SMS Into the Future

Capt Hesham Hamy

AVIA SAFETY CONSULTANCY GROUP

We focus towards Safety

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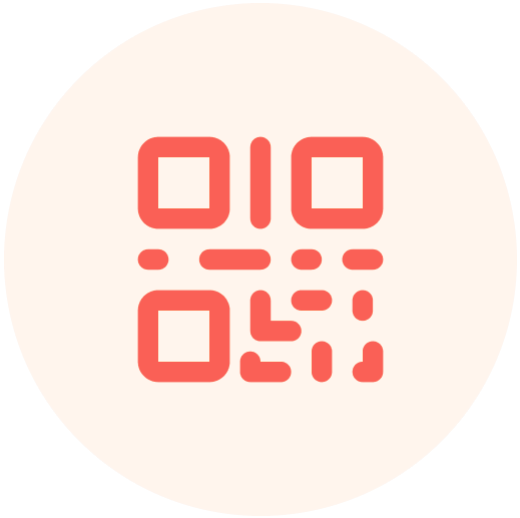

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What is Safety?

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Concept of safety

- **What is safety?**
  - Zero accidents or serious incidents *(a view widely held by the travelling public)*
  - Freedom from hazards *(i.e. those factors which cause or are likely to cause harm)*
  - Attitudes towards unsafe acts and conditions by employees of aviation organizations
  - Error avoidance
  - Regulatory compliance
  - … ?

Safety definition

- Safety is increasingly viewed as the outcome of the management of certain organizational processes,
- which have the objective of keeping the safety risks of the consequences of hazards in operational contexts under
- organizational control. Thus, for the purposes of this manual, safety is considered to have the following meaning

"The state in which the **possibility** of harm to persons or of property damage is reduced to, and maintained at or below, an **acceptable level** through a **continuing process of hazard identification and safety risk management." (ICAO, DOC9859)**

Safety = no unacceptable risks

About Us

Capt Hesham Hamy

Managing Director/Principal Consultant (Avia Safety Consult.)

Corporate Safety General Manager/SMS Postholder

Current PhD Student (Psychological Safety and Leadership Styles in Aviation)

Masters Degree (Aviation Safety) – University of Newcastle, Australia

- Type Rating Instructor / Examiner (Bell 206/212/412 Helicopters)
- Approved SMS/HF/CRM Instructor

- Your Name
- Title
- Brief Background
- What you aim to get from this session

Housekeeping

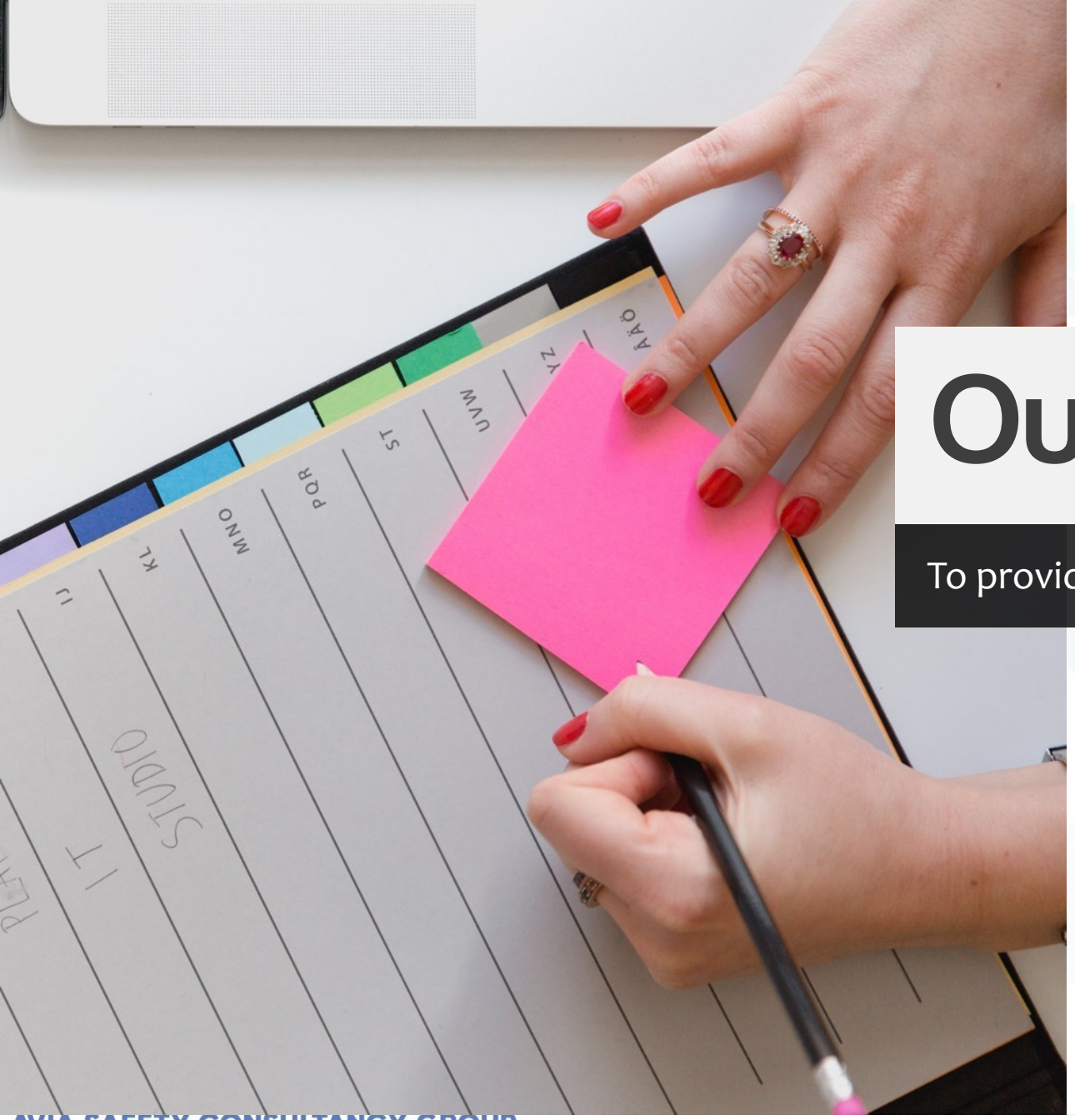
Punctuality

Phones

Participation

No Smoking

More Importantly NO SLEEPING



Our Goal

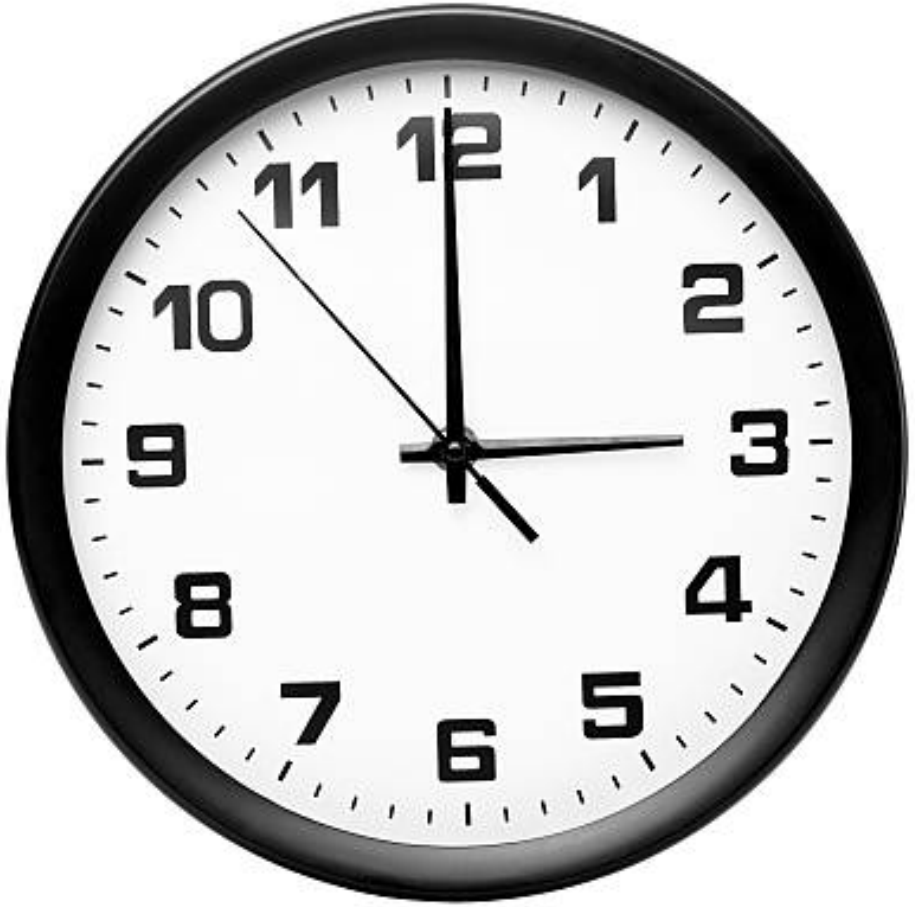
To provide you with a practical approach into SMS

Future of SMS

- Safety Management Policy
- Safety Risk Management
- Safety Assurance
- Safety Promotion

Schedule

- 09:30-10:45 – Session Activity
- 10:45 -11:00 - Coffee/Tea break
- 11:00 -12:30 – Lunch Break
- 12:30 - 13:30 – Session Activity
- 13:30 – 14:15 - Coffee/Tea break
- 14:15 – 15:30 – END



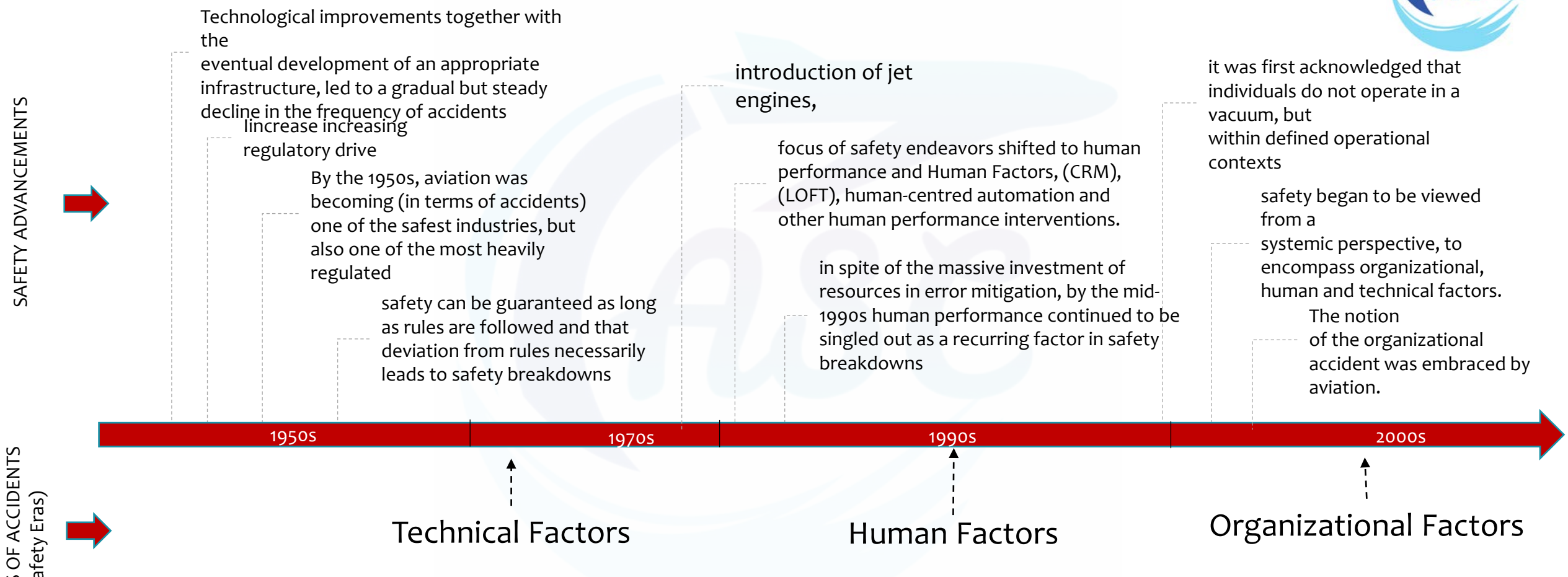
Where did it come from?

