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## SAFETY

“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 Doc 9859, Third Edition - 2013*

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## HAZARD

“those conditions that could cause or contribute to unsafe operation of aircraft”

*ICAO Doc 9859, Third Edition - 2013*

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## RISK

“combination of the overall probability, or frequency of occurrence of a harmful effect induced by a hazard and the severity of that effect”.

*European Commission Regulation 2096/2005*

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- SYSTEMIC
- SPECIFIC



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❖ **Reactive**

- ❖ Analysis of past outcomes or events
- ❖ *Lagging Indicator - metrics that measure events that have already occurred and that impact on safety performance*

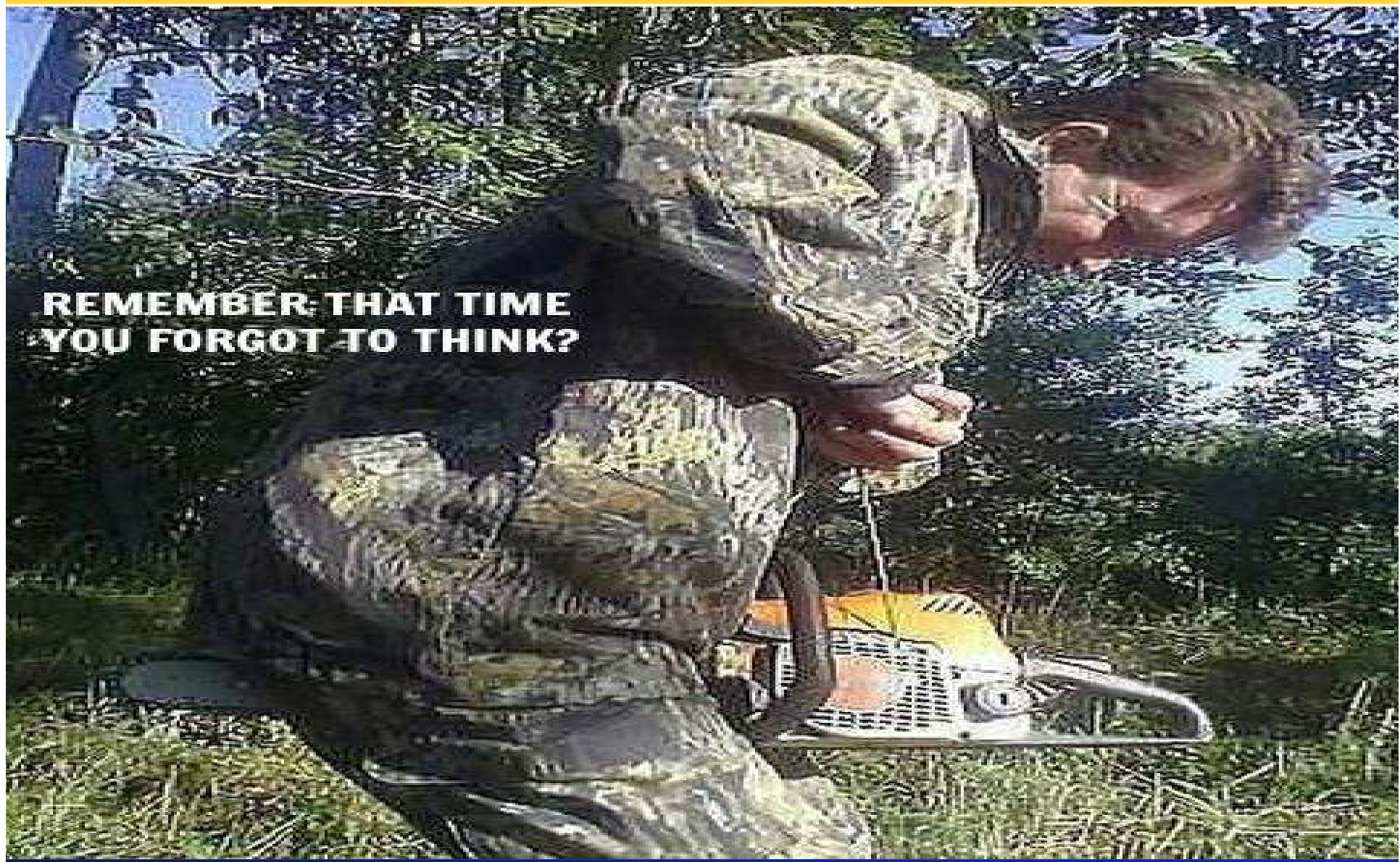
❖ **Proactive**

- ❖ Actively seeking hazards in the existing processes
- ❖ Reporting of near misses
- ❖ Identifying safety risks before they occur by analysing activities
- ❖ Safety audits & surveys
- ❖ *Leading Indicator - metrics that measure inputs to the safety system to manage and improve safety performance*

## ❖ Predictive

- ❖ Data gathering to identify possible negative future outcomes
- ❖ Advanced data analysis to predict emerging safety risks
- ❖ Routine operational monitoring of hazards e.g. FDM
- ❖ Voluntary hazard reporting
- ❖ Change process management

# Hazard Identification



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# SMICG Industry Day



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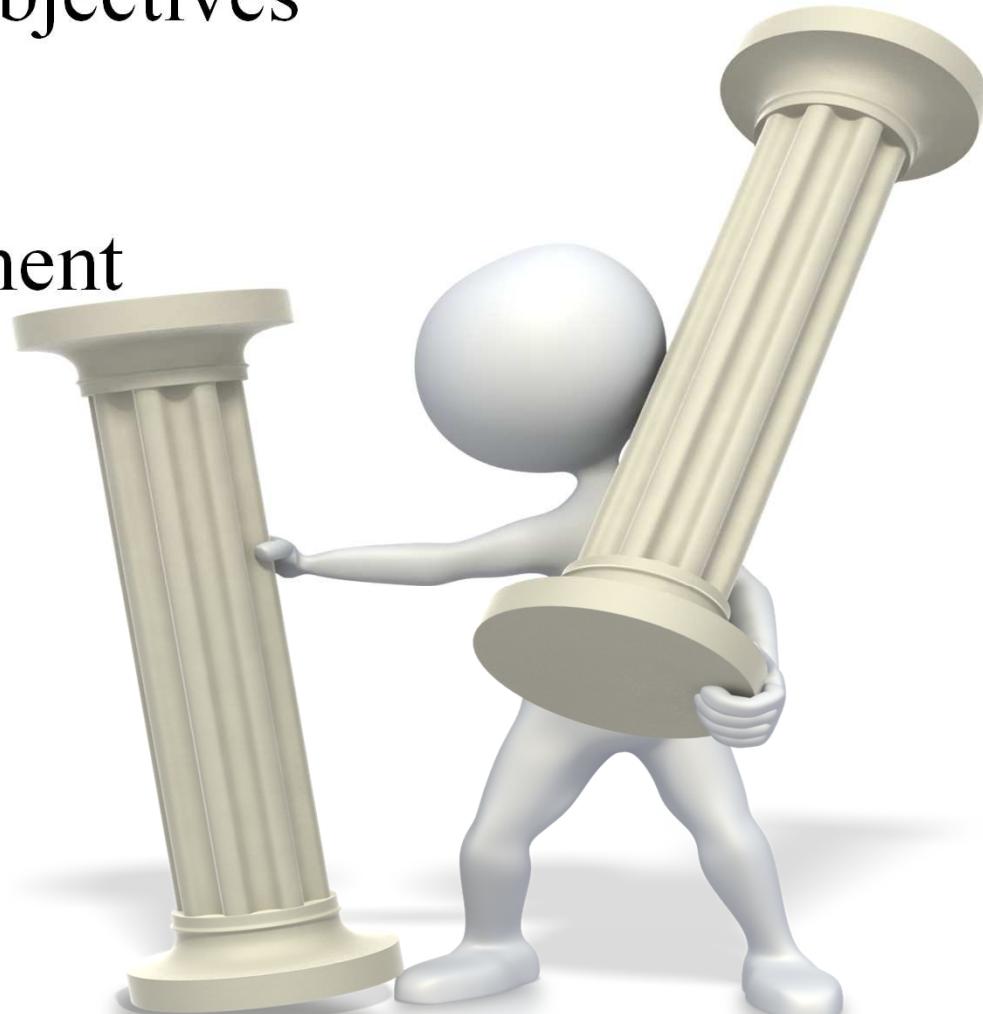
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## FOUR KEY COMPONENTS

