Safety Indicators, Targets, What Methods & Tools

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- SAFREP TF
- The Roadmap
- Safety KPIs background
- Leading Indicators
- Lagging Indicators
- Examples
- Tools and methods

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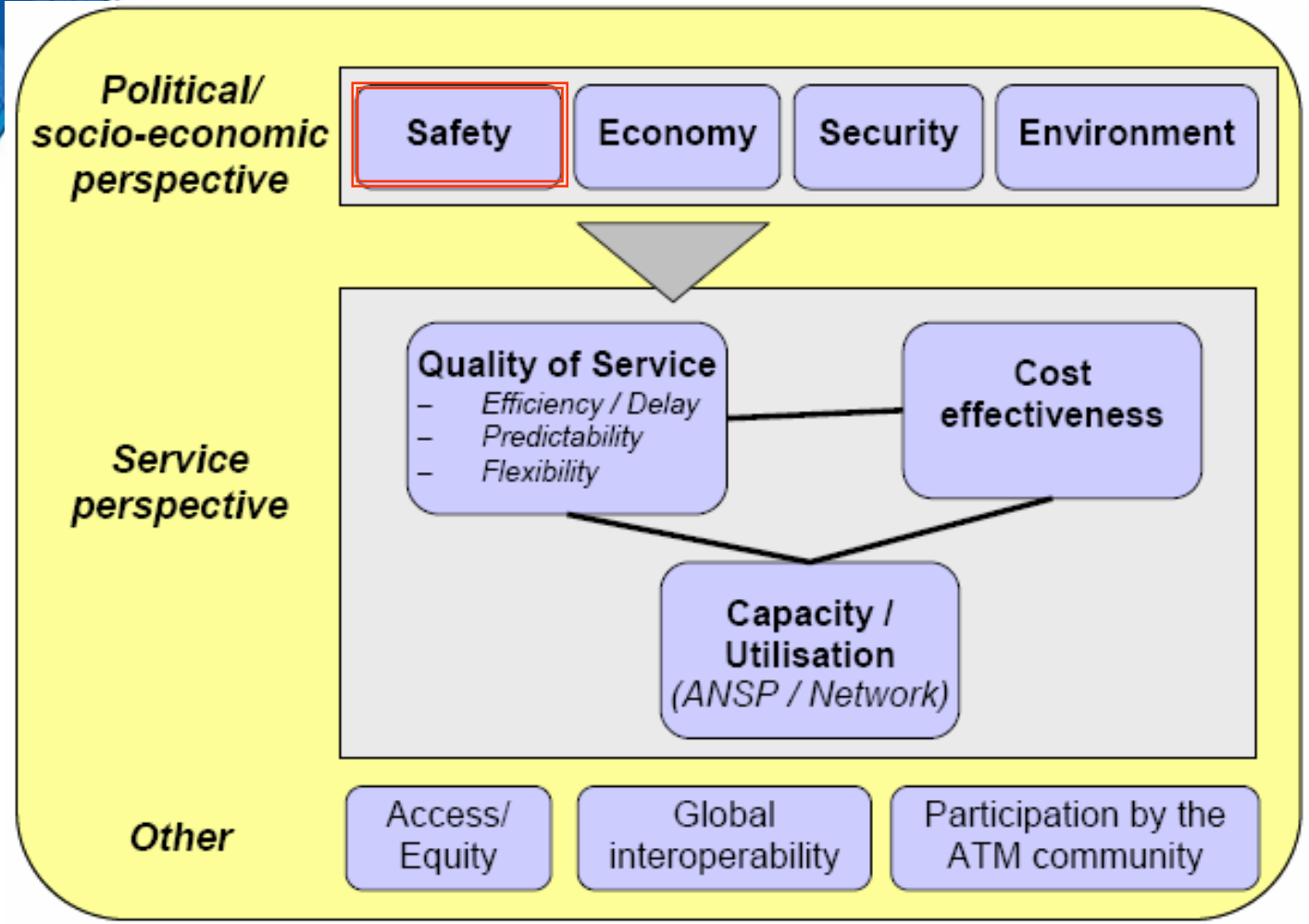
EC Mandate on Performance Measurement



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SAFREP TF Safety KPIs principles of development

- (1) ICAO Consistency
- (2) Roles and Responsibilities
- (3) Safety Improvement
- (4) Systemic approach
- (5) Practical Interface
- (6)Trust
- (7) Confidentiality
- (8) Consensus
- (9) Planning the details
- (10) Transparency and progress reporting to decision makers

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Stakeholder Requirements

Key Principles

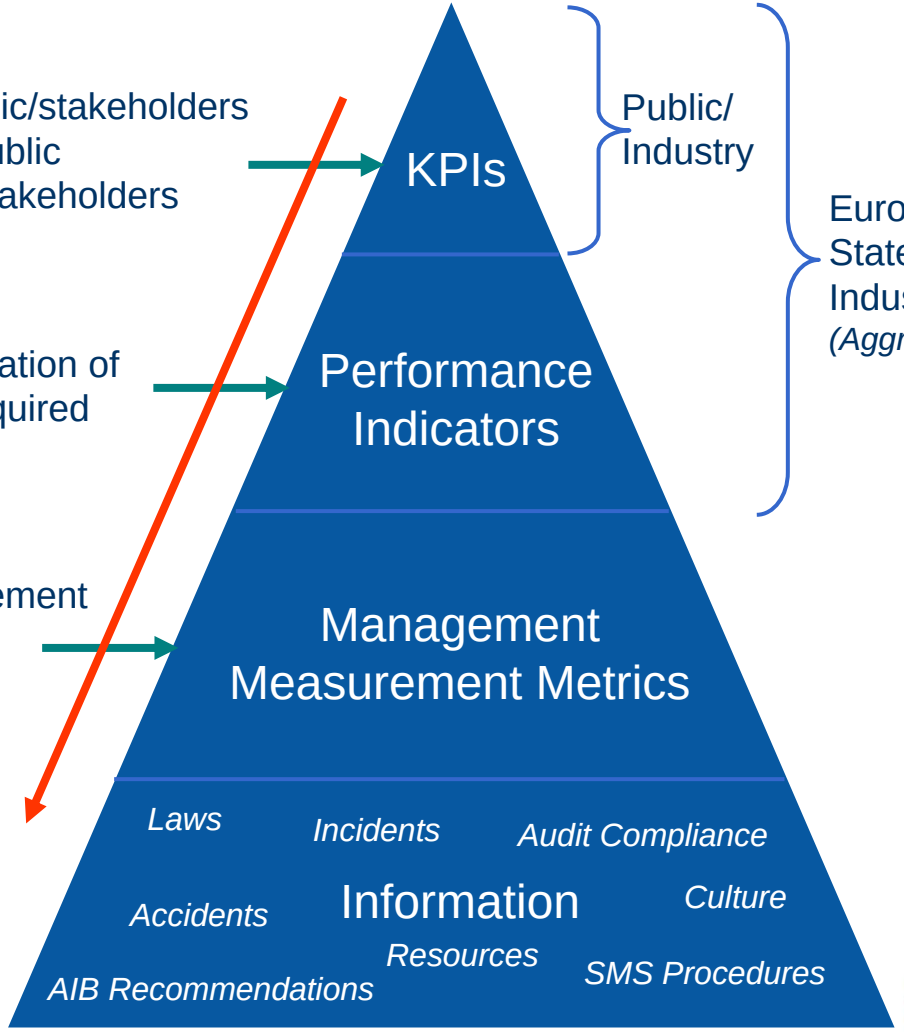
- Information to public/stakeholders
- Reassurance to public
- Call to action by stakeholders

- Facilitates identification of scope of action required

- Facilitates management of improvement of service

- Increasing level of details

Interested Parties



Public/ Industry

European/ States/ Industry
(Aggregation of ANSP/States)

Organisational Level (Service Providers)

Principles why what

Roles & Resp. Who why

The whole process needs to be a continuous improvement activity

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Types of Safety Indicators

- Systematic safety monitoring processes should evaluate, as a matter of routine, achieved safety performance in all safety-related operational activities.
- Safety performance indicators are used to analyse trends and detect unwanted degradation of safety levels, supporting the development of effective improvement plans.
- They can also be used to assess the extent to which political, strategic, regulatory and industry safety targets are being met.
- In addition to measuring the core safety task, a measurement system that can incorporate error tolerance, reaction and recovery level will be explored.

