BLUE MED
Mediterranean FAB

Co-financed by the EU (TEN-T)

FAB SAFETY CASE

ES2
Sarajevo
May 2011

Petros Stratis – WP Leader - Safety – DCA Cyprus

PART 1: Background and general information

PART 2: D3.3 - The FAB SMS roadmap

PART 3: D3.2 - The FAB Safety Case

PART 4: Going beyond the Regulation…
Demonstration of safety benefits

PART 1: Background and general information

BLUE MED is…

…a regional ATM development project between States aiming towards the creation of a FAB in the Mediterranean area

It comprises four EU partner-states: Cyprus, Greece, Italy and Malta…

…three non-EU states as associate partners (Egypt, Tunisia and Albania)

…two third countries as observers (Lebanon and the Kingdom of Jordan)

…a TEN-T funded project (50% of its current budget of 5.6 million Euros)

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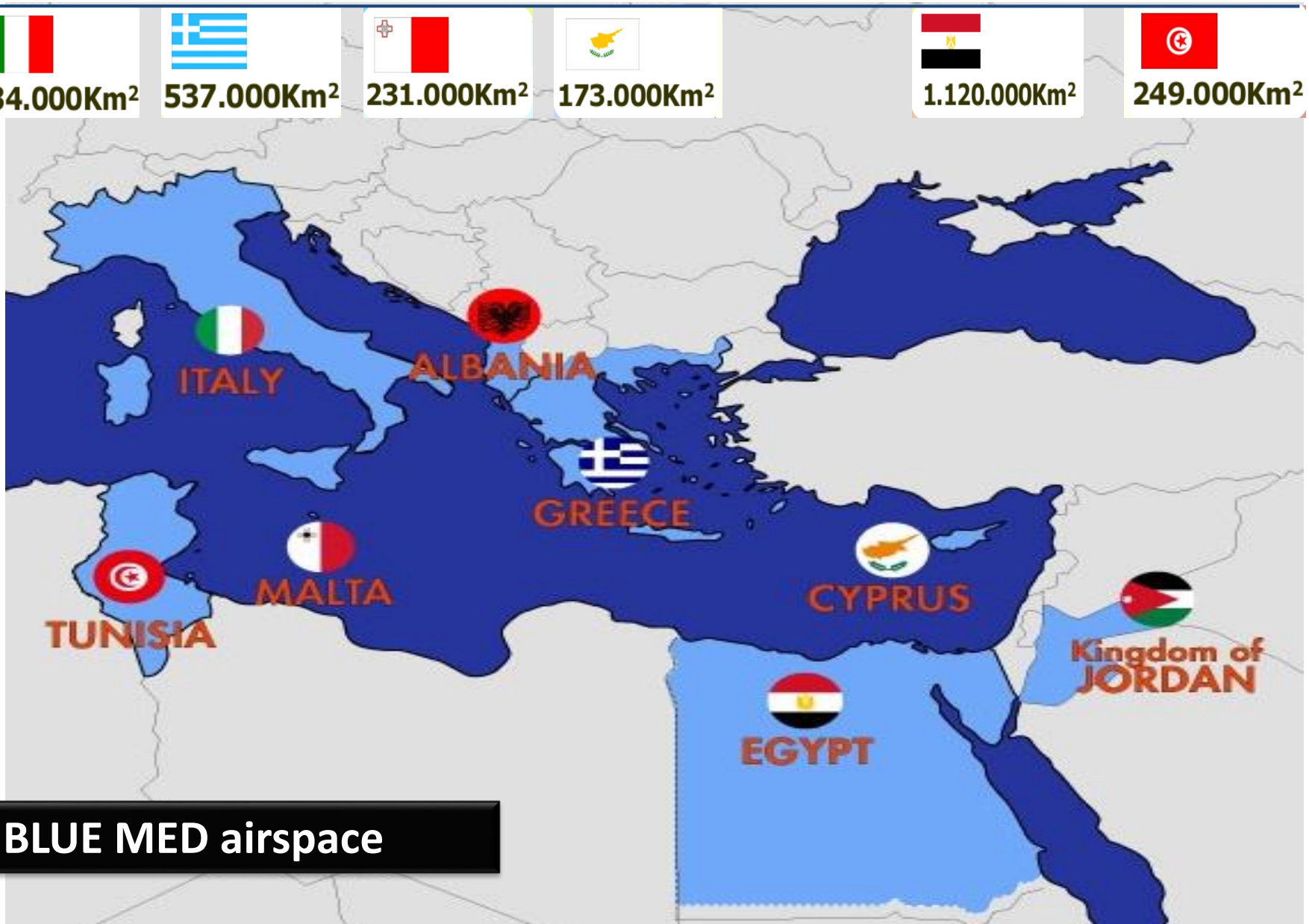

The BLUE MED airspace

BLUE MED timeframes…

Phase 1: Feasibility Study (2006 – 2008)

Phase 2: Definition (2009 – 2011)

Phase 3: Implementation (2012+)

BLUE MED milestones…

August 2008 – Feasibility Study completed…

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BLUE MED milestones…

November 2008 – Ministers' declaration – political go ahead…

February 2009 – EC funding granted for phase 2

April 2009 – Phase 2 commences

May 2010 – Approval of Strategic Action Plan by TEN-T

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BLUE MED Mediterranean FAB

Governance structure

Demonstration of political will and commitment

BM Governing Body

State-level representatives

Operational strategy, monitoring and guidance

BM Programme Management Board

- ANSP – Strategic Board
- Military Coord. Group
- NSA/REG Committee

BM Advisory Group

SESAR JU, IATA, EC, other FABs

Definition of operational solutions

BM Project Execution Team

Working Packages

BM Social Forum

Staff and Professional Associations

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BLUE MED Mediterranean FAB

BLUE MED WORK PACKAGES

- WP 0 Project Management — IT
- WP 1 Operational Implementation — GR
- WP 2 Technical Implementation — IT
- WP 3 Safety — CY
- WP 4 Economic Assessment — IT
- WP 5 Legal and Institutional aspects — MA
- WP 6 Human Resources issues and Social aspects — MA
- WP 7 Environmental Impact Assessment — GR
- WP 8 Implementation Planning — CY

…around 150 persons

…meetings every two months…

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Safety assessment process…
…inter-dependability between Work Packages

WP 1 Operational Implementation:
Airspace design and management processes, ATS procedures

WP 2 Technical Implementation:
Definition of technical solutions to operational requirements

WP 6 Human Resources issues:
definition of common staff policies on recruitment, selection, training and competence..