Three separate threads coming together:

- System Safety concepts (hazard, risk, mishaps)
- Human Factors –ergonomics (human machine interface), physiology (eg fatigue, stress), psychology (social, organisational, cognitive)
- Business Management –for aviation, driven in part by deregulation.

- Major drivers were a series of major investigations and root cause analysis into major disasters.

Safety Thinking Evolution



It is a tribute to the aviation safety community and its unrelenting endeavors that in a mere century aviation has progressed, from a safety perspective, from a fragile system to the first ultra-safe system in the history of transportation. In retrospect, the history of the progress of aviation safety reliability can be divided into three distinct eras, each with fundamentally differing attributes.

Accident costs

In average an aviation organization faces the following lossess whenever incidents or accidents occur:

Human Costs

Loss of Lives: Passengers, Company staff

- Loss of life of clients (Reputational damage of the organization)
- Loss of live of Company personnel
- (Moral damage to Company personnel)

«…If you think Safety is expensive, try having an accident…»

Economic Costs

Direct Costs:

- Total loss of equipment and/or infrastructure (Million of dollars USD)
- Short term compensations

Indirect Costs:

- Up to 19 times the direct costs.
- Loss of operational capability (Ops cancellation, delays)
- Reputational damage of the organization
- Raise in Insurance premiums
- Customer loyalty compromised
- Long term compensations

The essential is invisible to the eyes

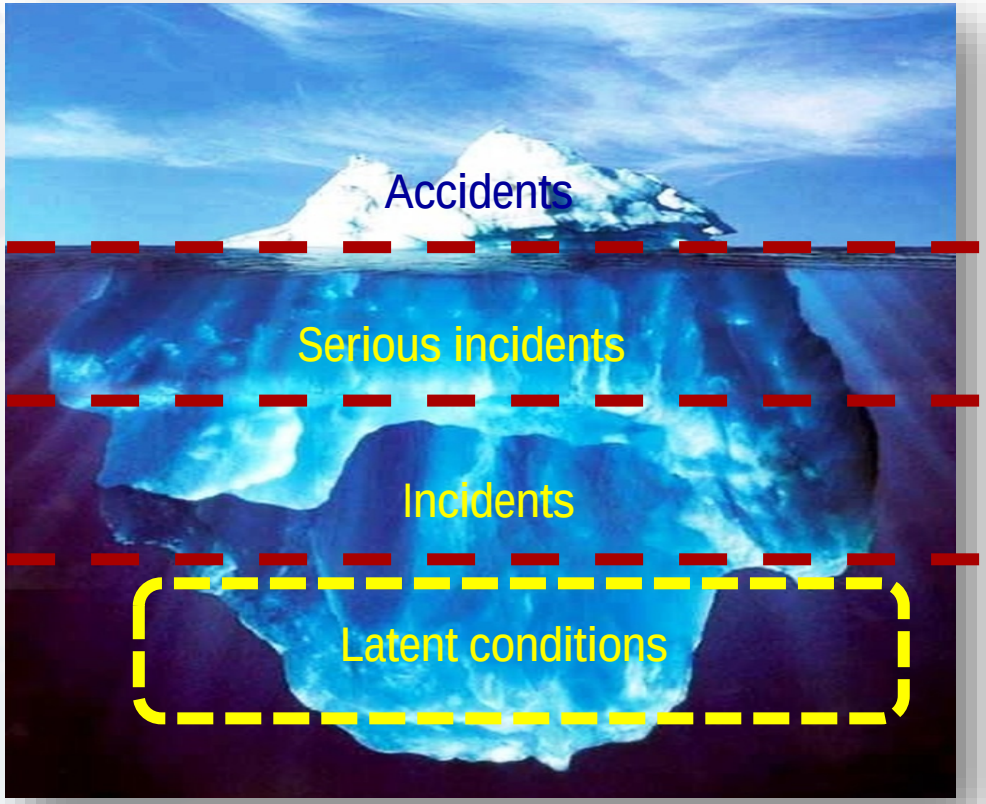
Number of occurrences

1 – 5

30 – 100

100 – 1000

1000 – 4000



Latent conditions

LATENT CONDITIONS

	Percentage Contribution
Safety Management	39%
Regulatory Oversight	33%
Flight Operations	30%
Flight Ops: SOPs & Checking	30%
Selection Systems	19%
Management Decisions	17%
Flight Ops: Training Systems	9%
Maintenance Operations	7%
Maintenance Ops: SOPs & Checking	7%
Design	6%
Maintenance Ops: Training Systems	4%
Ops Planning & Scheduling	2%
Technology & Equipment	2%
Dispatch	2%
Change Management	2%
Dispatch Ops: SOPs & Checking	2%

SMS into the Future

- HIGH RISK Operations
- Sophisticated Systems required to deliver highly safe operations
- Continuous Improvement of Safety
- Address ongoing gaps
- Evolving technology
- Deep Data Analysis
- Better solutions to improving the Safety Culture
- Incorporating HUMAN FACTORS into SMS
- A GOOD SMS can save you money

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Why do we need SMS in our organisations? How do you feel it can be better?

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Organizational Systems are the answer....

How Organizational systems are created?

- Organizational systems are established by boards in order to generate value to stake holders
- They are based in the systematic application of activities to develop a service or a product
- This establishment is heavily relies on a decision making process for recourse allocation
- This implies that we can control at some point organizational processes despite the context in which operations take place
- In order to assure safe operations, resourse allocation should be balanced between al areas of the organization

The vulnerabilities of operational systems

"Work as imagined"

Operations as planned

System Design

Operational deployment

Operational Realities

"Work as actually done"

Uncoupling of practice from procedure

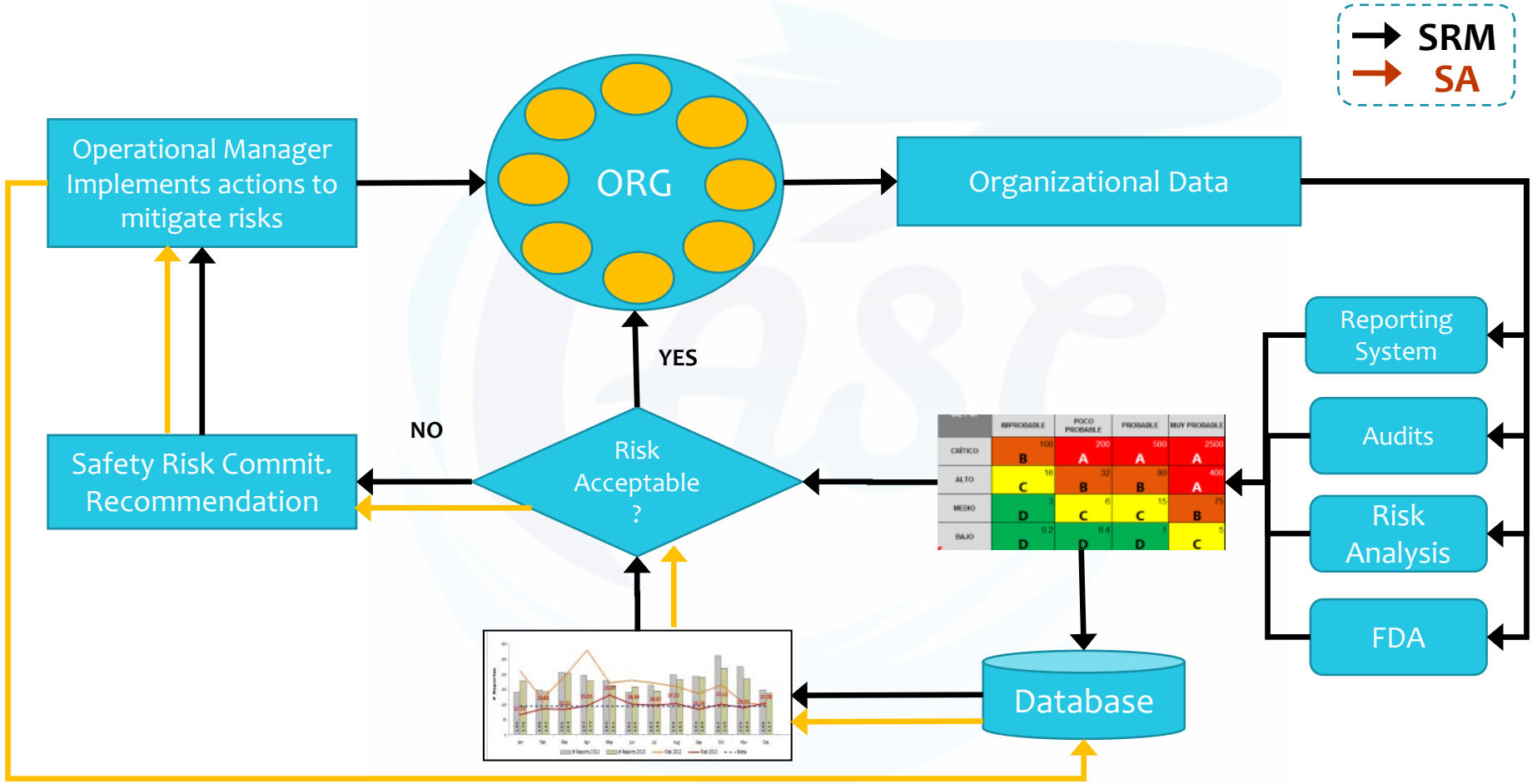
Why?

- ↗ Service delivery pressures
- ↗ Procedure no longer practical
- ↗ Short cuts are more efficient
- ↗ Supervisors allow it
- ↗ Informal practices develop
- ↗ Training inadequately conveys knowledge & skills

Making the system operational

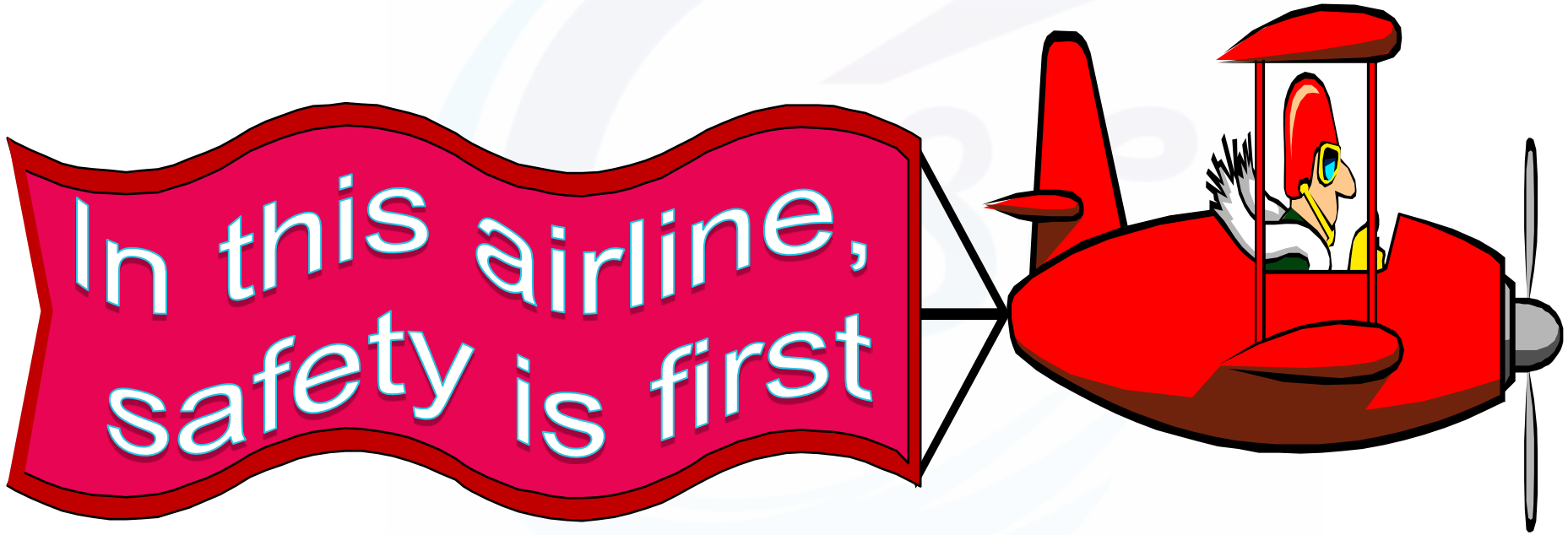
- A practical drift from baseline performance to operational performance is unavoidable in any system, no matter how careful and well thought out its design planning may have been.
- The reasons for the practical drift are multiple-fold:
  - technology that does not always operate as predicted;
  - procedures that cannot be executed as planned under dynamic operational conditions;
  - regulations that are not quite mindful of contextual limitations;
  - introduction of subtle changes to the system after its design without the corresponding reassessment of their impact on basic design assumptions;
  - addition of new components to the system without an appropriate safety assessment of the hazards such components might introduce;
  - the interaction with other systems; and so forth.

