



The Magic of Measuring: AHP & APF



A “How To Guide” for the Safety Exercise

EUROCONTROL ESP & Aloft Aviation
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The Challenge: Tangible vs. Intangible!



- Incorporate the impact (importance and influence) of many different factors and elements into a decision.
- Determine a quantifiable value of *intangible* elements to determine their *influence* or importance to the overall decision.
- AHP Methodology: Allows for the mathematical measurement of the psychology of human judgment-both individually and as a group.

A Look At “Old” vs. “New” Data Displays

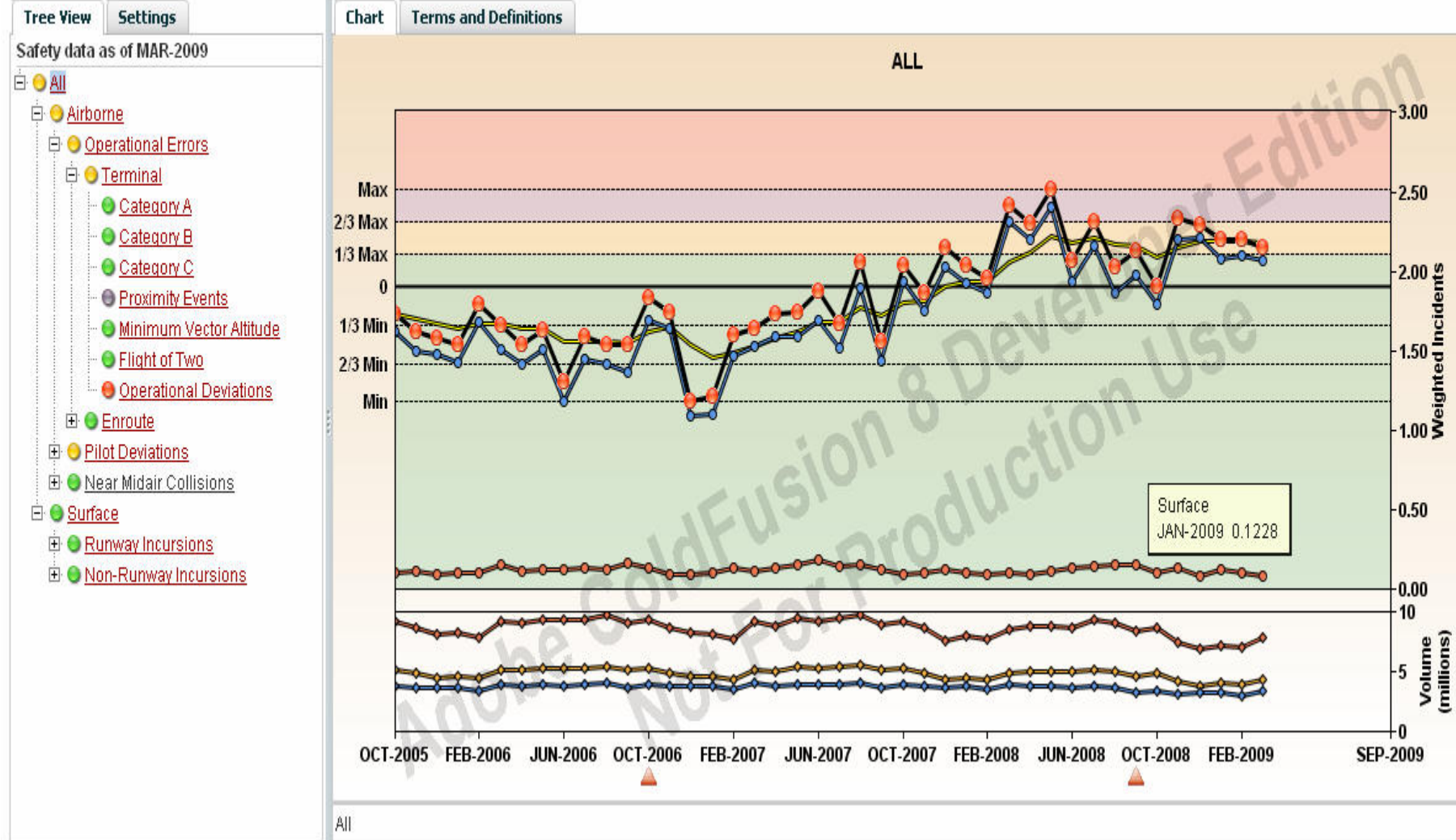
Here, The “Classic” Data Presentation



