

18th FAA/ATA International Symposium on
Human Factors in Maintenance and Ramp
Operations

ICAO

Harmonization of Safety management Systems (SMS)

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- Brief introduction to safety management systems (SMS)
- New harmonized ICAO Standards and Recommended Practices (SARPS)
 - ↗ Safety Programs
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 - ↗ Acceptable level of Safety
- ICAO framework (5 components of SMS)
- Relationship between SMS and QMS and the ICAO position
- Outline of ICAO SMS course and dissemination efforts
- Relationship of Human Factors to SMS

Safety-the traditional approach

Traditional approach – Accident prevention

- Focus on outcomes (probable cause)
- Unsafe acts by operational personnel
- Attach blame/punish for failures to “perform safely”
- Address identified safety concern exclusively
- Identifies:

WHAT?

WHO?

WHEN?

- But not always discloses:

WHY?

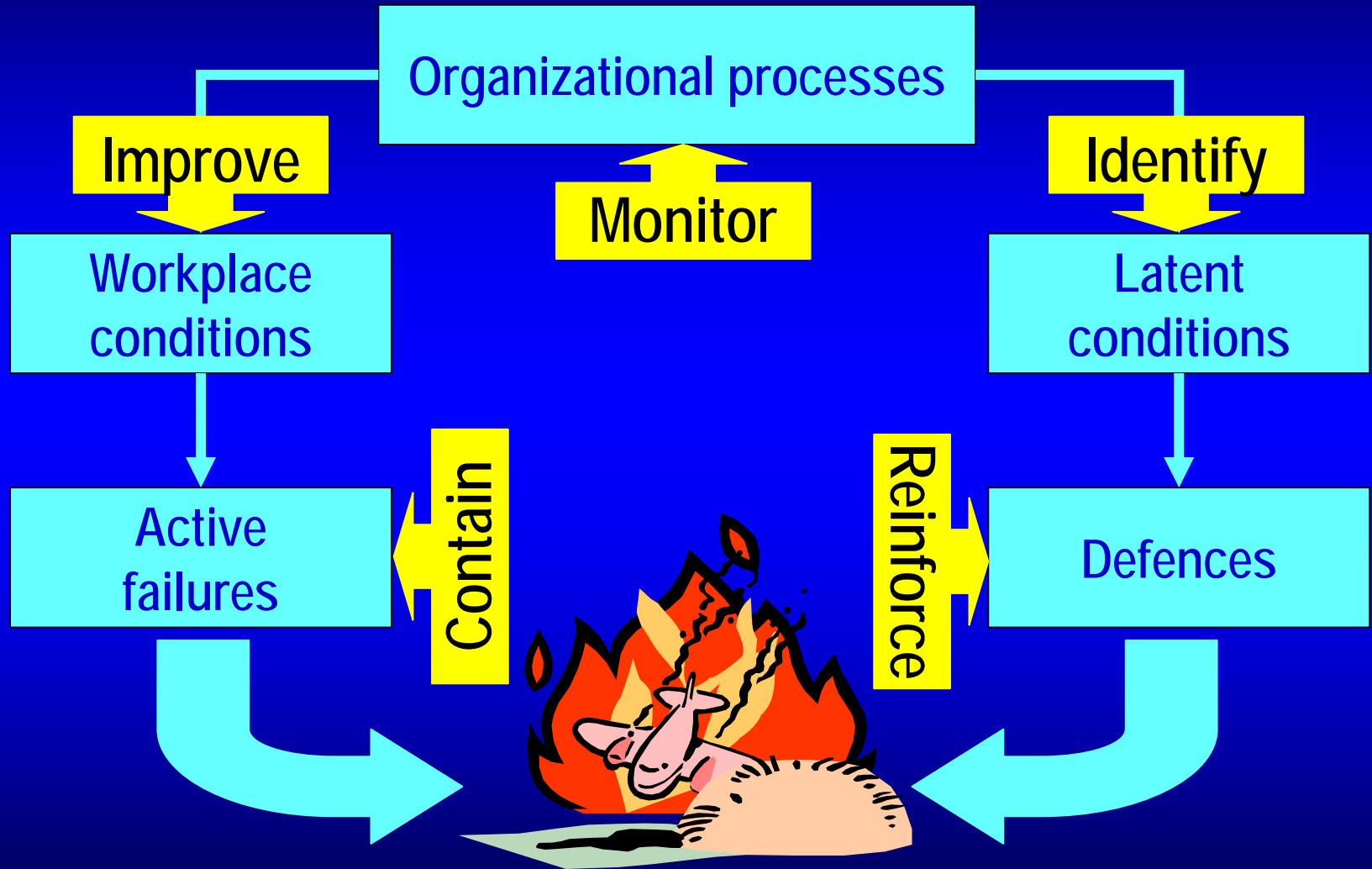
HOW?