Safety Management Systems



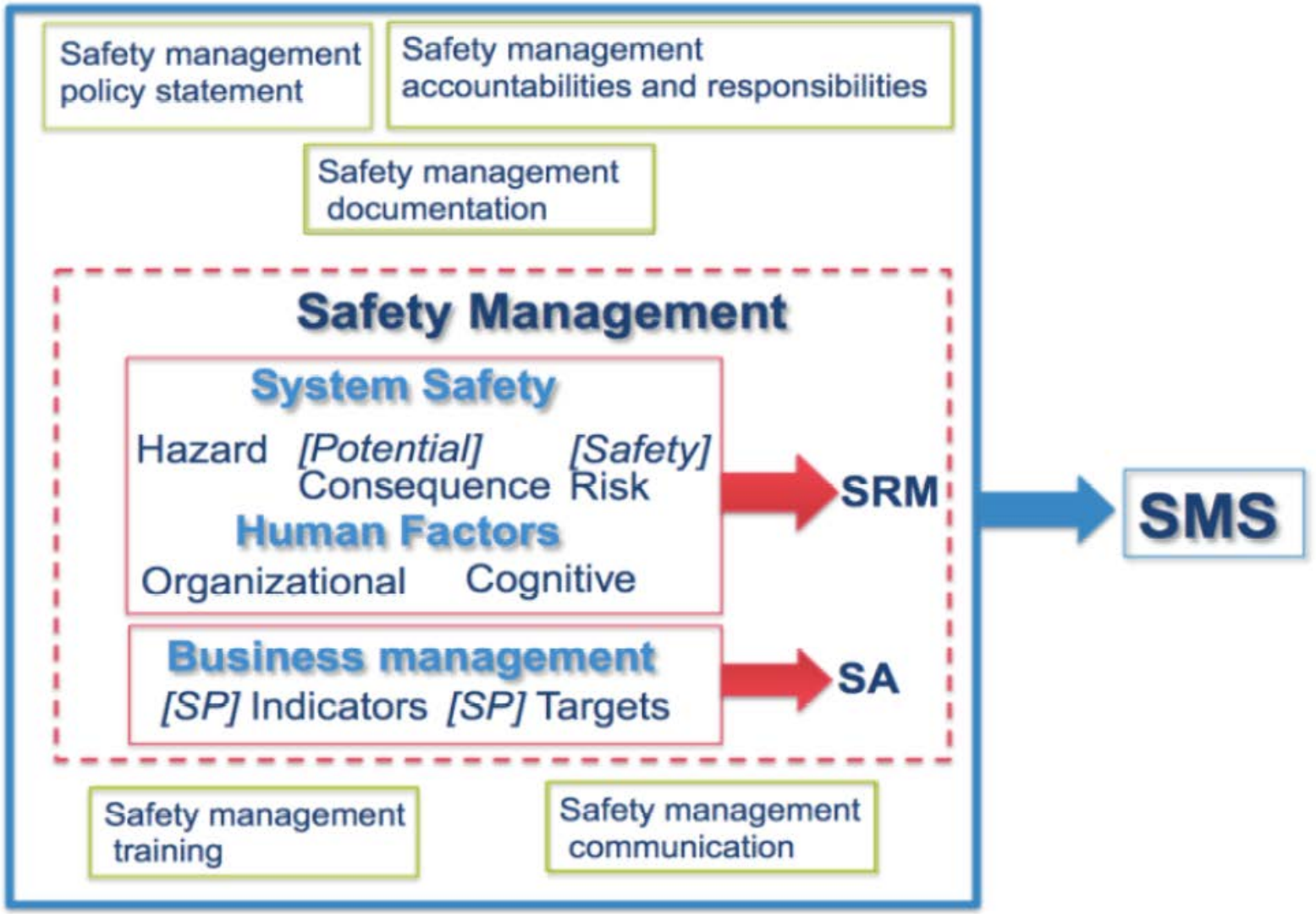
The implementation of a systematic process for the acquisition and analysis of data, allows the control of risks that are inherent to Production activities of the organization

The safety stereotype



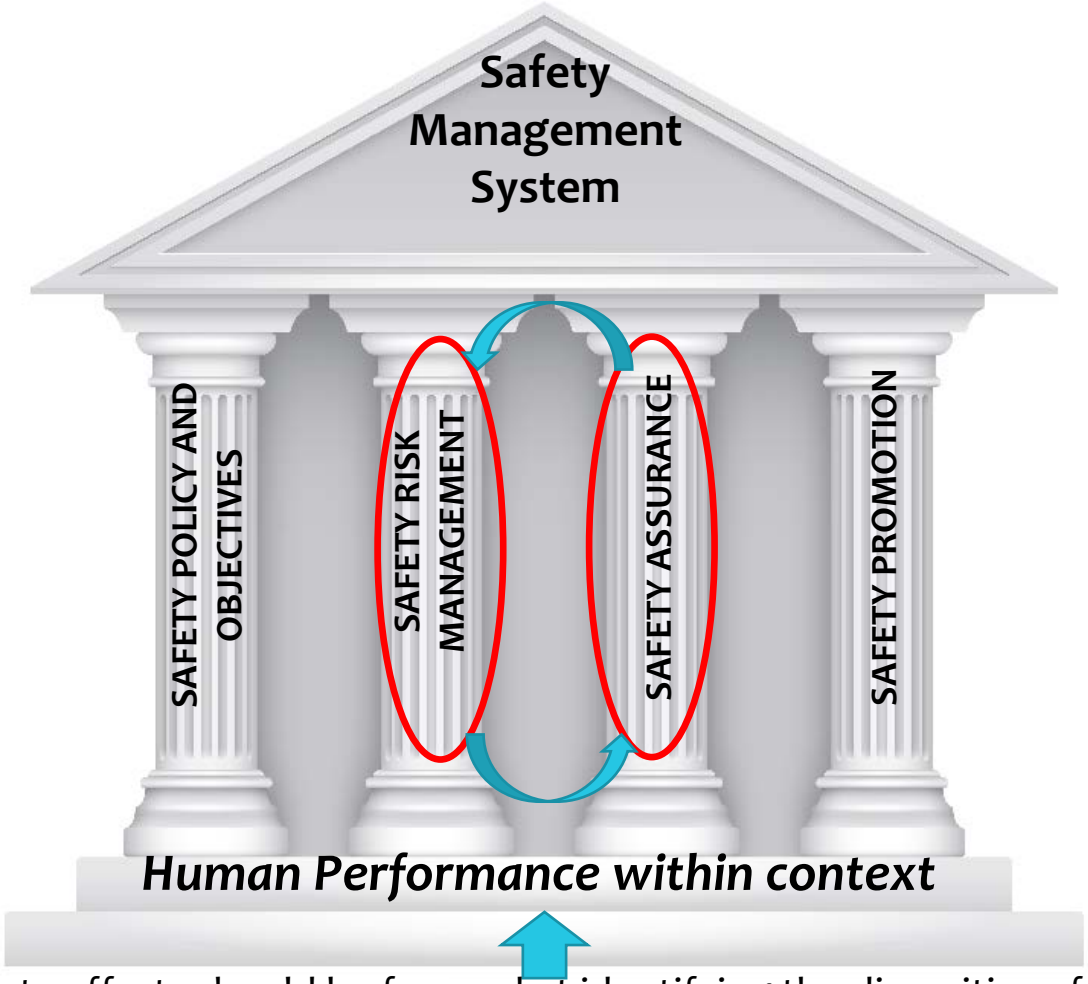
Introduction

What's in the SMS?



So what's different from past safety management activities and SMS?

Safety Management System



Safety efforts should be focused at identifying the disparities of the interactions of Humans with various elements of the system

Safety Management System

A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures . (Doc 9859 ICAO).

The aim of an SMS is to generate useful, relevant and reliable data for adequate risk based decision making for resource allocation!!

The ICAO Components of SMS

1. **Safety policy and objectives**

   1.1 – Management commitment and responsibility

   1.2 – Safety accountabilities

   1.3 – Appointment of key safety personnel

   1.4 – Coordination of emergency response planning

   1.5 – SMS documentation

2. **Safety risk management**

   2.1 – Hazard identification

   2.2 – Risk assessment and mitigation.

The ICAO Components of SMS

❸ Safety assurance

3.1 – Safety performance monitoring and measur

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.

1 Safety policy and objectives

1.1 – Management commitment and responsibility

1.2 – Safety accountabilities

1.3 – Appointment of key safety personnel

1.4 – Coordination of emergency response planning

1.5 – SMS documentation

Where do we start implementing SMS?

Preparing for SMS

3 basic activities need to be performed to start the implementation process:

- System description
- Gap Analysis
- Implementation Plan

Top Level Management Buy-in

1.2 Safety Accountability

	DUTIES	RESPONSABILITY
ACCOUNTABLE EXCECUTIVE	•Resource Allocation •Sign, promote and enforce the Safety Policy	•Accountable to the authority in case of accidents and for SMS implementation
SAFETY MANAGER	•Develop, Implement and maintain SMS in the organization	•Accountable to the Accountable executive for the implementation and maintenance of SMS
HIGH AND MEDIUM MANAGEMENT	•Resource allocation •Implement corrective actions to control risks •Report Hazards and/or events that affect or can affect Safety	•Accountable to the Accountable Executive for the results of the respective area •Accountable to the CAA in case of accidents
ORGANIZATIONAL PERSONNEL	•Report Hazards and/or events that affect or can affect Safety	•Comply with local regulations and organizational policies, process and procedures.

1.3. Safety Review Committee

- The SRC is a very high-level committee, chaired by the accountable executive and composed of senior managers, including line managers responsible for functional areas as well as those from relevant administrative departments.
- The safety manager participates in the SRC in an advisory capacity only. The SRC may meet infrequently, unless exceptional circumstances dictate otherwise.

