

Safety Tools Workshop  
Cyprus, May 2015



# Agenda

- Introductions
- Interactive Group Discussion – Measuring performance
- The Journey – Managing what you can measure. Safety v Risk
- Finally – an integrated system!
- Presentation by IAA
- Look for the “je ne sais quoi”!
- Q & A

# Group Discussion: Measuring the Effectiveness of an SMS & System Performance

- Limited data? Or more than we know what to do with – or both?
- Political and outside pressure and perceptions. Real?
- Safety v. Risk. Explain this to the “non-safety” person!
- Measuring intangibles. “Seeing through the eyes of the beholder?”
- Lagging and leading indicators. The past and the future!

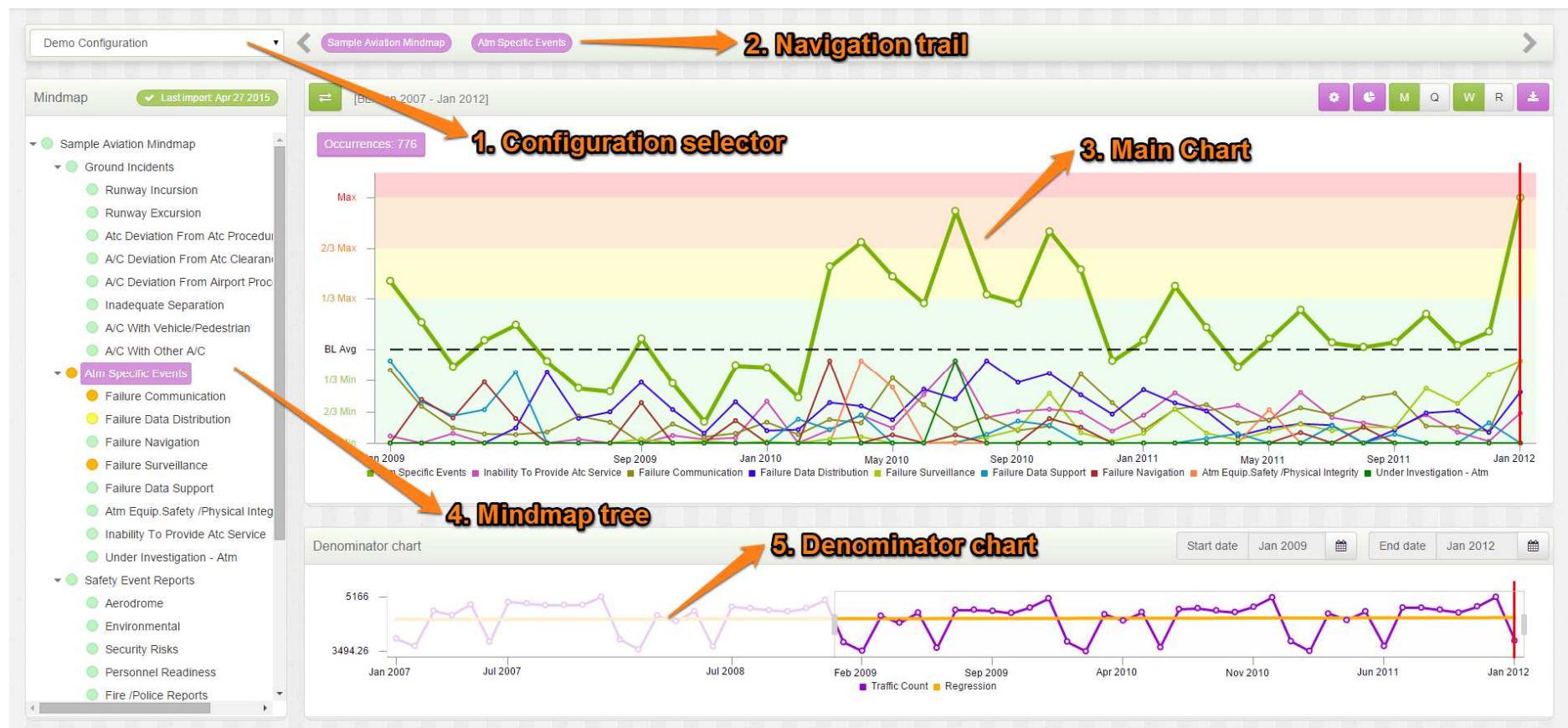
# The Journey – Where All That Lead -

- APF started in 2006 with a “simple” question – “So we are going to accept the system as it currently is? OK, but how do we measure that?”
- *APF was the quantifiable answer to a political question.*
- The methodology uses multiple metrics, normalising denominators, human judgment, and statistical analysis to present an organisation's performance over time utilising its own data.
- Integrated with RAT & TOKAI
- Can utilise BowTie risk methodology / concepts