Workplace interactions/human-evolution in understanding safety

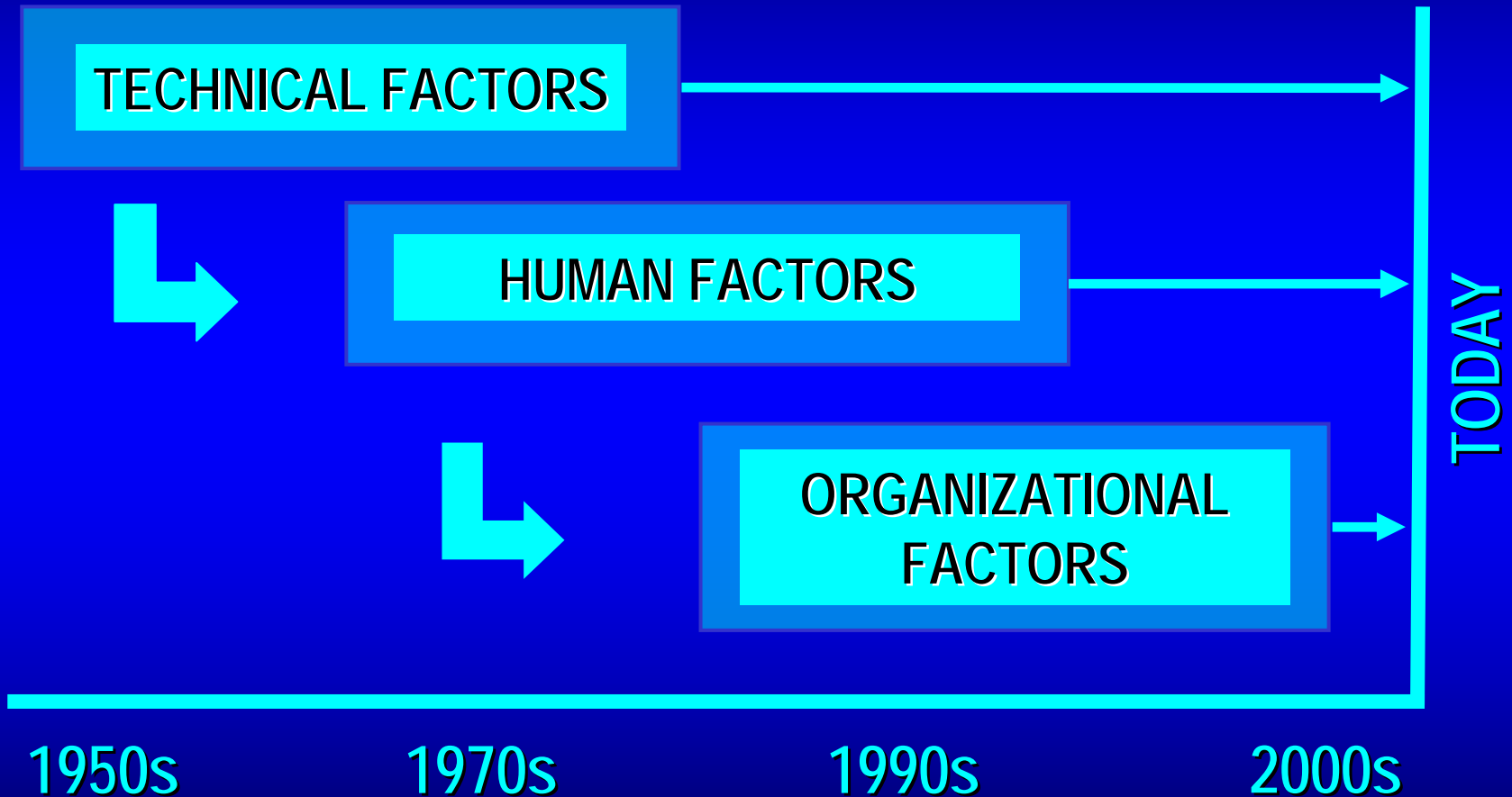
- Aviation workplaces involve complex interrelationships among its many components.
- To understand operational performance, we must understand how it may be affected by the interrelationships among the various components of the aviation work places.



The organization-continued evolution in understanding safety



The evolution of safety thinking



Concept of safety

- The elimination of accidents (and serious incidents) is unachievable.
- Failures will occur, in spite of the most accomplished prevention efforts.
- No human endeavour or human-made system can be free from risk and error.
- Controlled risk and error is acceptable in an inherently safe system.

Concept of safety (Doc 9859)

→ **Safety** is the state in which the risk of harm to persons or property damage is reduced to, and maintained at or below, an **acceptable level** through a continuing process of **hazard identification and risk management**.

What is an SMS?

→ A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.