WP 3 Safety
Review, assessment and definition of safety requirements…

BLUE MED – Safety WP goals and objectives

· Develop the BLUE MED FAB's **Safety Case**, arguing that the FAB can be implemented in a manner which is acceptably safe.

D3.2 FAB SAFETY CASE

· Define a long-term roadmap for **common safety management**, focusing on the need for uniform and enhanced levels of safety across the whole FAB

D3.3 FAB SMS ROADMAP

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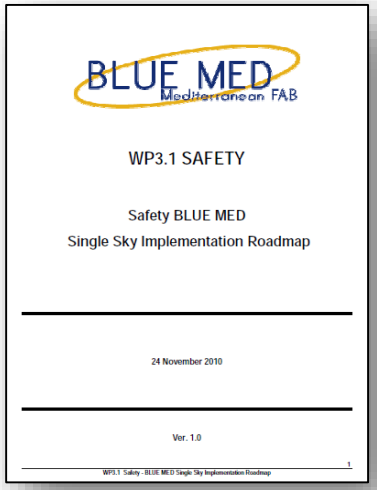
Practical results delivered so far…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WP3.1 SAFETY

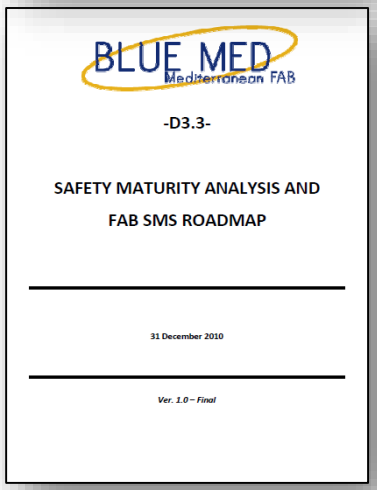
Safety BLUE MED
Single Sky Implementation Roadmap

24 November 2010

Ver. 1.0

BLUE MED – Regional Single Sky Implementation Roadmap -

Commonly defined actions for the safety LSSIP objectives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-D3.3-

SAFETY MATURITY ANALYSIS AND
FAB SMS ROADMAP

31 December 2010

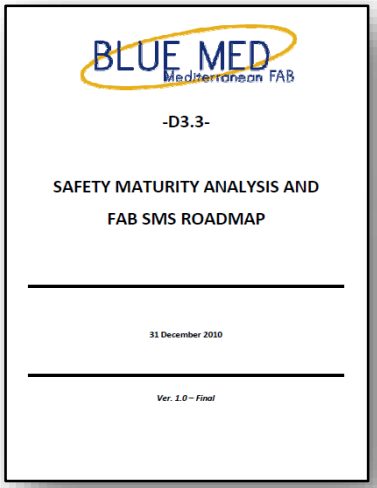
Ver. 1.0 – Final

FAB SMS roadmap (with actions that can be immediately implemented by those who need it). Action plan drafted is based on the results of a commonly conducted ***EUROCONTROL Safety Maturity Survey***

Common FAB target for safety maturity agreed at working level (L4)

PART 2: D3.3 - The FAB SMS roadmap

FAB SMS roadmap…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-D3.3-

SAFETY MATURITY ANALYSIS AND FAB SMS ROADMAP

31 December 2010

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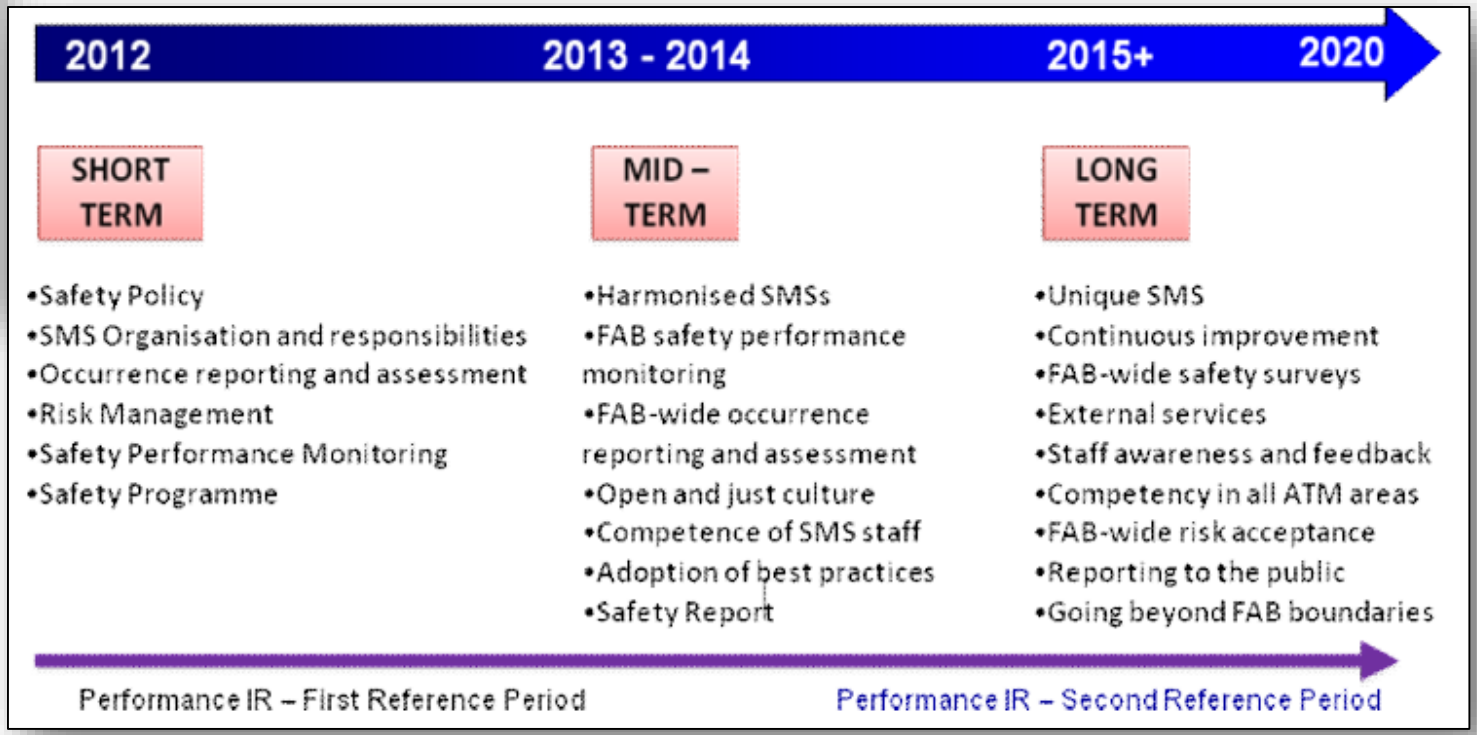
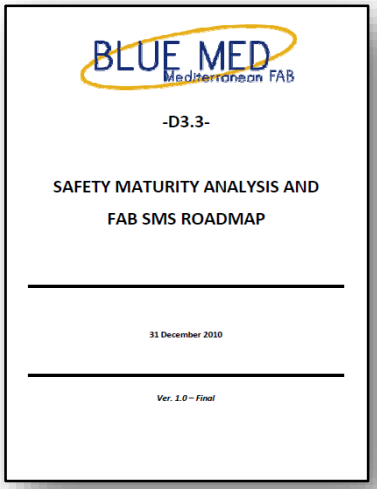
…action plan aligned with the reference periods of the performance regulation



