SMS Senior Management Briefing

Safety

❖ **Traditional approach – Preventing accidents**

➢ Focus on outcomes (causes)

➢ Unsafe acts by operational personnel

➢ Attach blame/punish for failures to "perform safely"

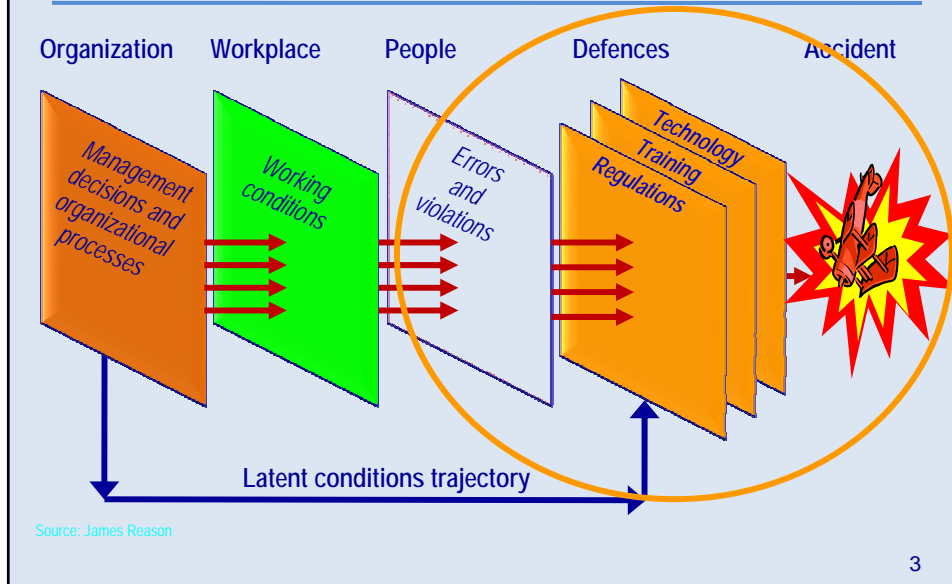➢ Address identified safety concern exclusively

➢ Identifies:

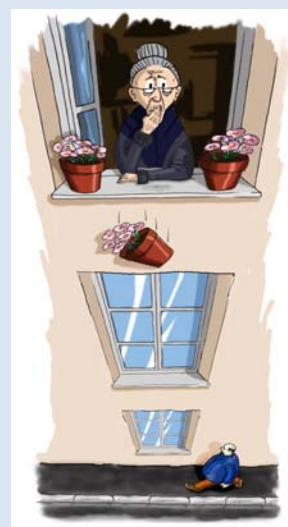**WHAT?**   **WHO?**   **WHEN?**

❖But not always discloses:

WHY?   **HOW?**

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A concept of accident causation

Organization	Workplace	People	Defences	Accident

Management decisions and organizational processes

Working conditions

Errors and violations

Technology
Training
Regulations
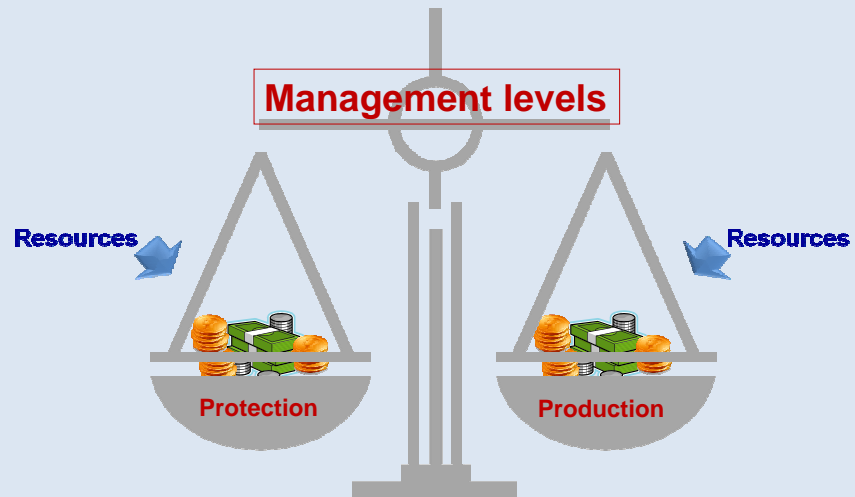
Latent conditions trajectory

