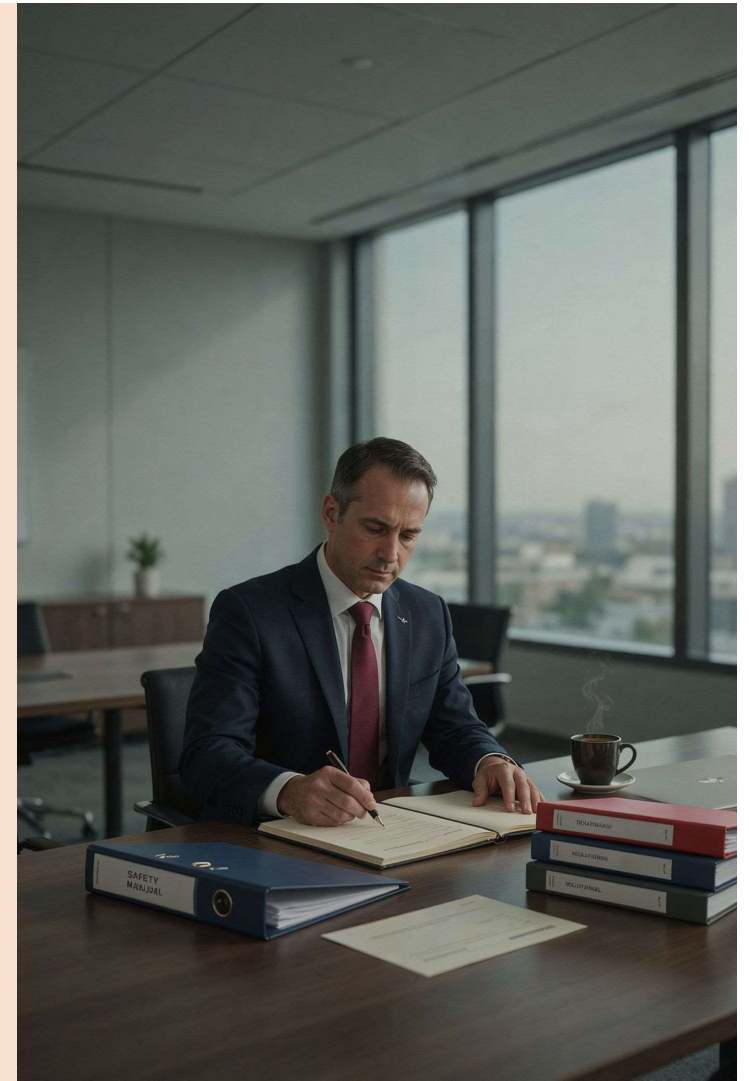
Safety Promotion

Builds a positive safety culture through training, communication, and the sharing of safety information across the organization.

COMPONENT 1

Safety Policy, Objectives & Resources

The first component of the ICAO SMS framework establishes the **organizational foundation** for everything that follows — defining what the organization stands for, what it aims to achieve, and how it will resource those aims.



Component 1: Key Elements

Safety policy, objectives, and resources encompass four critical sub-elements, each essential to building a credible and functional SMS foundation.



Safety Policy

A formal, signed statement of the organization's commitment to safety — approved by senior leadership and communicated throughout the organization.



Safety Objectives

Measurable safety outcomes aligned with the organization's operational context and risk profile — reviewed regularly at the management level.



Accountabilities & Responsibilities

Clear definition of who is responsible for safety outcomes at every level — from the Accountable Executive to front-line staff.



Resources & Key Personnel

Adequate funding, staffing, and competency to implement and maintain the SMS — including appointment of a Safety Manager.

Leadership Commitment Within Component 1

Where Leadership Commitment Belongs

Leadership commitment is a **foundational element of Component 1** — Safety Policy, Objectives & Resources — not a standalone SMS component. ICAO Annex 19 is explicit: senior management's visible commitment to safety is expressed through the safety policy and the allocation of resources.

Treating leadership commitment as a separate, fifth element misrepresents the Annex 19 structure and risks creating confusion during audits and regulatory reviews.

What the Accountable Executive Must Do

- Sign and endorse the organizational safety policy
- Allocate sufficient budget and qualified personnel
- Ensure safety objectives are established and reviewed
- Remain the single, identifiable point of accountability for SMS performance
- Demonstrate visible, active commitment — not just policy endorsement on paper

COMPONENT 2

Safety Risk Management

The second component of the SMS framework is where hazards are systematically identified, analyzed, and controlled — transforming safety awareness into structured, documented risk decisions.



