

Update on: Performance Based Environment

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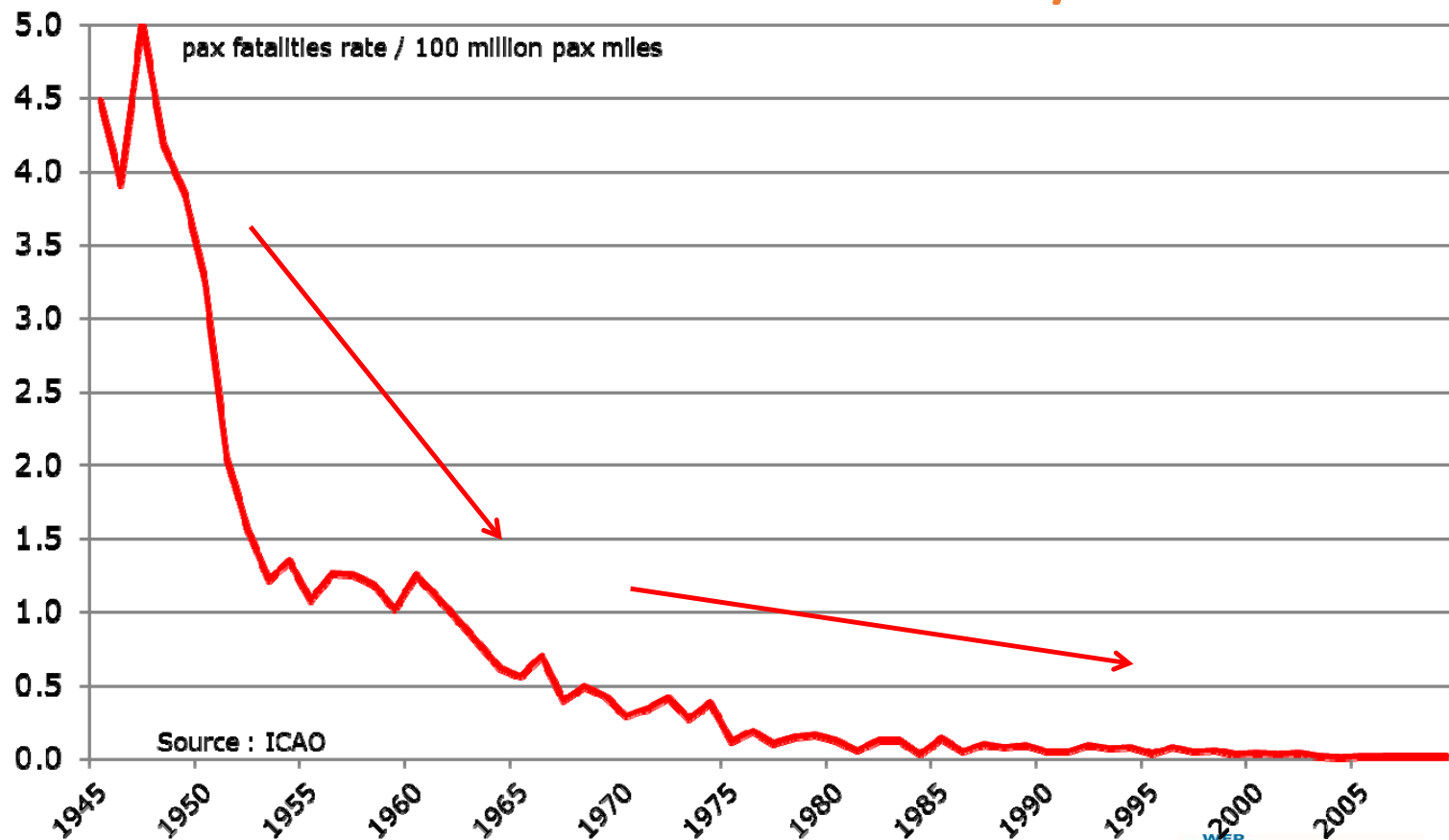


Source of information: EASA and SMICG

Outline

- Performance Based Regulations:
 - Definitions and concepts
 - Performance based environment
- Risk Based Oversight
- Performance Based Oversight
- Performance Based Audit:
 - SMS audit

Evolution of Safety



Update on Performance Based Environment

Definitions

- **Prescriptive Regulation:** A regulation that specifies requirements for mandatory methods of compliance.
 - *Associated key word: **Compliance***
- **Performance-Based Regulation (PBR):** A regulatory approach that focuses on desired, measurable outcomes.
 - *Associated key words:*
 - **Performance**
 - **Effective compliance**

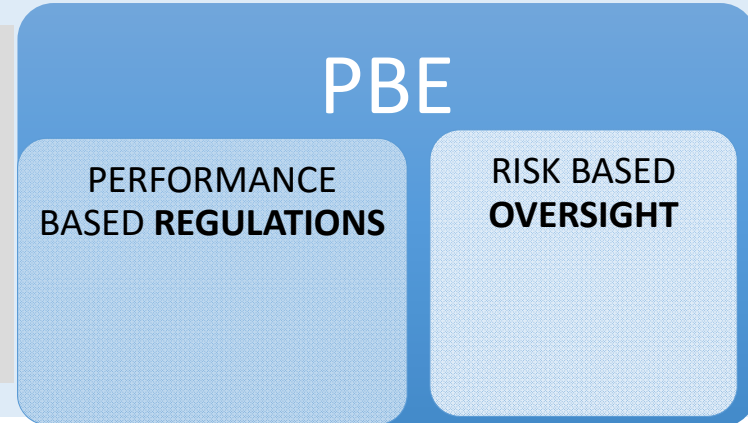
To illustrate

- **Prescriptive rules** (design of large aeroplane):
 - *CS 25.807 / 813 / 815: emergency exists – dimension, number of exit doors and width of the aisle are given*
- **Performance-based rules**
 - *CS 25. 807 and 810: sliding chutes must deploy within 6s + emergency evacuation in less than 90s – compliance by actual demonstration*
- **Another example in the field of air navigation:**
 - ANS performance scheme - (EU) No 390/2013 – indicators and targets related to environment, capacity (traffic), navigation (ex: separation) and safety

What's new with PBR?

- **We are trying to extend the concept of “ safety performance” to:**
 - Complex systems and Organisations.
- **New ICAO Annex 19 – *Safety Management* –focuses on desired, measured outcomes for:**
 - Services providers (SMS) and States (SSP).