FAB SMS roadmap…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-D3.3-

SAFETY MATURITY ANALYSIS AND FAB SMS ROADMAP

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…covers *most* of the elements required by the FAB implementing rule

- ***Planned measures to establish a common safety policy;***
- ***Plans on how to address the safety data collection, analysis and exchange;***
- ***The SMS processes and procedures planned to avoid degradation in safety performance within the FAB;***
- ***Arrangements with relation to the setting of safety targets..***

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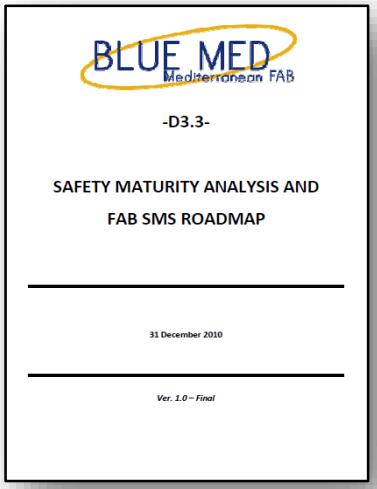
FAB SMS roadmap…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-D3.3-

SAFETY MATURITY ANALYSIS AND FAB SMS ROADMAP

31 December 2010

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…practical arrangements planned to be implemented…

7.2 FAB SAFETY MANAGEMENT ORGANISATION AND RESPONSIBILITIES

- A Safety Coordination Group, with defined TORs and responsibilities will review, manage and monitor the BLUE MED FAB SMS Roadmap described herein. Membership to the Group will be from the BLUE MED ANSP SMS units e.g. BLUE MED ANSPs' Safety managers or their appointed representatives and will report to the highest level of governance within BLUE MED. ANSPs shall endeavor to keep the membership consistent (at least in the initial period) to ensure harmonisation and cohesion.

- The BLUE MED Safety Coordination Group terms of reference will include (inter alia):
  - the need to consult regularly with the BM NSA Committee so as to remain updated with the applicable regulations/standards as required;
  - the mechanism for attending regional/international meetings so as to remain updated with the applicable rules/standards. Joint/coordinated representations will be arranged as so required.
  - the mechanism to work across the whole FAB
  - the meeting frequency (e.g. at least twice a year);
- The BLUE MED Safet
working groups on sp

Related Saf. Mat. survey Study Areas	Related Safety Maturity survey objectives	Implementation Status of individual BLUE MED ANSPs(as of 2010)
2.1	An approved, clearly documented, and recognised system for the management of safety. Management structure, responsibilities, accountabilities and authorities clearly defined and documented	

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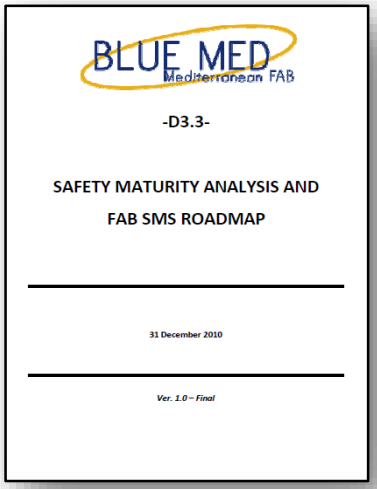
FAB SMS roadmap…


BLUE MED
Mediterranean FAB

-D3.3-

SAFETY MATURITY ANALYSIS AND
FAB SMS ROADMAP

31 December 2010

Ver. 1.0 – Final

…practical arrangements planned to be implemented…

7.3 SAFETY CULTURE

- All BLUE MED ANSPs shall undertake a safety culture measurement by the end of **2014** and develop a corresponding improvement plan (dependant on EUROCONTROL availability i.e. the budgetary and institutional arrangements for EUROCONTROL to perform activities for non-European members of BLUE MED). European ANSPs of BLUE MED will be planned and measured by 2014 as per objectives and within the resources of EUROCONTROL ESP+ programme.
- All BLUE MED ANSPs shall have plans to do regular measurements. It is expected that the measurement will be done at least every 5 years with defined ongoing improvement objectives targeted across both RP1 (2012-2014) and RP2 (2015-2019). These plans will be included in the bi-annual **FAB Safety Programme** (see 7.7 below).
- An overall BLUE MED FAB Safety Culture measurement shall be undertaken before end of 2020.