- ❖ Safety Policies and Objectives
- ❖ Safety Risk Management
- ❖ Safety Assurance
- ❖ Safety Promotion



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## Changing our mental Model

“None of us can carry an organisation in our minds ..... What we carry in our heads are images, assumptions and stories .... Our mental models determine not only how we make sense of the world, but how we take action”

*Peter M Senge*

*The Fifth Discipline: The Art & Practice of the Learning Organisation.*

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# “Without data, you don’t have an SMS”

*Captain D Maurino*

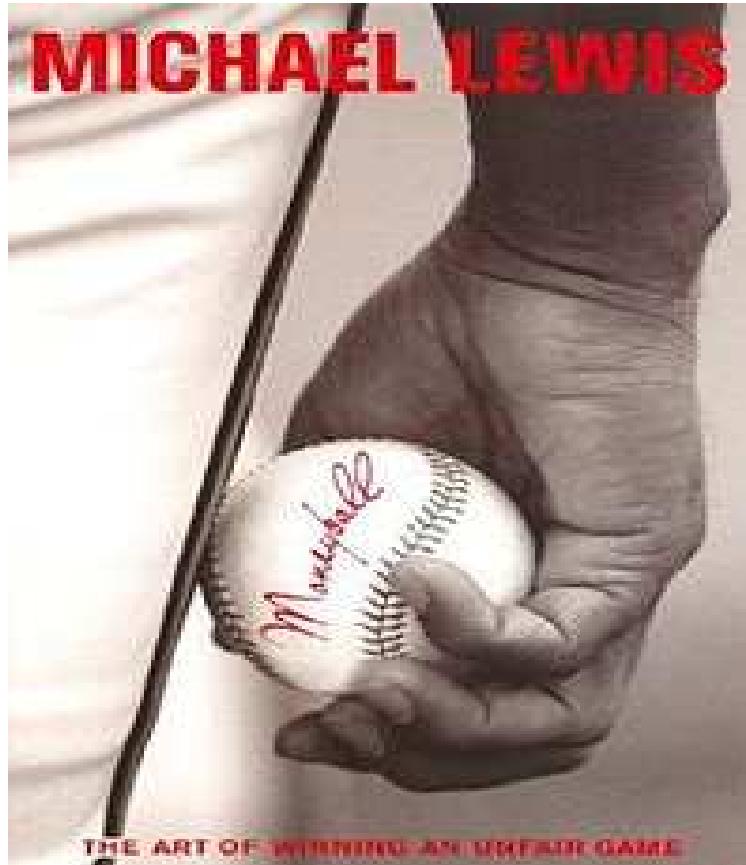
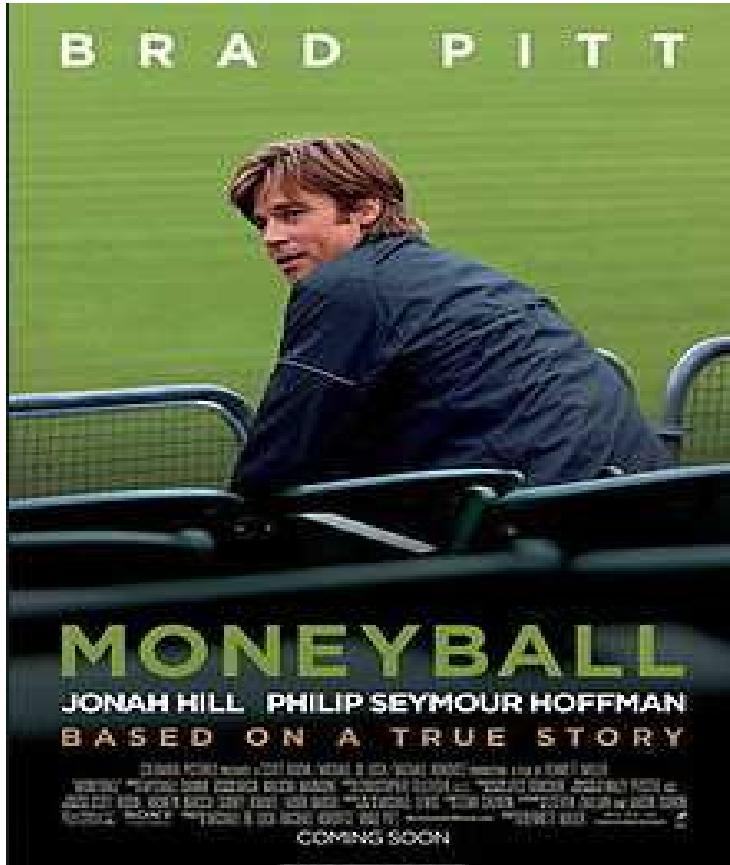
*Safety Management Advisor, ICAO*