## Performance – The APF Provides:

- Data trending showing overall performance;
  - Lagging indicators over time are good (but crude) “forecasts” of where you might be headed
  - Leading indicators can give you “early warnings” of change
- Normalisation against output, e.g., flight hours, number of operations, etc.;
  - This presents a balanced approach
- Utilisation of historical high & low performance points to create benchmark performance targets/goals
  - Baselines are set by the organisation and performance is measured against the baseline

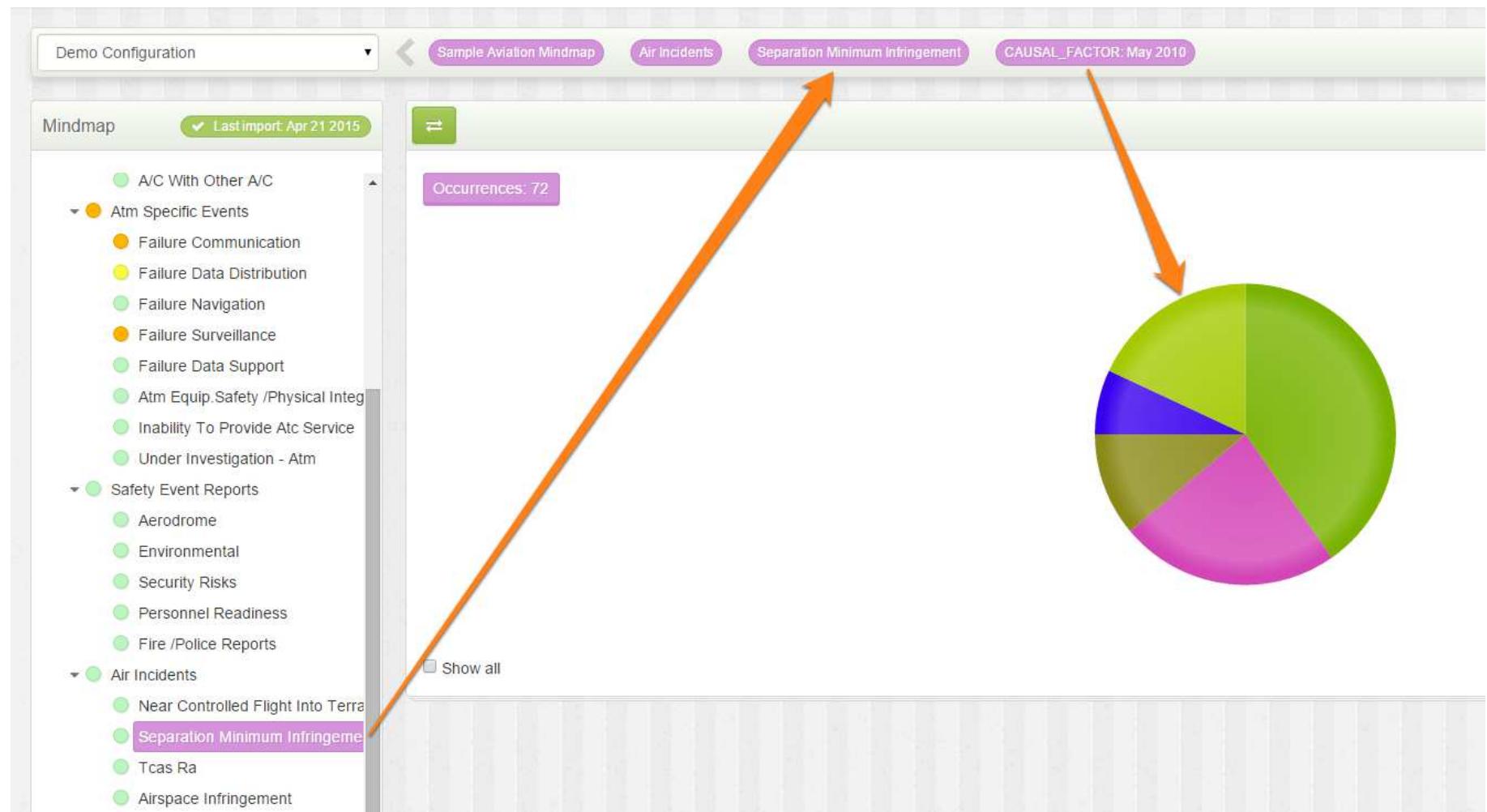
# Performance Trending and Targets



## Safety Indicators – The APF Provides:

- Capability to drill down by location and look for influencing factors;
  - Supports the search for “why” events are occurring
- Capability to search for key lagging and leading indicators
  - ***All totally dependent on the quantity & quality of your data***
- A “What If” function to allow you to model data elements and time to see what the impact would be on overall performance
  - Allows for modeling and resource allocation based on data