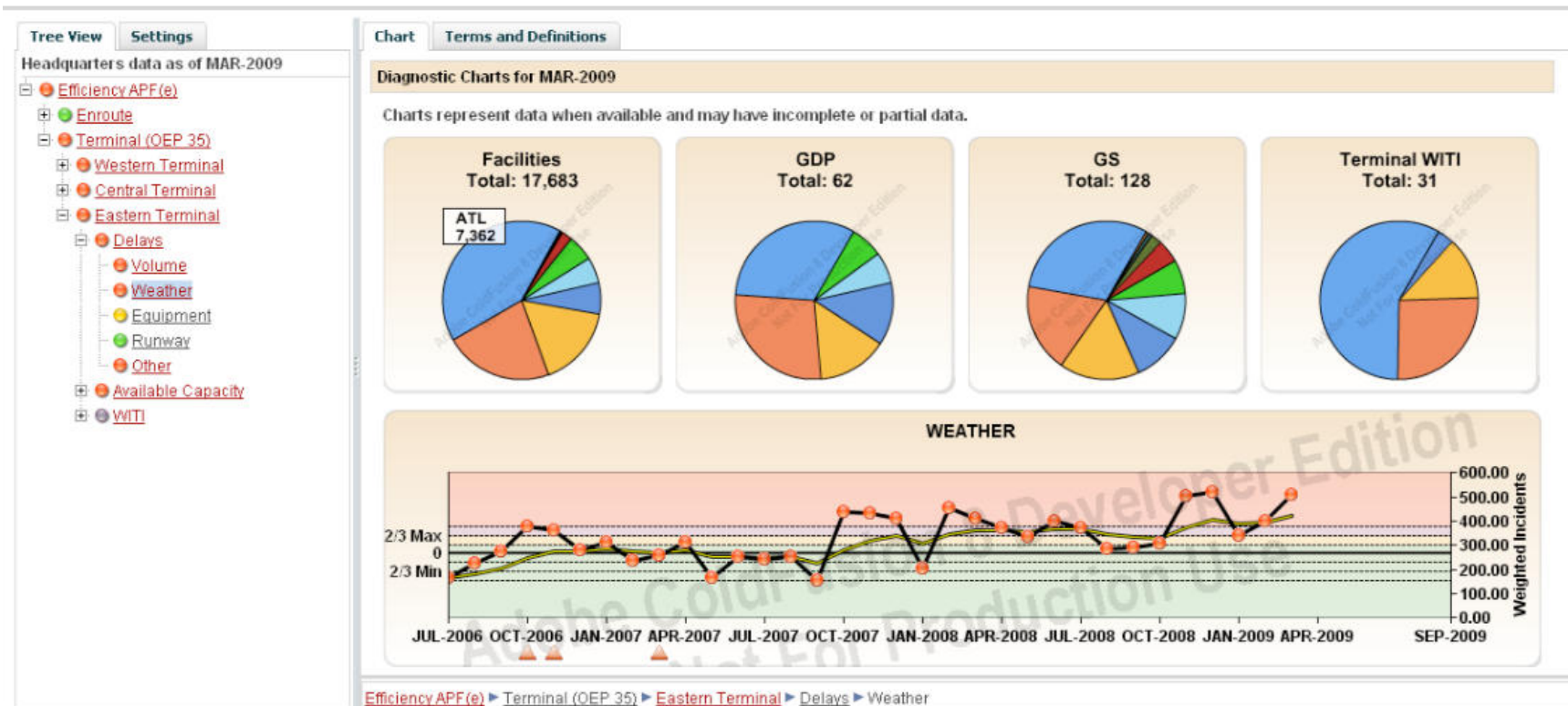
			2000	2004	Difference
Aircraft Accidents					
	Air Carrier		56	29	-27
	Air Taxi/Commuter		92	73	-19
	GA		1835	1614	-221
NMAC					
	PDs		1919	2628	709
	OE		1139	1216	77
	VPD		547	263	-284
Surface Incidents					
	Runway incursions		426	310	-116
Aircraft Operations					
			46,056,000	46,762,000	706,000
	Air Carrier		25,080,000	24,278,000	-802,000
	Air Taxi/Commuter		8,164,000	10,029,000	1,865,000
	GA		8,634,000	8,374,000	-260,000
	Military		4,178,000	4,071,000	-107,000
Aircraft Hours					
			318,000,000	273,000,000	-45,000,000

Can We Really Measure Total Organizational Change?

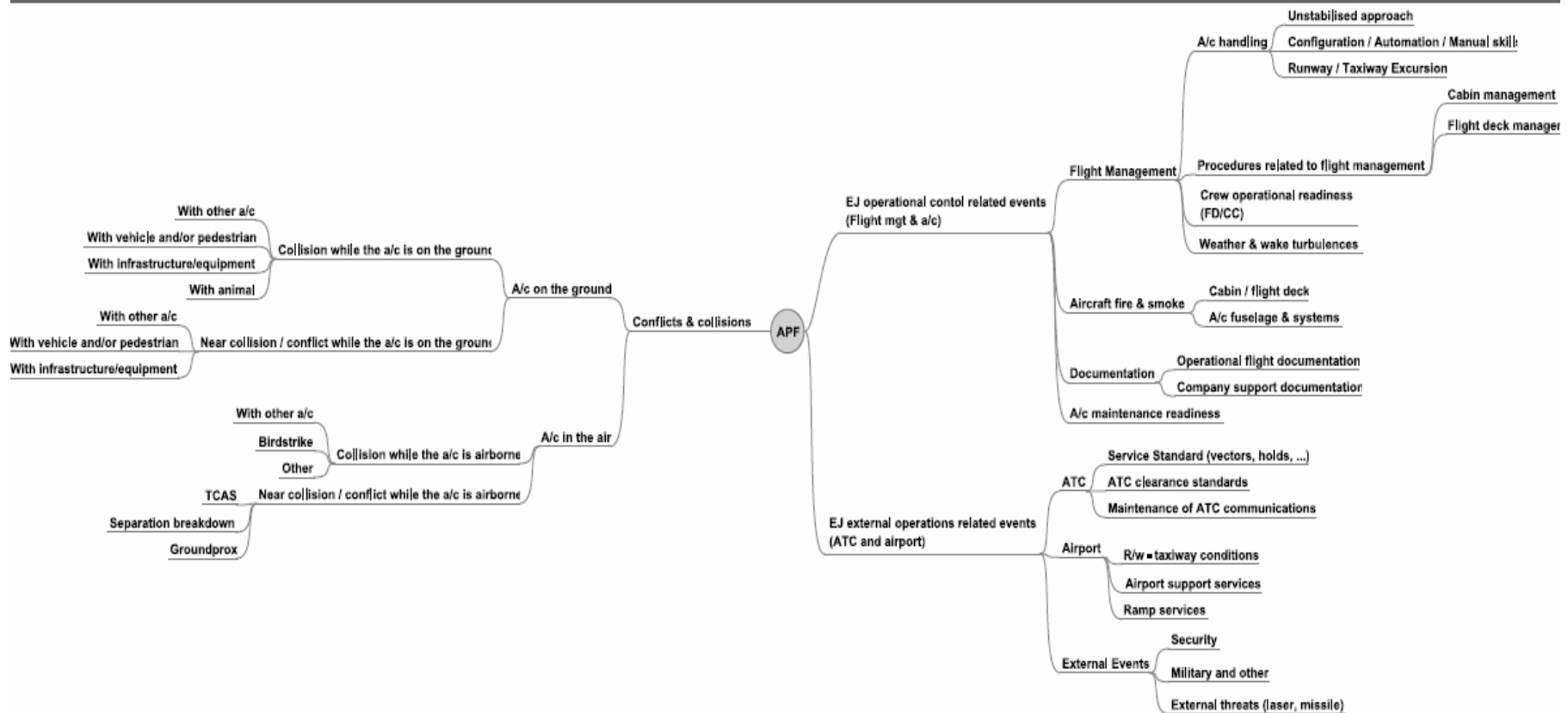
An Example Of The “New” Data Display Methodology