Component 2: Hazard Identification & Risk Assessment

1

Hazard Identification

Proactive and reactive processes to identify conditions or situations with potential to cause harm — using reports, audits, and operational data.

2

Risk Assessment

Evaluate each hazard's **likelihood** and **severity** using a risk matrix. Determine whether risk is tolerable, acceptable, or unacceptable.

3

Risk Mitigation

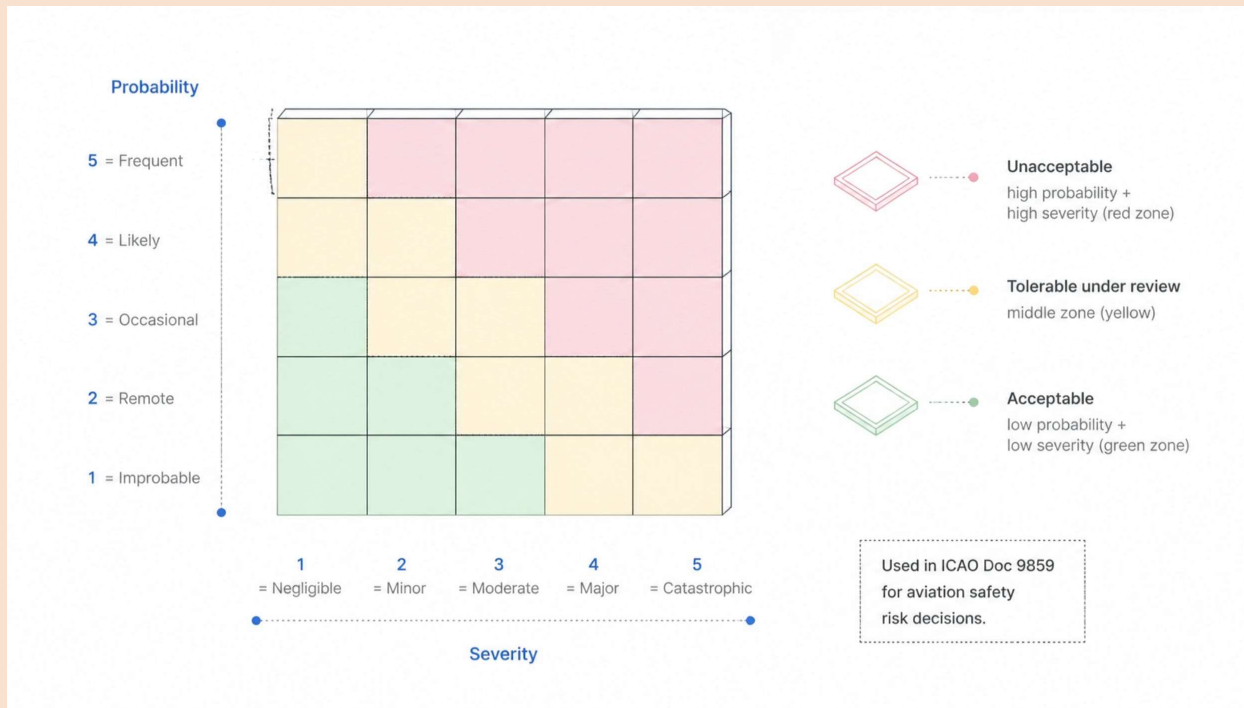
Develop and implement controls that reduce risk to an acceptable level — then document, communicate, and verify effectiveness of those controls.



Risk assessments must be documented and traceable. ICAO Doc 9859 requires organizations to maintain records of hazard identification and risk control decisions as part of their SMS documentation.