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Lagging indicators

Indicators which

- measure events (e.g. safety occurrences, such as accidents, incidents, system outages etc.) that have happened
- measure whether safety improvement activities have been effective in mitigating identified risk
- measure the outcome of the service delivery
- represent the consequences of actions previously taken
- frequently focus on results at the end a time period and characterize historical performance (e.g. the end of the supply chain i.e. ATM service provision)

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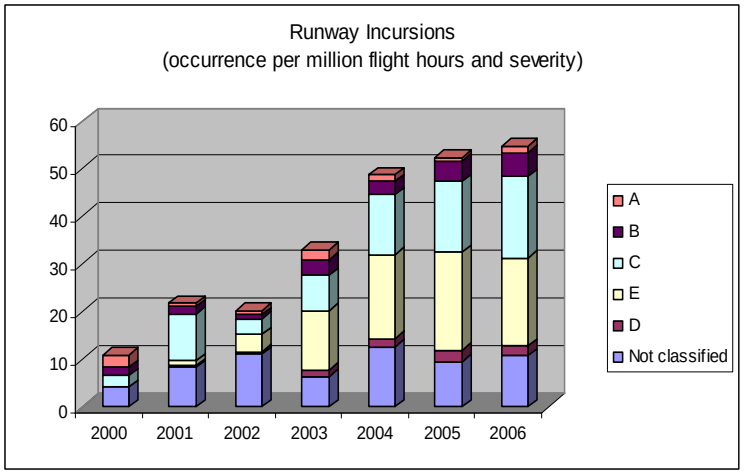
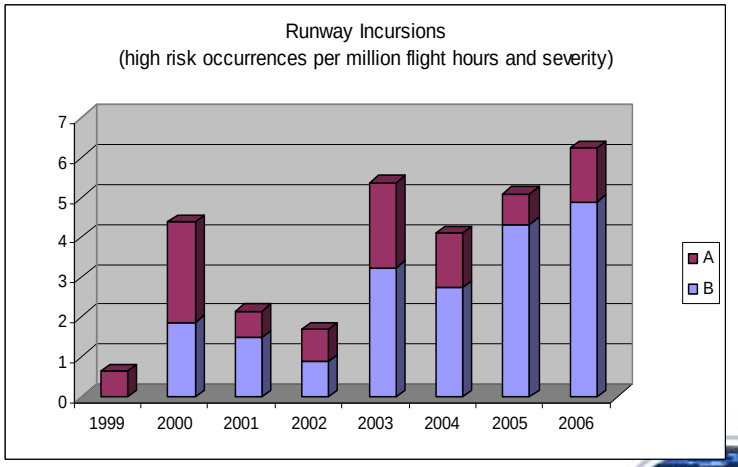
Lagging indicators - samples





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Leading indicators,

Indicators which

- are identified principally through the comprehensive analysis of the organisations (providers, regulators, States)
- are designed to help identify whether the providers and regulators are taking actions or have processes that are effective in lowering the risk
- are considered the "drivers" of **lagging indicators**. There is an assumed relationship between the two, which suggests that improved performance in a **leading indicator** will drive better performance in the **lagging indicator**. Improved rules, regulations, oversight, procedures etc will lead hopefully to fewer errors within various layers of organisation and hence to less safety occurrences

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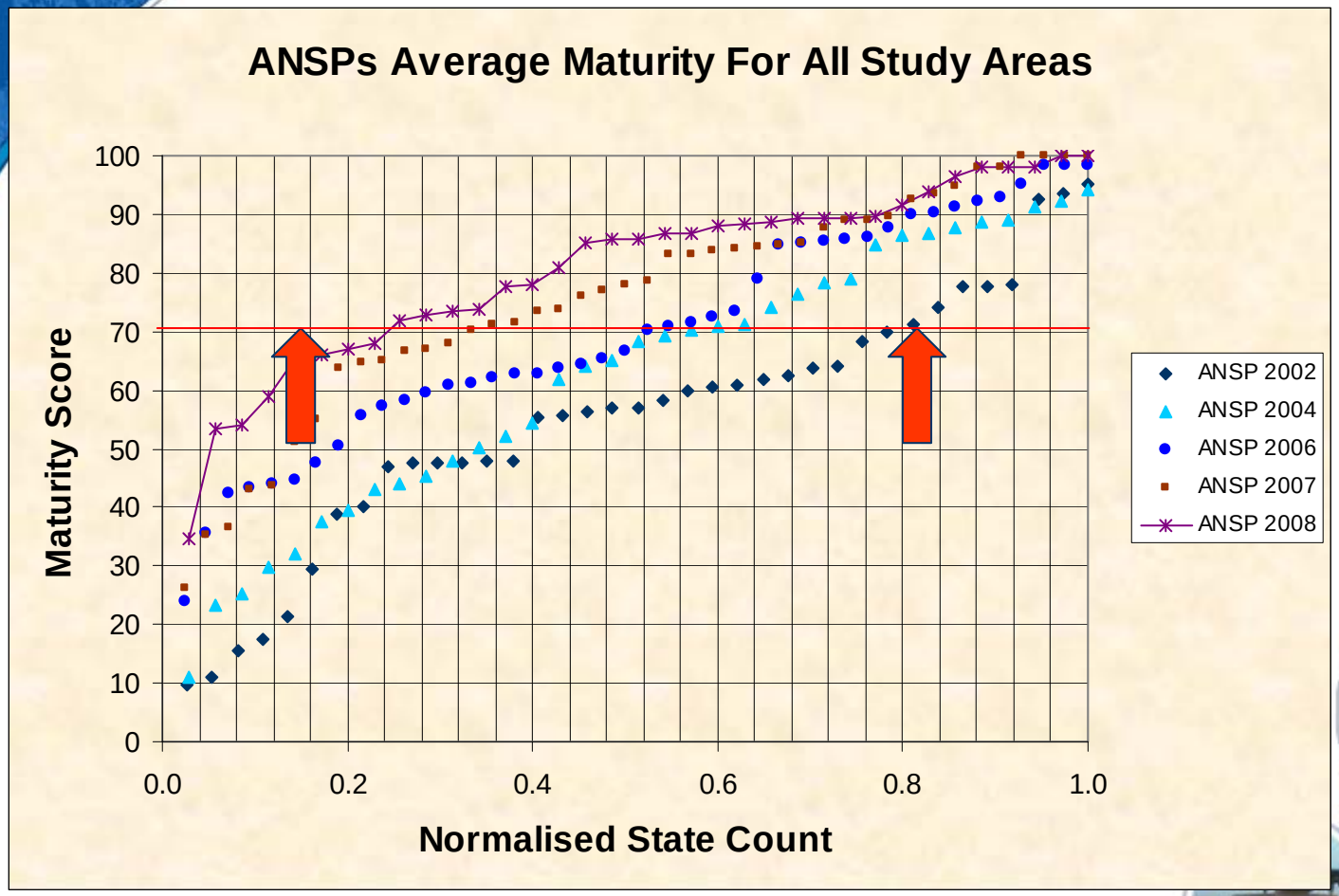
Sample of Leading indicators



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Sample of Leading Indicators – for REGULATORS

Level of Implementation of the Critical Elements of a Safety Oversight System										
CRITICAL ELEMENT	**1** = Not Implemented **10** = Fully Implemented ■ = State's Level of Implementation □ = ECAC Average									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Primary Aviation Legislation	□	□	□	□	□	□	□	□	■	□
Specific Operating Regulations	□	□	□	□	□	□	□	□	□	■
State Civil Aviation System and Safety Oversight Functions	□	□	□	□	□	□	□	□	□	■
Technical Personnel Qualification and Training	□	□	□	□	□	□	□	□	□	■
Technical Guidance, Tools and the Provision of Safety-Critical Information	□	□	□	□	□	□	□	■	□	□
Licensing, Certification, Authorisation and Approval Obligations	□	□	□	□	□	□	□	□	□	■
Surveillance Obligations	□	□	□	□	□	□	□	■	□	□
Resolution of Safety Concerns	□	□	□	□	□	□	□	□	□	■