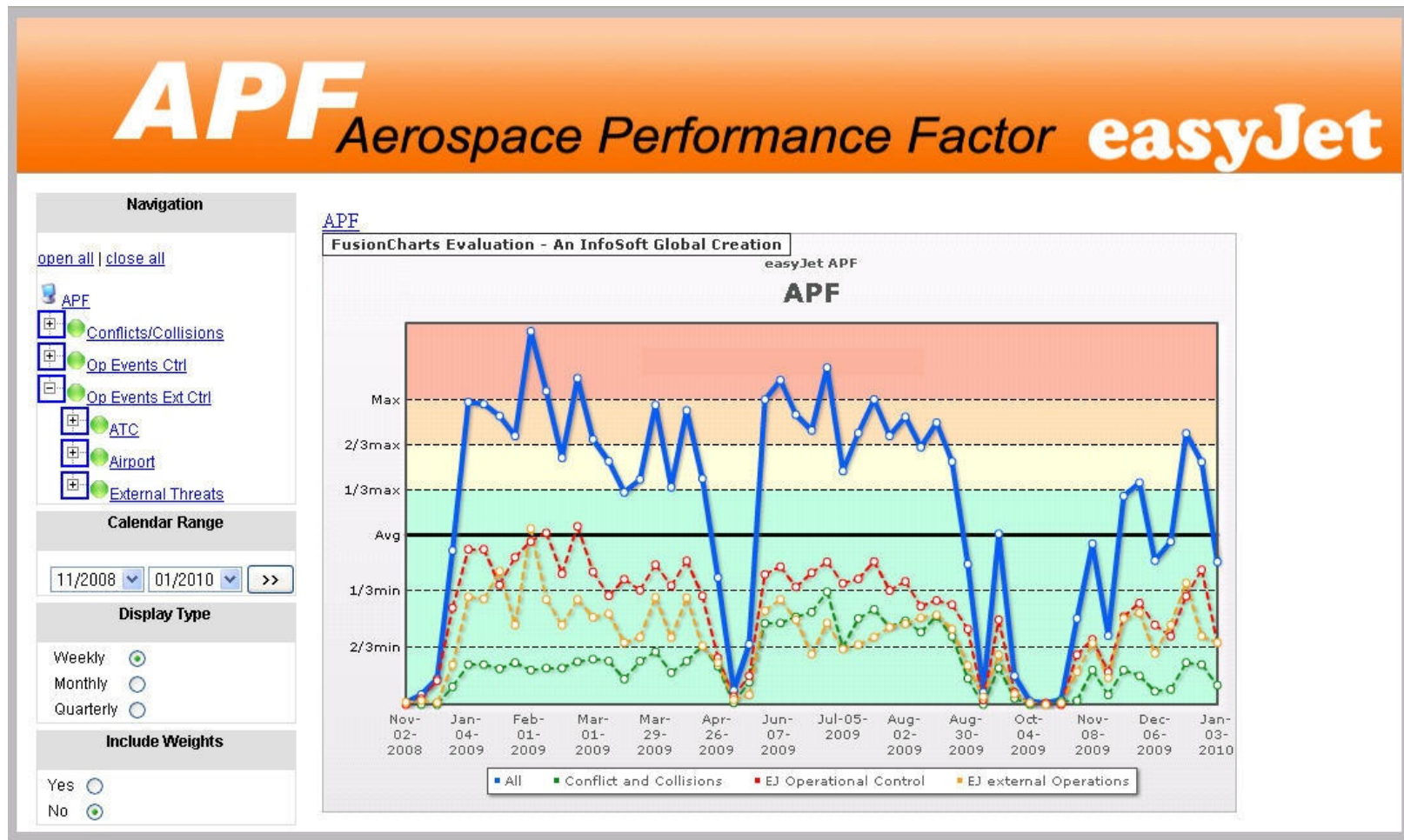
From Trending to Diagnostics & Drill Down: How the APF Presents Selected Raw Data