SMS – Introductory concepts

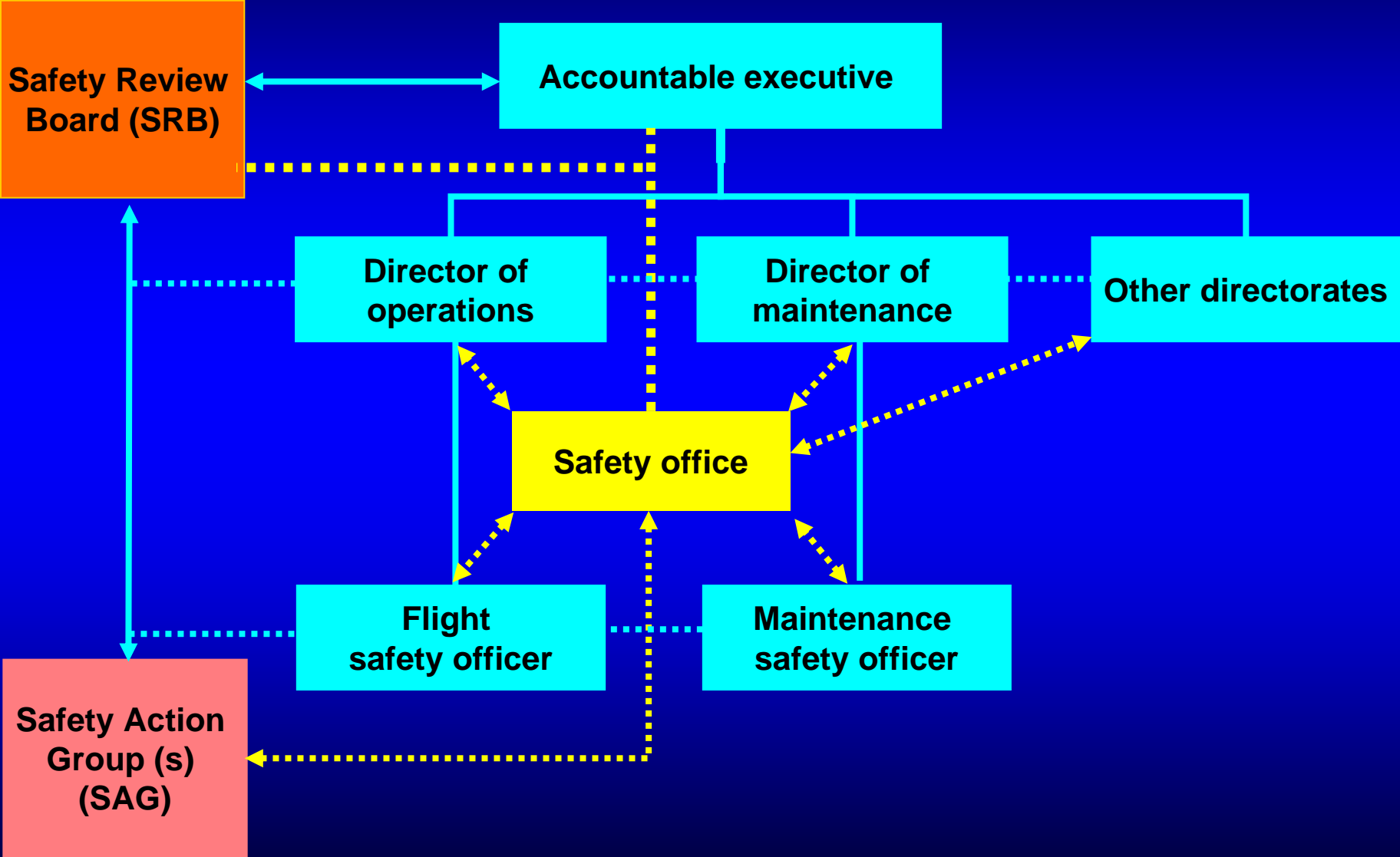
→ A toolkit

- ↗ The scope of SMS encompasses most of the activities of the organization.
- ↗ SMS must start from senior management, and safety must be considered at all levels of the organization.
- ↗ SMS aims to make continuous improvement to the overall level of safety.
- ↗ All aviation stakeholders have a role to play in SMS.

SMS features

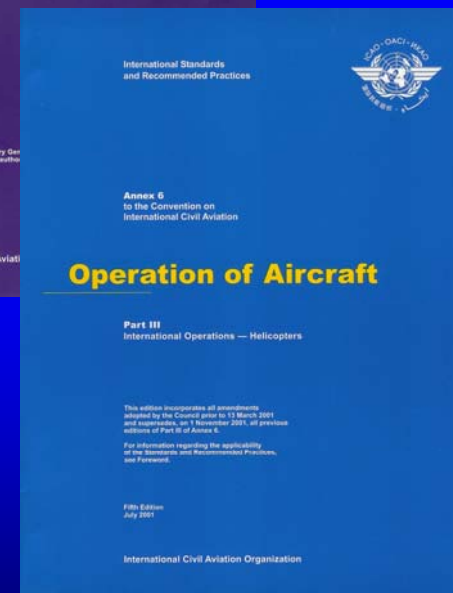
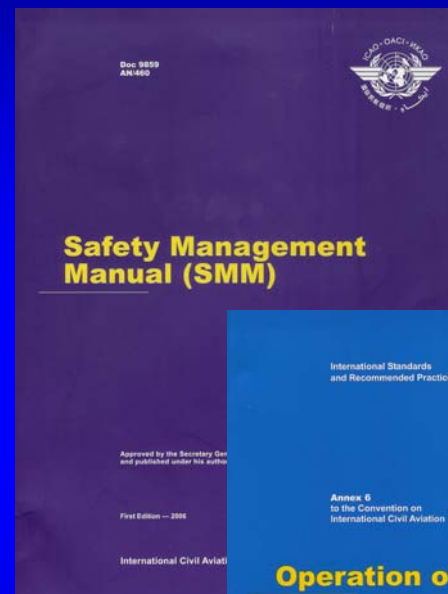
- Systematic – Safety management activities are in accordance with a pre-determined plan, and applied in a consistent manner throughout the organization.
- Proactive – An approach that emphasizes prevention, through hazards identification and risk control and mitigation measures, before events that affect safety occur.
- Explicit – All safety management activities are documented, visible and performed independently from other management activities.