Source: James Reason

3

Processes and outcomes

Causes and consequences of operational errors are not linear in their magnitude

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The management dilemma
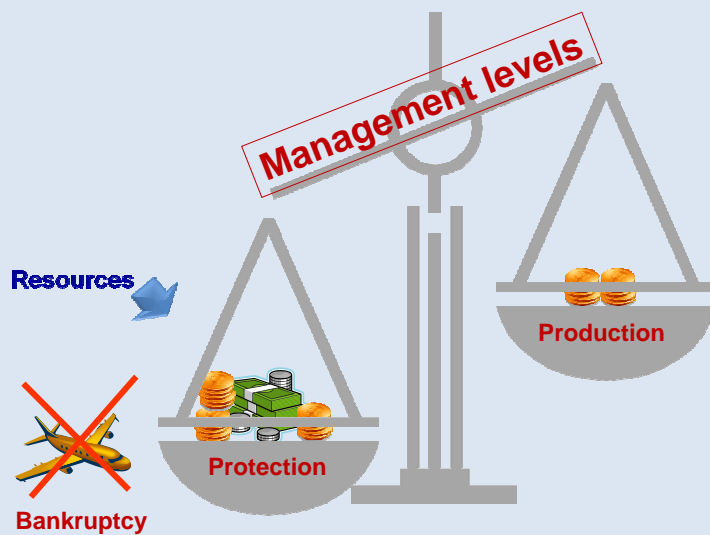

Management levels

Resources → Protection

Resources → Production

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The management dilemma

Management levels

Protection

Resources → Production

Catastrophe

6

The management dilemma

Management levels

Resources

Bankruptcy

Protection

Production

7

Safety space

Financial management

?

Bankruptcy

Protection

Safety space

Catastrophe

Production
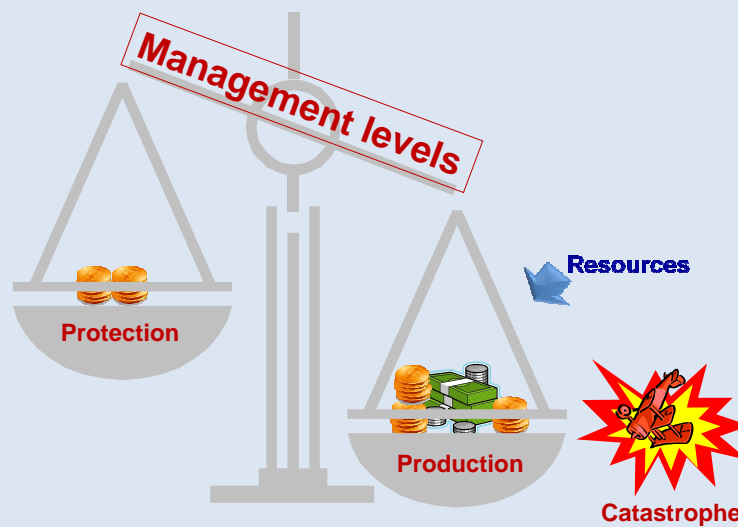
Safety management
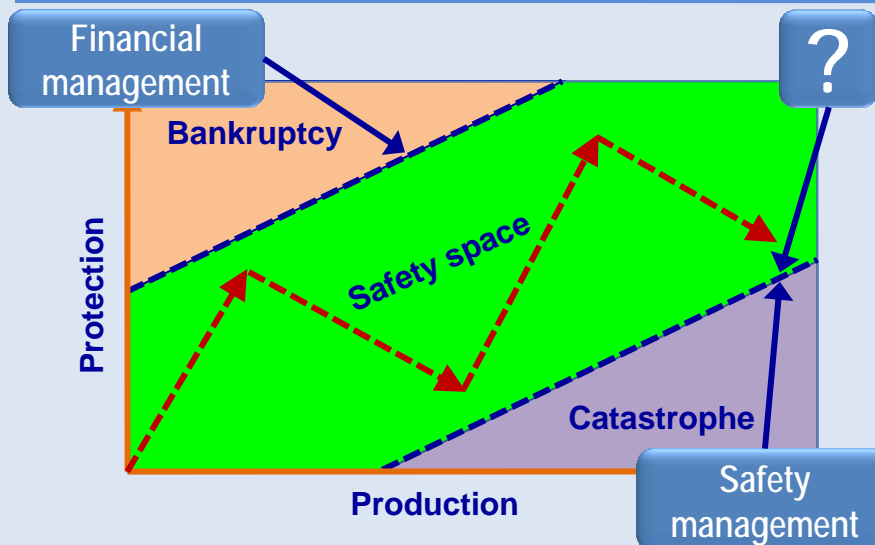
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Why SM? An imperfect system