The Risk Assessment Matrix

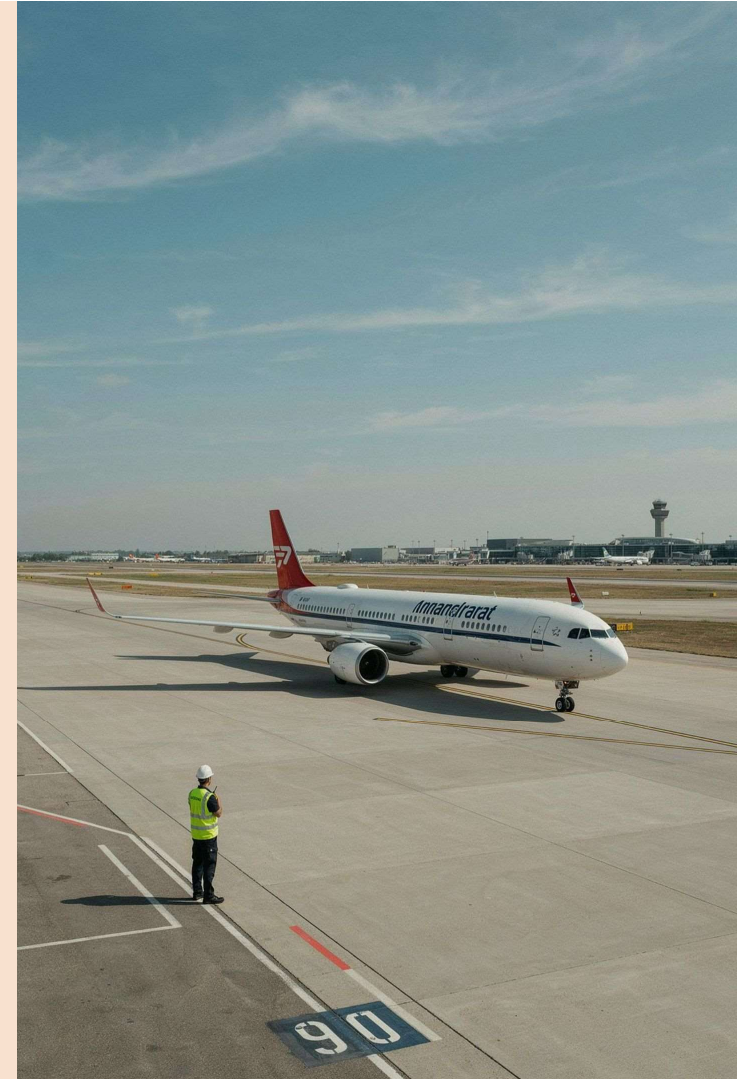
The ICAO risk matrix provides a consistent, structured way to evaluate hazards by scoring both the **probability** of occurrence and the **severity** of potential consequences. The resulting risk index drives decision-making on acceptability and control priority.



COMPONENT 3

Safety Assurance

Safety assurance ensures that risk controls remain effective over time — providing the feedback loops necessary to detect performance gaps before they escalate into incidents.



Component 3: Monitoring, Auditing & Improvement

What Safety Assurance Encompasses

Safety assurance is the mechanism by which an organization verifies that its SMS is functioning as designed. It closes the loop between risk mitigation planning and operational reality.

- **Safety performance monitoring** — tracking Safety Performance Indicators (SPIs) and Safety Performance Targets (SPTs)
- **Internal safety investigations** — systematic analysis of incidents and occurrences
- **Safety audits and surveys** — structured assessments of SMS processes and controls
- **Management of change** — evaluating safety implications of organizational or operational changes
- **Continuous improvement** — identifying and acting on opportunities to enhance safety performance