A Performance –based environment (PBE) comprises:
measurement of safety performance through SMSs and SSPs;
Performance-based rules (PBR) and -oversight (PBO)



Underlying concept to PBR / PBE

- Measurement of Safety (performance)
 - “You can’t manage what you can’t measure”.
 - Safety Performance Indicators (**SPIs**) associated with **targets** are the tools.
- “**What**” to measure and “**how**”
 - Must be Specific, Measurable, Achievable, Realistic, Sensitive to safety, Representative of the activity (usefulness), Cost-beneficial...;
 - Systems easy to capture reliable data;
 - Can be associated to the measurement of risks

PBE: Enablers and challenges

- Data collection - common terminology
- Open-reporting environment + protection of information and people
- Cooperation and sharing
- Mature SMSs and SSPs
- Responsibilities and Enforcement
- Data Driven Decision making based on SPIs (intelligence - big data)
- Resources, cultural change
- Oversight

Prescriptive Rules vs PBR = better rules

Prescriptive

- Simple (reactive) philosophy per domain
- Simple oversight: you comply or you don't
- Often: one fits all (no proportionality)



PBR

- No matter “how”: only the outcomes count
- Improved understanding of risks and mitigations
- Flexibility and proportionality
- Better targeting of resources
- Address the regulatory gaps between domains (interoperability)



Introduction of PBR: several options under scrutiny

1. SMS/SSP (already in motion – ICAO Annex 19)
 - Discretion left to the State and its service providers
2. Performance scheme
 - Better appropriate to organisations?
3. SPIs directly introduced into the rules
 - Better appropriate to systems?
4. Acceptable Means of Compliance versus Alternative MC
 - Only high level objectives in the hard rules - An approach to flexibility?

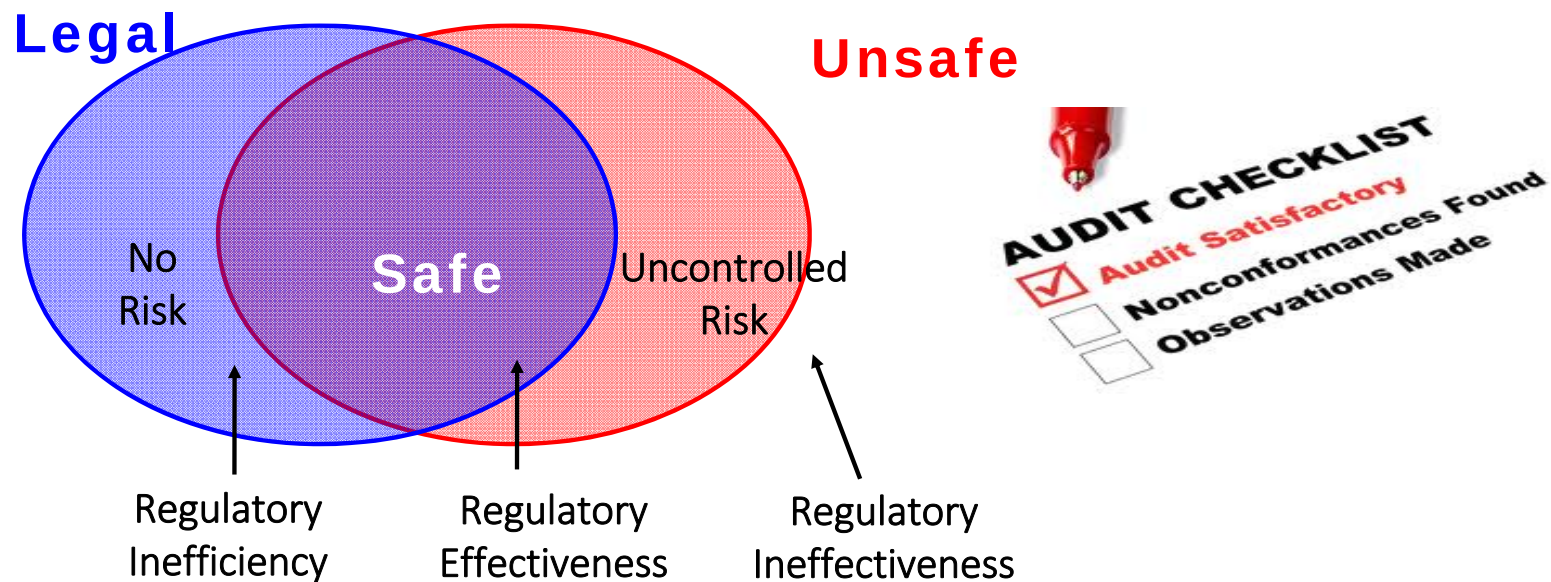
Conclusions

- Performance-based regulation (PBR) would:
 1. not replace prescriptive rules but rather complement it.
 2. continue to improve or maintain safety
 3. give flexibility how to achieve it but is not a relaxation of the rules
 4. take time to implement and mature
 5. Be a game changer for oversight
 6. Needed partnership with the industry

Types of oversight

- Compliance Based:
 - black and white, checklist
- Risk Based:
 - specific action taken in response to individual risks, investigation due to an occurrence report; and
- Performance Based:
 - measurement of an organisation's realised or actual safety accomplishments compared with its safety objectives
 - or
 - measurement of an organisation's capability to develop and implement appropriate risk controls as part of its SMS

Compliance based oversight picture



What is RBO? Definitions:

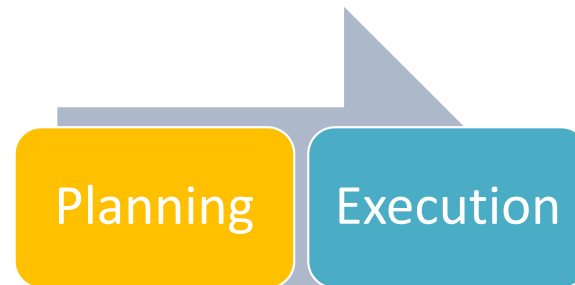


Oversight: the function by means of which a competent authority **ensures that the applicable requirements are met** by regulated entities

Surveillance: The State activities through which the State proactively ensures through inspections and audits that aviation licence, certificate, authorization or approval holders continue to meet the established requirements and function at the level of competency and safety required by the State. (Amendment to Annex 19 – March 2016)

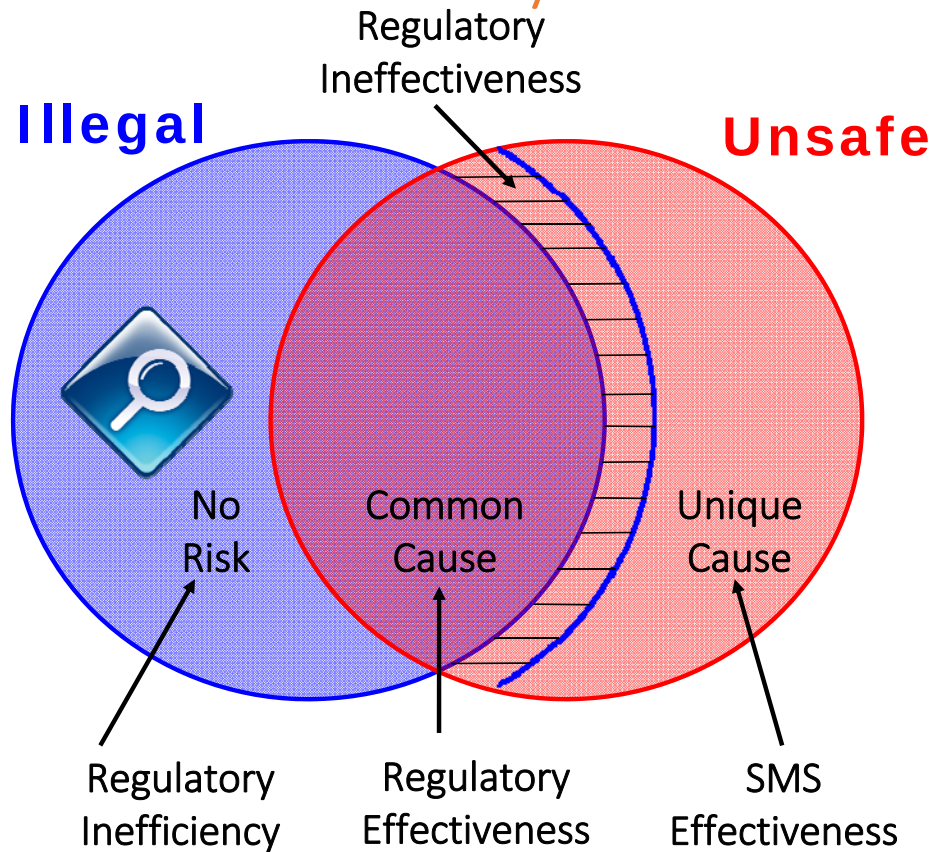
Risk Based Oversight:

A way of performing oversight, where **planning** is driven by the **risk profile** and **execution**, besides **ensuring compliance**, focuses on the management of **operational risks**



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Why is RBO interesting?

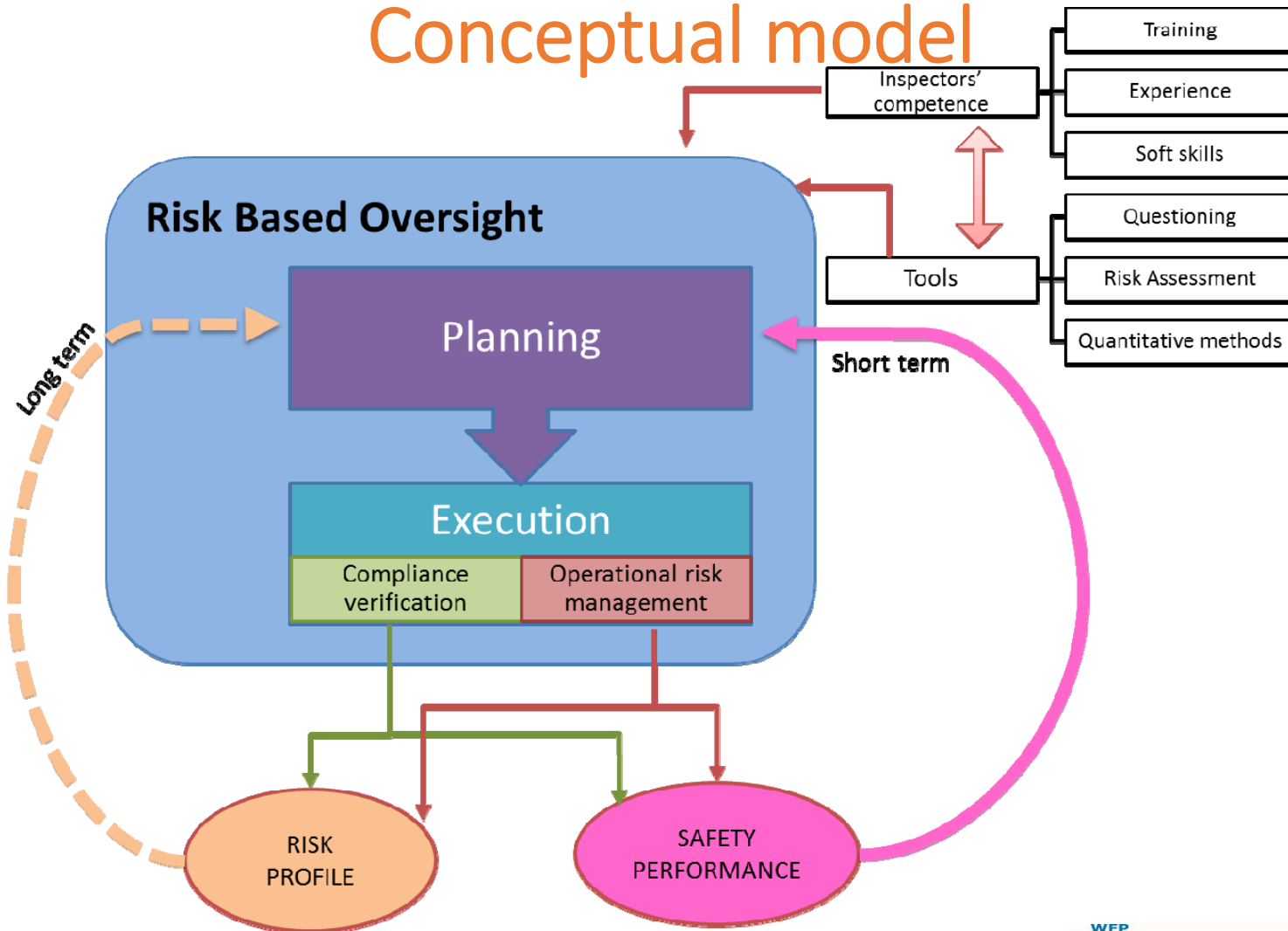


- Data driven
- Targeted use of resources
- Focus on safety
- Positive effect of prescriptive requirements is maintained

from M. Sparrow, 'The Regulatory Craft'

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Conceptual model



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Risk profile and safety performance

Risk Profile

- ***The elements of risk that are inherent to the nature and the operations of the regulated entity***
- It includes:
 - the specific nature of the organisation;
 - the complexity of its activities;
 - the results of past certification and/or oversight;
 - the maturity of the (Safety) Management System, including the ability to manage changes; and
 - the operational risks

Safety performance

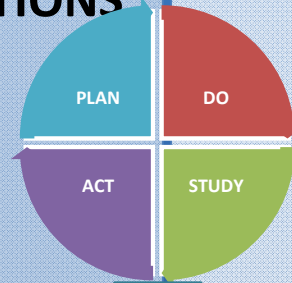
- ***How effectively can a regulated entity mitigate its operational risks***
- The demonstrated ability to:
 - comply with the applicable requirements,
 - implement and maintain effective safety management,
 - identify and manage safety risks by setting and achieving adequate targets, and
 - achieve and maintain safe operations.

$$\text{PBE} = \text{PBR} + \text{RBO}$$

PERFORMANCE BASED ENVIRONMENT

PERFORMANCE BASED REGULATIONS

RISK BASED OVERSIGHT



CE-1

CE-2

CE-3

CE-4

CE-5

CE-6

CE-7

CE-8

Safety oversight transformation



A maturity Journey driven by “safety intelligence”, looking for effective implementation of performance based regulations to assure ALoSP

Safety intelligence

“Safety Intelligence” as the organizational capability to manage a systematic and continuous process to collect key operational data, translate it to meaningful information, to learn or understand, or to deal with new or trying situations, as well applying knowledge to achieve the expected outcome in an efficient way for managing safety risks and assure safety performance

CE-4. **New** type of Qualified technical personnel (Competencies)

CE-5. **New** technical guidance, tools and provision of safety-critical information (Capabilities)

- Updated operational technical field expertise (SME)
- Measuring safety performance
- Safety analysis technics
- Systems thinking
- SPLs architecture
- IT & dedicated tools
- Soft skills –HPLs- collaboration

Designed to support processes

- Compliance oversight: Inspections/audits/certification
- Performance oversight: Occurrence reporting, Flight/Radar data monitoring, Normal operations observation, risk and incident analysis (barrier model), FRMS, data management, dashboards, etc.