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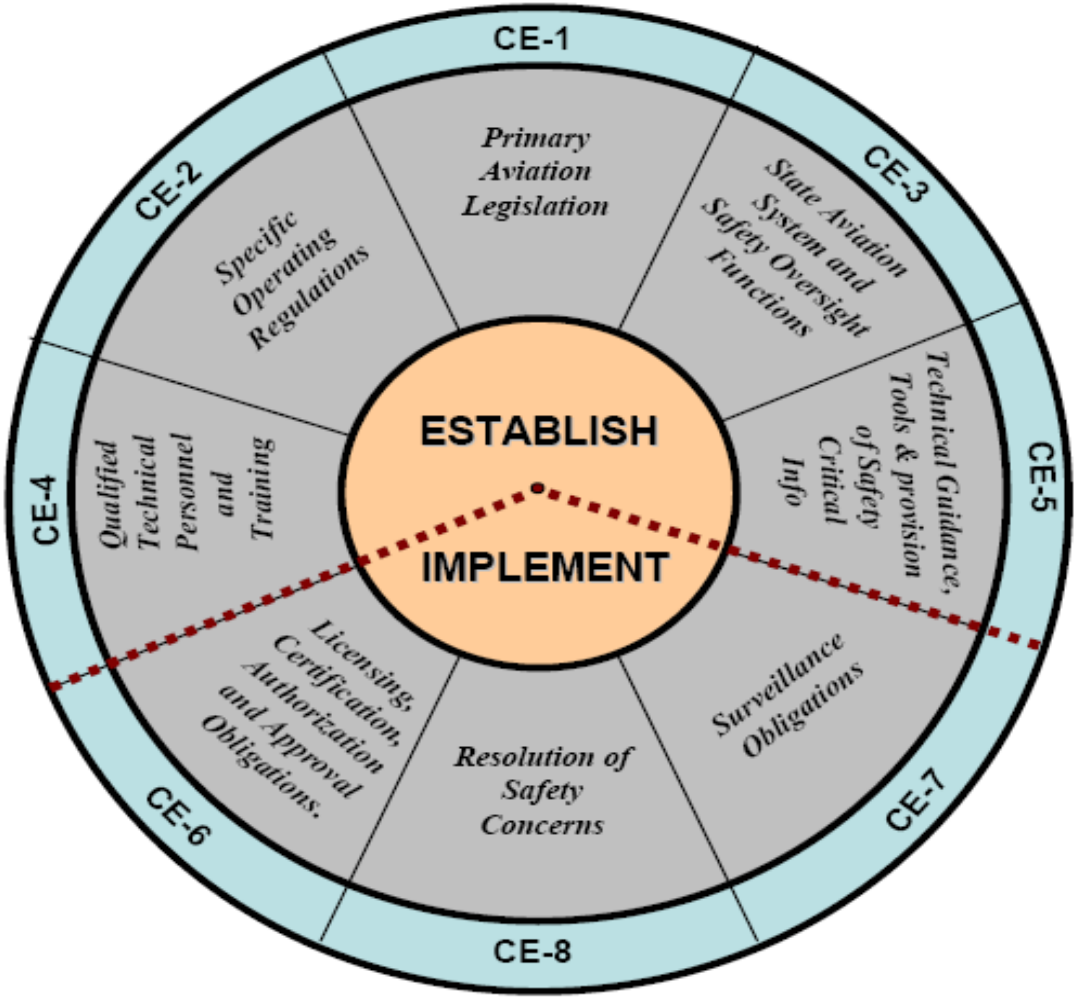
Sample of Leading Indicators – for REGULATORS



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Safety Targets

- Safety targets are derived to meet either political, strategic, regulatory, industry safety objectives or management performance-driven improvements.
- A cautious approach in setting targets is recommended.
- If targets are set too early in the process, or if they are unduly correlated with other performance indicators (such as efficiency or pay), the whole process may be threatened.
- The starting point for setting targets should be **leading indicators** and subsequently with improved maturity of the system the targets for **lagging indicators**

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Tools and Methods

- TAXONOMY (HEIDI/ADREP)
- TOKAI (TOol Kit for ATM Occurrence Reporting)
- Severity and risk of recurrence principles (EAM2-GUI5) and its related TOKAI tool
- SOAM – Systemic Occurrence Analysis Methodology – Causal Factors & Safety recommendations (EAM2-GUI8) TOKAI future tool
- Safety metrics, statistical tool & analysis of safety trends – TOKAI tools
- ASMT/InCAS
- Safety Maturity Questionnaire – What If tool – RADAR diagram analysis*
- Safety Surveys Technique (EUROCONTROL/ ICAO/Transport Canada)
- Overall SMS principles and metrics in EGSMM*

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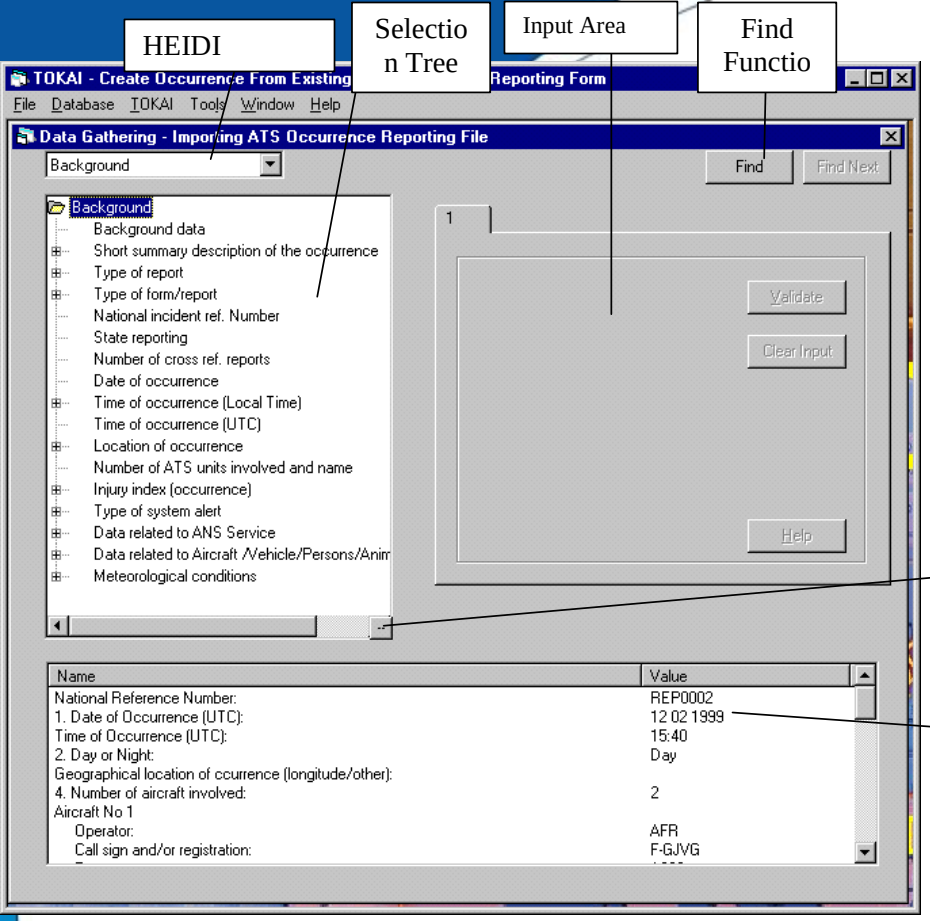
TAXONOMY