1.3. Safety Action Group

- Once a strategic direction has been developed by the SRC, implementation of safety strategies must be coordinated throughout the organization.
- This can be accomplished by creating a safety action group (SAG).
- SAGs are composed of line managers and front-line personnel and are normally chaired by a designated line manager.
- SAGs are tactical entities that deal with specific implementation issues per the direction of the SRC

SMS - Implementation

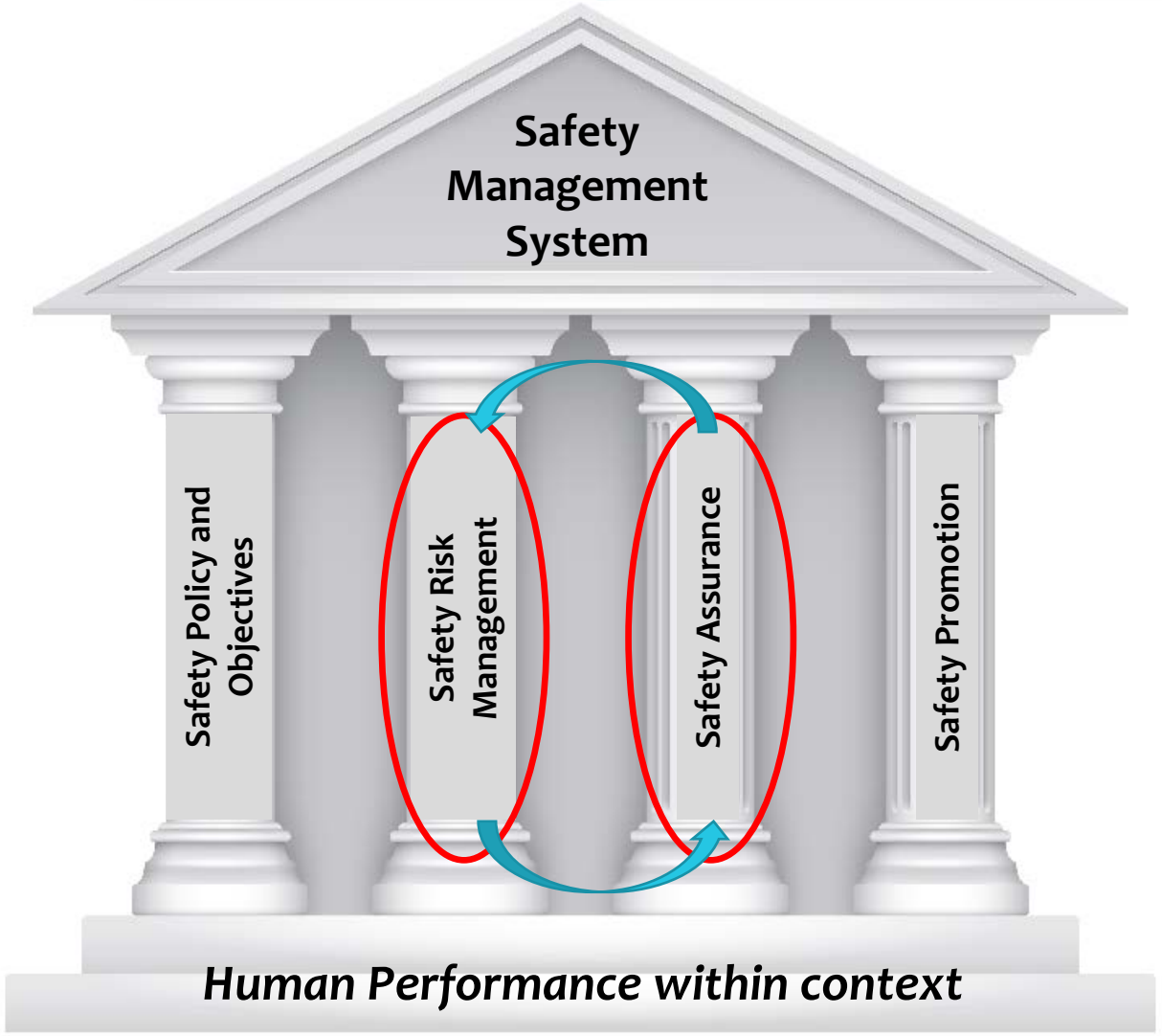
- Development Challenge
  - Change is Difficult
  - Behavior Change (No accident means Safety)
- Clear Communication and easy Processes
- Top – Lowest level Person

- Electronic Reporting
- Flight Data Monitoring
- Line Operational Safety Audits
- Fatigue Risk Management
- Risk Based Audits

- Safety Review Meetings
- Safety Case Studies
- Safety Monitoring and Analysis
  - Safety – performance indicators and Targets
  - Quality – performance indicators
  - Investigations – status reports
  - Review trends and causal factors

What are the processes and procedures of SMS?

SMS Core procesess



❷ Safety risk management

2.1 – Hazard identification

2.2 – Risk assessment and mitigation.

How can we implement a continuing process of hazard identification and safety risk management?

2.1 Hazard Identification- Identification sources

There are a variety of data sources of hazard identification that may be both internal and external to the organization.

INTERNAL SOURCES

a) normal operation monitoring schemes (e.g. flight data analysis for aircraft operators);
b) voluntary and mandatory reporting systems;
c) safety surveys;
d) safety audits;
e) feedback from training; and
f) investigation and follow-up reports on accidents/incidents.

EXTERNAL SOURCES

a) industry accident reports;
b) State mandatory incident reporting systems;
c) State voluntary incident reporting systems;
d) State oversight audits; and
e) information exchange systems.

Safety Risk Management

Safety Risk Management

- Safety risk management requires the service provider to develop and maintain a formal process to identify hazards that may contribute to aviation safety-related occurrences. Hazards may exist in ongoing aviation activities or be inadvertently introduced into an operation whenever changes are introduced to the aviation system.
- SRM is composed of three main activities:
  - Hazard Identification
  - Risk Evaluation
  - Risk Mitigation

SRM = HI+RE+RM

Hazard Identification

What is a Hazard?

- a condition or an object with the potential to cause death, injuries to personnel, damage to equipment or structures, loss of material, or reduction of the ability to perform a prescribed function.
- There is a common tendency to confuse hazards with their consequences or outcomes.
- A consequence is an outcome that can be triggered by a hazard
  - *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 **consequences** of the hazard.*

Hazard and consequence

The Fundamentals of Hazards

- **Natural hazards:**

  ✓Severe or adverse weather conditions

- **Technical Hazards:**

  ✓Technical or system failures

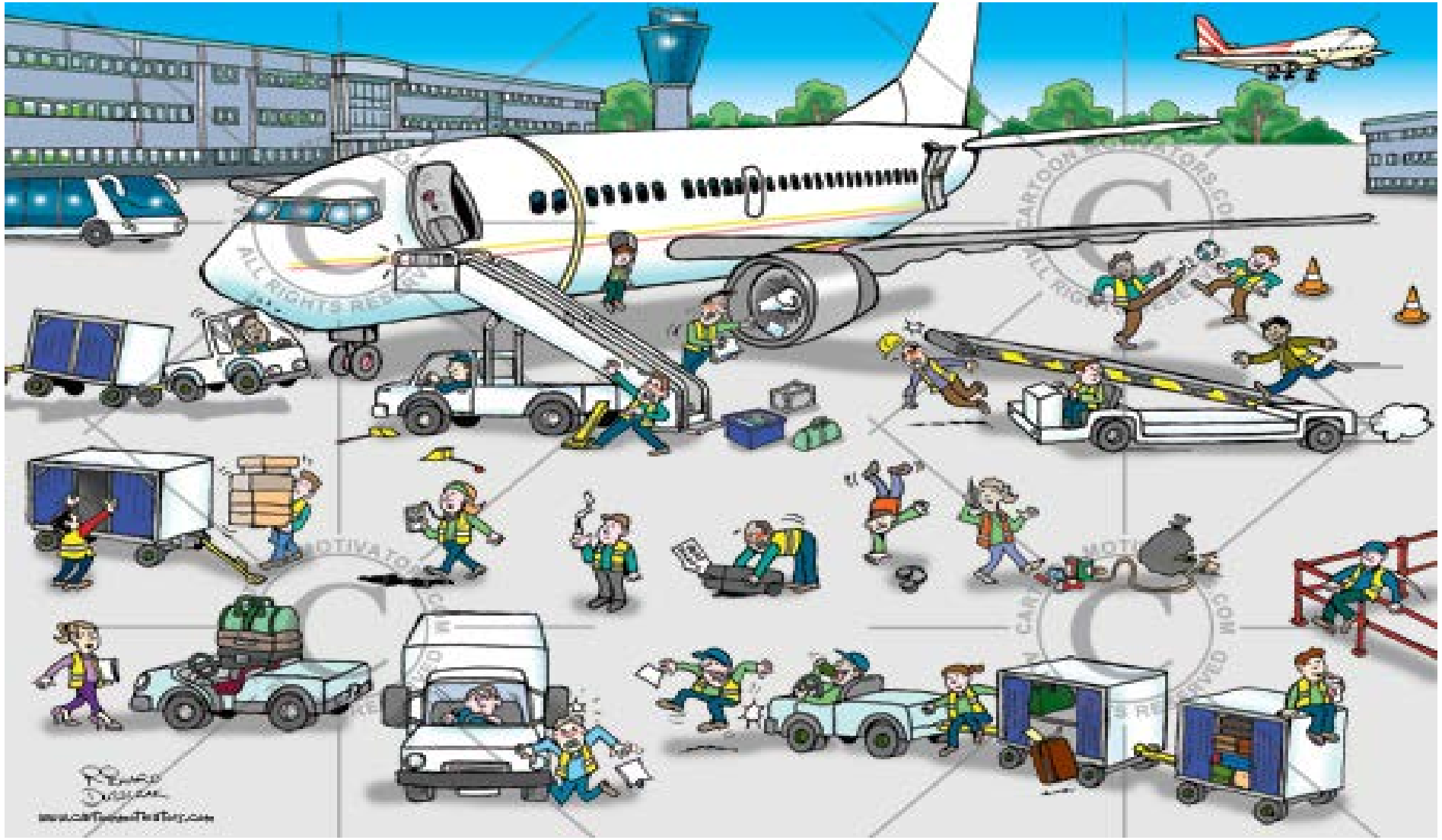
- **Economic Hazards:**

  ✓Recession, strong growth, cost increases

- **Environmental Hazards:**

  ✓Wildlife activity, fuel spills

Can you Identify the HAZARDS!!



Hazard Identification

- Formal activities to identify safety deficiencies and hazards during operations related to provision of services
- Based on a combination of reactive, proactive and predictive programs of safety data capture

Reactive method

Responds to the events that already happened, such as incidents and accidents

Proactive method

Looks actively for safety risks through the analysis of the organization's activities

Predictive method

Captures system performance as it happens in real-time normal operations

Hazard identification

- Tools to capture safety data
  - *Safety reporting program*
  - *Safety inspections*
  - *Safety studies*
  - *Safety reviews*
  - *Safety inspections*
  - *Safety surveys*
  - *Internal safety investigations*

Vulnerabilities and their relationship with SRM

- We need to understand where Hazards are coming from.
- Every operational system is inherently vulnerable, safety-wise
- Safety vulnerabilities are described in terms of
  - Deficiencies
  - Hazards
  - Consequences
  - Safety risks
- Safety deficiencies and hazards are identifiable components of a system and their consequences controllable
- Safety risks are the reference control measures

Vulnerability description

SAFETY DEFICIENCY

A condition which is a source of hazards and/or allows their existence and/or perpetuation in time (Man Made)

HAZARD

Condition or object – always present – 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

SAFETY RISK

The quantification, expressed in terms of predicted probability and severity, of the consequence(s) of a hazard taking as reference the worst foreseeable situation [but credible] condition

Incomplete aerodrome certification

Unclear aerodrome signage

Runway incursion

Quantification of the consequences of the potential runway incursion expressed in terms of probability and severity

Vulnerabilities – Confusions in the description

- Describing the hazard as a consequence
  - "Unclear aerodrome signage" vs. "runway incursion"
  - Improper hazard description
    - Disguises the nature of the hazard
    - Interferes with identifying other important consequences
  - Proper hazard description allows
    - Identification of the components of the hazard
    - Effective corrective action(s)

Vulnerability description – Tips

- Safety deficiencies are “human-made”
- Hazards are components of the operational context
- Hazards can not be assessed in terms of probability and severity of occurrence
- Consequences can be assessed in terms of probability and severity of occurrence
- **Hazards are in the present**
- **Consequences are in the future**
  - The “snapshot test”

Safety Risk Evaluation

Safety Risk

- Safety risk is the projected likelihood and severity of the consequence or outcome from an existing hazard or situation.
- While the outcome may be an accident, an "intermediate unsafe event/consequence" may be identified as "the most credible outcome".
- Formal activities to
  - Analyze potential consequence(s) of hazards
  - Determine probability and severity of consequence(s)
  - Assess tolerability
  - Implement initial mitigations

Probability and Severity

- **Probability:**
- The likelihood that an (unsafe) event or condition might occur …
- **To assess the probability of an occurrence, answer the following:**

✓ Is there a **history of occurrences** like the one being assessed or is this an isolated event?