How will different stakeholders be affected (costs), including the CAA...

The best way for an entity to ensure that it will not spend more than necessary on costs associated with compliance activities is to demonstrate good safety performance

Safety performance will be a factor which is taken into consideration in determining frequency of CAA intervention

Processes which are likely to result in increased costs to stakeholders are:

- Accountable manager related preparation,
- Costs associated with continuous oversight,
- Costs associated with agreed-upon risk mitigation measures (Some of these will be suggested by the entity, some by the NAA based upon up-to-date knowledge of industry best practices),
- Condensed audit cycles for poorer performers,
- Training of industry staff (Transitional cost).

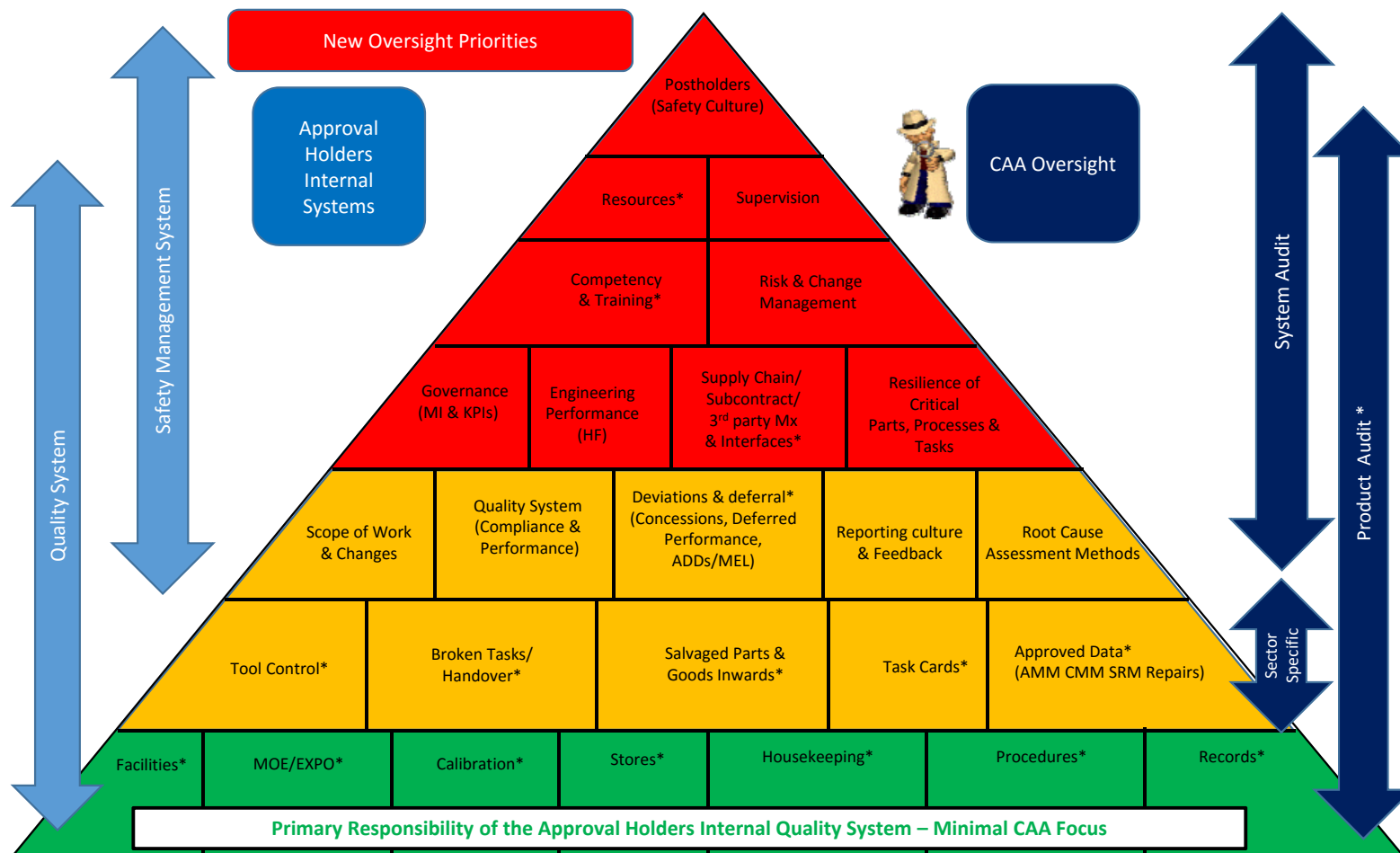
Benefits, including the CAA...

Reduce safety and security incidents and near misses by releasing capacity, using better data, and reallocating resources

- By increasing process efficiency and effectiveness,
- By gathering more/better safety risk and performance information,
- By better allocation of resources to risk,
- Improving the competency of regulatory resources,
- Strengthening NAA's engagement with the industry,
- Increasing CAA's influence across the Total Aviation System.

Reduce the Cost to Industry of Regulatory Compliance, quantifying savings associated with greater competence and efficiency:

- Effective risk management will improve the performance of entities, reducing the probability of unwanted findings and need for re-visits.
- Effective risk management will also reduce the need for reactive & unplanned activities.
- Stakeholders demonstrating high performance in areas of regulatory focus will be audited less frequently in those areas, depending on organisational development and safety culture
- A reduction in the amount of time needed from management to oversee regulatory compliance