Collapse button

Inputs made in ATS Occurrence

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EUROPEAN AIR TRAFFIC MANAGEMENT PROGRAMME

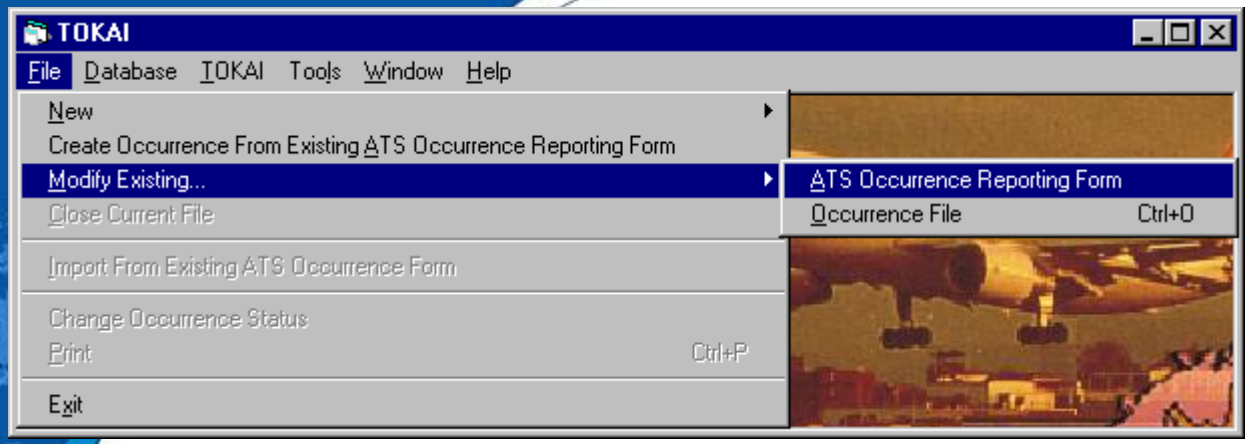
E A T M P

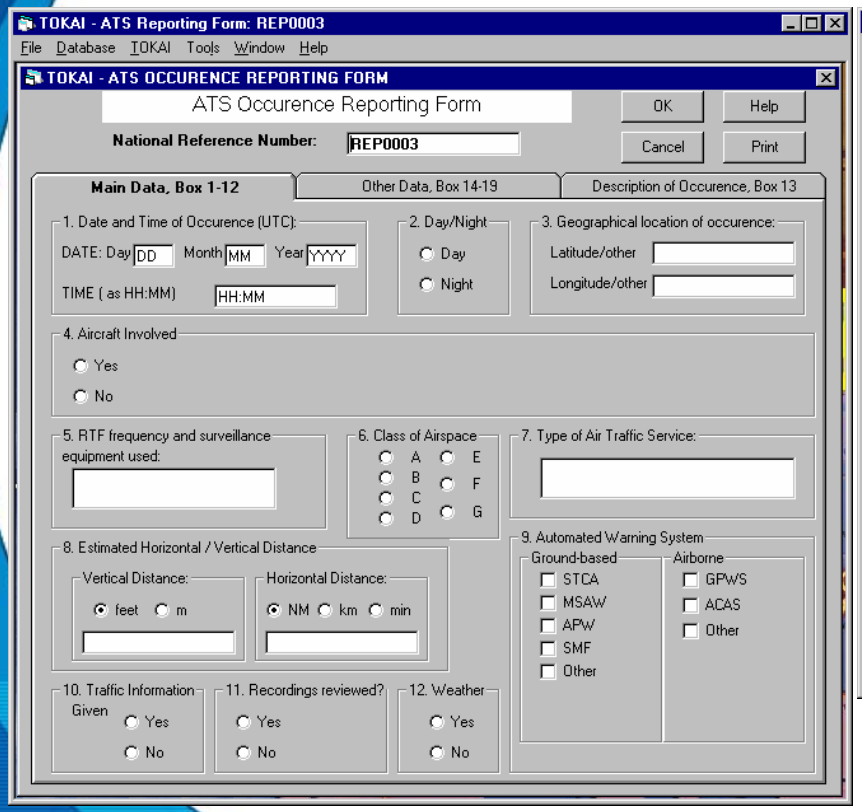
HEIDI TAXONOMY

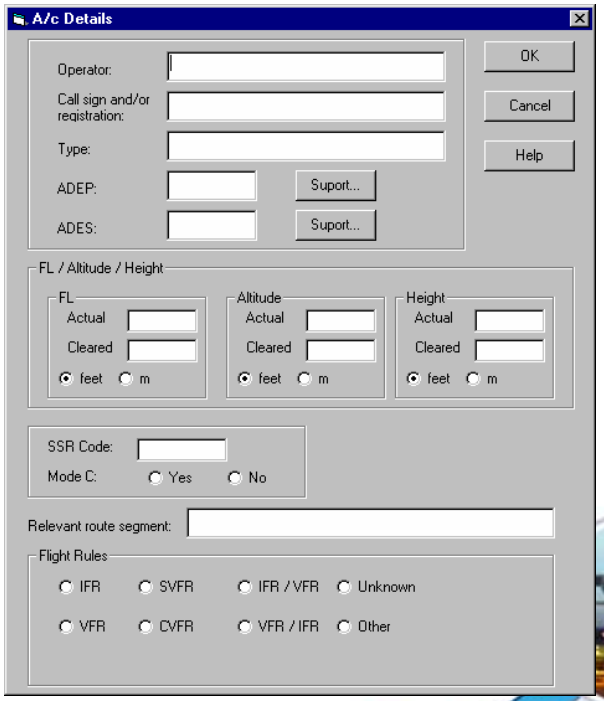
SAF.ET1.ST01.1000-10-00

Edition 1.1

TOKAI







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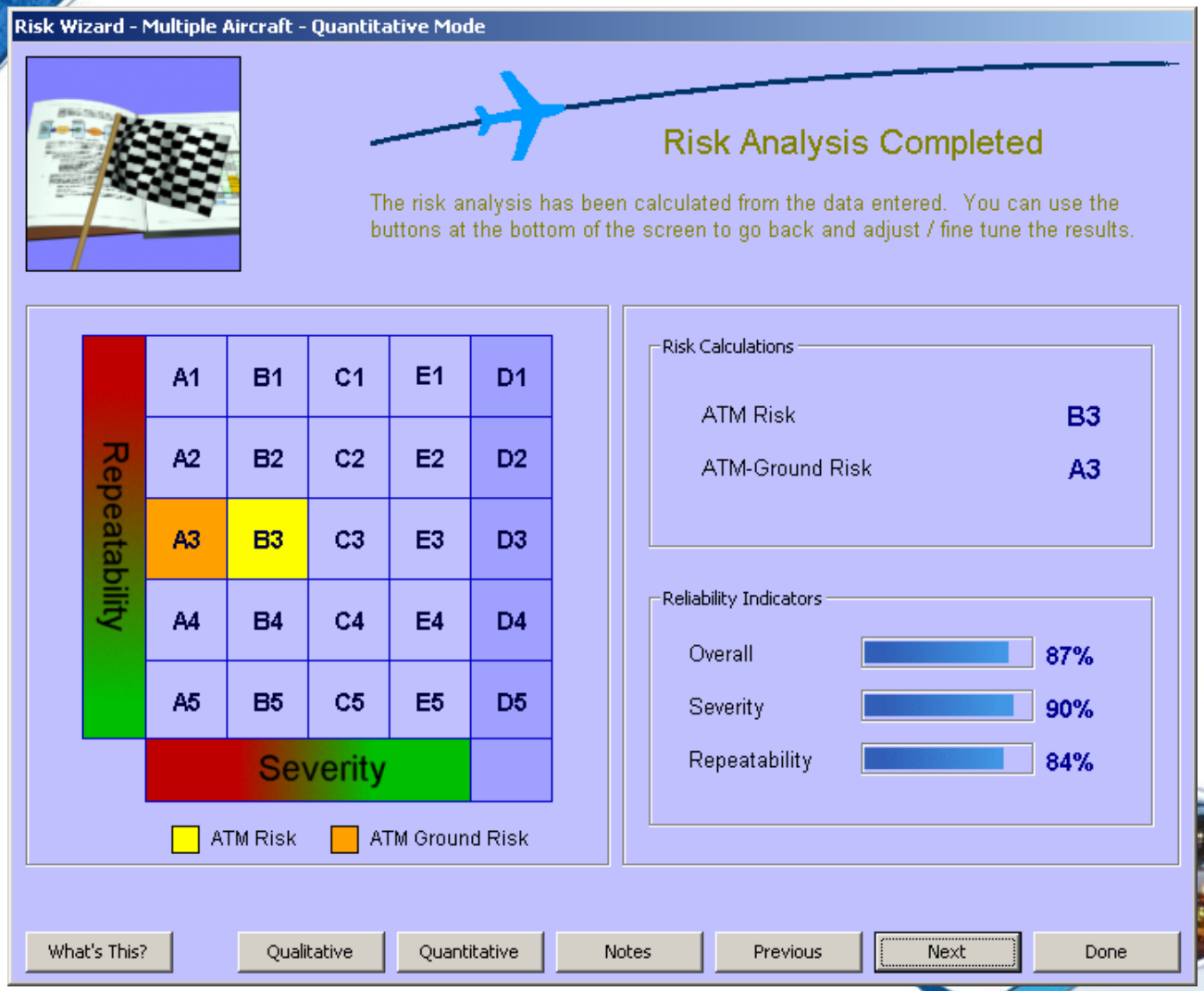
Severity and risk of recurrence principles (EAM2-GUI5) and its related TOKAI tool