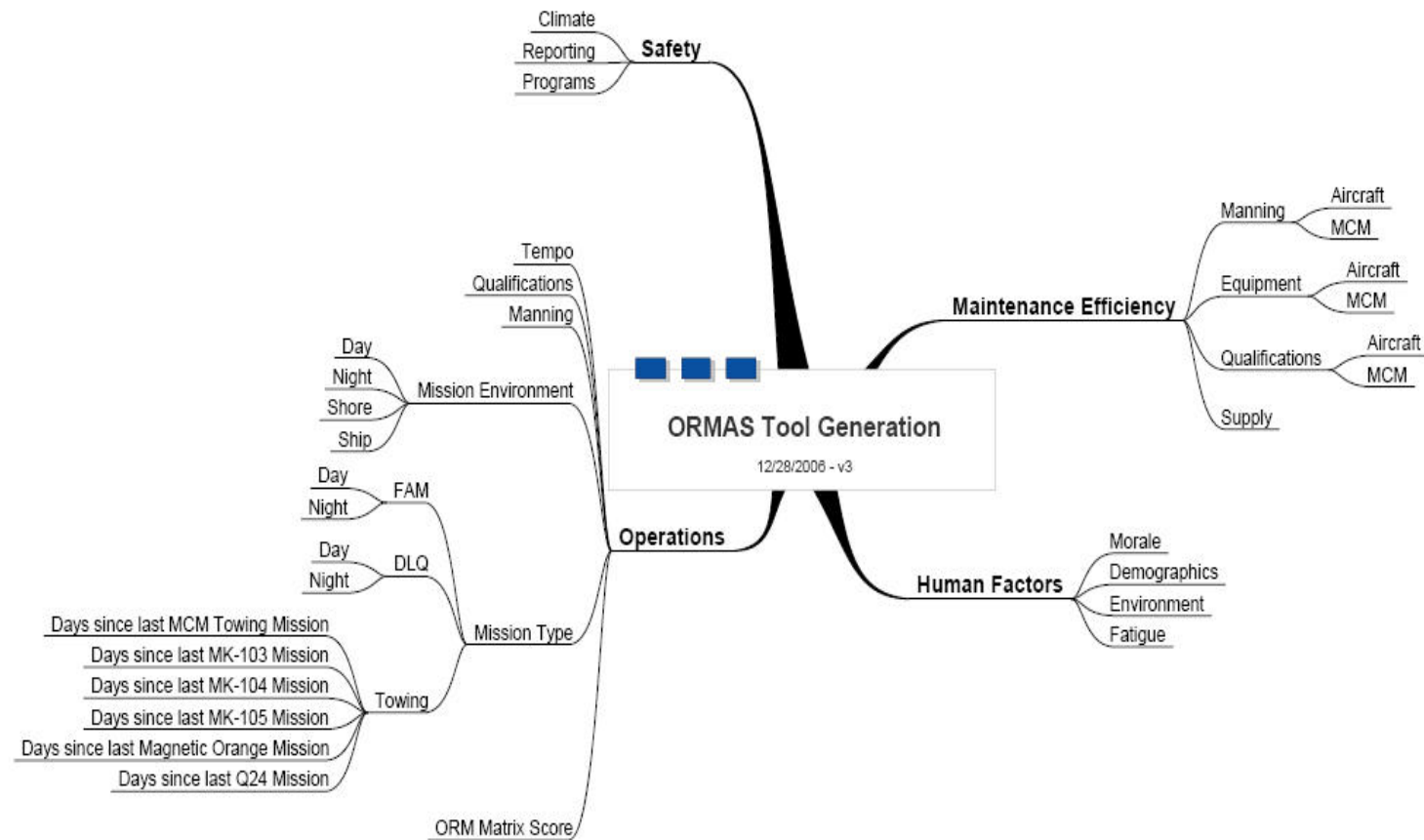
easyJet Flight Operations- Original Mindmap



Display of Airline Data (Developmental Data)