SMS responsibilities– An example



Safety management SYSTEM responsibilities

- A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.
- Providers (operators, organizations) are responsible for establishing an SMS.
- States are responsible of the acceptance and oversight of providers' SMS.



ICAO safety management requirements

→ ICAO safety management requirements

↗ Operation of aircraft

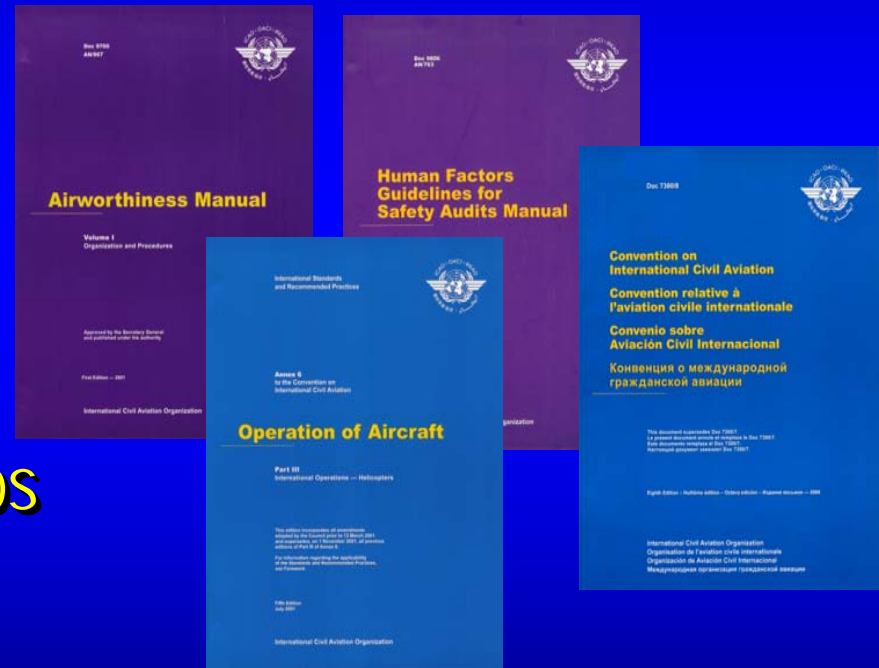
↗ Maintenance of aircraft

↗ Air traffic services

↗ Aerodromes

↘ Two audience groups

↘ Three "chunks"



As of 23 November 2006

- States shall establish a safety programme, in order to achieve an acceptable level of safety in:
 - ↗ The operation of aircraft (Rec Practice-2006, Standard 2009)
 - ↗ The maintenance of aircraft (Same as above)
 - ↗ The provision of air traffic services
 - ↗ Aerodrome operations
- The acceptable level of safety to be achieved shall be established by the State(s) concerned

What is a safety programme?

- An integrated set of regulations and activities aimed at improving safety.
- States are responsible for establishing a safety programme:
 - ↗ Safety regulation
 - ↗ Safety oversight
 - ↗ Accident/incident investigation
 - ↗ Mandatory/voluntary reporting systems
 - ↗ Safety data analysis
 - ↗ Safety promotion
 - ↗ ...