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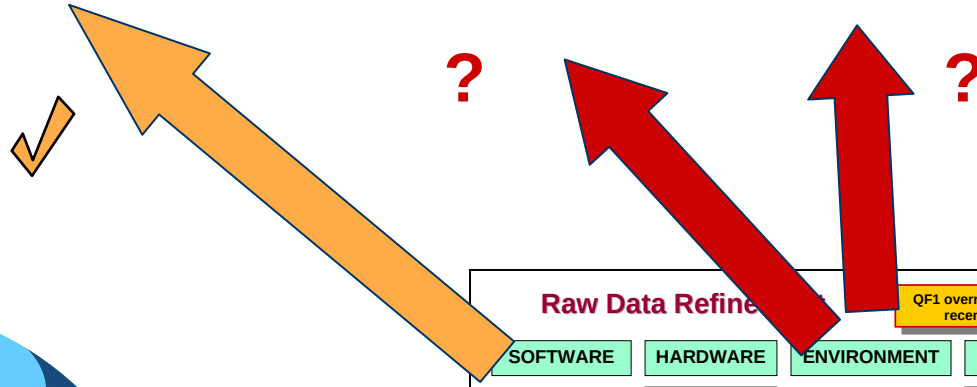
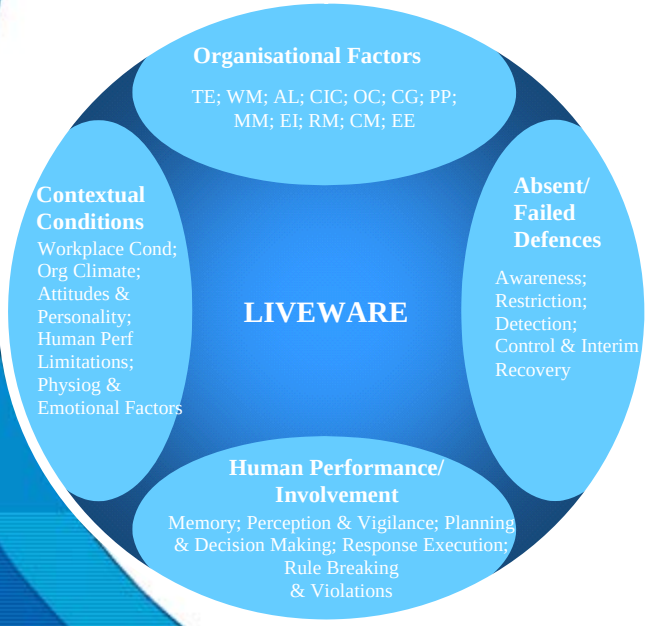
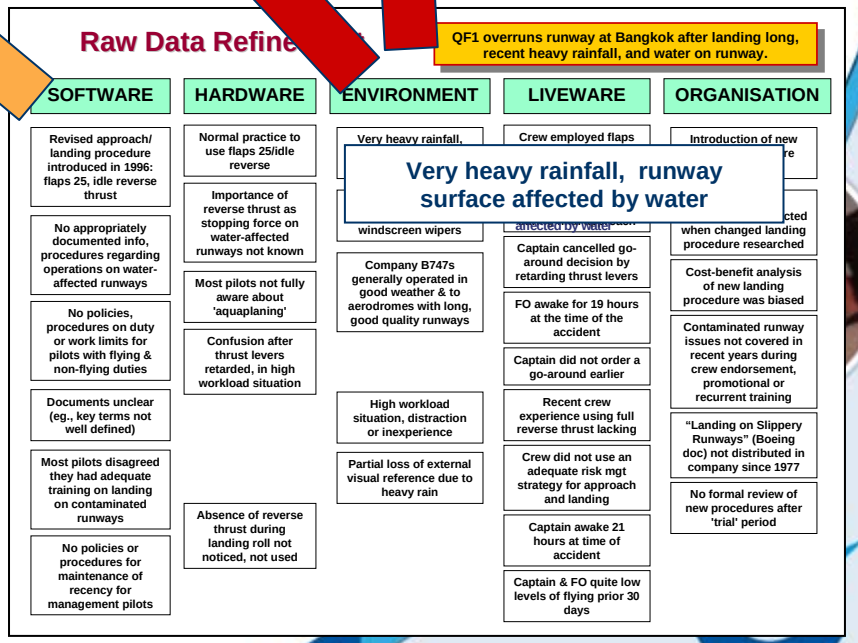
SOAM – Systemic Occurrence Analysis Methodology
EAM2-GUI8

ORGANISATIONAL FACTORS	CONTEXTUAL CONDITIONS	HUMAN INVOLVEMENT	ABSENT OR FAILED BARRIERS	ACCIDENT
	Very heavy rainfall, runway surface affected by water	Very heavy rainfall, runway surface affected by water	Very heavy rainfall, runway surface affected by water	







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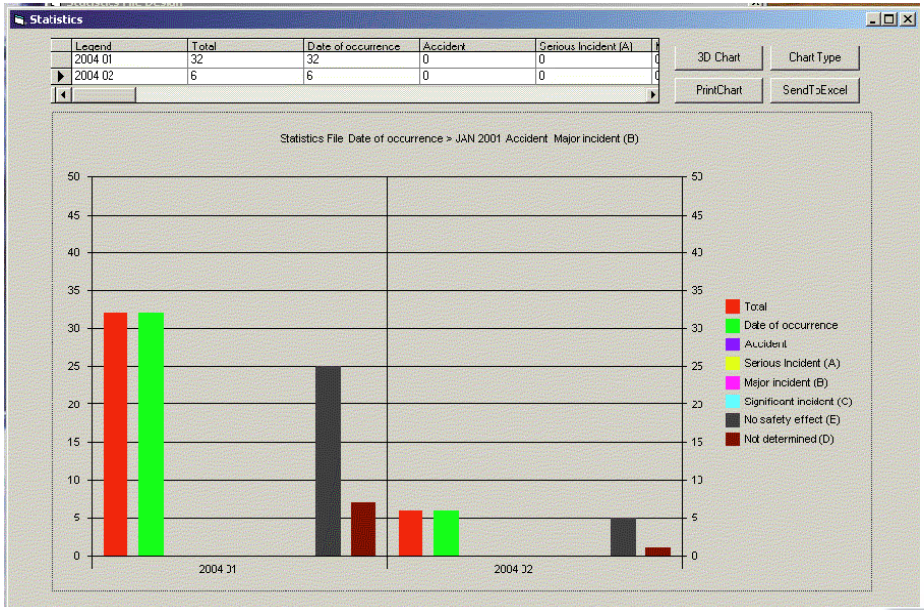
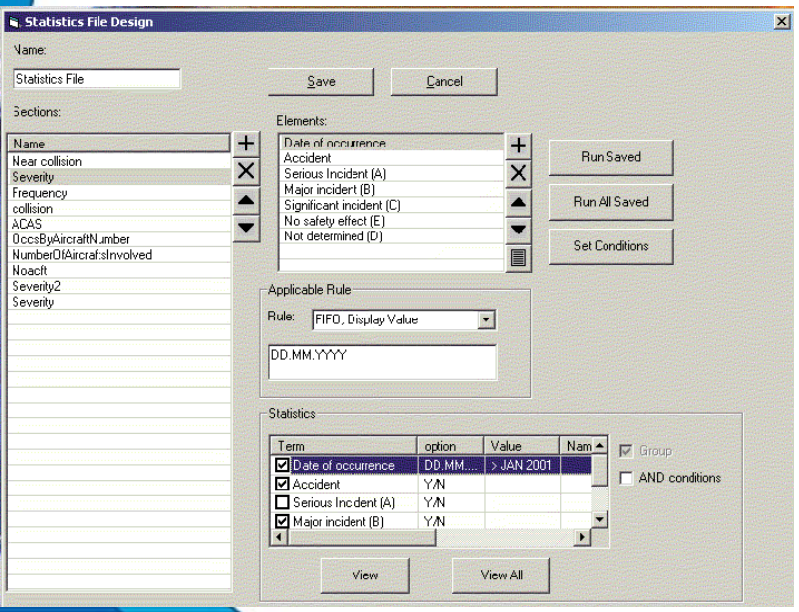
Safety metrics, statistical tool & analysis of safety trends – TOKAI tools