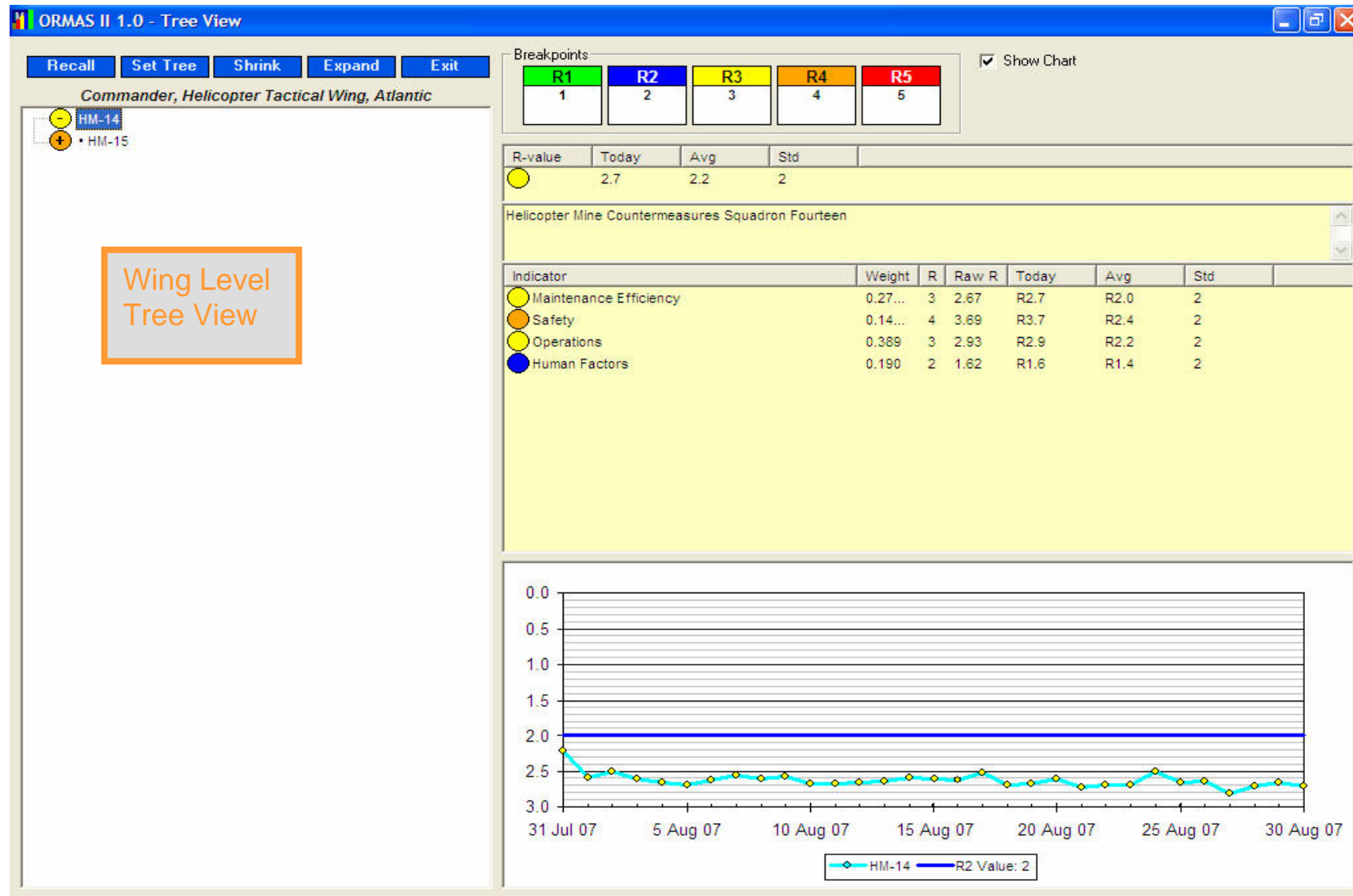


First US Navy Mindmap: Complex & “Lesson’s Learned”



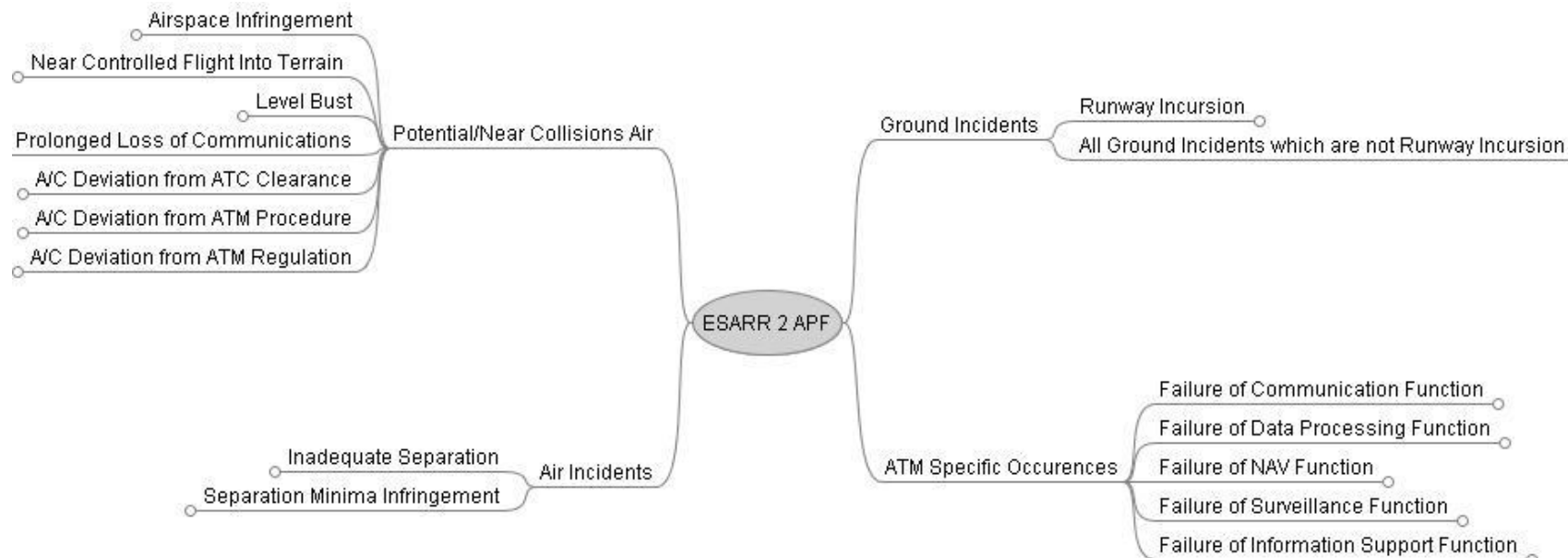
C:\Documents and Settings\AOV300SS\My Documents\ORMAS Tool Generation.mmp - 12/28/2006 - -