# Drill Down and Diagnostics



# Cautions About Statistical Significance!





# Experience From An ANSP With APF v1



Bill Becton  
IAA Safety Management Unit



# IAA use of APF



- Commenced the implementation and use of APF in 2014
- Currently being validated prior to full roll out
- ESARR 2 Mind Map with some minor additions being used at present.
  - To be reviewed and re-validated by end of 2015
- Will simplify the process of trend reporting by operational units.
- Currently consulting with NSA with regard to using APF for performance and trend reporting.
- To be used as decision making tool by Organisational Safety Committee

## Example of APF Use By IAA

- Using APF a potential issue identified with Separation Minima infringements at one operational unit.

# Example of APF Use



- **Action:** Specialist group put in place involving ATC, Standards and Procedures department and Safety Management unit
- Using APF looked back at trend in Sep Min events to start of 2013 (including review of investigation reports).
- **Outcome:** Group reported back to Director Operations and Head of Safety Management within one week identifying recommendations or areas that require further action.

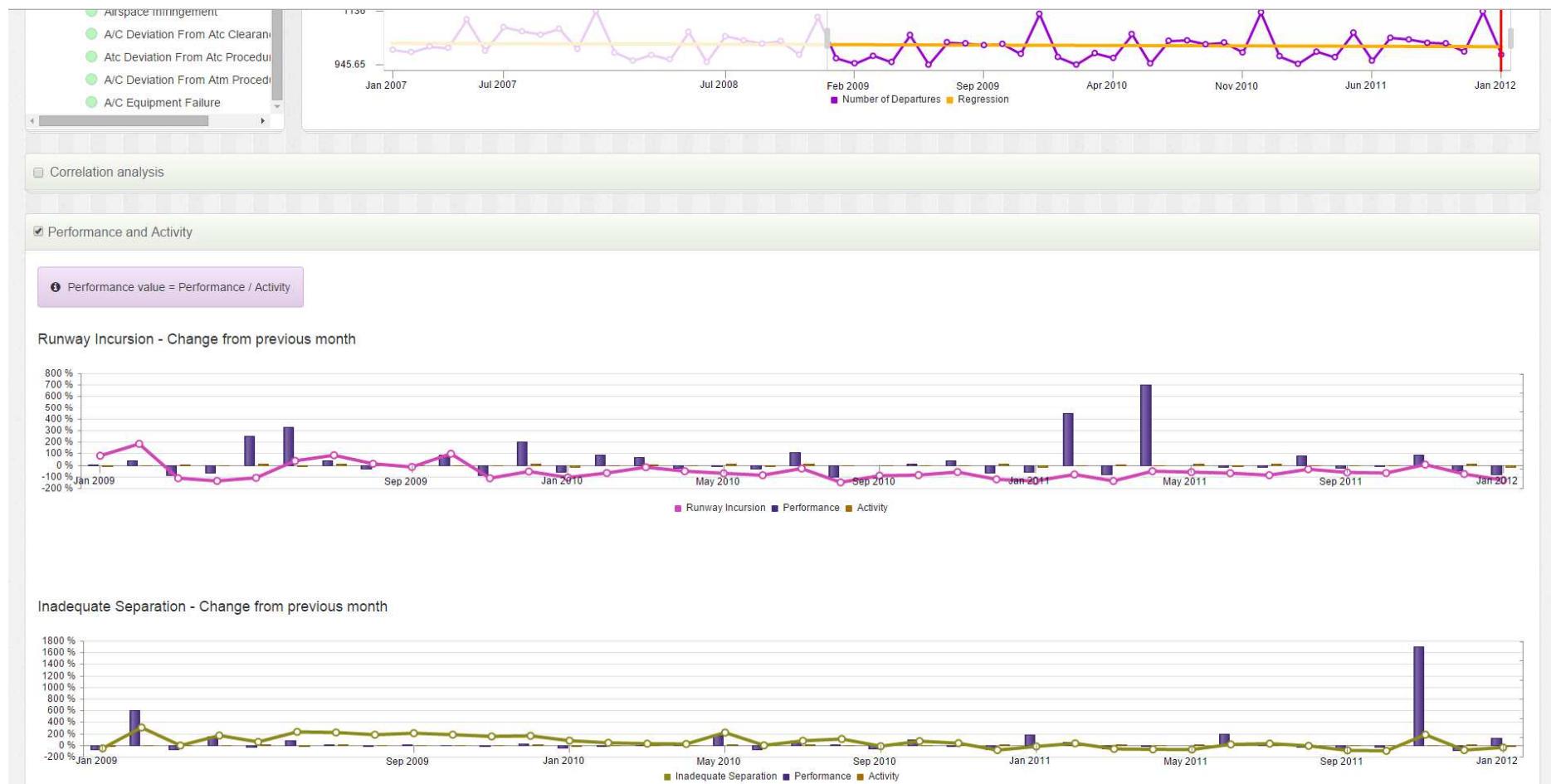
Thank You

And Now....v2.0!

## Analysis – APF v2 Provides:

- Advanced – and automated – analysis including:
  - Correlation Analysis to indicate relationships between data elements;
  - A “What If” function to allow you to model data elements and time to see what the impact would be on overall performance
  - Pareto charts – and the ability to export them
  - Indication of provisional data pending full investigations

# Performance v Activity & Influence





# Correlation Analysis & Relationships

**Correlation analysis**

Full correlation matrix  Sample Aviation Mindmap - Performance  0 months  Auto detect Start date Jan 2009  End date Jan 2012