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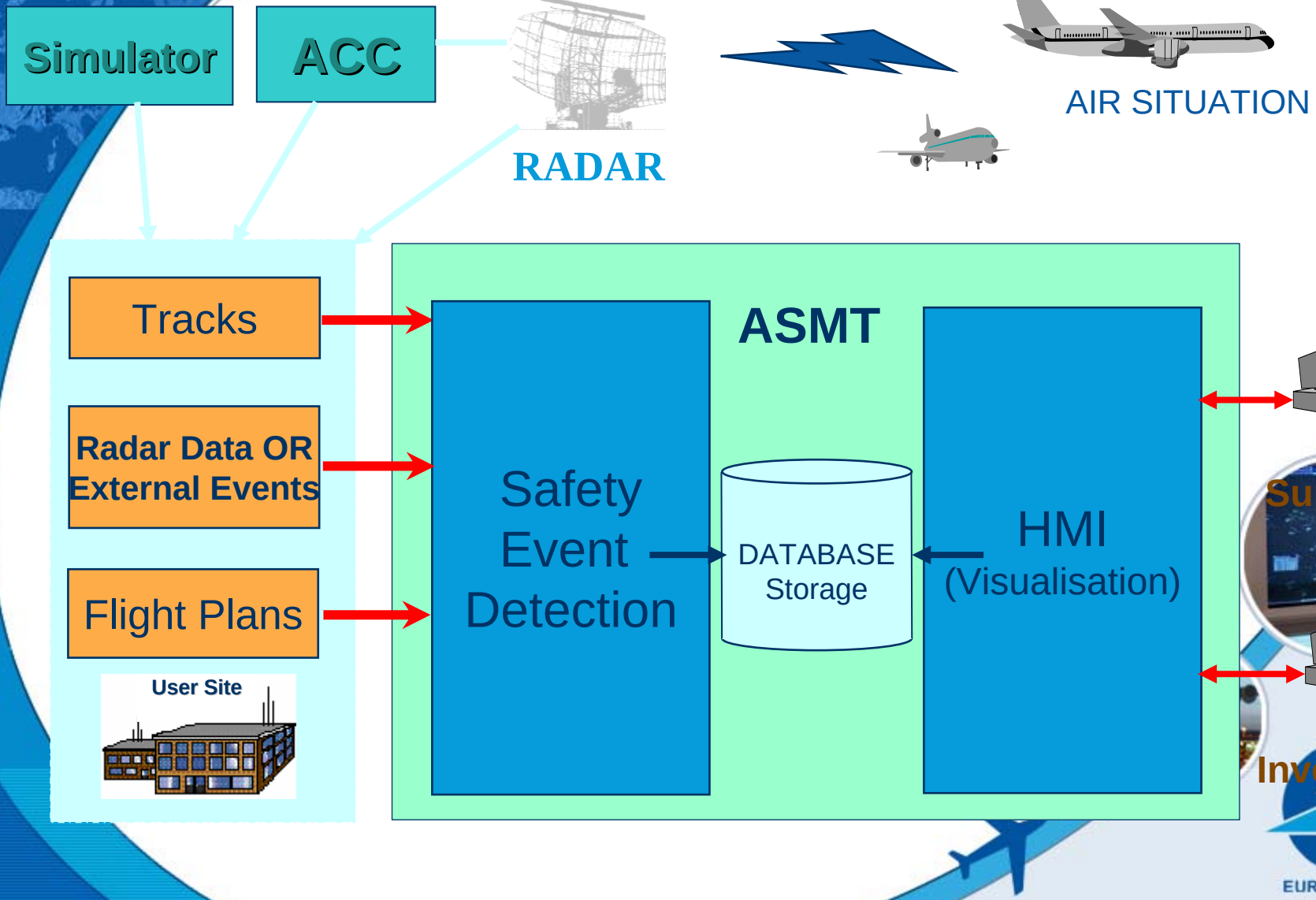
ASMT


Simulator
ACC
RADAR
AIR SITUATION
Tracks
Radar Data OR External Events
Flight Plans
User Site
ASMT
Safety Event Detection
DATABASE Storage
HMI (Visualisation)
Supervisor
Investigator
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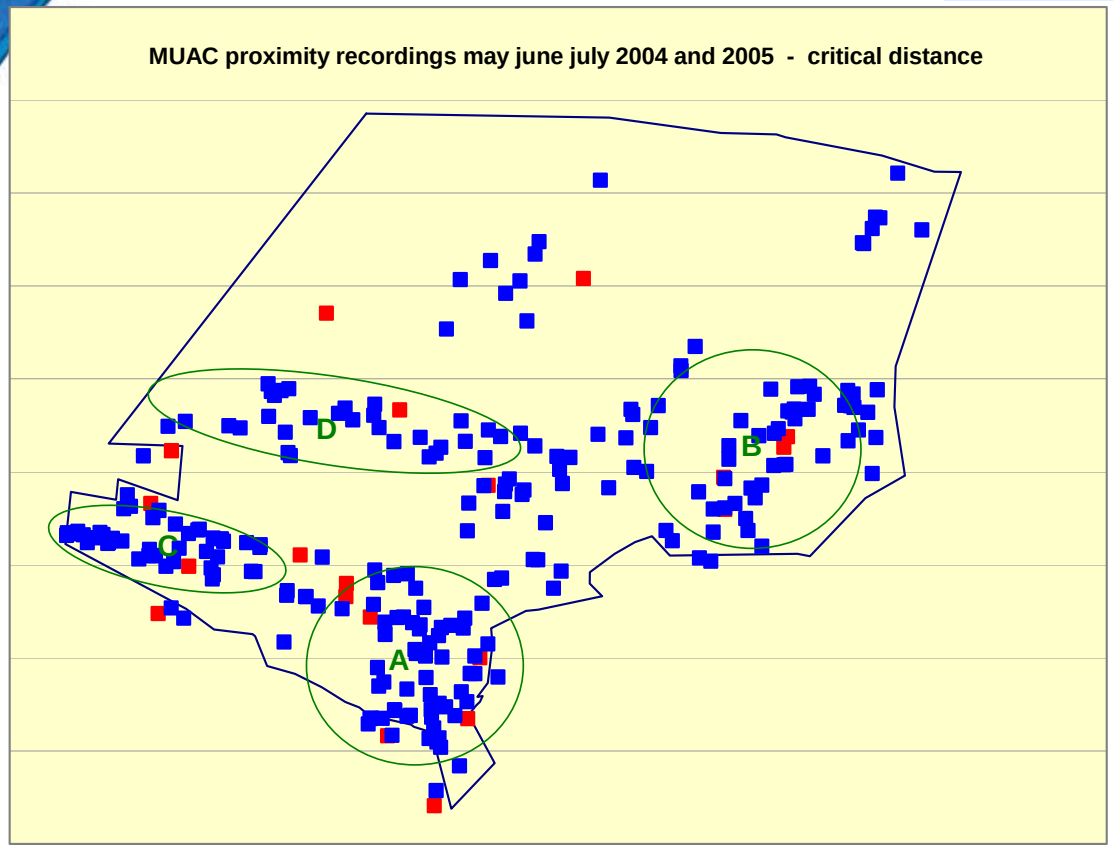
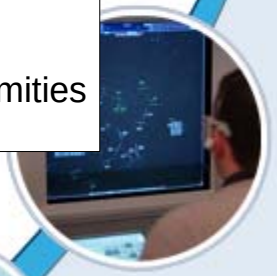
Hot Spot Analyses