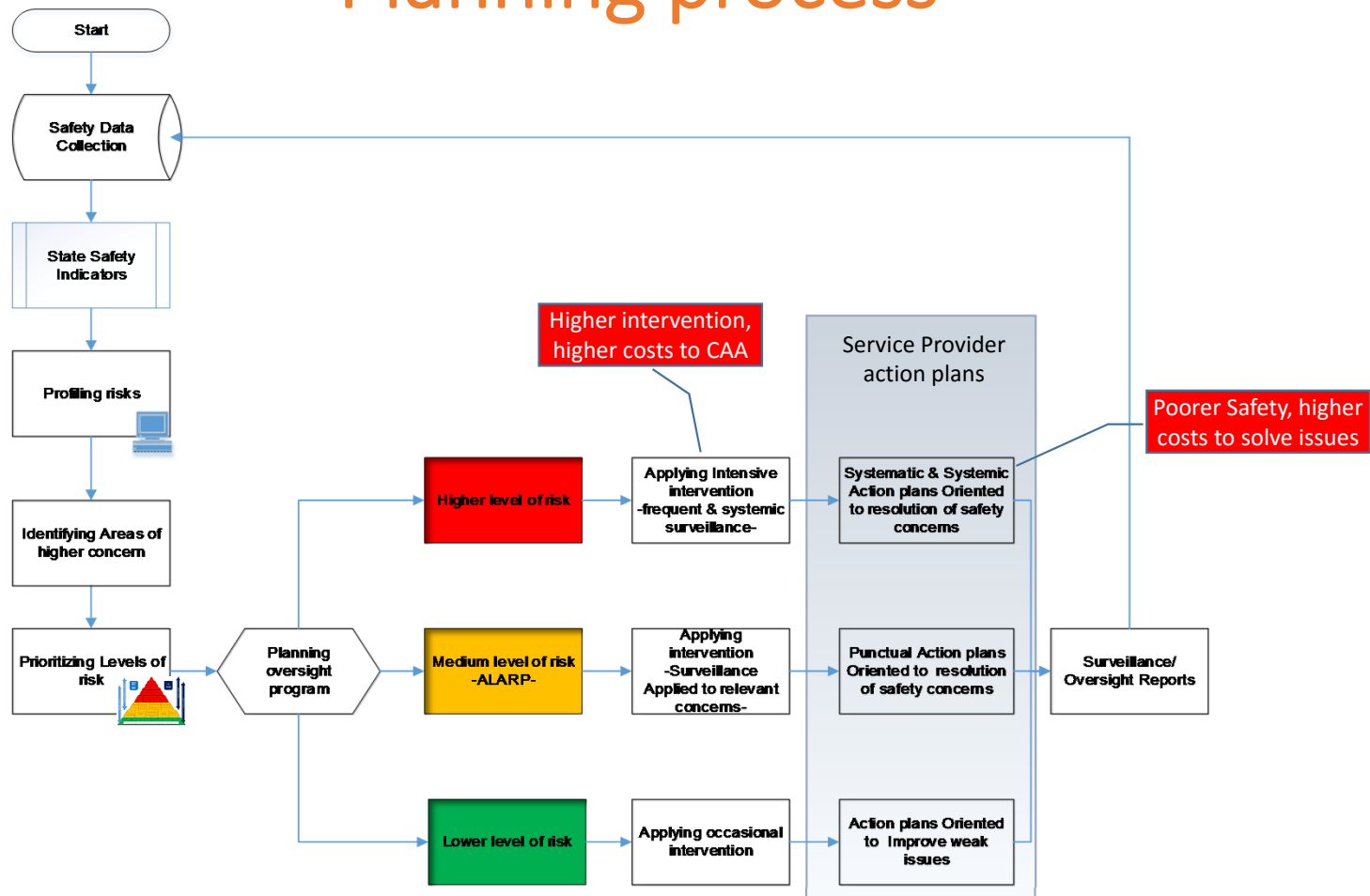
The way forward

- Basic regulations are prescriptive risk-based surveillance mechanisms.
- States are aimed to define prescriptive “Risk-based surveillance”:
 - Risk-based surveillance standards provide a mechanism to achieve harmonized and comparable surveillance (which meets a defined objective) while allowing flexible approaches that are adapted to the different service providers under surveillance.
 - When correctly implemented, they can result in lower cost and greater protection against high-level safety issues.

Reduced Costs	Industry and
Higher efficiency	Civil Aviation Authorities

- Risk-based surveillance considerations are useful to support both strategic and operational decision making.
- Upon Risk-based surveillance standards, parameters and indicators must be developed.
- There are two basic steps:
 1. Defining single risk profile – parameters.
 2. Linking risk profiles to oversight cycles.

Planning process



Conclusion

- The CAA's Performance Based Regulation and consequent Risk-based oversight programme can be chosen as the preferred option to deliver safety assurance in a proportionate and targeted manner.
- The best means of fulfilling ICAO obligations.

AUDITING SMS

Why Measure?

- You can't manage what you can't measure (Drucker),
- What gets measured gets managed,
but...
- If you measure the wrong things, you'll manage the wrong things.
- Careful measurement is essential in safety decision making!

Safety: Operational Definition

- What do we mean?
 - Observable behaviors representing the construct, “Safety”
- Safety: How well risk is managed:
 - How little harm (lowest severity)
 - How little probability (lowest likelihood)

Safety Performance: Operational Definition

- Capability to manage risk:
 - Identification of hazards
 - Development & implementation of risk controls
 - Assurance of effectiveness of risk controls
 - Assurance of competency
 - Communication of essential information

* Safety Promotion requirements:
not currently in SPMA



Update on Performance Based Environment

Operational Definitions: Summary

- **Safety**: how well **risk** is **managed** (state of being)



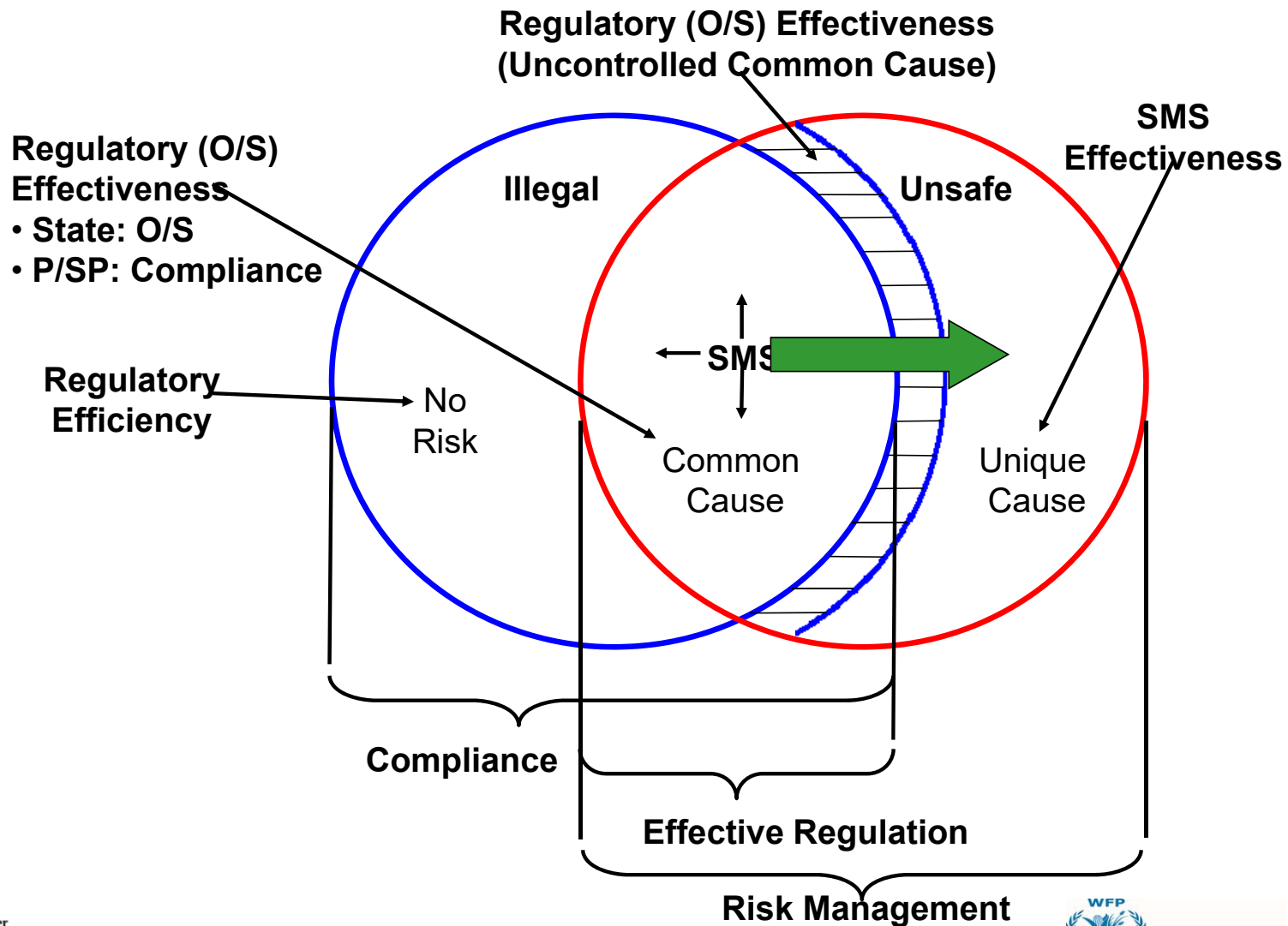
- **Safety performance**: **capability** to **manage** risk