Key Output: Safety Performance Data

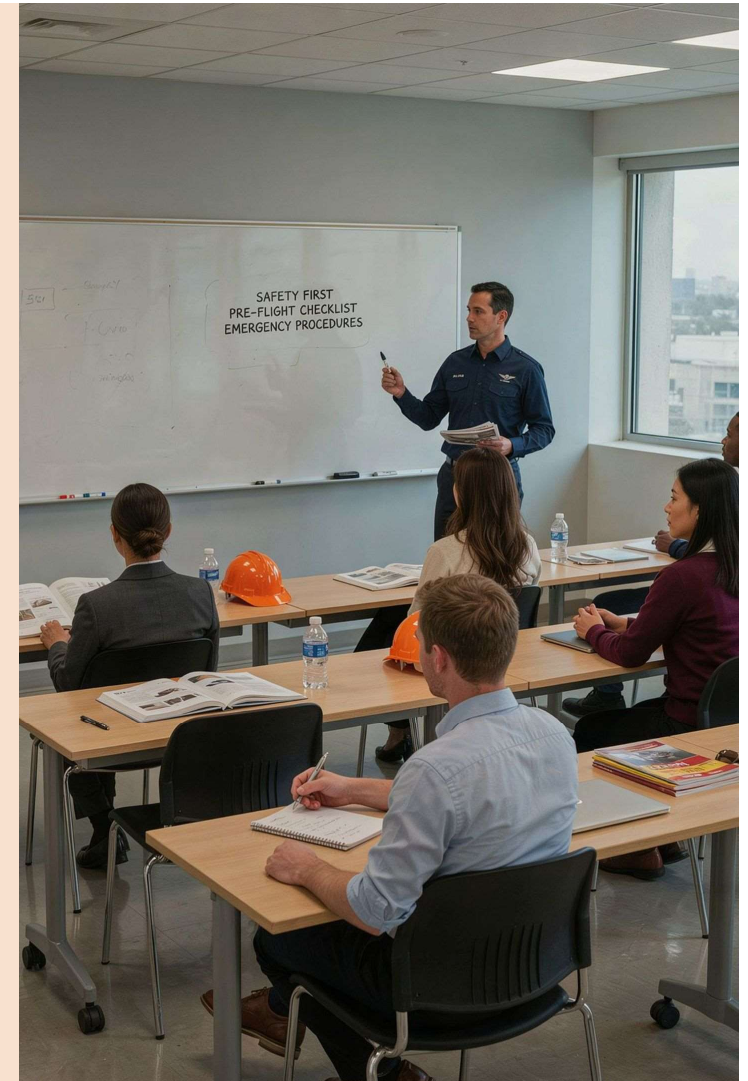
Safety assurance produces the data that management reviews to make informed decisions. Without robust assurance processes, the SMS operates on assumptions rather than evidence.

Findings from assurance activities feed directly back into **Component 2 (Safety Risk Management)** and **Component 1 (Safety Objectives)** — reinforcing the cyclical nature of the SMS.

COMPONENT 4

Safety Promotion

The fourth component creates and sustains the cultural and organizational conditions that allow all other SMS components to function effectively — ensuring safety is a shared value, not just a compliance obligation.



Component 4: Training, Communication & Culture



Safety Training & Education

All personnel receive training appropriate to their SMS role — from awareness-level for operational staff to advanced competency for Safety Managers and the Accountable Executive.



Safety Communication

Regular, structured sharing of safety information — including lessons learned, hazard alerts, investigation outcomes, and safety performance results — across all levels of the organization.



Positive Safety Culture

An environment where personnel feel safe to report hazards and concerns without fear of blame. A just culture is a prerequisite for effective voluntary reporting and organizational learning.

Safety promotion reinforces and amplifies the impact of Components 1–3. An organization that communicates well, trains effectively, and nurtures a just culture will extract far greater value from its SMS than one that treats promotion as an afterthought.

How the Four Components Work Together

The ICAO SMS framework is not a linear checklist — it is a **closed-loop, self-reinforcing system**. Each component feeds into and depends upon the others.



Leadership commitment — embedded within Component 1 — is what energizes the entire cycle. Without a genuine, resourced policy commitment at the top, none of the remaining components can achieve their intended effect.

Key Takeaways for SMS Trainers

Use the Exact ICAO Structure

Always present SMS using the four components from Annex 19 and Doc 9859. Avoid substituting or re-labeling components — regulatory auditors and ICAO evaluators expect this exact taxonomy.

Place Leadership Commitment Correctly

Leadership commitment belongs within **Component 1** — Safety Policy, Objectives & Resources. It is not a fifth component. Misplacing it creates inconsistency with Annex 19 and may confuse trainees during audits.

Reinforce the Cyclical Nature

SMS is a continuous improvement system. Assurance findings should visibly loop back to policy review and risk reassessment — demonstrating to trainees that the system evolves with operational reality.

Connect Culture to Structure

Safety promotion is not a soft add-on — it is a required component. A just culture and effective communication are structural requirements of a compliant SMS, not optional enhancements.

Reference: Safety Intelligence — Doc 10159

ICAO Doc 10159 introduces the concept of **Safety Intelligence** as an evolution beyond traditional SMS. It emphasizes the use of **data analytics**, **predictive safety management**, and **organizational learning** to proactively identify systemic risks before they manifest.

Trainers should be aware that Doc 10159 *complements* the four-component SMS framework and represents the next frontier in aviation safety management.



Trainer Reference: Doc 10159 does not replace the Annex 19 SMS structure — it builds upon it. Introduce this document to advanced trainees as a forward-looking resource on proactive and predictive safety practices.