Critical distance recordings

between 0-2NM / 0-600ft
between 2.1-4NM / 0-400ft





- Critical distance recordings do not show a hot spot

⇨ criterion not relevant for hot spot analyses

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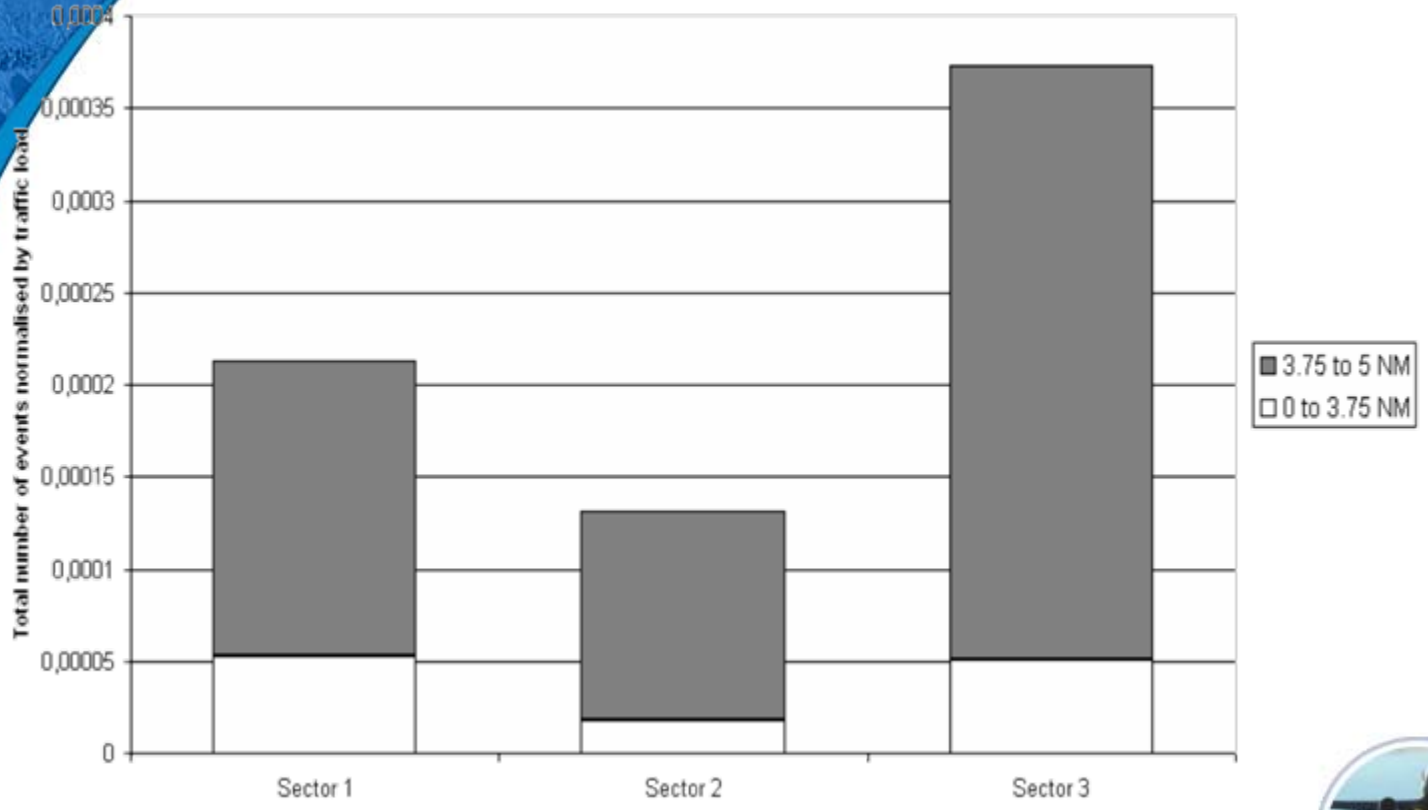
Analyze a wider set of occurrences



White part: high probability for manual reporting

Grey part: low probability for manual reporting

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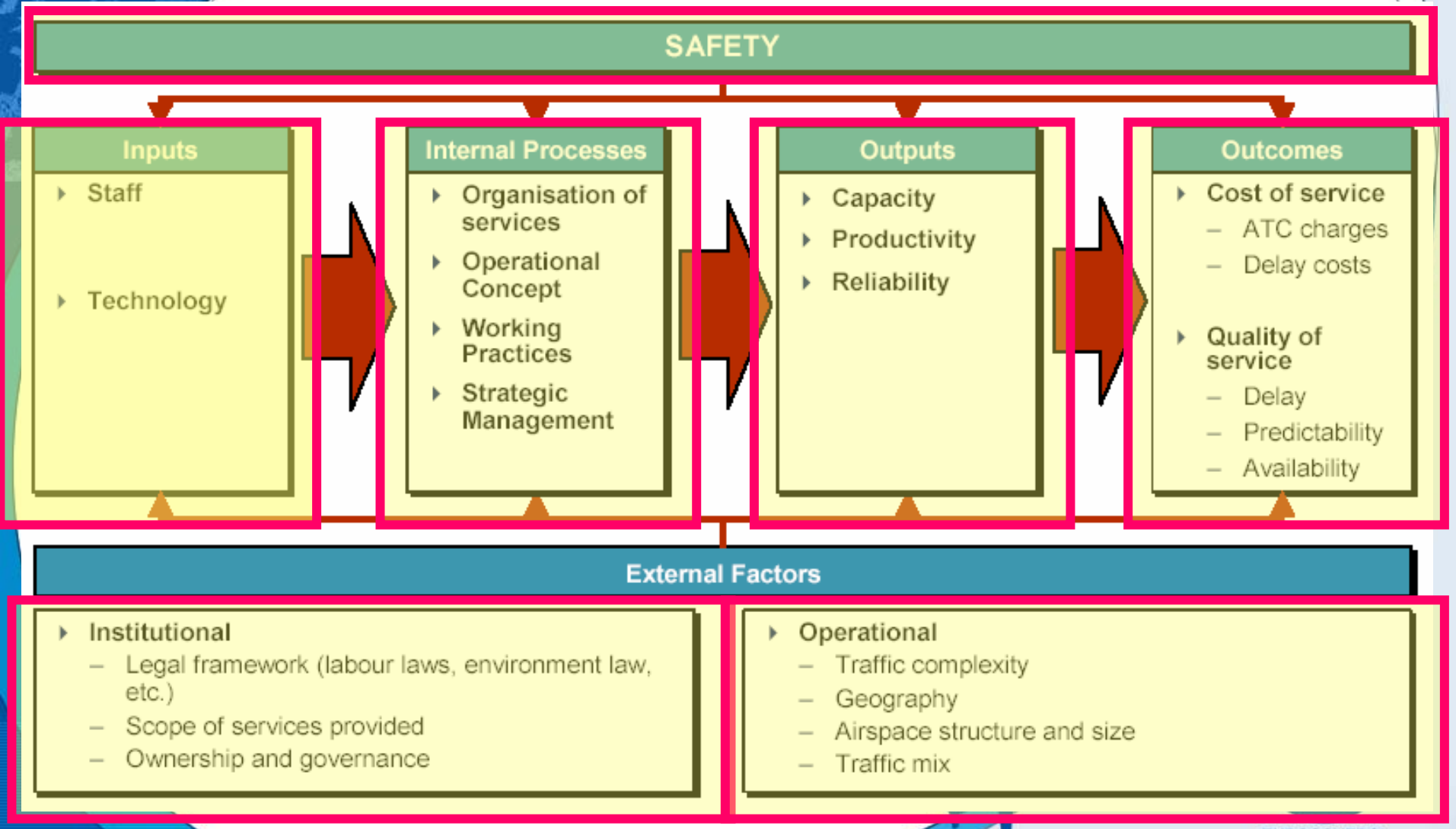
Safety Surveys Technique (EUROCONTROL/ ICAO/Transport Canada)



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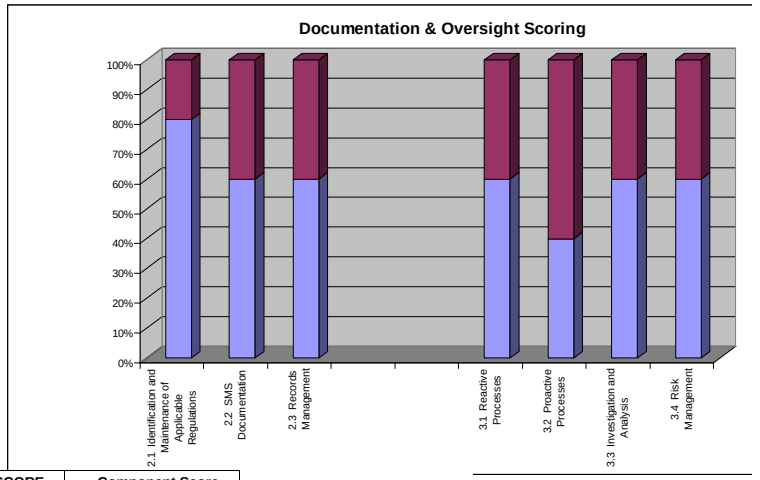