Definitions

→ Acceptable level of safety – A concept

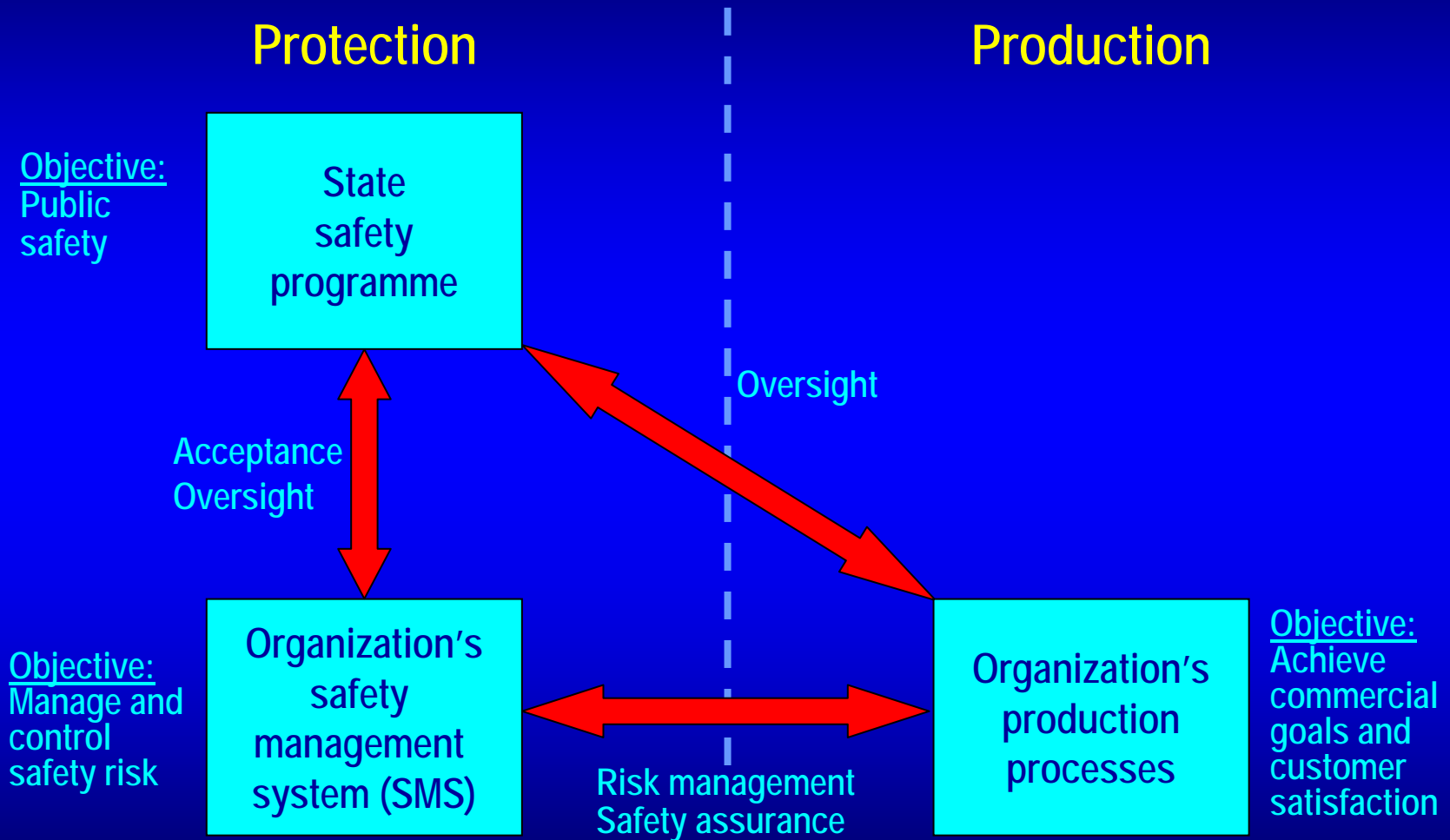
- High level safety management goals of an oversight authority [or a service provider]
- Minimum safety performance that service providers should achieve while conducting their core business functions
- A reference against which measuring safety performance

As of 23 November 2006

→ States shall require, as part of their safety programme, that an *[operator, maintenance organization, ATS provider, certified aerodrome operator]* implements a **safety management system** accepted by the State that, as a minimum:

- Identifies safety hazards
- Ensures that remedial action necessary to maintain an acceptable level of safety is implemented
- Provides for continuous monitoring and regular assessment of the safety level achieved
- Aims to make continuous improvement to the overall level of safety