- **Measurement of safety management**: capability in terms of **SM processes** (What)



- **Process measurement** (How – Strategy)
 - **Process**: Leading/Lagging
 - **Outcome**: Ultimate benefits, results (Lagging)



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The SMS audit aim

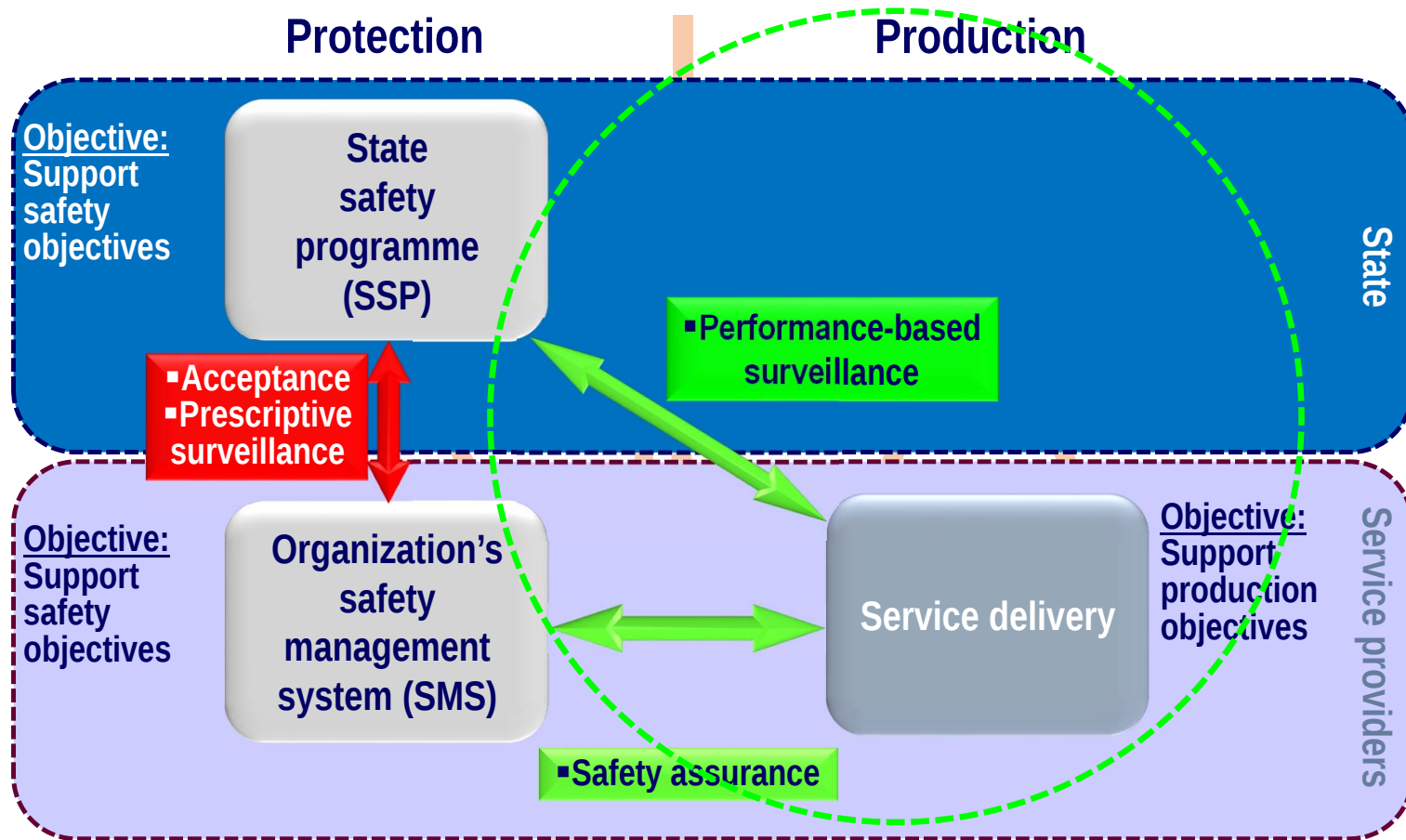
- It recognizes the difference in oversight methodologies from traditional compliance-based oversight to performance-based oversight that assesses not only compliance but also the effectiveness of the SMS
- Indicate the expected standard of an organisation's SMS in terms of:
 - compliance with the SMS regulation, and
 - its performance to effectively manage safety risk.