Related Saf. Mat. survey Study Areas	Related Safety Maturity survey objectives	Implementation Status of individual BLUE MED ANSPs (as of 2010)
1.2	Regular measurement of safety culture and an improvement programme	

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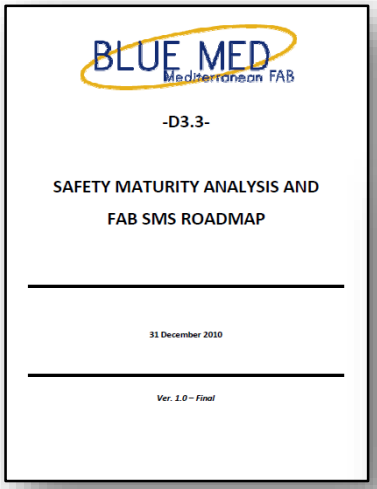
FAB SMS roadmap…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-D3.3-

SAFETY MATURITY ANALYSIS AND FAB SMS ROADMAP

31 December 2010

Ver. 1.0 – Final

…proposes specific SMS elements for harmonisation…

12.3 Safety Occurrence assessment/investigation[4]

Input(s)	Occurrence report
Process elements to be applied commonly in all the FAB	• Decision to carry out an assessment/investigation • Use of recordings and related sources of information for occurrence reconstruction • Safety occurrence risk assessment – use of the RAT tool
Output(s)	Final Occurrence Investigation Report (outline contents to be agreed)

PART 3: D3.2 - The FAB Safety Case

BLUE MED – Safety Case scope and objective…

CONSTRAINTS:

…BLUE MED is *primarily* a consortium of ANSPs…

…there is no single BLUE MED NSA…

…some ANSPs are not bound by EU regulations…

…not all changes will happen everywhere and not at the same time…

…THEREFORE, at this stage…

…the BLUE MED Safety Case will aim mainly for regulatory compliance in accordance with the FAB Guidance material…

…it will be so structured so as to easily adapted by the national SM Units, to meet NSA and other local requirements…

BLUE MED FAB will be acceptably safe when we can demonstrate that…

- SCr1: FAB Safety arrangements meet the FAB IR requirements

AND

(**optionally at the moment – under discussion**)

- SCr2: Risks will be lower if changes are implemented in the framework of the FAB (or the FAB can offer **safety benefits**),

AND

- SCr3: Risks will be mitigated as far as reasonably practicable

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Extracts form the FAB IR guidance material…

…There is not yet any widely agreed definition for a Safety Case….

…In principle, it is a **documented body of evidence that provides a demonstrable and valid argument** that a system is adequately safe for a given application and environment over its lifetime**.**

…A safety case in support of FAB establishment should mean **one or several documents that include claims, arguments and evidences that …… operations will meet or continue to meet the safety requirements.**

The FAB SC IS NOT an ANSP SC !

BLUE MED D3.2 (already delivered)

JUSTIFICATION 01:
FAB creation is both an operational and a regulatory requirement (SES I and SES II)

ACCEPTABILITY CRITERIA
Cr1 : FAB Safety arrangements meet the FAB IR requirements
OPTIONAL – UNDER DISCUSSION
Cr2 : Risks will be lower if foreseen changes will be implemented in the framework of the FAB (or safety benefits can be achieved with the FAB established), AND
Cr3 : Risks will be mitigated as far as reasonably practicable

OVERALL CLAIM (Arg 0):

BLUE MED FAB will be acceptably safe

ASSUMPTION:
T.B.D.

CONTEXT:
- Current operations are acceptably safe
- SES I / II requirements
- BM Concept of operations
- FAB Safety Policy

St00:
Demonstrate that safety is achieved by success in four main pillars: **Safety culture, safety management , safety oversight and ATM/ANS system safety**, providing direct and backing evidence that safety is addressed throughout the system lifecycle and for all its various elements

Under discussion

EUROCONTROL

Arg. 1: Safety Culture will be developed

Str1.1
Provide direct and backing evidence by means of safety culture surveys and after care improvements that a positive safety culture is created, cultivated, monitored and improved in all the FAB

Arg. 2: Safety will be managed

Str2.1
Provide direct and backing evidence that safety management is being practiced at all stages (planning, implementation managing and measuring and improvement) in a harmonised manner in all the FAB (CROSS REFERENCE TO THE FAB SMS ROADMAP (D3.3))

Arg. 3: FAB ATM/ANS systems will be acceptably safe

Str3.1
Provide direct and backing evidence that the FAB ATM /ANS systems and elements thereof are assessed and monitored for their safety, throughout the system lifecycle, both in "success" and "failure" scenarios, using industry standard methodologies (SAM etc..)

Arg. 4: Safety oversight on ATM/ ANS will be provided in a coordinated manner

Str4.1
Provide direct and backing evidence that safety oversight will be provided to the FAB, in a harmonised manner, through the enhanced cooperation of the BLUE MED NSAs

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SAFETY CASE STRATEGY

Demonstrate that safety is achieved by success in four main pillars:

Safety culture, safety management , safety oversight and ATM/ANS system safety, providing direct and backing evidence that safety is addressed throughout the system lifecycle and for all its various elements

FAB SAFETY CASE
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Arg. 1:
Safety Culture will be developed

Str1.1
Provide direct and backing evidence by means of safety culture surveys and after care improvements that a positive safety culture is created, cultivated, monitored and improved in all the FAB

REGULATORY HEALTH CHECK:
ASSUMED TO COVER THE REQUIREMENTS OF THE PERFORMANCE REGULATION ON JUST CULTURE

FAB SAFETY CASE
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Arg. 2:
Safety in the FAB will be managed