Safety programme – SMS relationships



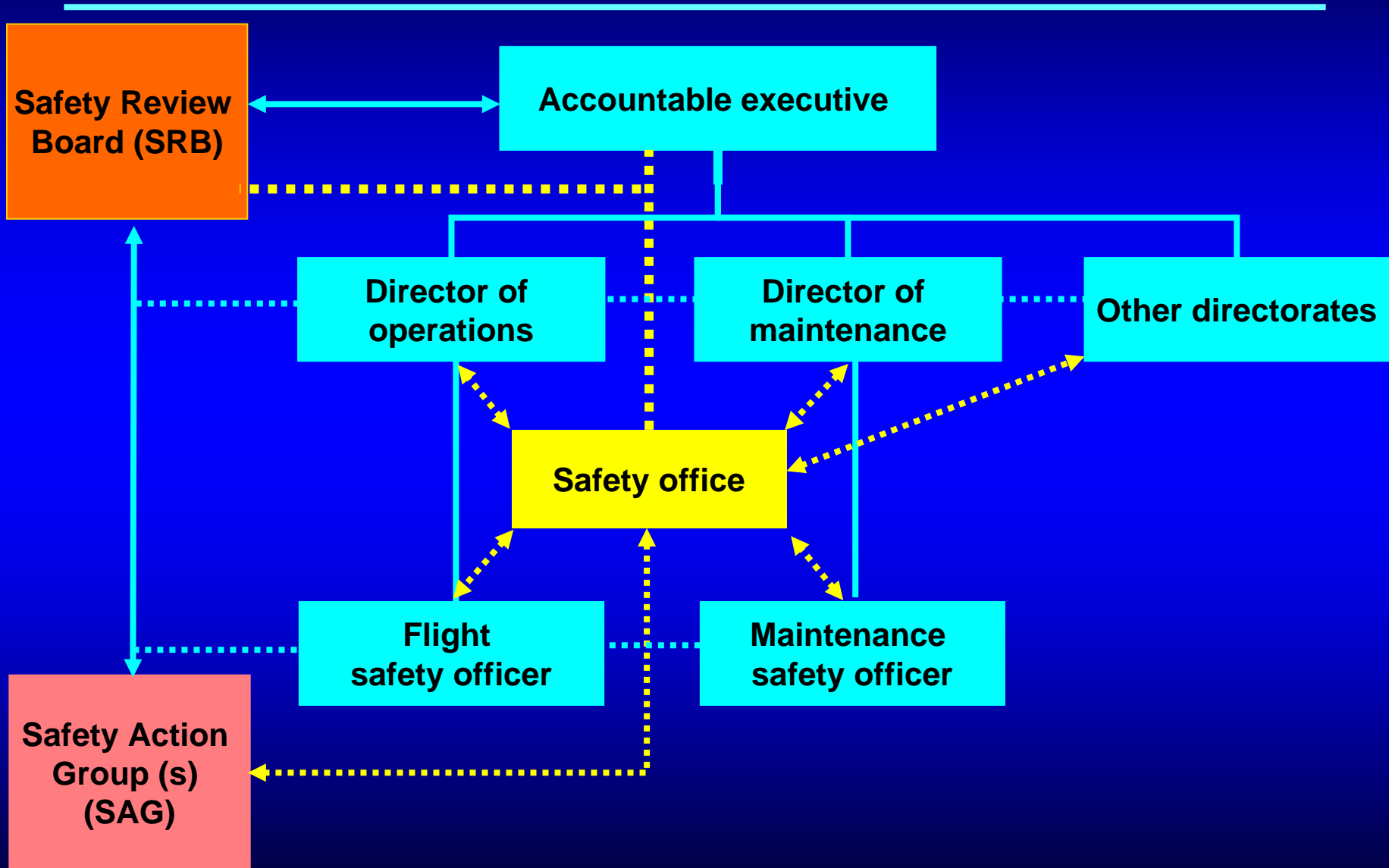
As of 23 November 2006

→ An accepted safety management system shall clearly define **lines of safety accountability** throughout the *[airline, maintenance, ATS provider, certified aerodrome operator]* organization, including **direct accountability for safety on the part of senior management**.

Note. – Guidance on safety management systems is contained in the ICAO Safety Management Manual (Doc 9859).

(Accountability – Obligation or willingness to account for one's actions)

SMS responsibilities– An example



Acceptable level of safety

→ ... Implementation

➤ The relationship between acceptable level of safety, safety performance indicators, safety performance targets and safety requirements is as follows:

- ↳ a) acceptable level of safety is the overarching concept;
- ↳ b) safety performance indicators and safety performance targets are the measures or metrics to determine if the acceptable level of safety has been achieved; and
- ↳ c) safety requirements are the tools or means to achieve the safety indicators and safety targets.

Acceptable level of safety

→... Implementation

- The safety indicators of an acceptable level of safety should be uncomplicated and linked to major components of a State safety programme, or an operator/services provider SMS.
- They are generally expressed in numerical terms. An example of a safety indicator is *0.2 fatal accidents per 100 000 hours of operations*.

Acceptable level of safety

→ ... Implementation

- ↗ The **safety targets** of an acceptable level of safety should be determined weighing what is desirable and what is realistic for individual operator/services providers.
- ↗ Safety targets should be measurable, acceptable to stakeholders, and consistent with the State safety programme.

Acceptable level of safety

→ ... Implementation

➤ The **safety requirements** to achieve the safety targets and safety indicators of an acceptable level of safety should be expressed in terms of operational procedures, technology and systems, programmes, contingency arrangements and so forth, to which measures of reliability, availability and/or accuracy may be added.

From the FAA's Flight Plan for air traffic

→ Design, develop, and implement a Safety Management System (SMS) that complies with ICAO requirements and applies a system safety approach to the FAA's delivery of air traffic services.

→ Performance Targets

→ Maintain Category A and B (most serious) operational errors to a rate of no more than 4.27 per million activities through FY 2008.

Acceptable level of safety

→ Scope

- There will seldom be a single or national acceptable level of safety.
- Most frequently, within each State, there will be different acceptable levels of safety that will be separately agreed between the oversight authority and individual operators/services providers. ...