US Navy ORMAS Risk Tool: Based on APF Concepts

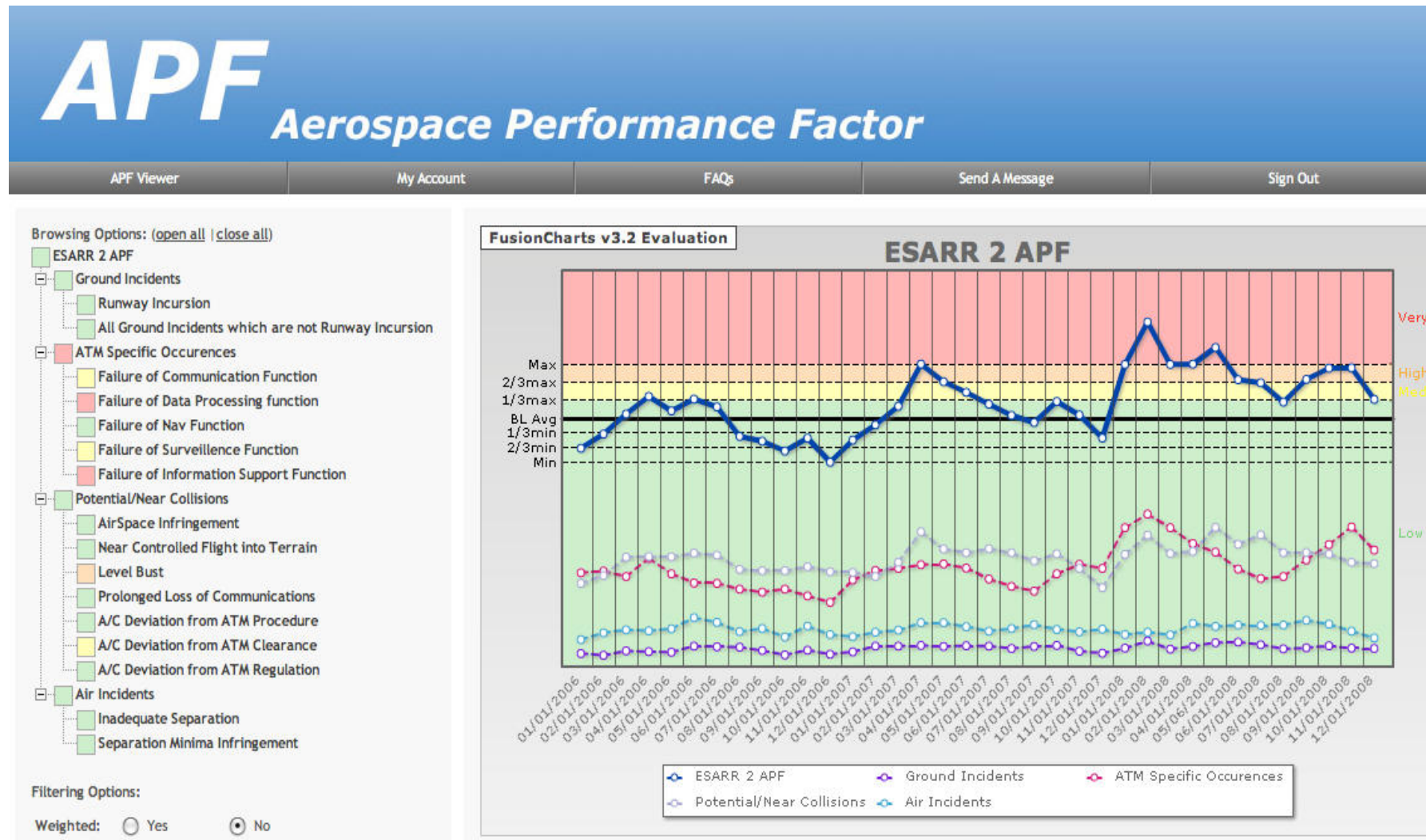


Current EUROCONTROL Mindmap

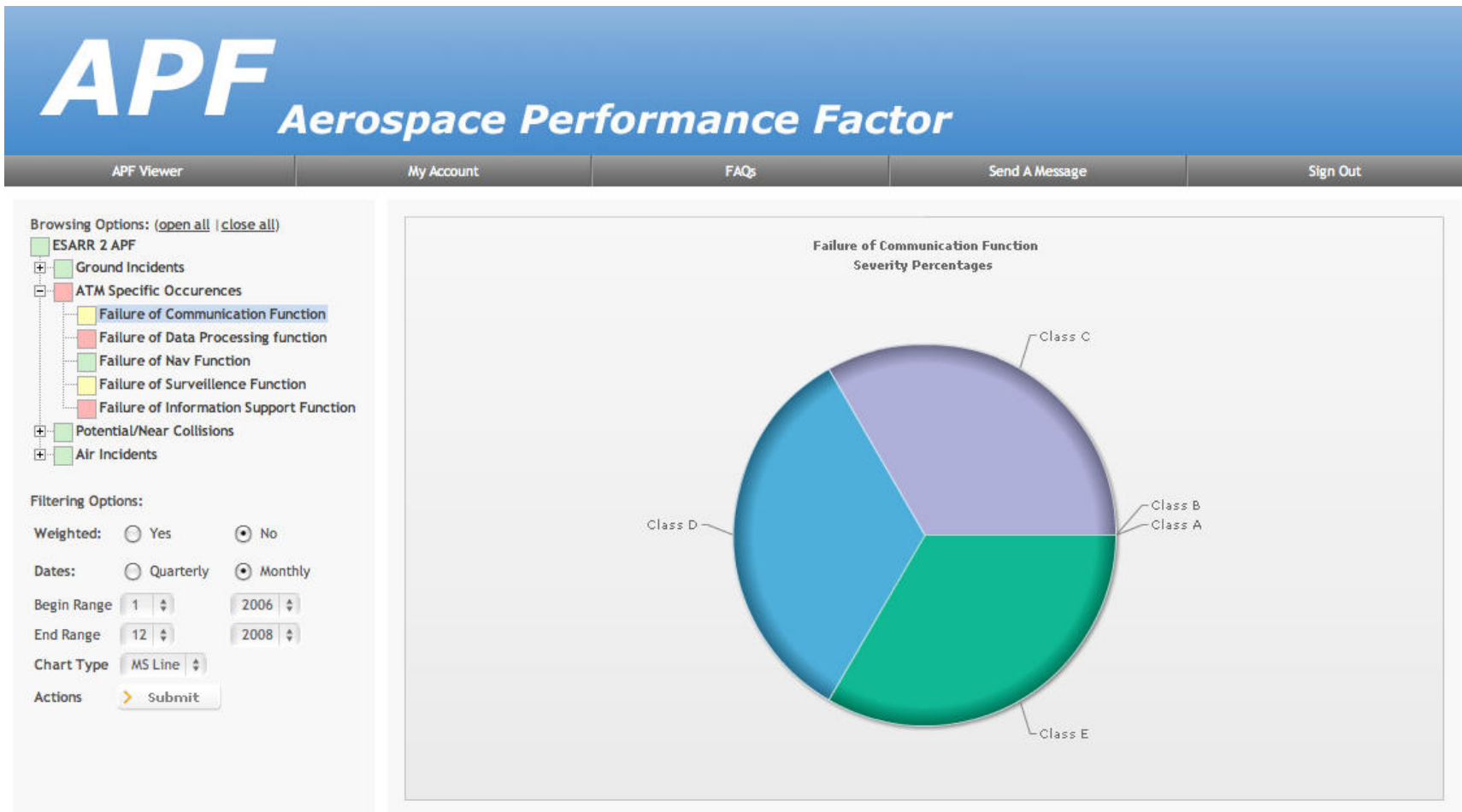
Note The Symmetrical Shape:
~A Design Goal When Possible~