SMS

System design

Operational deployment

Baseline performance

"Practical drift"

Operational performance

Operational performance

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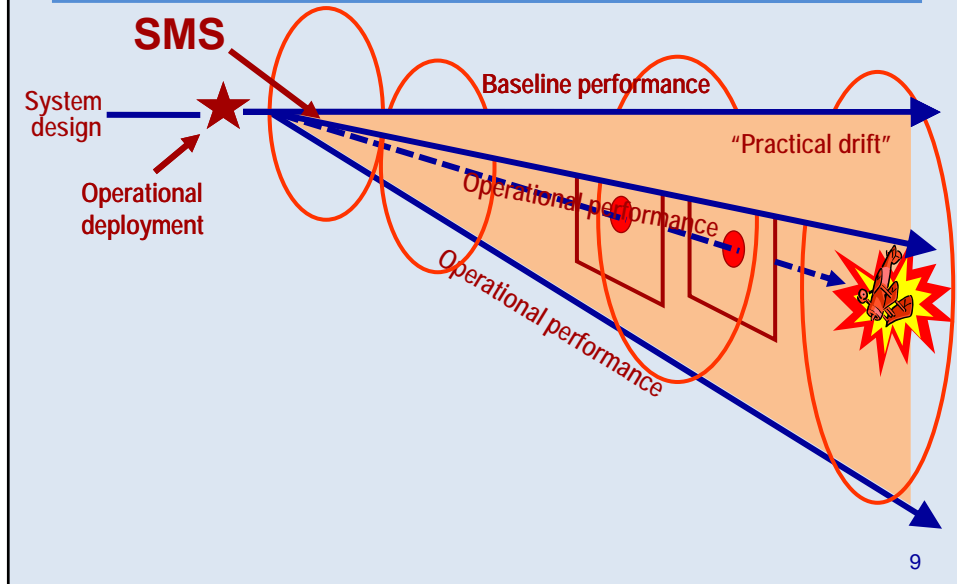
Strategies – Levels of intervention and tools

Safety management levels

Baseline performance

High

Middle

Low

Hazards

| Predictive | Proactive | Reactive | Reactive |

| FDA Direct observation system | ASR Surveys Audits | ASR MOR | Accident and incident reports |