Name	Type	R	Latency
1. Failure Data Support	Performance Level 2	0.72	-18
2. Runway Incursion	Performance Level 2	0.7	-20

Name	Type	R	Latency
1. Failure Communication	Performance Level 2	-0.77	-23
2. Fire /Police Reports	Performance Level 2	-0.75	-24
3. Air Incidents	Performance Level 1	-0.72	-17
4. Failure Data Distribution	Performance Level 2	-0.71	-18
5. Atc Deviation From Atc Procedures - GI	Performance Level 2	-0.7	-22
6. Personnel Readiness	Performance Level 2	-0.7	-22

Independent
-------------

# What If – Data Modeling

Mindmap

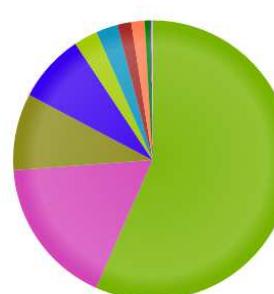
Last import: May 14 2015

- ▶ Primary Excursion
- Atc Deviation From Atc Procedur
- A/C Deviation From Atc Clearanc
- A/C Deviation From Airport Proc
- Inadequate Separation
- A/C With Vehicle/Pedestrian
- A/C With Other A/C
- ▶ Atm Specific Events
- Failure Communication
- Failure Data Distribution
- Failure Navigation
- Failure Surveillance
- Failure Data Support
- Atm Equip.Safety /Physical Integ
- Inability To Provide Atc Service
- Under Investigation - Atm
- ▶ Safety Event Reports
- Aerodrome
- Environmental
- Security Risks
- Personnel Readiness
- Fire /Police Reports
- ▶ Air Incidents
- Near Controlled Flight Into Terra
- Separation Minimum Infringeme

Classification	Subclassification	Name	Value	What if	Transition	Start date	End date
Ground Incidents		CAUSAL_FACTOR	3. Human Involvement	<input type="button" value="20 %"/> 20 %	0 months	Jan 2009	<input type="button" value="Set end date"/> <input type="button" value="Delete"/>
Ground Incidents		CAUSAL_FACTOR	4. Situational Factors: 4.4 Communications	<input type="button" value="35 %"/> 35 %	0 months	Jan 2009	<input type="button" value="Set end date"/> <input type="button" value="Delete"/>