Acceptable level of safety

→ ... Legal considerations – Operators and service providers

➤ Establishing acceptable level(s) of safety for their safety management system leaves unaffected the obligations of operators or services providers and other related parties, and it does not relieve the operator, services providers and other related parties from compliance with SARPs and/or national regulations, as applicable.

Protecting sources of safety information

- Assembly Resolution A35/17
- Legal guidance developed in Annex 13, Attachment E
- *Safety information must not be used for purposes different from the purposes for which it was collected.*
 - ↗ *Introduction and definitions*
 - ↗ *General principles*
 - ↗ *Principles of protection*
 - ↗ *Principles of exceptions*
 - ↗ *Responsibilities of the custodian of safety information*
 - ↗ *Protection of recorded information*

Why ICAO safety management provisions?

→ A move from prescription to performance

- **Prescriptive regulations** – Prescribe what the safety requirements are and how they are to be met.
- **Performance based regulations** – Specify the safety requirements to be met, but provide flexibility in terms of how safety requirements are met.

ICAO SMS FRAMEWORK

- 1 Safety policy and objectives**

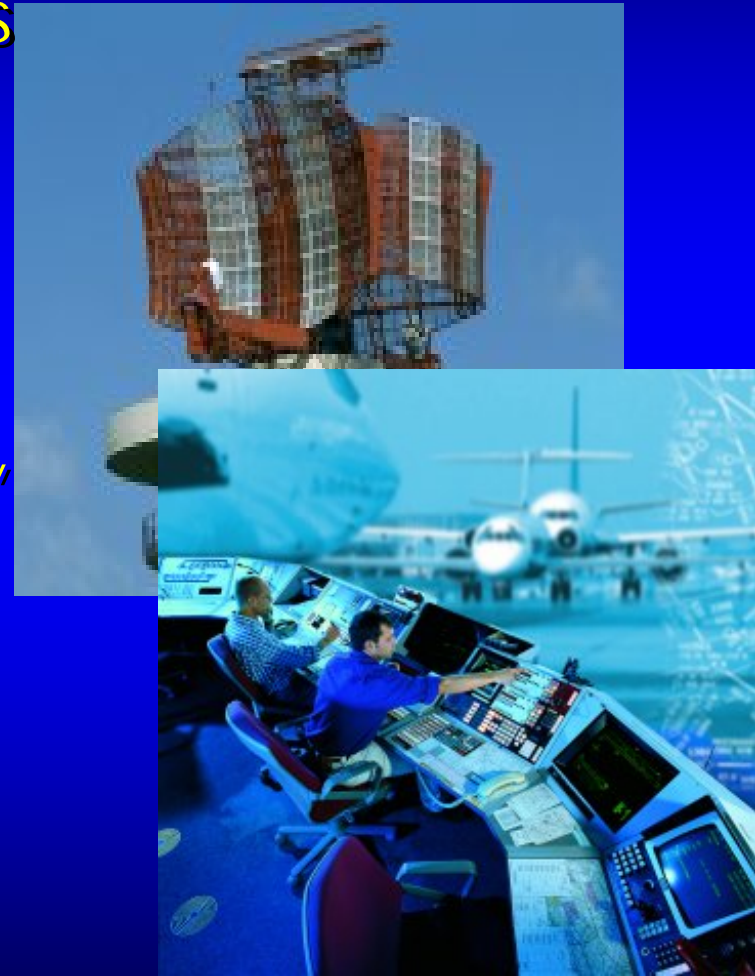
 - 1.1 – Management commitment and responsibility
 - 1.2 – Safety accountabilities of managers
 - 1.3 – Appointment of key safety personnel
 - 1.4 – SMS implementation plan
 - 1.5 – Documentation
- 2 Safety hazard identification and risk management**
 - 2.1 – Hazard identification processes
 - 2.2 – Risk assessment and mitigation processes
 - 2.3 – Internal safety investigations
- 3 Safety assurance**
 - 3.1 – Safety performance monitoring and measurement
 - 3.2 – Audits and surveys
 - 3.3 – The management of change
 - 3.4 – Continuous improvement of the safety system
- 4 Safety promotion**
 - 4.1 – Training and education
 - 4.2 – Safety communication
- 5 Emergency response planning**
 - 5.1 – Development of the emergency response plan

Third fundamental – SMS and QMS

→ SMS differs from quality systems in that:

➤ SMS focuses on the safety, human and organizational aspects of an operation (*i.e., safety satisfaction*)

➤ QMS focus the product (s) of an operation (*i.e., customer satisfaction*)