| Highly efficient | Very efficient | Efficient | Insufficient |

Desirable management levels

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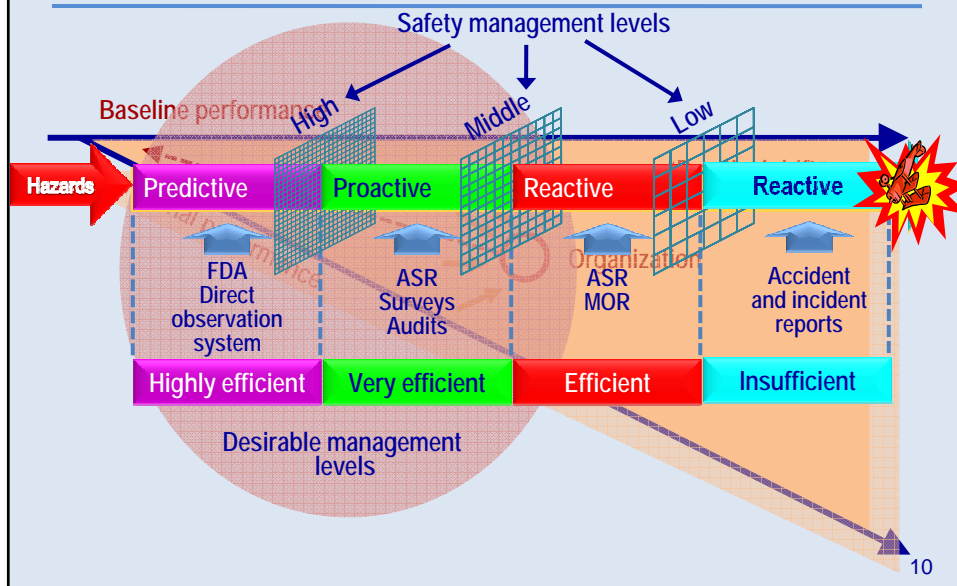
Three possible organizational cultures
regarding the management of information

|	Pathological	Bureaucratic	Generative
Information	Hidden	Ignored	Sought
Messengers	Shouted	Tolerated	Trained
Responsibilities	Shirked	Boxed	Shared
Reports	Discouraged	Allowed	Rewarded
Failures	Covered up	Merciful	Scrutinized
New ideas	Crushed	Problematic	Welcomed
Resulting organization	Conflicted organization	"Red tape" organization	Reliable organization

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Two definitions

❖ Hazard – Condition, object or activity **with the potential** of causing injuries to personnel, damage to equipment or structures, loss of material, or reduction of ability to perform a prescribed function.

❖ Consequence – Potential outcome(s) of the hazard.

➢ *A wind of 15 knots blowing directly across the runway is a hazard.*

➢ *The potential that a pilot may not be able to control the aircraft during takeoff or landing is one of the consequences of the hazard.*

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Examples of <u>natural</u> hazards

❖ Severe weather or climatic events:
  ➢ E.g.: hurricanes, major winter storms, tornadoes and wind shear.
❖ Geophysical events:
  ➢ E.g.: earthquakes, volcanoes, tsunamis, floods and landslides.
❖ Geographical conditions:
  ➢ E.g.: adverse terrain or large bodies of water.
❖ Environmental events:
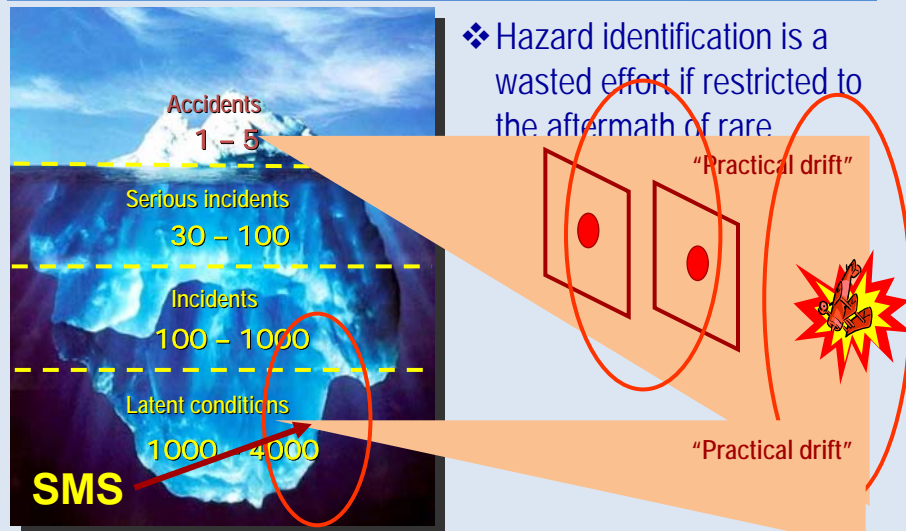 ➢ E.g.: wildfires, wildlife activity, and insect or pest infestation.
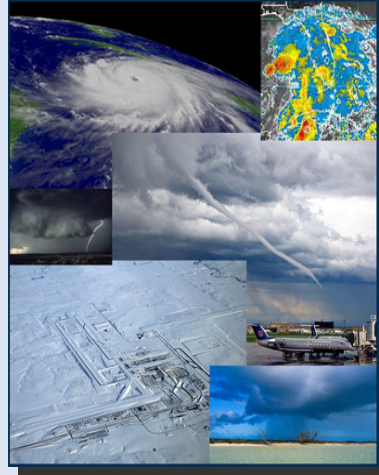
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Examples of <u>technical</u> and <u>economic</u> hazards