An Example Of The “New” Data Display Methodology Development



From Trending to Diagnostics & Drill Down: How the APF Presents Selected Raw Data



Intangible Elements: You Will Meet In The Exercise-



- *Flight Efficiency for the Airlines*
- *Sector Capacity*
- *Cost / Benefit for ANSPs and Airlines*
- *Political and Social Pressures*
- *Environment*
- *Safety*

Weighting the Data Elements

The Analytic Hierarchy Process (AHP)



- Analytic Hierarchy Process:
 - Developed by Dr. Thomas Saaty to use multiple factors involved in complex decisions.
 - Used in original SALT Treaty discussions.
 - A “blend” of mathematics and the psychology of measuring intangibles.
 - Uses pair-wise comparisons.
- For additional reading go to:
http://en.wikipedia.org/wiki/Analytic_Hierarchy_Process

The Classic AHP Example

AHP: Selecting a Leader



Tom



Dick



Harry

Goal:

Choose a Leader
1.000

Criteria:

Age
.300

Experience
.400

Education
.100

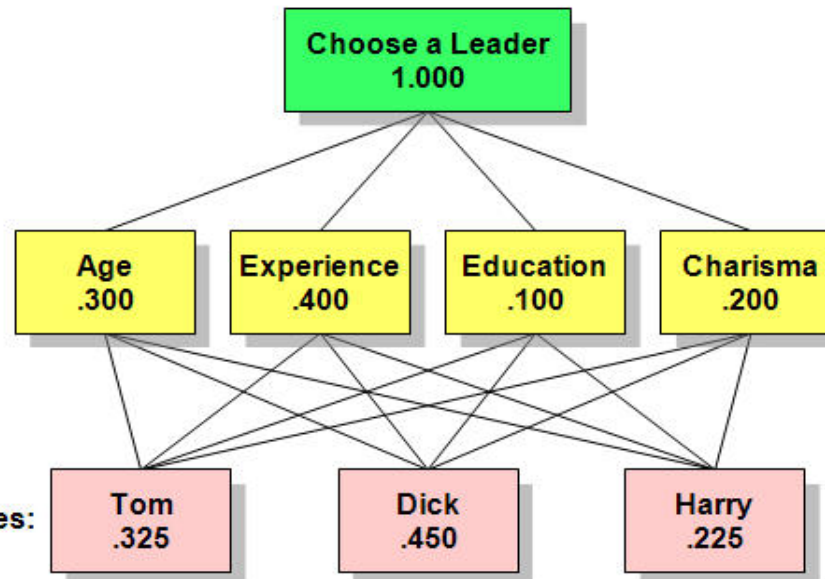
Charisma
.200

Alternatives:

Tom
.325

Dick
.450

Harry
.225



Demo Of AHP Process



- Important Aspects For Selecting A Family Car (Goal)
 - Body Type (Element)
 - 2-Door (sub criteria)
 - 4-Door (sub criteria)
 - Hatchback
 - Engine Type
 - Gasoline
 - Diesel
 - Hybrid
 - Transmission Type
 - Manual Transmission
 - Automatic Transmission
 - Manufacturer Type
 - European Manufacture
 - Asian Manufacture
 - American Manufacture

Consistency vs. Inconsistency



- Consistency simply means your answers are following the same relative pattern
 - Consistency = If $A > B$ and $B > C$, then $A > C$
 - Inconsistency = If $A > B$ and $B > C$, you answer $C > A$
- Inconsistency can happen for a number of reasons:
 - Getting “lost” in the mindmap
 - “Clicking” in the wrong direction,
 - An unclear definition