✓ What other elements of the system, or similar type of components may have **similar defects**?

✓ How **frequently** is the system component in question used?

✓ How **many people** must use the specific system component?

Elements of Risk

Severity

Probability

Risk is the combination of probability (P) and severity (S), often expressed as P x S when using a numerical scale or tolerability matrix.

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**

Probability and Severity

- To assess the severity of an occurrence, answer the following:
- **How many lives may be lost?**
  - ✓Employees
  - ✓Passengers
  - ✓General public
- **What is the environmental impact?**
  - ✓Physical disruption of natural habitat
- **What is the severity of the property or financial damage?**
  - ✓Direct operator property loss
  - ✓Damage to aviation infrastructure
  - ✓Third party damage
  - ✓Financial impact and economic impact
- Are there **organizational, management or regulatory implications** that might generate larger threats to public safety?
- What are the likely **political implications** and/or **media interest**?

Severity

Severity of occurrence		
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. - Death or 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 consequence	**E**

Risk Assessments

- In order to assess the risk, it must be evaluated by probability and severity

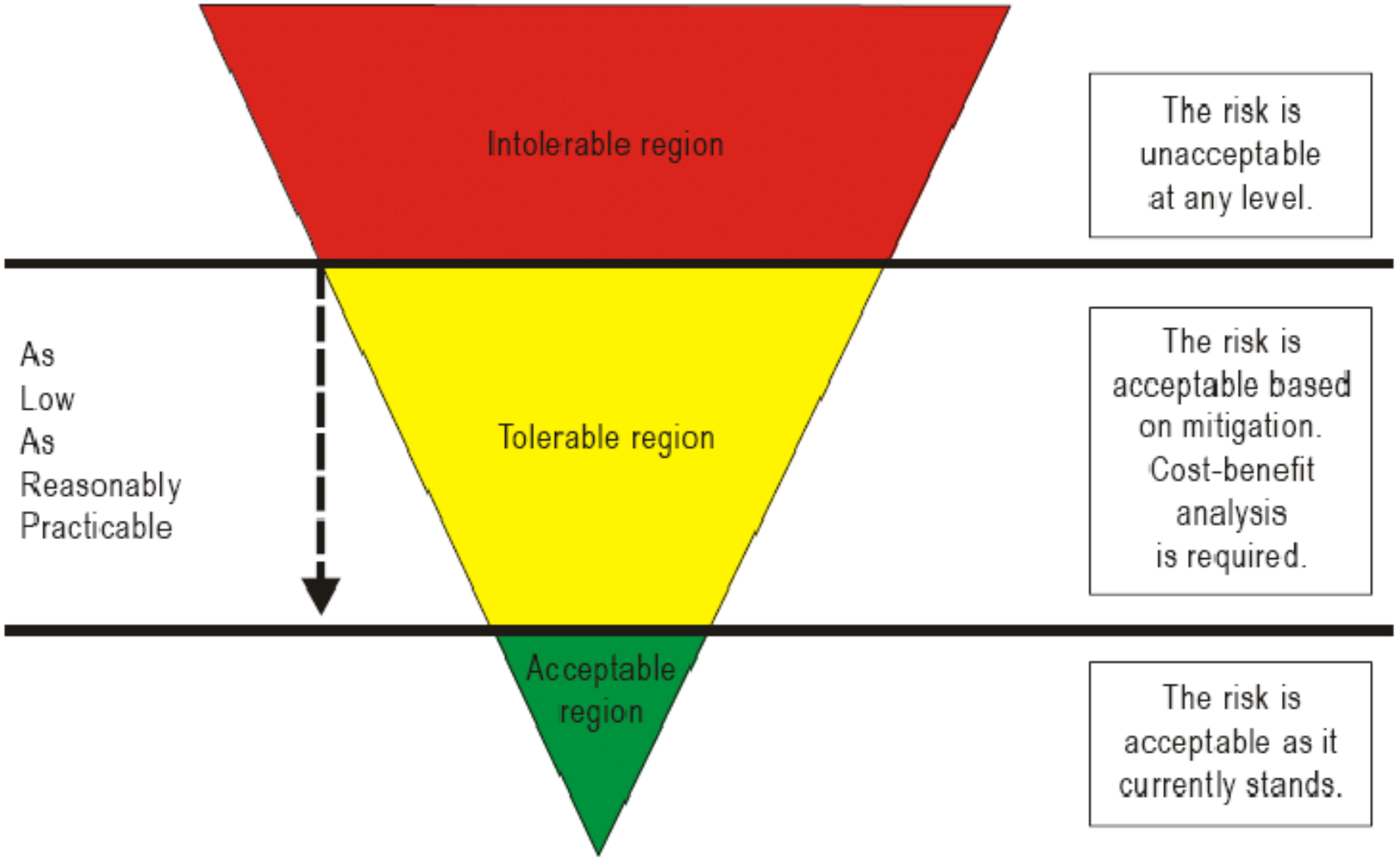
Colored Cells are the Risk Categories	Low Risk	Medium Risk	High Risk

Frequency of Scenario	Severity of Consequences		
	Low Severity	Medium Severity	High Severity
High Frequency	Medium	High	High
Medium Frequency	Low	Medium	High
Low Frequency	Low	Low	Medium

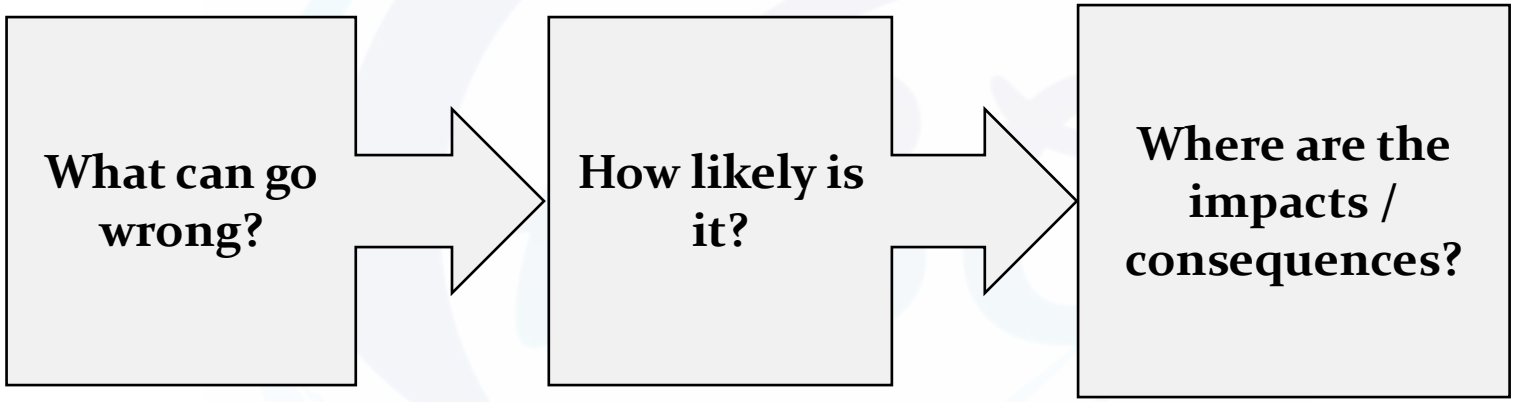
Likelihood \ Impact	Negligible	Minor	Moderate	Significant	Severe
Very Likely	Low Med	Medium	Med Hi	High	High
Likely	Low	Low Med	Medium	Med Hi	High
Possible	Low	Low Med	Medium	Med Hi	Med Hi
Unlikely	Low	Low Med	Low Med	Medium	Med Hi
Very Unlikely	Low	Low	Low Med	Medium	Medium

The use of a risk matrix allows the level of risk for each hazard to be easily identified - many different risk matrices exist

Risk Management Fundamentals



Risk Assessment - Discussion



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Who decides what is acceptable risk? What are the factors that affect acceptability?

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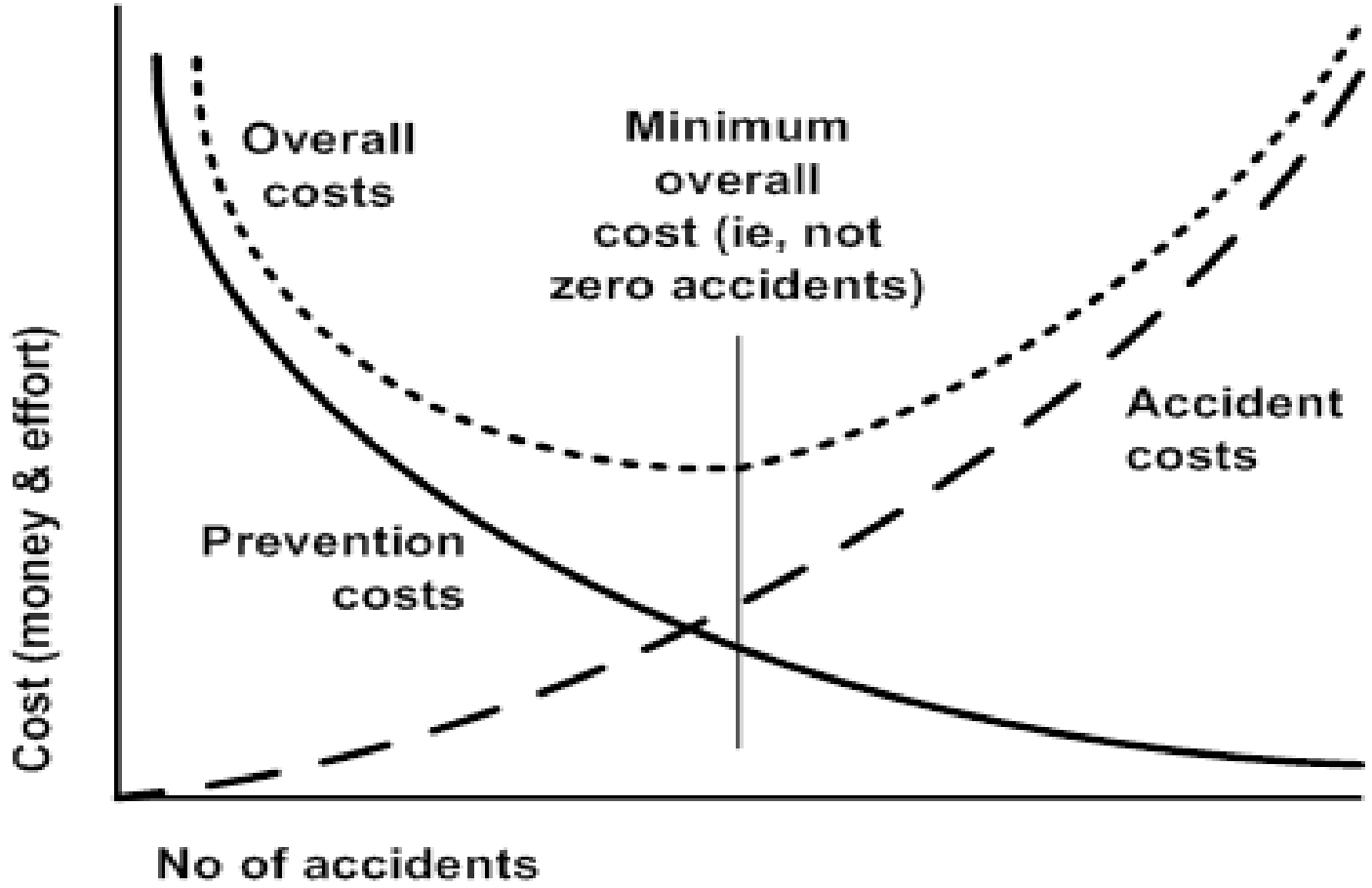
Issues of Acceptable Risk

- There is no practical definition because:
- Its perception varies among industries (Automobile industry/Aeronautical industry)
- It is very hazard specific (Nuclear accidents)
- Even government agencies are not consistent
- Transport/Pharmaceutical
- There are contemporary comparisons that can be made
- Other countries, international organizations (ICAO)

Factors Affecting Risk Acceptance

- Familiarity: Flight crew or passengers;
- Frequency: Flying every day or once per year;
- Control: Driving or sitting in the back seat;
- Media attention: Aircraft accident or car accident;
- Consequence: Catastrophic (nuclear accident) or minor (power failure).