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- ❖ The science of collecting, organizing, presenting, analysing, and interpreting data to assist in making more effective decisions.

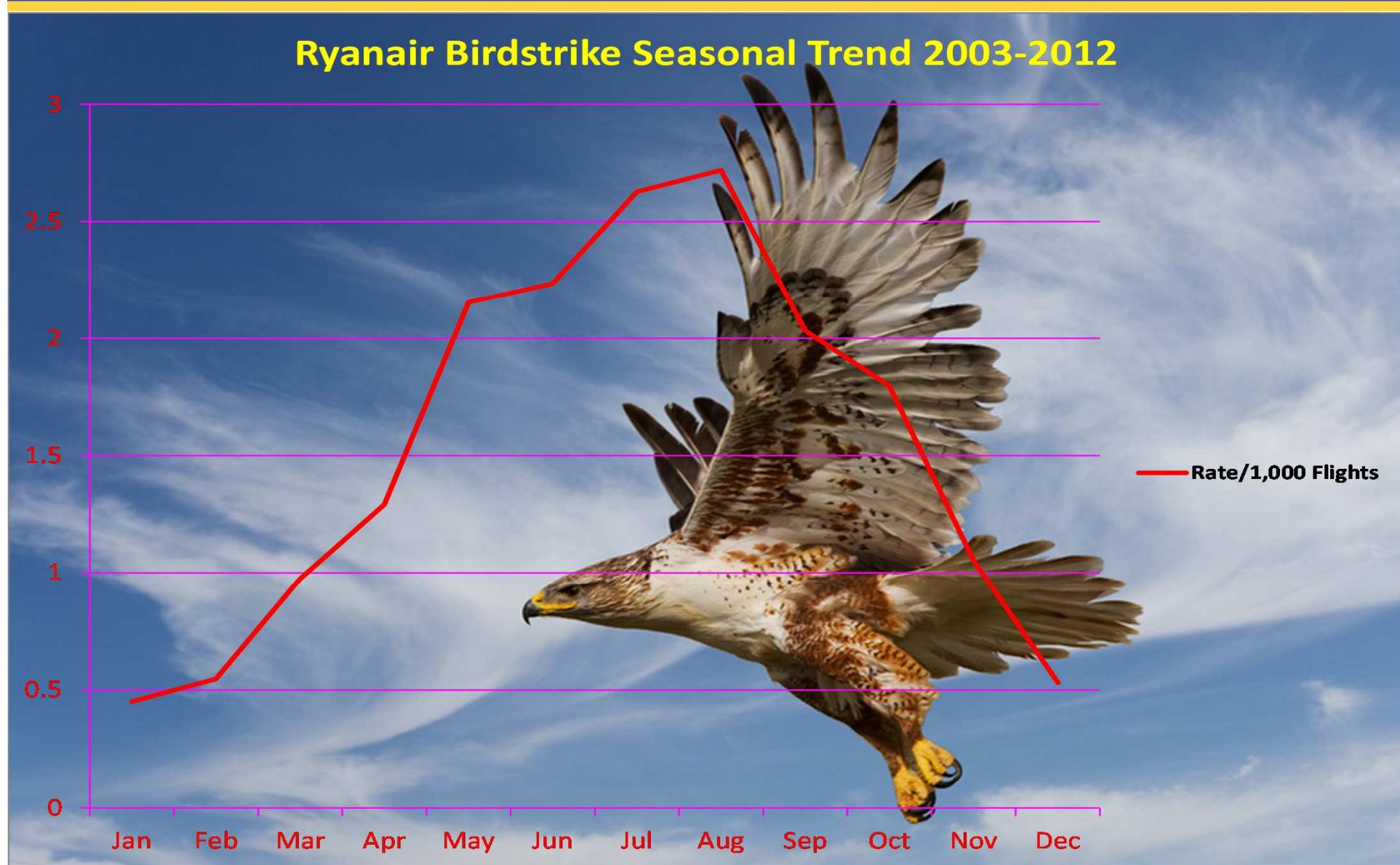


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# Types of Statistics – Analytical



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## Interpretation of Data

- *ADREP Taxonomy* - ICAO Accident Data Reporting System
- ARMS Methodology

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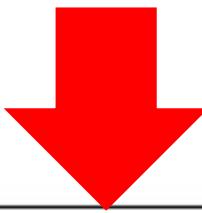
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Question 2

What was the effectiveness of the remaining barriers between this event and the most credible accident scenario?

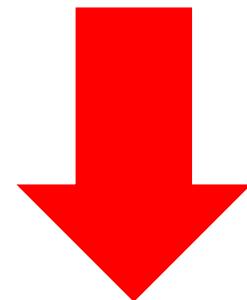
Effective	Limited	Minimal	Not effective
50	102	502	2500
10	21	101	500
2	4	20	100
1			



Question 1

If this event had escalated into an accident outcome, what would have been the most credible outcome?

Catastrophic Accident	Loss of aircraft or multiple fatalities (3 or more)
Major Accident	1 or 2 fatalities, multiple serious injuries, major damage to the aircraft
Minor Injuries or damage	Minor injuries, minor damage to aircraft
No accident outcome	No potential damage or injury could occur



Typical accident scenarios

Loss of control, mid air collision, uncontrollable fire on board, explosions, total structural failure of the aircraft, collision with terrain
High speed taxiway collision, major turbulence injuries
Pushback accident, minor weather damage
Any event which could not escalate into an accident, even if it may have operational consequences (e.g. diversion, delay, individual sickness)



## Interpretation of Data

- **Statistical significant** - is the probability that an effect is not likely due to just chance alone.
- **Probability** - is a measure or estimation of likelihood of occurrence of an event

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# Probability



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# Key Operational Risk Areas

Key Operational Risk Area (KORA)	RYR	EU	IAA	UKCAA
Bird Strike	X			
Controlled Flight into Terrain (CFIT)	X	X	X	X
De-icing (ICE)	X		X	
Ground Collision (GCOL)	X	X		
Loading error	X		X	X
Loss of Control In-flight (LOC-I)	X	X	X	X
Mid Air Collision (MAC)	X	X	X	X
Runway Excursion	X	X	X	X
Runway Incursion	X	X	X	X
Unreported ground damage	X		X	X
Airborne & Post Crash Fire				X
Human Factors & Performance			X	
OFDM			X	