❖ Deficiencies regarding:
  ➢ E.g.: aircraft and aircraft components, systems, subsystems and related equipment.

❖ Major trends related to:

  ➢ Growth.

  ➢ Recession.

  ➢ Cost of material or

     equipment.

  ➢ Etc.

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The focus of hazard identification

Accidents
1 – 5

Serious incidents
30 – 100

Incidents
100 – 1000

Latent conditions
1000 – 4000

SMS

"Practical drift"

"Practical drift"

❖ Hazard identification is a wasted effort if restricted to the aftermath of rare

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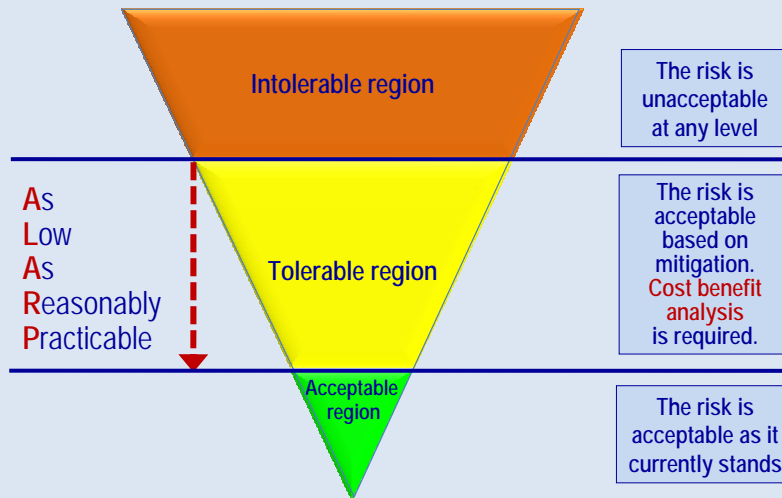
Definition of risk

❖ **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.

➢ *A wind of 15 knots blowing directly across the runway is a hazard.*

➢ *The potential that a pilot may not be able to control the aircraft during takeoff or landing is one of the consequences of the hazard.*

➢ *The assessment of the consequences of the potential loss of control of the aircraft by the pilot expressed in terms of probability and severity is the risk.*

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Risk management

Intolerable region	The risk is unacceptable at any level
As **L**ow **A**s **R**easonably **P**racticable — Tolerable region	The risk is acceptable based on mitigation. **Cost benefit analysis** is required.
Acceptable region	The risk is acceptable as it currently stands

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Second fundamental - Risk probability

Probability of occurrence

Qualitative definition	Meaning	Value
Frequent	Likely to occur many times *(has occurred frequently)*	5
Occasional	Likely to occur some times *(has occurred infrequently)*	4
Remote	Unlikely, but possible to occur *(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

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Third fundamental – Risk severity

Severity of occurrences		
Aviation definition	**Meaning**	**Value**
Catastrophic	➢Equipment destroyed. ➢Multiple deaths.	A
Hazardous	➢A large reduction in safety margins, physical distress or a workload such that the operators cannot be relied upon to perform their tasks accurately or completely. ➢Serious injury. ➢Major equipment damage.	B
Major	➢A significant reduction in safety margins, a reduction in the ability of the operators to cope with 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	➢Little consequences	E