Total costs (Cost of Safety/Cost of Accidents)



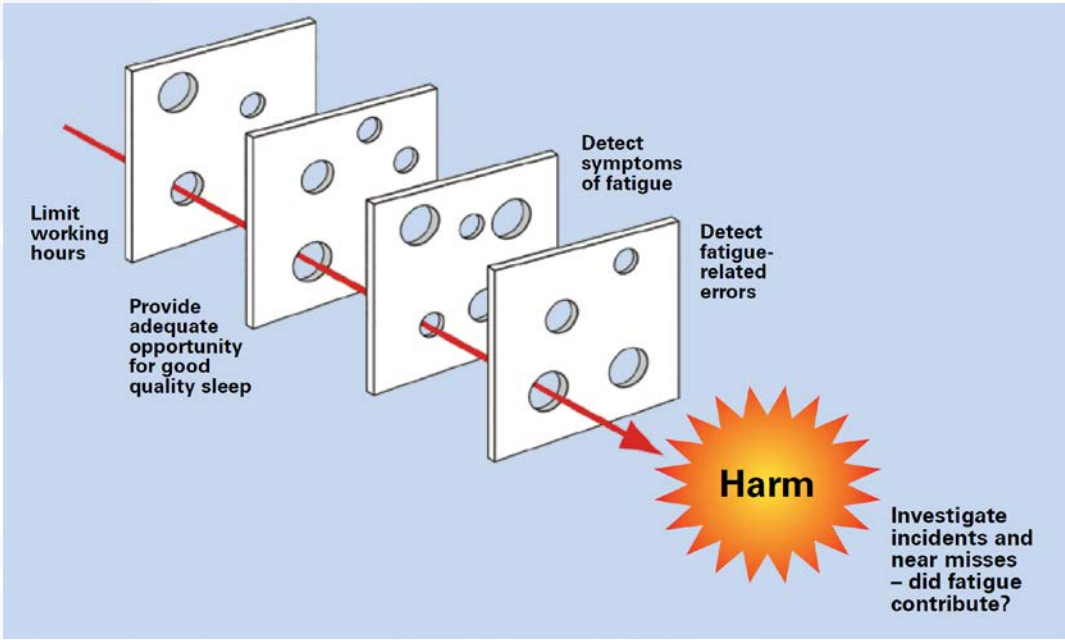
Safety Risk Mitigation

Risk treatment- Mitigation

Mitigation – Measures to address the potential hazard or to reduce the risk probability or severity.

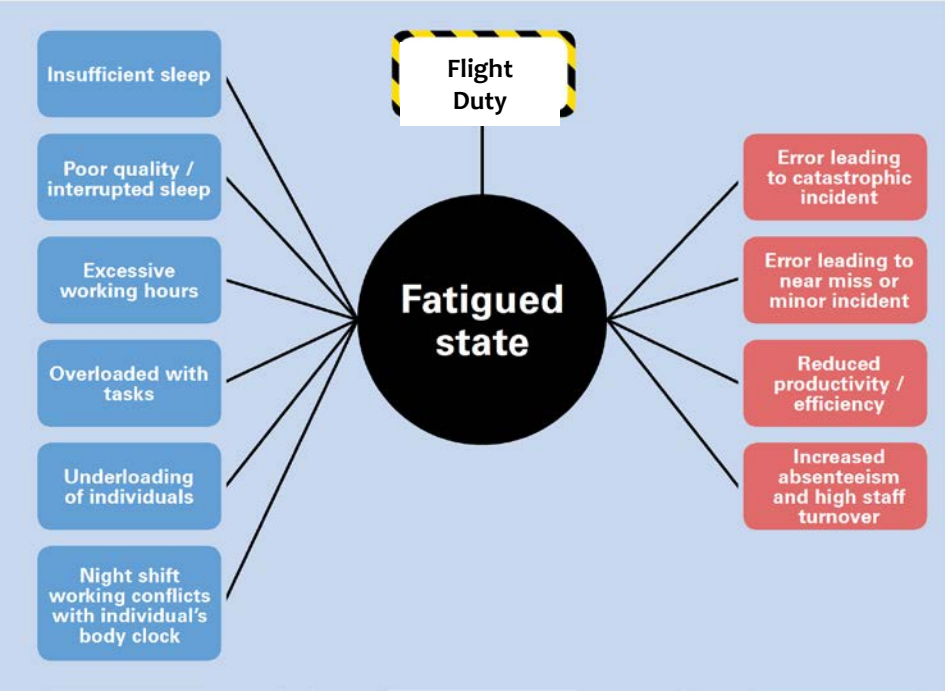
- Operations into an aerodrome surrounded by complex geography are specifically trained.

(Mitigate – To make milder, less severe or less harsh)

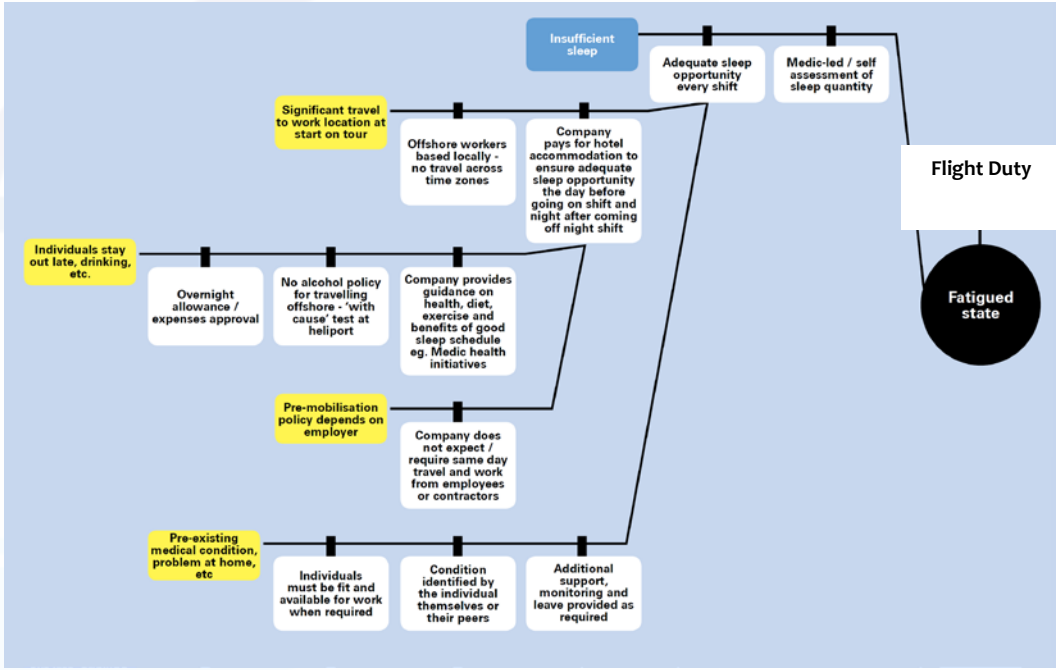


Risk Management Using Bowties

- The bowtie provides an easy-to-use template for an organization to assess its risk management, e.g..



Reduce fatigue risk to ALARP levels



Relationship between SRM and SA

- Safety risk management
  - ↗ Activities aimed at the identification and initial control of safety deficiencies and hazards in the operational environment
- Objectives
  - ↗ Capture of data on safety deficiencies and hazards
  - ↗ Implementation of initial strategies for the control of safety deficiencies and hazards

SRM looks into the future

- Safety assurance
  - ↗ Activities to ensure that the proposed mitigations of safety deficiencies and hazards in the operational environment work as expected
- Objectives
  - ↗ Data storage
  - ↗ Continuous monitoring of the effectiveness of initial mitigation strategies
  - ↗ Implementation of alternative strategies

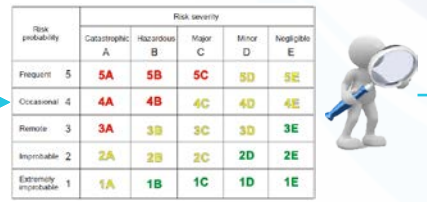
Safety assurance controls the present

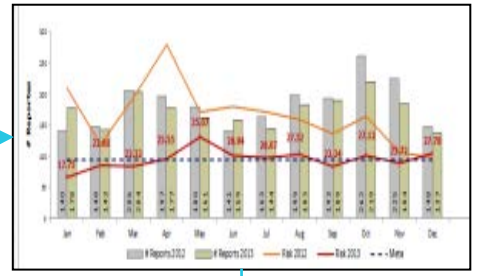
SRM-SA Applied

- All SMS Programs follow the same activities
- The only difference is the way they capture data to identify hazards

Data Collection	Analysis of Data	Finding Generation	Corrective Action	Performance Monitororing
Safety Programs	*Risk evaluation* + *RCA*	*Safety Vulnerabilities*	*Risk Mitigation*	*Safety Assurance*