The elements 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 – Safety risk assessment and mitigation
- 3 **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**
 - 4.1 – Training and education
 - 4.2 – Safety communication

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SSP – SMS relationship

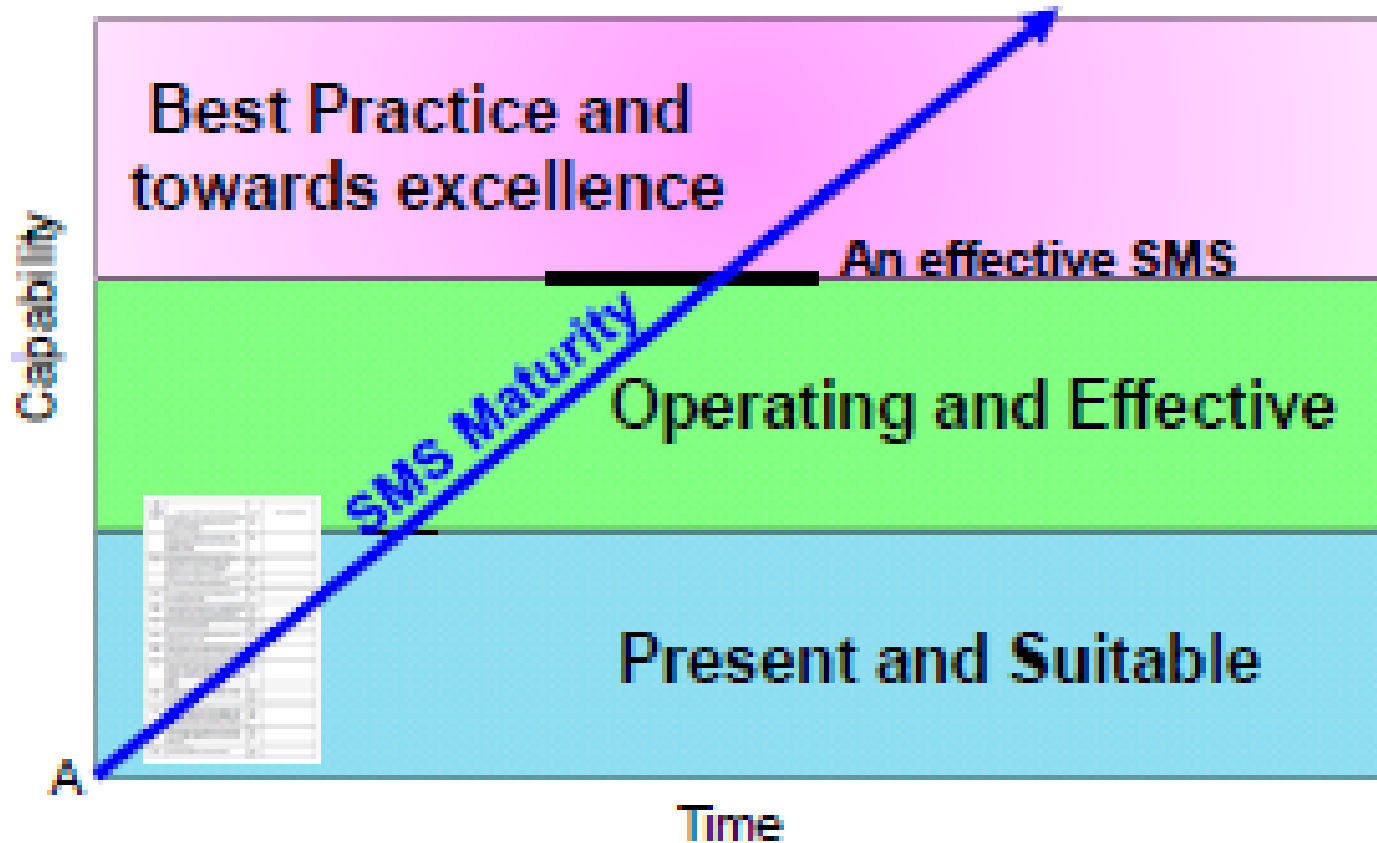


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The SMS Journey and its assessment

- For most organisations SMS will take time to implement and **several years** to **mature** to a level where it is **effective**
 - Different levels of SMS maturity as an organisation implements and develops its SMS
 - The indicators against the service provider's SMS maturity can be used in stages looking initially for whether the key elements of an SMS are present and suitable
- At a later stage the SMS can be assessed for how well it is operating and effective but it also recognised best practice

The SMS Journey



Initial assessment

- It should define the expectations on the individual indicators before a certificate or Approval is issued
- It should include:
 - A desk top review of the documentation that focuses on assessing whether the 'indicators for compliance and performance' are present and suitable
 - On-site visit to assess whether the indicators are operating and overall effectiveness is achieved
 - Carried out by a team including a team leader with an appropriate level of competence in SMS and technical specialists to support the assessment

Ongoing surveillance through the audit tool

- Evaluates the compliance and effectiveness of the SMS through a series of indicators. It is set out using the 12 elements of the ICAO SMS Framework with the Framework definition followed by **an effectiveness statement for that element**
- For each element, a series of **‘indicators for compliance and performance’** is listed followed by a series of **‘indicators of best practice’**
- Each indicator should be reviewed to determine whether the indicator is **present, suitable and operating and effective**, using the definitions and guidance set out below, so that the overall effectiveness of the element can be justified and supported.

Key Concepts included in the audit tool

- **Present**

- There is evidence that the 'indicator' is clearly visible and is documented within the organisation's SMS documentation.

- **Suitable**

- The indicator is suitable based on the size, nature, complexity of the organisation and the inherent risk in the activity, including consideration of the industry sector.

Key Concepts included in the audit tool (cont)

- **Operating**

- There is evidence that the indicator is in use and an output is being produced.

- **Effective**

- There is evidence that the indicator is effective and achieving the desired outcome

Key Concepts included in the audit tool (cont.)

- **Evidence**

- Evidence includes documentation, reports, records of interviews and discussions. For example, for an indicator to be present the evidence is likely to be documented only, whereas for assessing whether it is operating it may involve assessing records as well as face to face discussions with personnel within an organisation.
- 'How it is achieved' should include summary statements and any references to documentation and records.

- **Verification**

- The Verification Column should be for the regulator to record any observations, conversations, records and documents sampled.

1 SAFETY POLICY AND OBJECTIVES

1.1 MANAGEMENT COMMITMENT AND RESPONSIBILITY

The organisation shall define its safety policy which should be in accordance with **international and national requirements**, and which shall be **signed by the Accountable Executive of the organisation**. The safety policy shall reflect organisational commitments regarding safety, including a clear statement about the **provision of the necessary human and financial resources** for its implementation and **be communicated, with visible endorsement, throughout the organisation**. The safety policy shall include the **safety reporting procedures** and clearly indicate **which types of behaviours are unacceptable** and shall include the **conditions under which disciplinary action would not apply**. The safety policy shall **be periodically reviewed** to ensure it remains relevant and appropriate to the organisation.