Str2.1
Provide direct and backing evidence that safety management is being practiced at all stages (planning, implementation managing and measuring and improvement) in a harmonised manner in all the FAB (**CROSS REFERENCE TO THE FAB SMS ROADMAP – D3.3**)

REGULATORY HEALTH CHECK:

THE *FAB SMS ROADMAP* (*D3.3 - ALREADY DELIVERED*) COVERS THE REQUIREMENTS OF THE FAB IR ON COMMON SAFETY POLICY, INCIDENT INVESTIGATION AND PLANS HOW TO ADDRESS DATA COLLECTION, ANALYSIS AND EXCHANGE, PLANS TO AVOID DEGRADATION IN SAFETY PERFORMANCE WITHIN THE FAB, ARRANGEMENTS FOR IDENTIFYING AND ALLOCATING THE RESPONSIBILITIES AND INTERFACES WITH RELATION TO THE SETTING OF THE SAFETY TARGETS

FAB SAFETY CASE
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Arg. 3:
FAB ATM/ANS systems will be acceptably safe

Str3.1
Provide direct and backing evidence that the FAB ATM /ANS systems and elements thereof are assessed and monitored for their safety, throughout the system lifecycle, both in “success” and “failure” scenarios, using industry standard methodologies (SAM etc..)

REGULATORY HEALTH CHECK:

COVERS THE REQUIREMENTS REGARDING THE STATEMENTS THAT SAFETY ASSESSMENT, INCLUDING HAZARD IDENTIFICATION , RISK ASSESSMENT AND MITIGATION HAS BEEN CONDUCTED BEFORE INTRODUCING OPERATIONAL CHANGES RESULTING FROM THE ESTABLISHMENT OF THE FAB

SAFETY CASE: … Foreseen changes…

Examples of ATM elements to be safety assessed (clear relevance on FAB-wide operations):

- **5 NM lateral separation in all the FAB**
- **Extension of upper limit of controlled airspace (FL660 considered)**
- **Reduction of lateral separation minima at transfer of radar control**
- **Enhance GND-GND automatic coordination between ACCs (Full OLDI)**
- **Implementation of Free Route Airspace**
- **Harmonisation of ATCO competence (common ACS RAD training plan)**
- **Implementation of a FAB SMS**

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Initial hazard log and associated mitigations

HAZ ID	ATM Domain	Change description	WHAT COULD GO WRONG	HAZARD(S)	MITIGATIONS
3	AIRSPACE	Harmonisation of en-route lateral separation minima (5 NM under consideration)	ATC error	Loss of nominal lateral separation	Simulation and training (adapt to new skills required)
			Pilot error		
5	AIRSPACE	Partial implementation of free route operations (limited in geographical and/or time scope)	ATCO not fully aware of airspace constraint not updated	Inadequate ATC planning by ATCO	Simulation and training (adapt to new skills required)
			Working methods no longer applicable due to change in traffic flows and patterns	Inadequate ATC planning by ATCO	Adaptation of written procedures
			Aircraft entering in the geographical Free route airspace outside the activation time	Unexpected deviation from FPL route	Ensure proper notification and issue reminder NOTAMs

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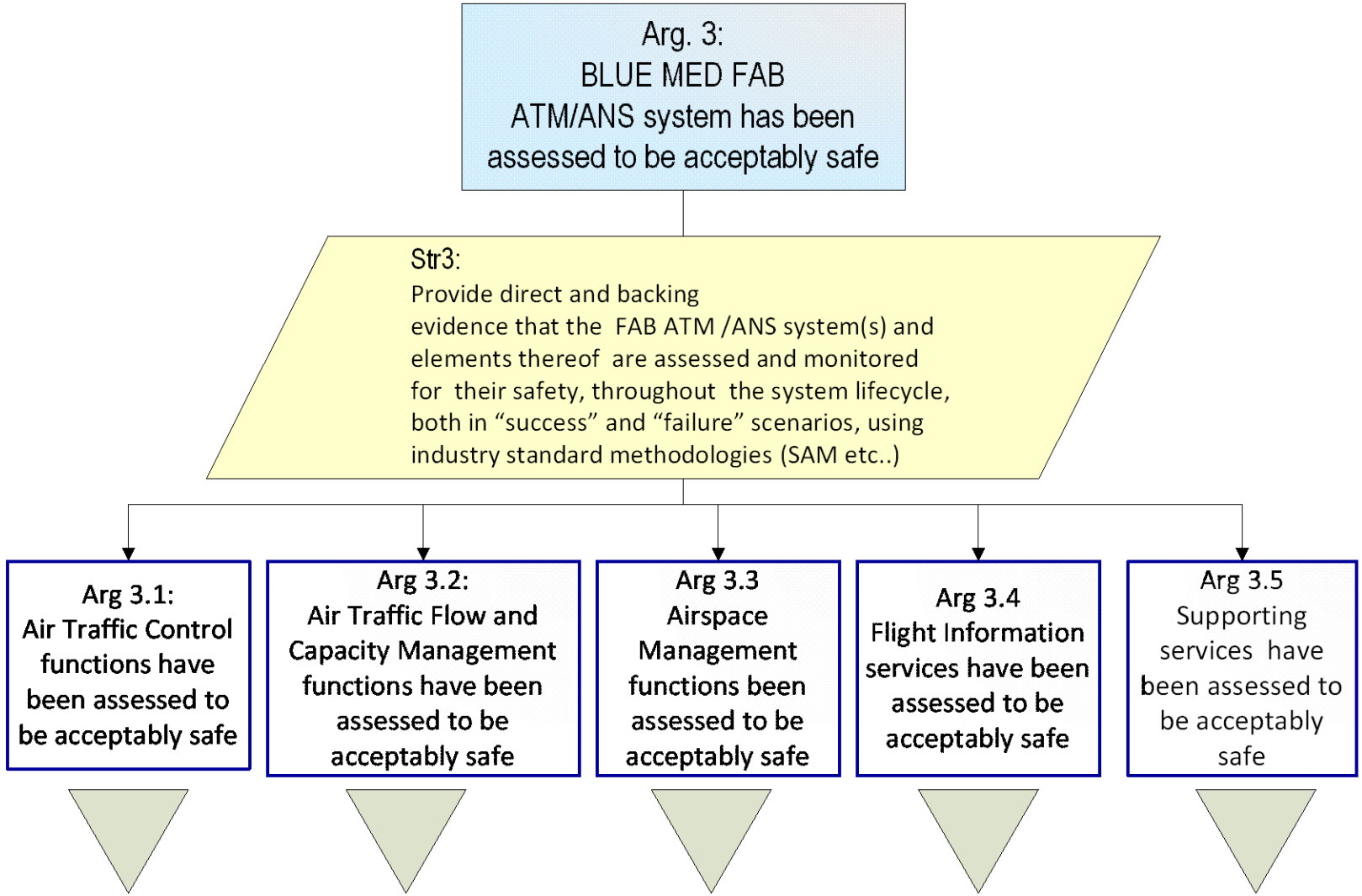