	ELEMENT	ESARR Compliant	ELEMENT SCORE	Component Score
	1.1 Safety Policy	Y / N	4	
	1.2 Non-punitive Safety Reporting Policy	Y / N	3	
	1.3 Roles, Responsibilities and Employee Involvement	Y / N	3	
	1.4 Communication	Y / N	2	
	1.5 Safety Planning, Objectives and Goals	Y / N	3	
	1.6 Performance Measurement	Y / N	2	
	1.7 Management Review	Y / N	4	
		Total:	21 / 35	60%
	2.1 Identification and Maintenance of Applicable Regulations	Y / N	4	
	2.2 SMS Documentation	Y / N	3	
	2.3 Records Management	Y / N	3	
		Total:	10 / 15	67%
	3.1 Reactive Processes	Y / N	3	
	3.2 Proactive Processes	Y / N	2	
	3.3 Investigation and Analysis	Y / N	3	
	3.4 Risk Management	Y / N	3	
		Total:	11/20	55%
	4.1 Training, Awareness and Competence	Y / N	4	
		Total:	4/5	80%
	5.1 Operational Quality Assurance*	Y / N	3	
		Total:	3/5	60%
	6.1 Emergency Preparedness and Response	Y / N	3	
		Total:	3/5	60%
			Component Score Total:	
			Overall SMS Score (Component Score Total / # of Components):	52/85 62%

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Stakeholder Requirements

Key Principles

- Information to public/stakeholders
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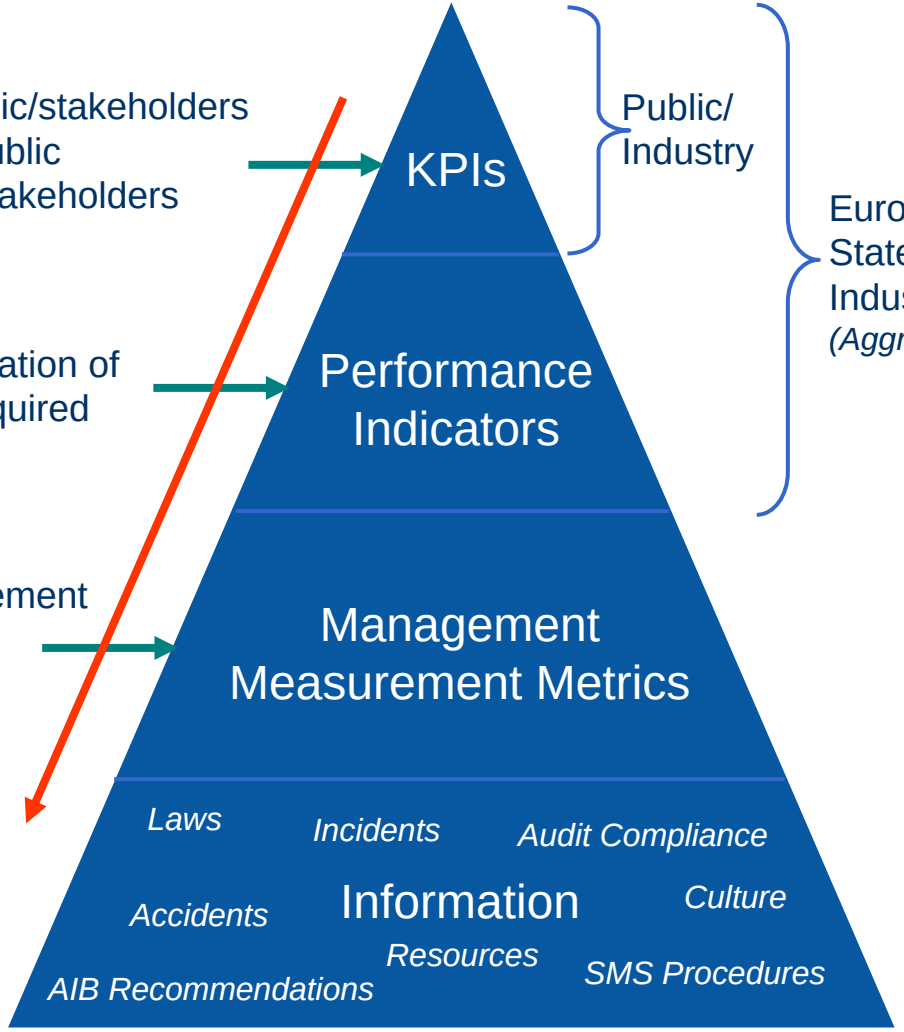
Interested Parties



Public/ Industry

European/ States/ Industry
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Organisational Level (Service Providers)

Principles why what

Roles & Resp. Who why

The whole process needs to be a continuous improvement activity

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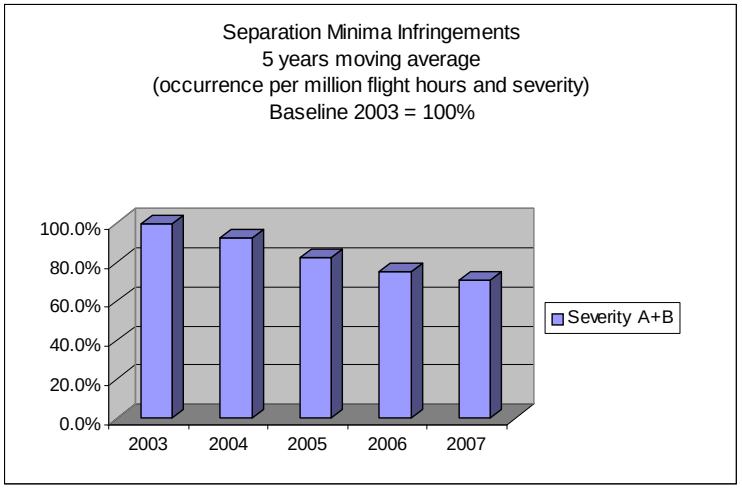
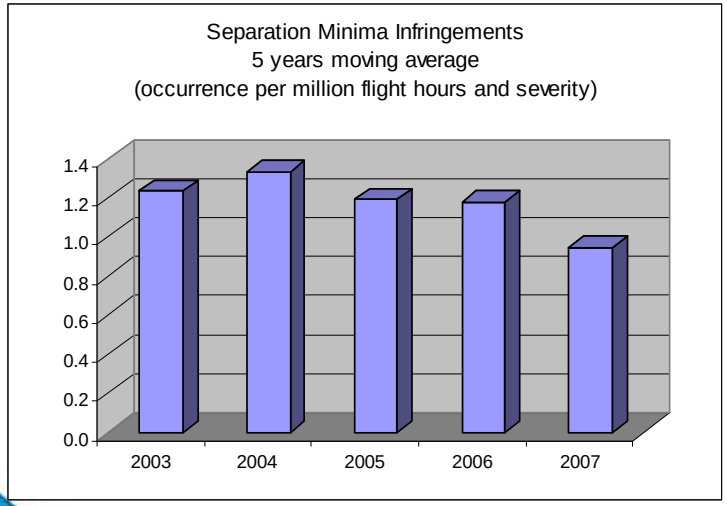
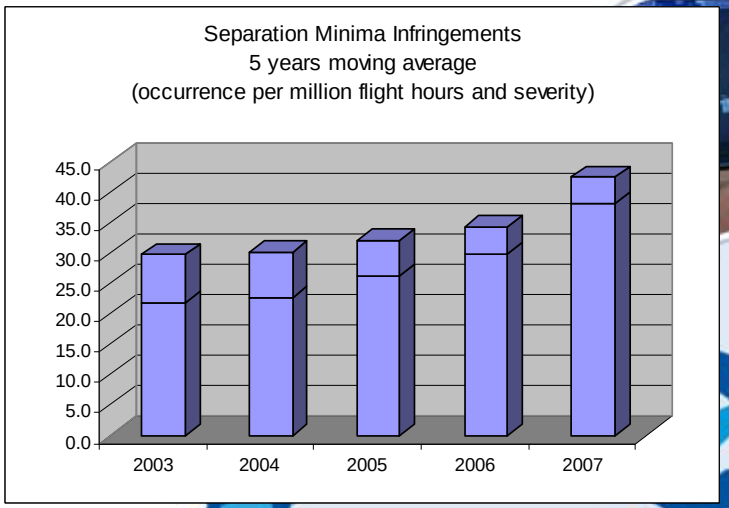
Example of Public KPI – SMI in FABs







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