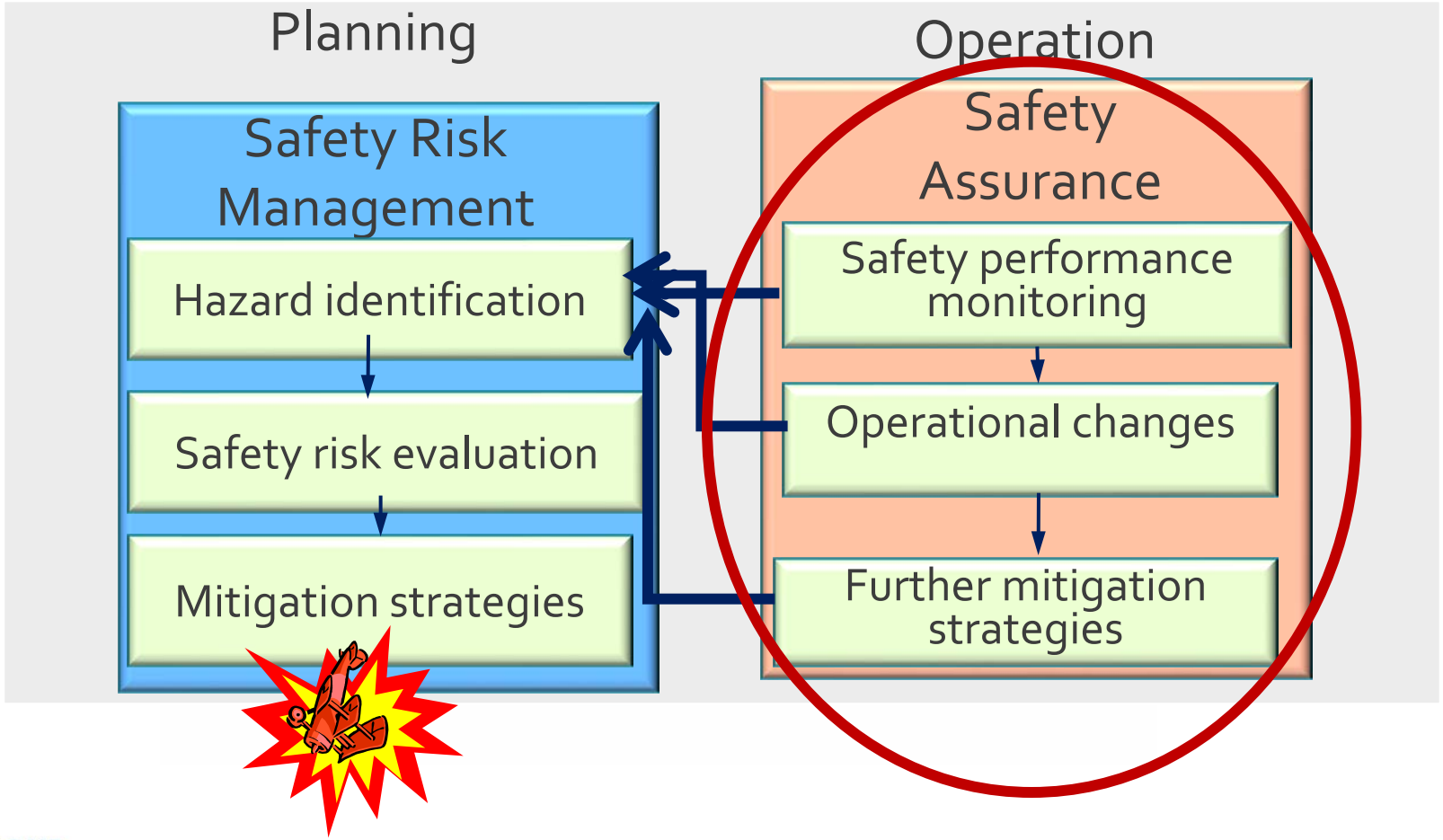
- IEP
- Hazard Analysis
- Safety Reports
- Investigation
- Data Analysis





VULNERABILITY

SRM-SA Relationship



❸ Safety assurance

3.1 – Safety performance monitoring and measurement

3.2 – The management of change

3.3 – Continuous improvement of the SMS

4. Safety promotion

- Safety promotion encourages a positive safety culture and creates an environment that is conducive to the achievement of the service 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.
- Senior management provides the leadership to promote the safety culture throughout an organization.

Safety performance of an SMS

- The safety performance of an SMS represents safety performance measurement exclusively.
- The safety performance of an SMS is expressed in practical terms by two measures or metrics:
  - ***Safety performance indicators***
  - ***Safety performance targets***
- It is delivered through various tools and means:
  - ***Safety requirements.***

Safety performance of an SMS

- **Safety performance indicators**
  - Short-term, tactical, measurable objectives reflecting the safety performance of an SMS.
  - They include safety performance measurement exclusively.
  - Expressed in numerical terms.
- **Safety performance targets**
  - Long-term, strategic, measurable objectives reflecting the safety performance of an SMS.
  - They include safety performance measurement exclusively.
  - Expressed in numerical terms.

What are some examples of SPIs?

How do you set them?

Target / Alert Levels.....

❹ Safety promotion

4.1 – Training and education

4.2 – Safety communication

Continuous Review/Updates to Training Programmes

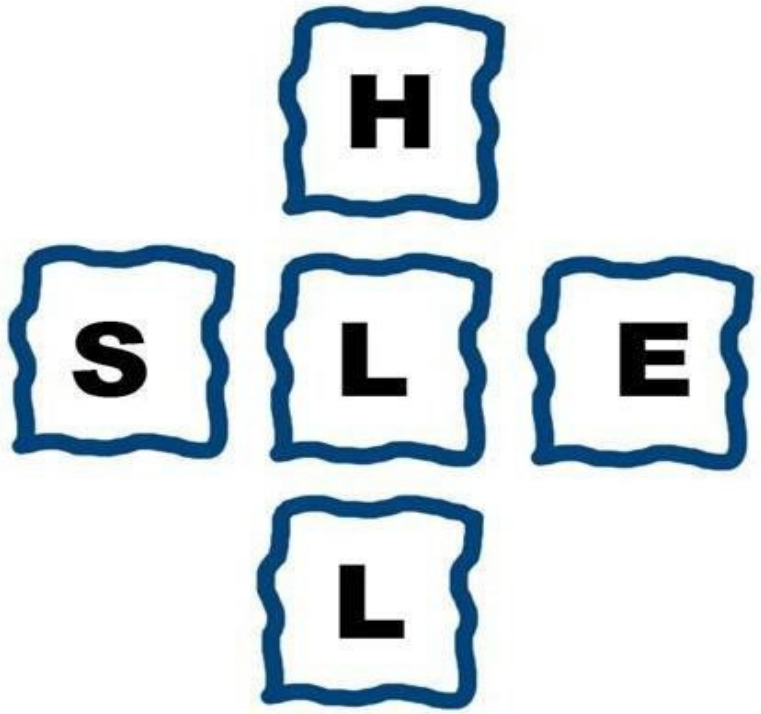
Communication – Newsletters, Bulletins and Lessons Learnt (Internal and External)

Integrating **Human Factors** with **Safety Management Systems**

Premise

- Considerable advancements have been made in aviation HF and SMS, but the full benefits of these safety initiatives will only be realised if operators and regulators take an integrated approach
- People who are critical to the success of any system or process should have input into its design and implementation

Connection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SMS
Safety Management Policy
Safety Risk Management
Safety Assurance
Safety Promotion

Viewpoint

Validation of B737 MAX return to service:

Assess the appropriateness of human factors considerations, including crew workload based on crew of ‘average piloting skills’ and capability to execute procedures with resulting failure considerations

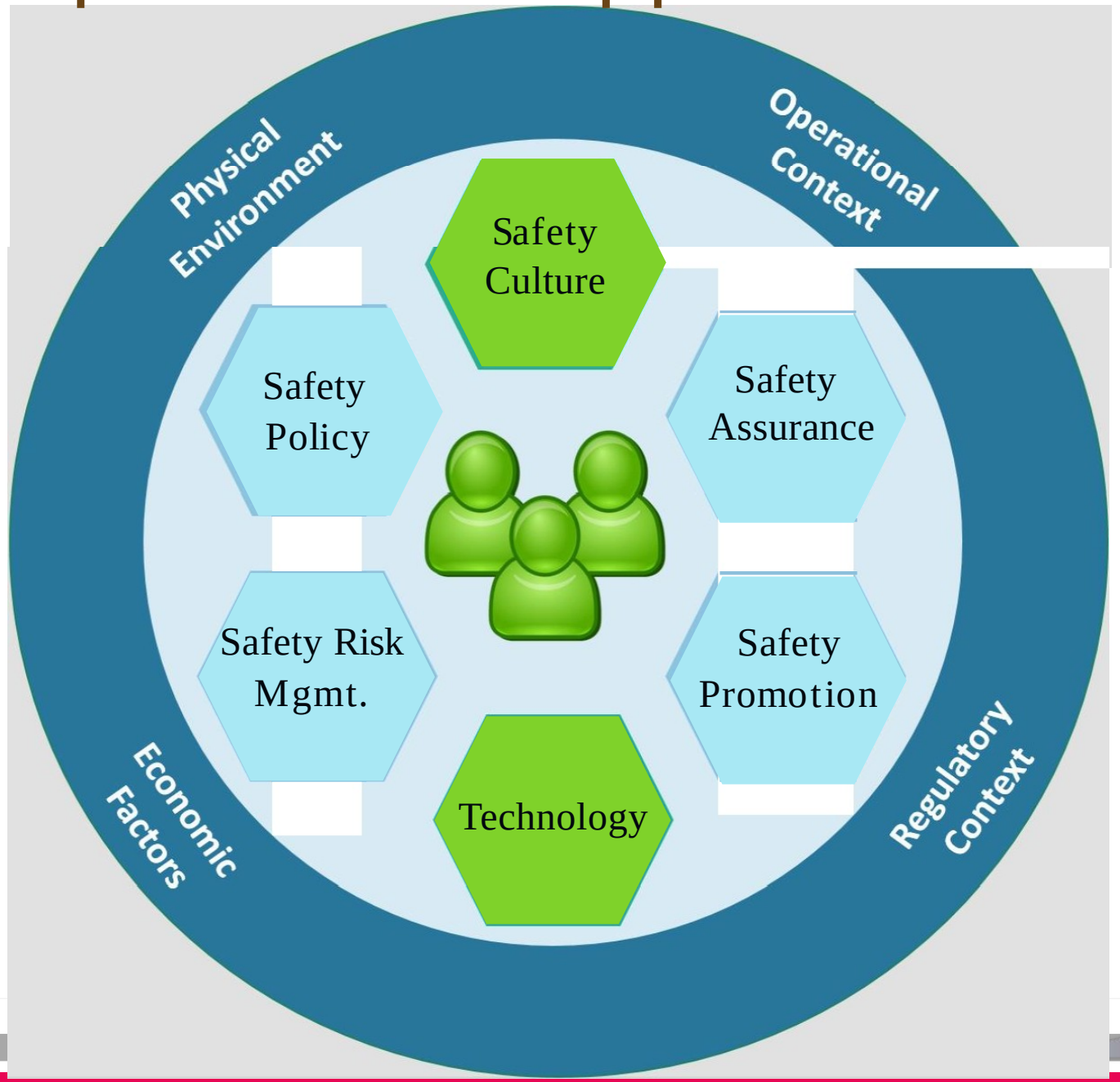
Insight

Video: Captain Sullenburger's presentation to US Congressional Hearing regarding Boeing 737 MAX accidents. *"We must consider all the human factors of these accidents, and how system design determines how many, and what kinds of, errors will be made and how consequential they will be."*

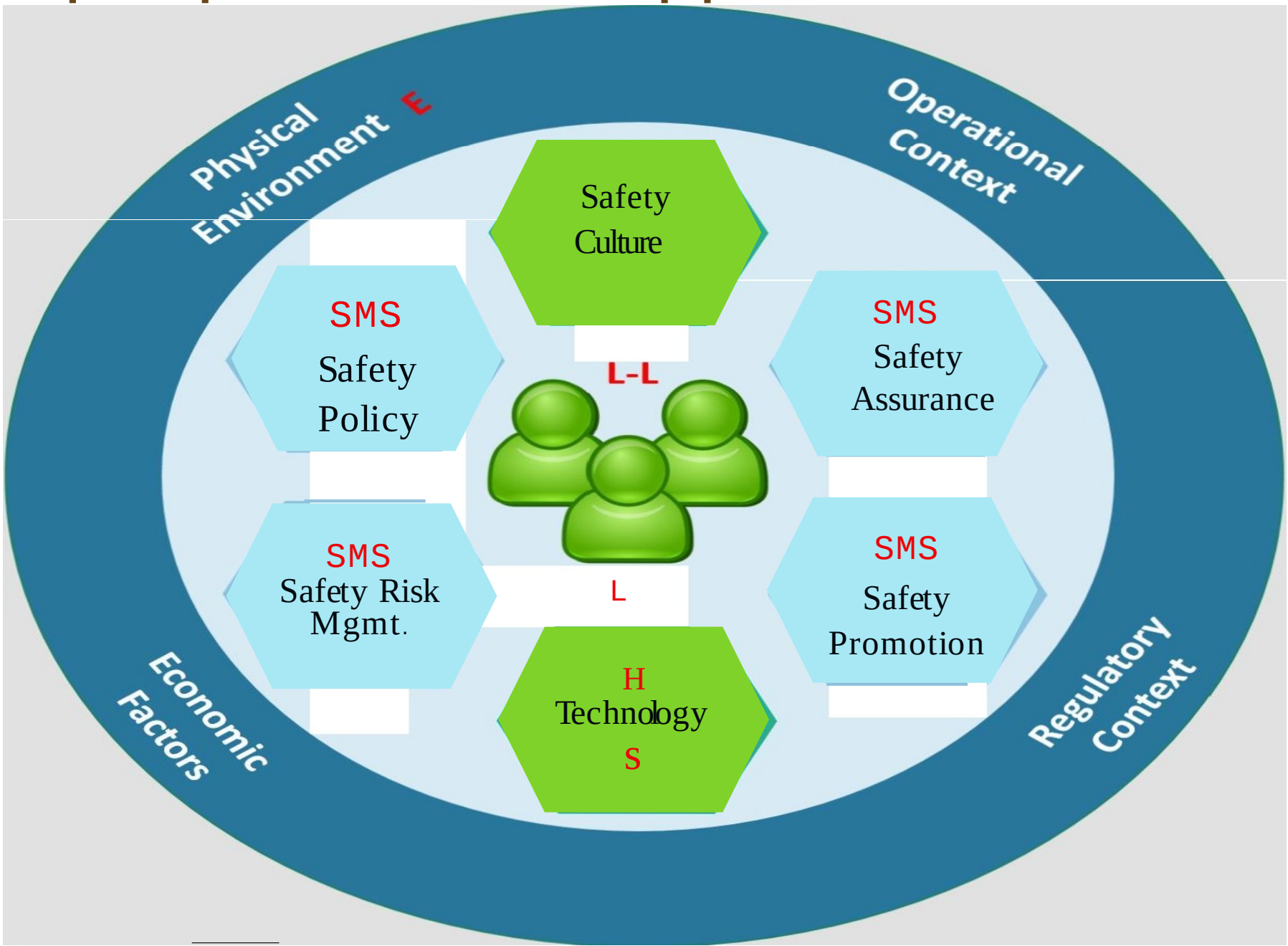
Limits of SMS (without HF)