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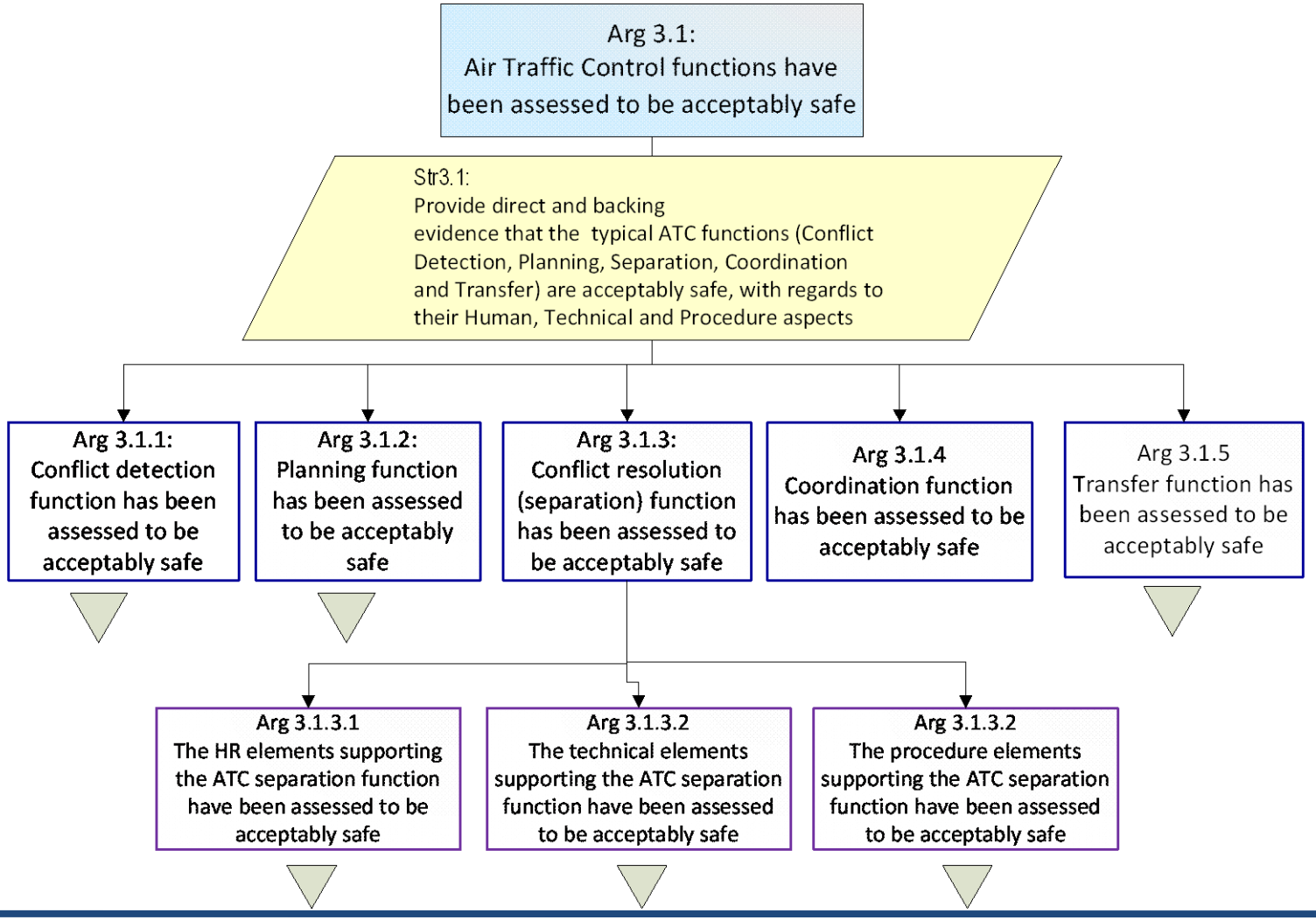

SAFETY CASE – OUTSTANDING ITEMS FROM THE FAB IR – STILL UNDER DISCUSSION

FAB IR:…A description of the arrangements clearly identifying and allocating the responsibilities and interfaces with relation to the…safety oversight and the accompanying enforcement measures in regard to the provision of air navigation services within the functional airspace block;

- **ARG 4 – CROSS REFERENCE TO THE BLUE MED NSA AGREEMENT**

FAB IR: A description of the arrangements dealing with …investigation

- **CROSS REFERENCE TO THE RELEVANT ARTICLE IN THE STATE LEVEL AGREEMENT**

PART 4: Going beyond the Regulation… Demonstration of safety benefits

D R A F T – S T I L L U N D E R D I S C U S S I O N

What additional information do we consider useful to give to the decision makers ?

…we can tell you which changes have a safety impact…

…we can advise you on which changes have the *most* safety impact…

…we can provide you with an initial assessment on ***what*** the safety impact may be on operations (positive / negative) …

Hence, identify need for mitigations

…we can advise you whether introducing the changes in the framework of the FAB has safety benefits (or, reduces the associated risks) …

Demonstration of safety benefits – HOW ?