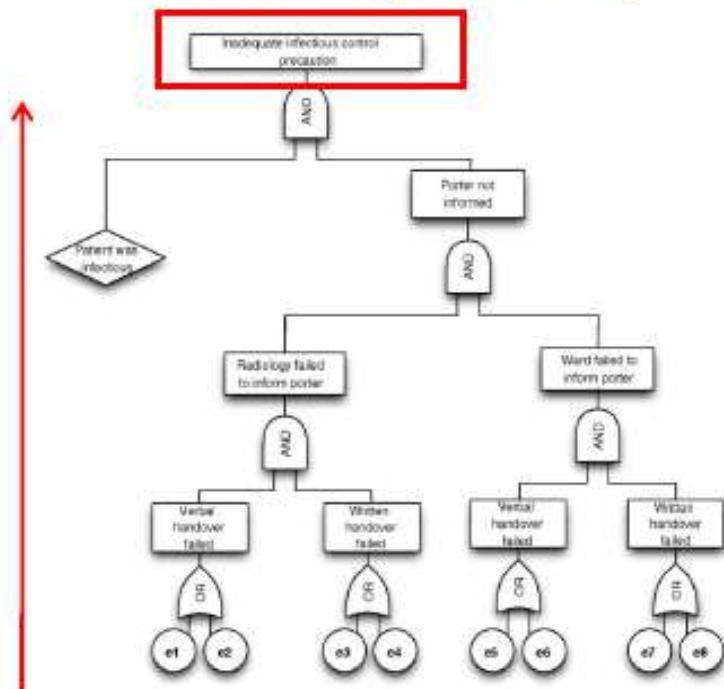
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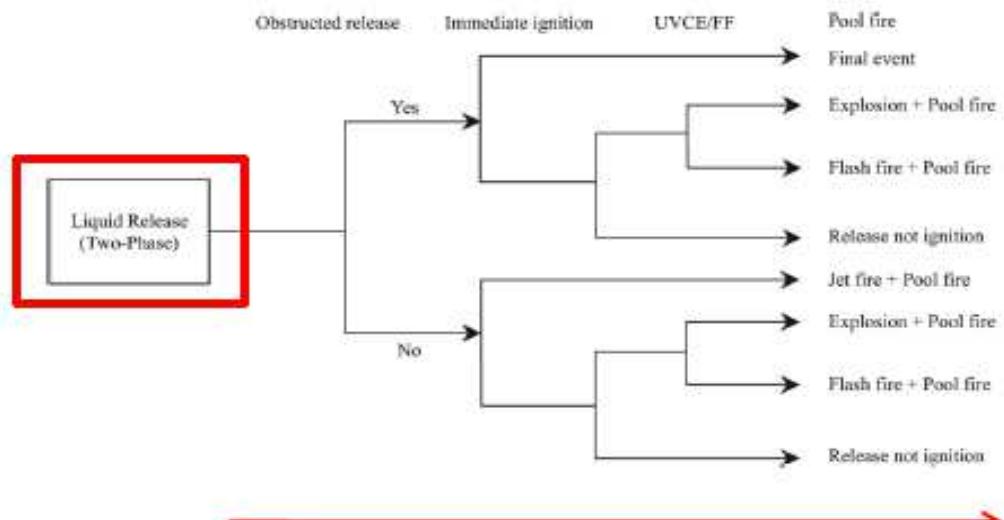
# What is a Bow Tie