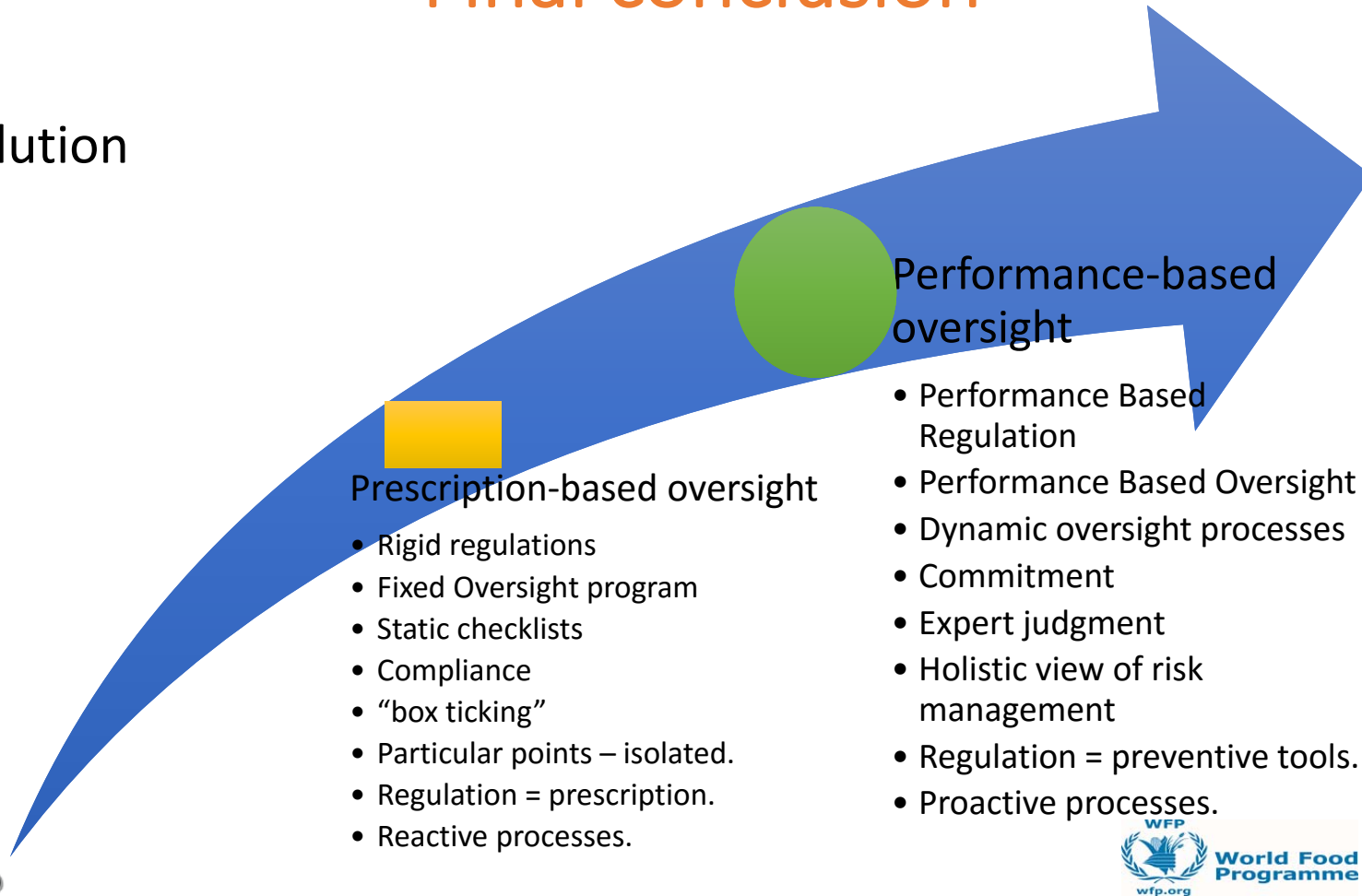
- **EFFECTIVENESS** is achieved when the organisation has defined its safety policy that clearly states its intentions, safety objectives and philosophies and **there is visible evidence of safety leadership and management 'walking the talk' and demonstrating by example**.

INDICATORS OF COMPLIANCE + PERFORMANCE		P	S	O	E	How it is achieved	Verification
1.1.1	There is a safety policy that includes a commitment towards achieving the highest safety standards signed by the Accountable Executive.						
1.1.2	The organisation has based its safety management system on the safety policy.						
1.1.3	The Accountable Executive and the senior management team promote and demonstrate their commitment to the Safety Policy through active and visible participation in the safety management system.						
1.1.4	The safety policy is communicated to all personnel with the intent that they are made aware of their individual contributions and obligations with regard to Safety.						
1.1.5	The safety policy includes a commitment to observe all applicable legal requirements, standards and best practice providing appropriate resources and defining safety as a primary responsibility of all Managers.						
1.1.6	The safety policy actively encourages safety reporting.						
1.1.7	The safety policy states the organisation's intentions, management principles and commitment to continuous improvement in the safety level.						
1.1.8	The safety policy is reviewed periodically to ensure it remains current.						
1.1.9	There is commitment of the organisation's senior management to the development and ongoing improvement of the safety management system.						
1.1.10	A disciplinary policy has been defined that clearly identifies the conditions under which punitive action would be considered (e.g. illegal activity, negligence or wilful misconduct).						
1.1.11	There is evidence of decision making, actions and behaviours that reflect a positive safety culture.						

BEST PRACTICE INDICATORS		P	S	O	E	How it is achieved	Verification
1.1.12	Personnel at all levels are involved in the establishment and maintenance of the safety management system.						
1.1.13	There is one aviation safety policy used throughout the organisation and it is implemented at all levels of the organisation.						
1.1.14	The safety policy is clearly visible, or available, to all personnel and is included in key documentation and communication media.						
1.1.15	Safety policy objectives drive the organisation's goals and mission statements.						
1.1.16	The organisation regularly verifies that personnel throughout the organisation are familiar with and have understood the policy and its message.						
1.1.17	The Accountable Executive demonstrates their commitment by attending training and /or safety conferences.						
1.1.18	Senior management has adopted an integrated safety planning process with published and measurable safety targets and objectives.						

Final conclusion

- Evolution



PBE building blocks

Rollout of Performance Based Oversight

- Finite resources + expert judgment
- Tools to record indicators of entity risk and performance
- Oversight activities targeted
- Gathering evidence regarding risk and performance
- Regulator assure how safety decisions are made
- The entity can present key risks and how to address them
- Targeted action plans
- Compliance with prescriptive rules → targets the areas of key risk
- Findings determine frequency and nature of NAA's oversight

Development of SSP

- Industry best practices to collect & use information/data
- Analyze the information within the appropriate context
- Better understanding of risks
- Evidentiary data routinely obtained and analyzed
- Avoiding over-regulating or under-regulating
- Intervention regulation proportionate and targeted.
- Evidentiary analysis to recommend improvements
- SMS tools to identify the most significant safety risks
- Strategic plans to help industry to manage risks
- Information on particular risks & similar entities risks.

People Transformation and Getting the Right Safety Culture

- Qualified staff address issues collaboratively,
- Industry can present views and supporting evidence as envisioned by the process
- Staff take into account industry costs associated with the decisions that they make
- Enable Authority's staff to be proportionate and targeted

Sector Level and Industry-Wide Engagement

- Safety → no attempt to gain the edge over a competitor, but that collective improvement is to the mutual benefit of all
- Sharing best practices
- Determine which practices are most effective in addressing risks
- Potential issues are addressed as we move forward
- Set up PBR composed of both industry and NAA representatives

Engagement on an International Level

- International nature of commercial aviation → safety risk addressed collaboratively
- The analysis of data and practices at the entity, sector and total system levels strengthen the effectiveness of the national system at key international levels
- Solutions to be promoted at higher levels should avoid the adoption of disproportionate and over-burdensome standards.