…How can you compare the safety effect, given the dissimilar type of changes ?

…Coordination and transfer (from telephone to automatic)

…vs

…Changing the lateral separation from 10 NM to 5 NM

Demonstration of safety benefits – HOW ?

...Novel approach is needed !

Aerospace Performance Factor (APF)
+ Analytic Hierarchical Process (AHP)

EUROCONTROL

Step 1: Identify changes with a safety significance (e.g. Comms, coordination etc…)

Step 2: Decide on relative safety significance, using expert judgement *e.g. what can have the highest safety impact, loss of COMMS or loss of SUR ?*

Step 3: Assess (*qualitatively*) on ***what*** the impact may be (positive / negative)

Step 4: Assess whether introducing the changes in the framework of the FAB has safety benefits (…and why and by how much)

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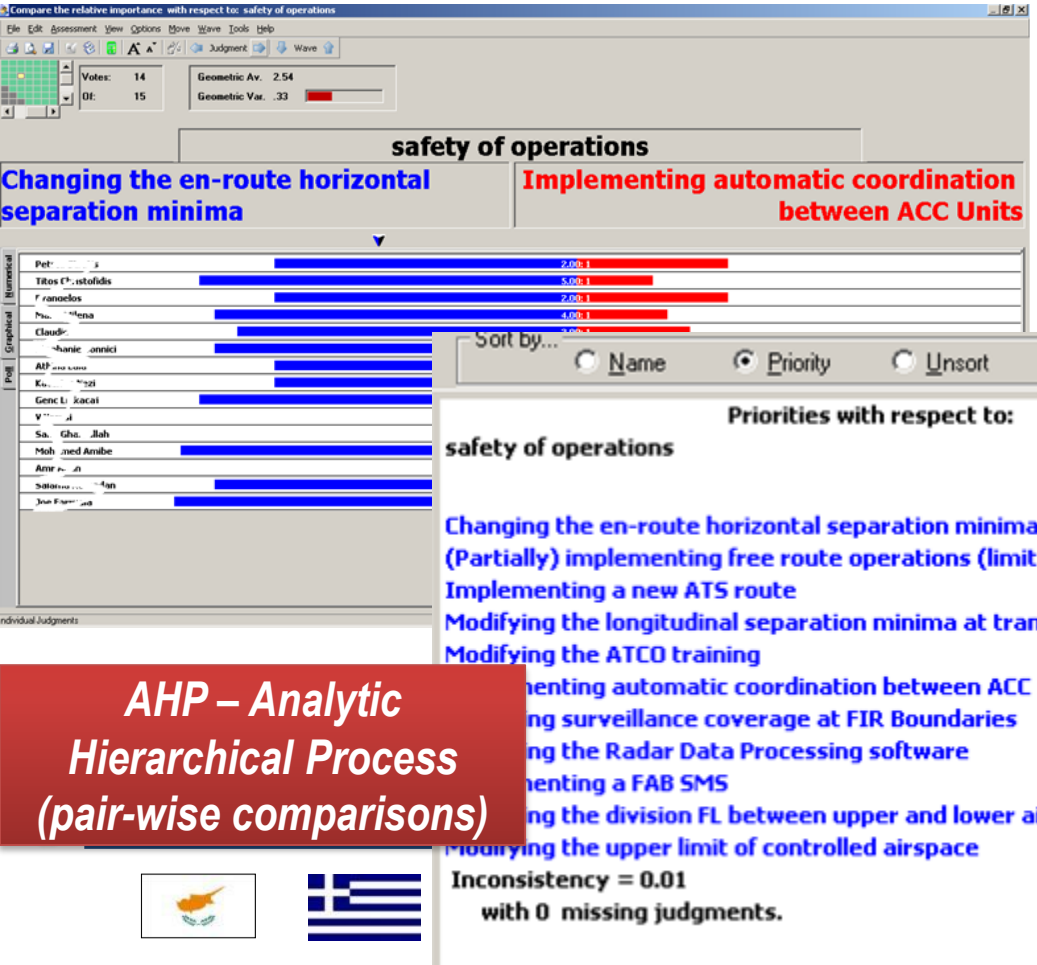
Demonstration of safety benefits – HOW ?