- Bow-Tie's parents

## Fault Tree: (pre error)

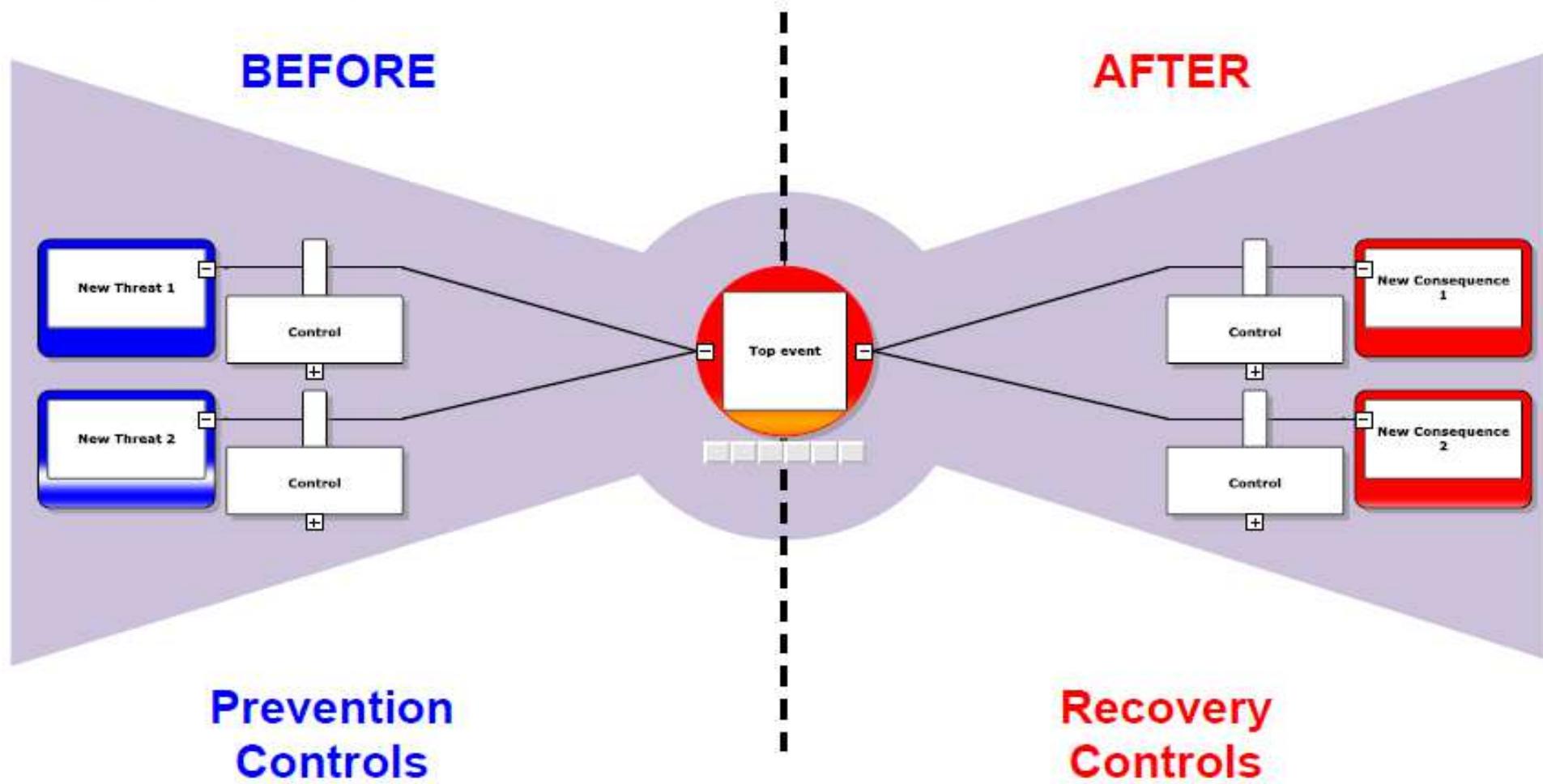


## Event Tree: (post error)



# Bow Tie

- Scenario based





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