Configuration name: Demo Configuration - What if

Occurrences: 473



# Enhanced Data Capabilities

## Enhanced data

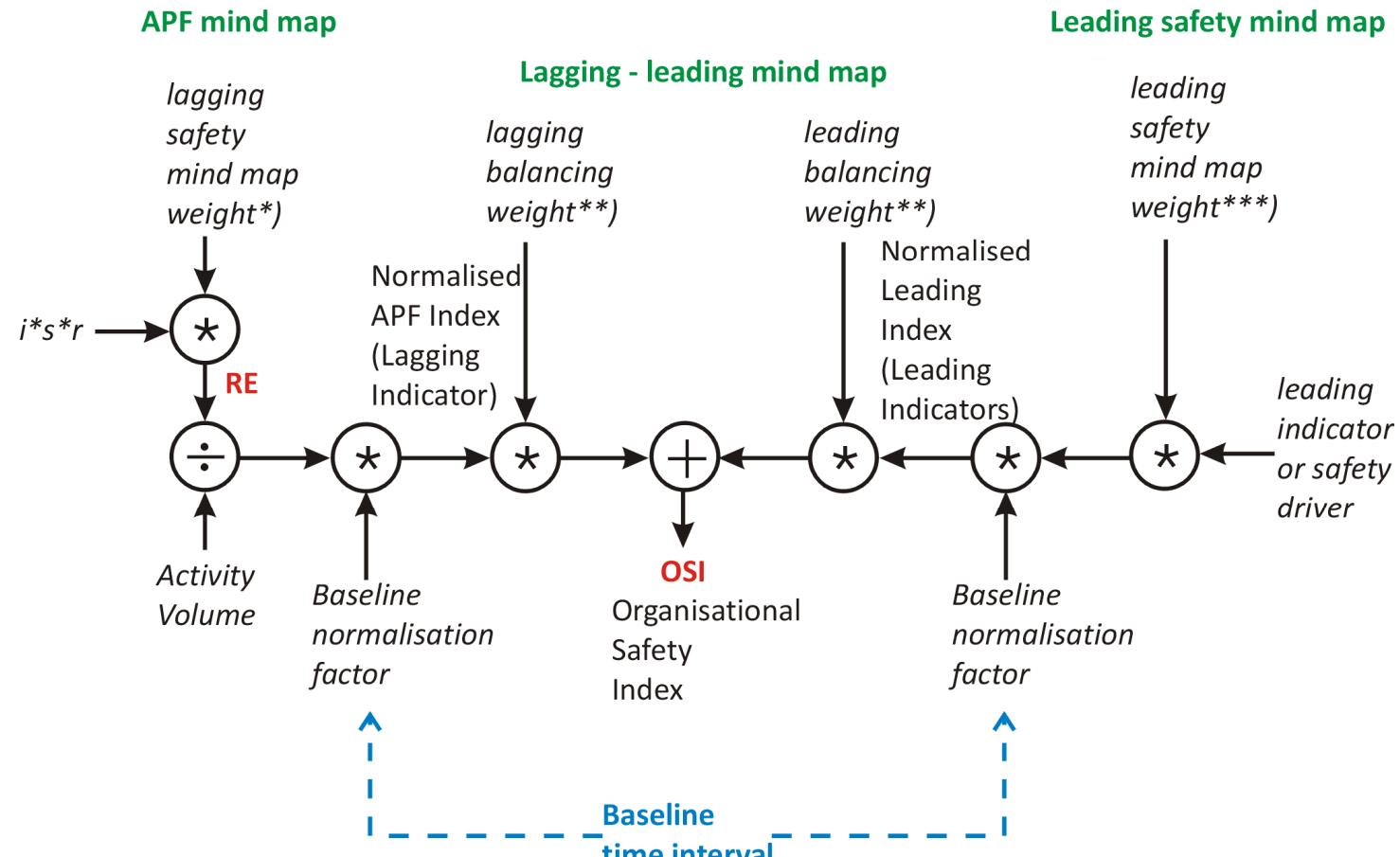
Please select an organization

Aloft

[+ Create new](#)

Potential performance impact	Name	Unit of measurement	Source
Leading indicators	1. Special weather	Hours	   
Management accounting	2. Degraded modes	Hours	   
Other	3. Work in progress on airports / ATC centres	Hours	   
	4. Cost changes	%	   
	5. Changes in volume of traffic	%	   
	6. Staffing changes	%	   
	7. Operational changes	%	   
	8. New systems being implemented (how much of the total system has been changed)	%	   
	9. Special events	Hours	   

# The Engineering Design (For Leisure Review)



\*) current APF mind map

\*\*) two weights reflecting  
expert opinion on balancing  
lagging and leading indicators

\*\*\*) new mind map of  
leading indicators and  
safety drivers

# Other Capabilities – Depending On Your Data

Supports Positive Safety	Supports Leading Indicators, KPIs / KPIs
Management accounting of costs	Correlation Analysis
Pareto Analysis	Multiple Counting
Modeling and (basic) forecasting via the What If Tool	Data noise reduction
Changeable time units	Adjusts for data semantics paradox (higher numbers can be good, etc.)
Warning when limited data makes results statistically questionable	