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Fourth fundamental – Risk assessment

Risk probability	Risk severity				
	Catastrophic A	**Hazardous B**	**Major C**	**Minor D**	**Negligible E**
Frequent 5	5A	5B	5C	5D	5E
Occasional 4	4A	4B	4C	4D	4E
Remote 3	3A	3B	3C	3D	3E
Improbable 2	2A	2B	2C	2D	2E
Extremely improbable 1	1A	1B	1C	1D	1E

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Fourth fundamental – Risk tolerability

Risk management	Assessment risk index	Suggested criteria
Intolerable region	**5A, 5B, 5C, 4A, 4B, 3A**	Unacceptable under the existing circumstances
Tolerable region	**5D, 5E, 4C, 4D, 4E, 3B, 3C, 3D, 2A, 2B, 2C**	Acceptable based on risk mitigation. It might require management decision
Acceptable region	**3E, 2D, 2E, 1A, 1B ,1C, 1D, 1E**	Acceptable

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SMS – Introductory concepts

❖ A toolbox
  ➤ 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.

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The components of SMS

❶ Safety policy and objectives

❷ Safety risk management

❸ Safety assurance

❹ Safety promotion

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The elements of SMS

❶ 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 emergency response planning

1.6 – Documentation

❷ Safety risk management

2.1 – Hazard identification processes

2.2 – Risk assessment and mitigation processes

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The elements of SMS

❸ Safety assurance

    3.1 – Safety performance monitoring and measurement

    3.2 – The management of change

    3.3 – Continuous improvement of the SMS

❹ Safety promotion

    4.1 – Training and education

    4.2 – Safety communication

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ICAO SMS framework

❶ 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 emergency response planning
    1.6 – Documentation
❷ Safety risk management
    2.1 – Hazard identification processes
    2.2 – Risk assessment and mitigation processes
❸ Safety assurance
    3.1 – Safety performance monitoring and measurement
    3.2 – The management of change
    3.3 – Continuous improvement of the SMS
❹ Safety promotion
    4.1 – Training and education
    4.2 – Safety communication

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Safety responsibilities – An example

- Safety Review Board (SRB)
- Accountable executive
- Operations
- Maintenance
- other areas
- Flight safety officer
- Maintenance safety officer
- Safety Action Group(s) (SAG)
- Safety services office

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The bridge

Civil Aviation Authority → State's safety programme ← Service Providers SMS

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State's safety programme

❖ **Definition**

➢ *An integrated set of regulations and activities aimed at improving safety.*

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State's safety programme

❖ **Implementation**

➢ Develop the State's safety programme around the following four components:

1. State's safety policy and objectives

2. State's safety risk management

3. State's safety assurance

4. State's safety promotion

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State's safety programme components

1. State's safety policy and objectives

❖ How the CAA will oversee the management of safety in the State.

  ➢ A definition of CAA requirements, responsibilities and accountabilities regarding the State's safety programme.

  ➢ Similar to the equivalent SMS component.

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State's safety programme components

2. State's safety risk management

❖ Establishment of controls which govern how service providers SMS will operate:

  ➢ Standards/requirements for service providers SMS

  ➢ Same processes as SMS

    ▪ Hazard identification and risk management

  ➢ Different outputs

    ▪ New/modified rules and/or regulations (i.e., controls) which govern how service providers SMS operate.

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State's safety programme components

3. State's safety assurance

❖ Ensuring that the operation of service providers SMS follows established controls (standards / requirements)

  ➤ Oversight, inspections and audits

  ➤ Data tracking and analysis

    ▪ Data driven targeting of oversight on areas of greater concern/need.