SMS and QMS

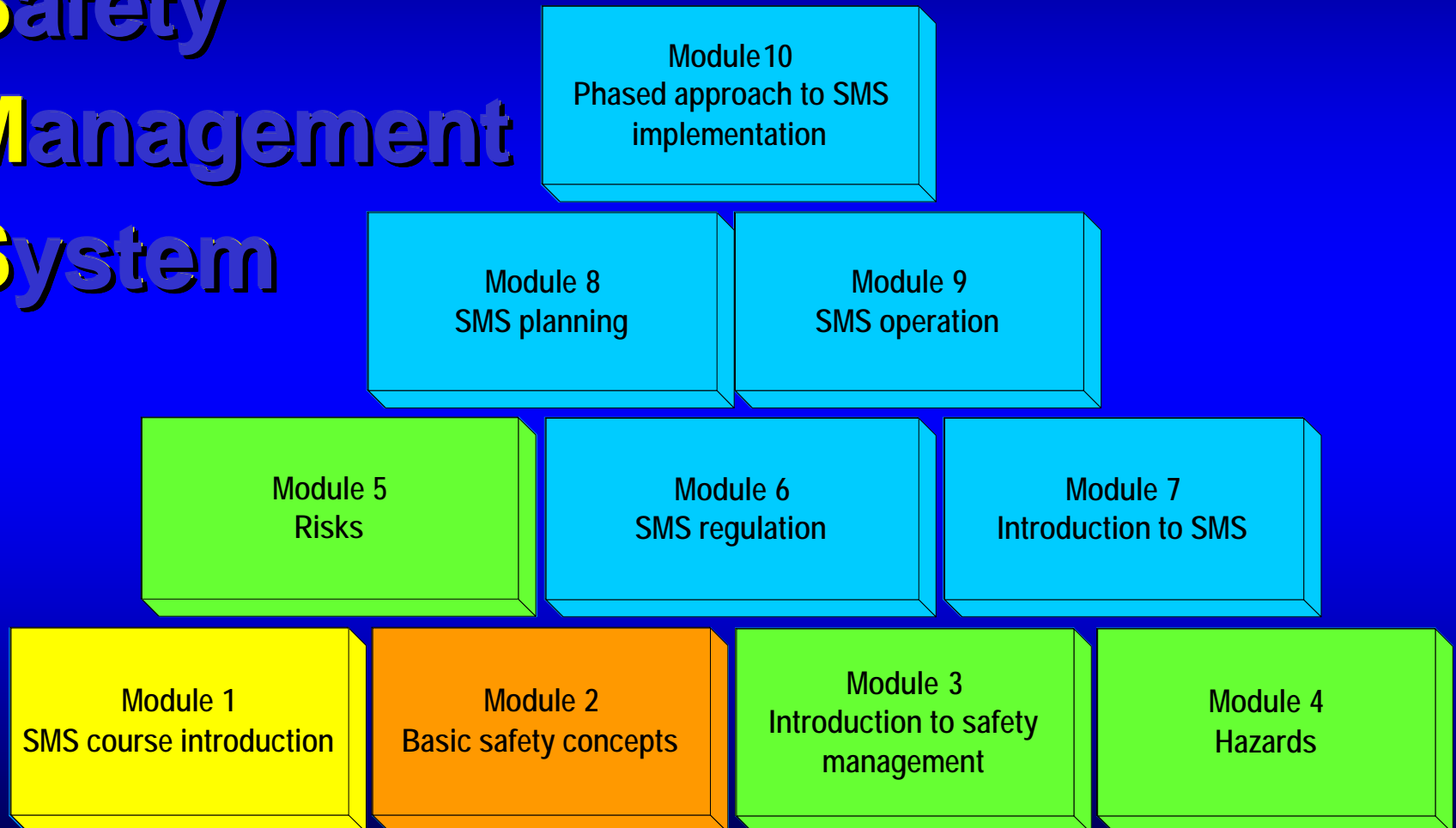
- SMS results in the design and implementation of organizational processes and procedures to identify hazards and control/mitigate risks in aviation operation.
- QMS techniques provide a structured process for ensuring that these processes and procedures achieve their intended objectives and, where they fall short, to improve them.

SMS and QMS – Striking a balance

- SMS builds partly upon QMS principles.
- SMS should include both safety and quality policies.
- The coverage of quality policies should be limited to quality in support of safety.
- Safety objectives should receive primacy where conflicts are identified.

Course structure

Safety Management System



Thank you for all those years of Human Factors research

- SMS requires identification of hazards and risk assessment and mitigation
- Human factors identified the notion of latent conditions
 - Workplace conditions, active failures, threats, defences
- SMS requires a robust reporting process
- Human Factors gave us the notion of a safety/reporting/just culture
- SMS is all about a systemic and proactive approach to safety
- Human Factors identified the organizational accident and role
- Human Factors has caused our understanding of safety to evolve including the notion of human error
- SMS would not be possible without the prior Human Factors work

Summary

- Our knowledge of safety has evolved to understanding and managing risks-there is no perfect safety system
- Safety can and should be managed-SMS
- New harmonized ICAO Standards and Recommended Practices (SARPS)
 - ↗ Safety Programs
 - ↗ SMS
 - ↗ Acceptable level of Safety
- ICAO framework (5 components of SMS)
- QMS is great, but we are stressing SMS
- ICAO is working toward a common understanding
- SMS is an outgrowth of Human Factors work