Advanced Tips For The Exercise

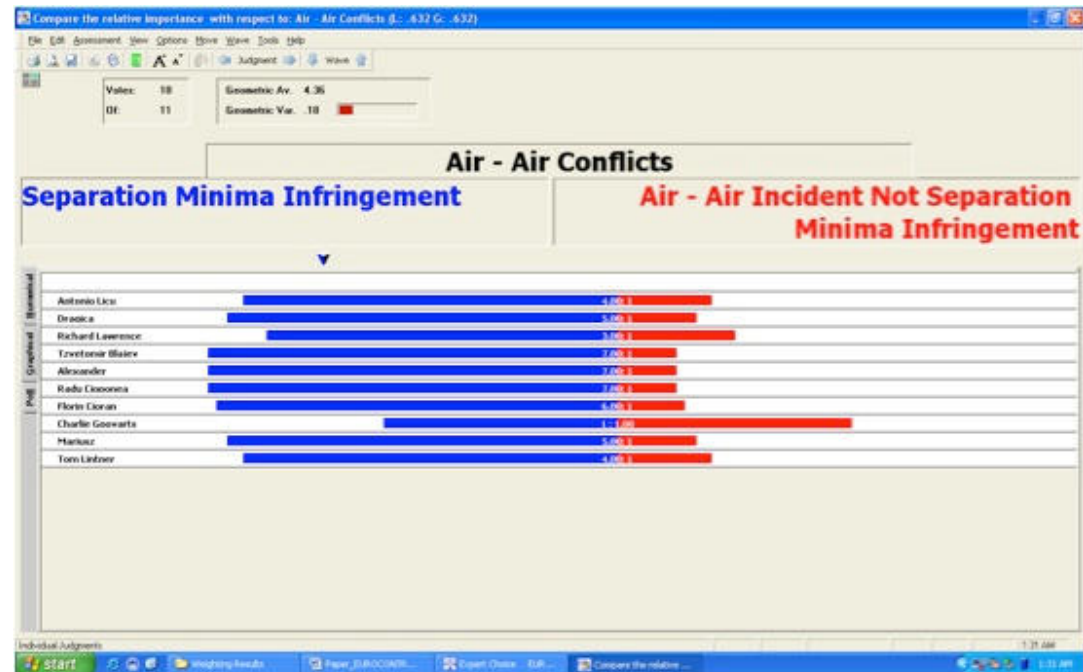


- Remember the goal question.
 - Applies to the primary goal and sub-set elements
- Go with your instinct!!! Shoot from the hip!!!
 - Don't think and debate with yourself! Depend on your experience!
 - If you ponder, you are instead assessing specific events, not taking a system-wide view.
- Understand “Inconsistency” but don't drive yourself crazy
- Enjoy the post-exercise discussion!
 - This is not designed to make someone change their mind. It's designed to make sure everyone understands the factors.

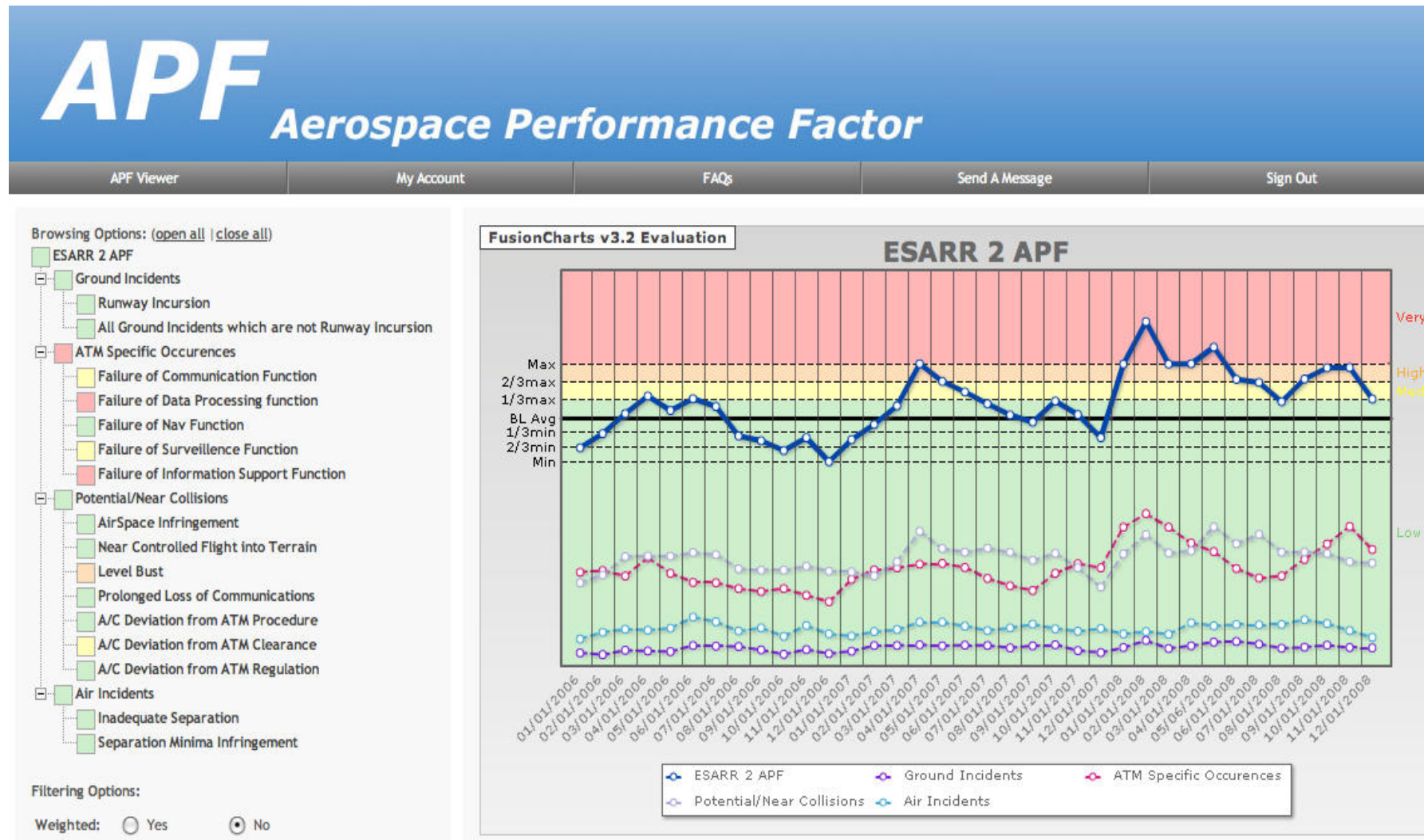
Post Weighting Exercise Discussion- A Critical Element



- Group review & discussion
- Assess and understand conclusions



The Results- A New Data Display Methodology, The APF!



Now, Let's Select A Family Car...



- Important Aspects For Selecting A Family Car (Goal)
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