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State's safety programme components

4. State's safety promotion

❖ Support the integration of the State safety programme with the operation of service providers SMS

  ➤ Training, communication and dissemination of safety information

  ➤ Dual-track promotion

    ▪ Within the CAA

    ▪ Among service providers it oversees

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State's safety programme framework

1. **State's safety policy and objectives**
   - 1.1 CAA safety standards
   - 1.2 CAA safety responsibilities and accountabilities
   - 1.3 Accident and incident investigation
   - 1.4 Enforcement policy
2. **State's safety risk management**
   - 2.1 Safety requirements for service providers SMS
   - 2.2 Approval of service providers acceptable levels of safety
3. **State's safety assurance**
   - 3.1 Safety oversight
   - 3.2 Safety data collection, analysis and exchange
   - 3.3 Safety data driven targeting of oversight on areas of greater concern or need
4. **State's safety promotion**
   - 4.1 Internal training, communication and dissemination of safety information
   - 4.2 External training, communication and dissemination of safety information

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CAAs – Four steps to support SMS implementation

STEP 1 – State's safety programme gap analysis:
- ❖ Conduct a gap analysis vis-à-vis the current status in the State of the following:
1. **State's safety policy and objectives**
   - 1.1 CAA safety standards
   - 1.2 CAA safety responsibilities and accountabilities
   - 1.3 Accident and incident investigation
   - 1.4 Enforcement policy
2. **State's safety risk management**
   - 2.1 Safety requirements for service providers SMS
   - 2.2 Approval of service providers acceptable levels of safety
3. **State's safety assurance**
   - 3.1 Safety oversight
   - 3.3 Safety data driven targeting of oversight on areas of greater concern or need
4. **State's safety promotion**
   - 4.1 Internal training, communication and dissemination of safety information
   - 4.2 External training, communication and dissemination of safety information

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CAAs – Four steps to support SMS implementation

STEP 2 – CAA training programme:

❖ Develop a training programme for CAA officers to:

➢ provide knowledge of **safety management concepts and ICAO SARPs** on safety management in Annexes 6, 11 and 14, and related guidance material; and

➢ develop knowledge to **certify and oversee** the implementation of key components of an SMS, in compliance with the national regulations and relevant ICAO SARPs.

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CAAs – Four steps to support SMS implementation

STEP 3 – Implementation SMS SARPs:

❖ Develop SMS regulations for operators/service providers.

➢ Refer to the SMS components and elements as per the ICAO SMS training course.

❖ Prepare guidance material for the implementation of SMS.

➢ Refer to ICAO Doc 9859 and the ICAO SMS training course.
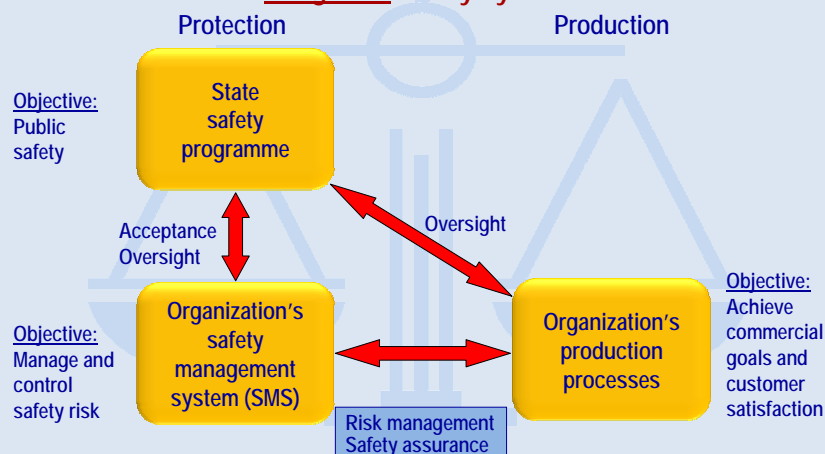
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CAAs – Four steps to support SMS implementation

STEP 4 – CAA enforcement policy:

❖ As part of the State's safety programme, revise the CAA's enforcement policy.

➢ Operators/service providers allowed to deal with deviations/minor violations internally, within the context of the SMS, to the satisfaction of the authority.

➢ Gross negligence, wilful deviation and so forth to be dealt through established enforcement procedures.

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A vision of the future – Integration

State's safety programme + Service providers SMS = Integrated safety system

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