- SMS cannot plan for, control, and defend against all potential error-prone situations
- SMS processes/policies/procedures are not easily adaptable to variations in the operational environment
- Many employees work without direct supervision
- 90% of organisational knowledge is tacit in nature: it is contained in the minds and experience of its employees.
- Systems serve humans, not humans serve systems

A people-centred approach



A people-centred approach

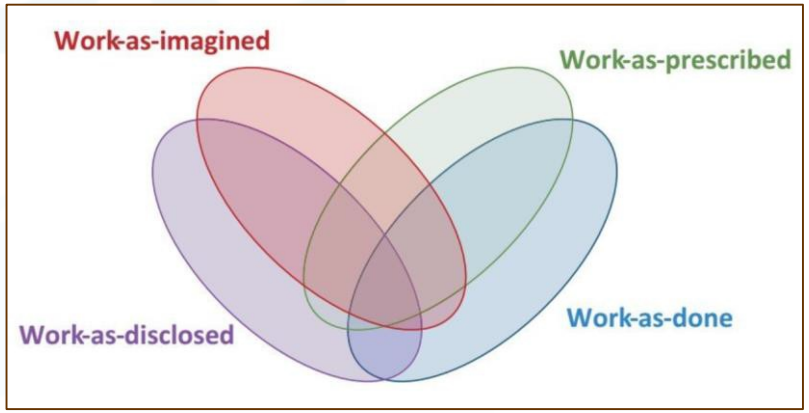


A people-centred approach

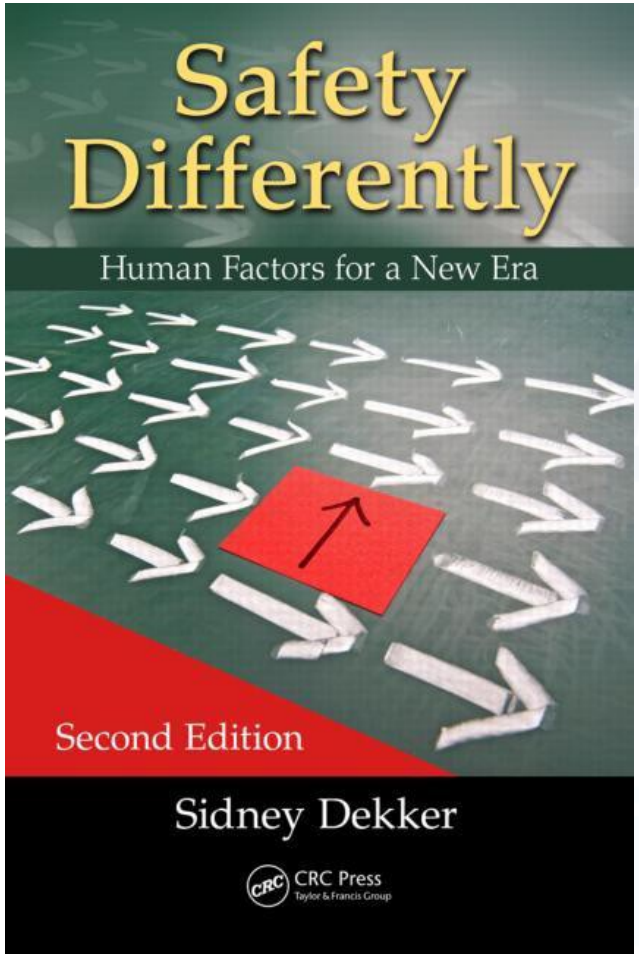
- Technology
- Management systems
- Process and procedure
- Job and task design
- Training and competency
- Information
- Risk management
- Culture

Culture

- **SMS + Safety Culture = Performance**
- Safety Culture can be influenced, fostered
- Understand motivations and influencers/incentives
  - Cognitive and emotional safety engagement
- Create an inclusive working environment
- Safety seen as a value
- Effective communication
- Monitor & measure



Operator and regulator mind-set



- People are the problem
- Tell them what to do
- Success is the absence of negative events

- People are problem solvers
- Ask them what they need
- Enhance positive capacities

Benefits

- Optimises safety performance of people and organisation
- Improves efficiency and resilience
- Employee empowerment, ownership, motivation and satisfaction
- Timely and relevant information for improved decision-making
- Helps keep SMS ‘alive’ (adaptive, relevant, effective)

SYNERGY

Safety Information

- Safety Management Systems are predicated on useful data and information being collected, analysed /assessed, and used to make decisions

- Data and information provide the “fuel” for the tools use by all participants to manage risks

- The same data and information used by operators is used by regulators information flows both ways.
- The flow of information is key to managing risks within the system
.

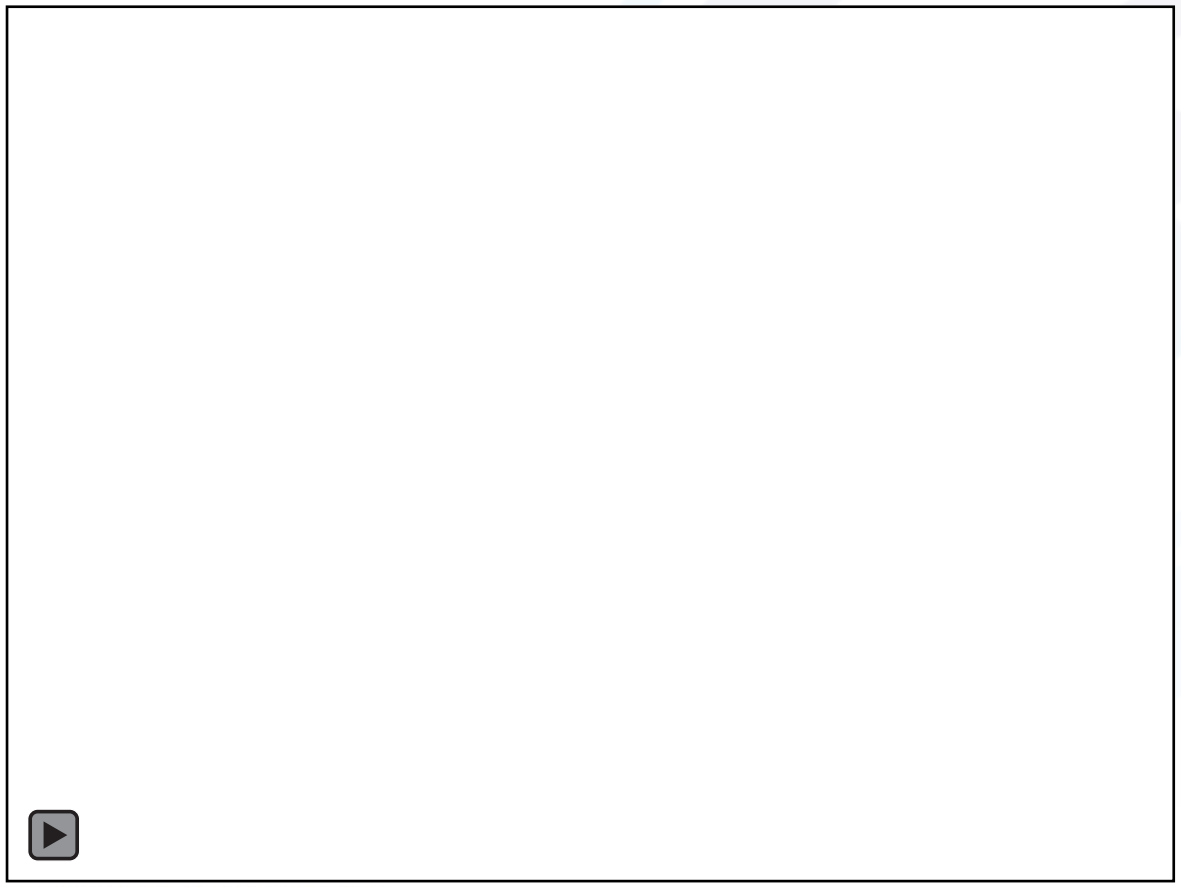
Adaptation of Human performance to Organizational Systems is the answer....

People, Safety and context

- On the other side of the Hand, many accidents occur by the adaptation of the individual to the contexts and the systems interacting with it.
- To understand the human contribution to safety and to support the human operational performance necessary to achieve the system's production goals, it is necessary to **understand how human operational performance may be affected by the various components and features of the operational context and the interrelationships between components, features and people.**
- A proper understanding of operational performance and operational errors cannot be achieved without a proper understanding of the operational context in which operational performance and errors take place.

Why systems are not perfect…

An Example….



The unidentified interactions between man and the elements necessary for the development of operations, directly affect the development of the system, causing deviations from prescribed established guidelines

Why systems are not entirely perfect?

SHELL Model: Understand the relationship between people and operational contexts

Software

Hardware

Environment

Liveware

Liveware, other persons

The disparities between the interactions of the person with their environment generate the errors, these disparities are generated and are accentuated by the presence of organizational deficiencies (factors of the organizational accident)

Operational Error intervention: psychology or system?

psychology-based perspective

the source of error “resides” within the person, and is a consequence of specific psycho-social mechanisms

- it is impossible to anticipate in a systematic manner typical human frailties such as distraction, tiredness and forgetfulness, and how they can interact with components and features of an operational context under specific operational conditions
- Individual-based mitigation strategies are considered “soft” mitigations, because deficiencies in human performance will pop up when least expected, not necessarily in demanding situations, and unleash their damaging potential.

System-based perspective

the source of error “resides” within the system, and is a consequence of deficiencies in the interaction of the human with the elements of the system,

removing the source of the operational error from the human and placing it squarely in the physical world the source of the operational error thus becomes visible, and it can be articulated in operational terms, as opposed to scientific terms (perceptual limitations). The source of the operational error can therefore be anticipated and mitigated through operational interventions

There is not much that safety management can achieve regarding human perceptual limitations, but there is an array of options available through safety management to counteract the consequences of a design that includes a partially hidden switch.

ThankYou

Hesham Hamy

+201001782956

Hesham.ralph@aviasafety.com

Avia Safety Consultancy Group