Step 2: Decide on relative safety significance, using expert judgement

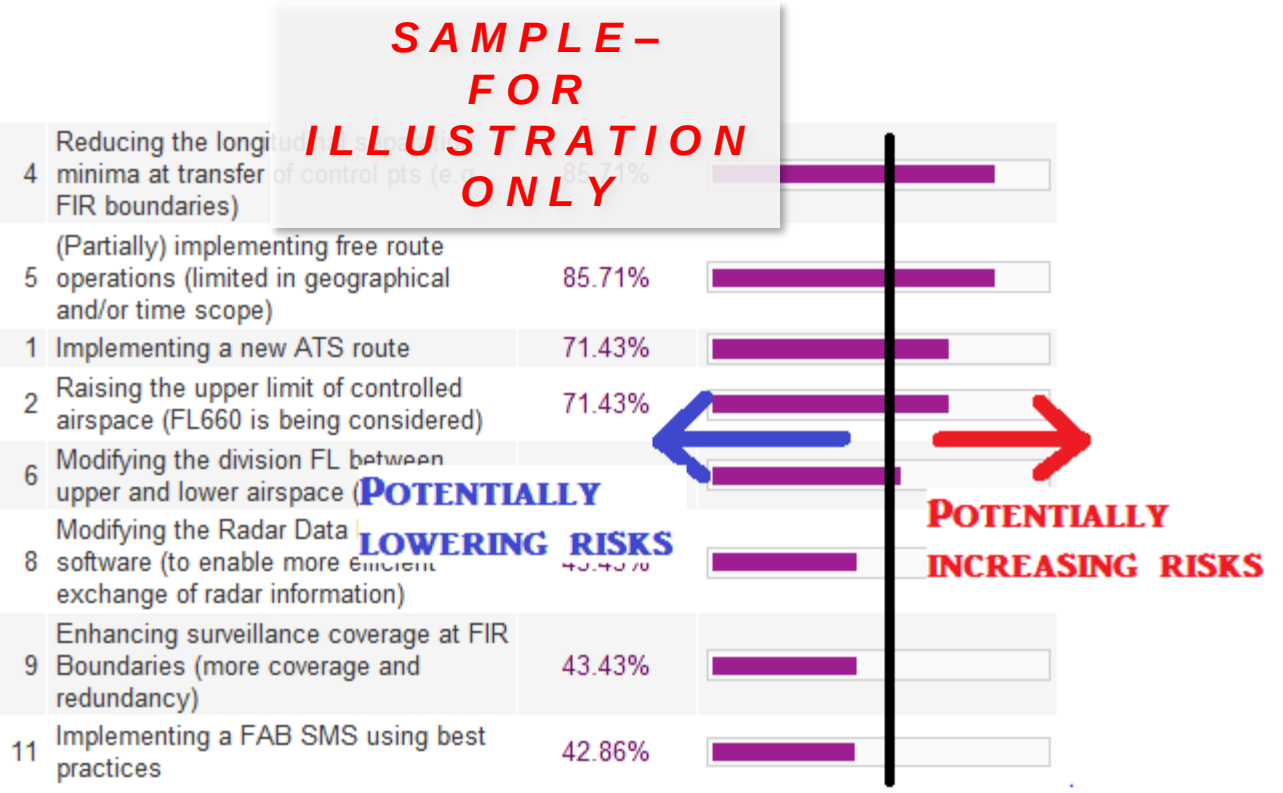


Software tools are available to help !

AHP – Analytic Hierarchical Process (pair-wise comparisons)

Demonstration of safety benefits – HOW ?

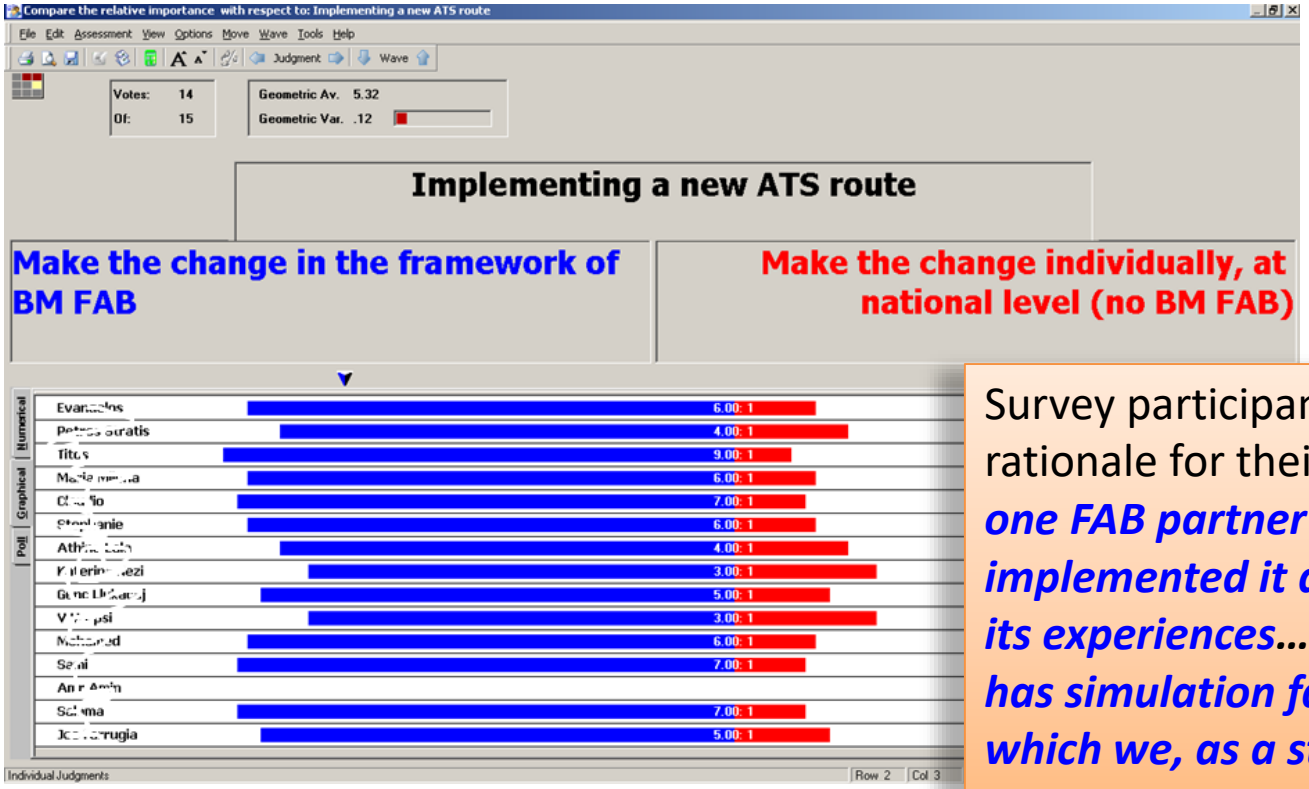
Step 3: Assess (*qualitatively*) on ***what*** the impact may be (positive / negative)



Info which can help FAB management to prioritise changes with respect to their safety effect

Demonstration of safety benefits – HOW ?

Step 4: Assess whether introducing the changes in the framework of the FAB has safety benefits (…and why and by how much)



SC safety arguments

Survey participants also offer the rationale for their replies e.g. ***"…because one FAB partner has already implemented it and we can learn from its experiences…"*** or ***"…because the FAB has simulation facilities and expertise which we, as a state, we don't have…"***

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Demonstration of safety benefits – HOW ?

Putting it all together…

Domain / Change	Relative Weight	SAFETY EFFECT OF CHANGES		FAB FACTOR	SAFETY EFFECT WITH FAB
Modifying the en-route horizontal separation minima (5 NM under consideration)	0,199	2	0,398	0,697	0,277406
Harmonising the logitudinal separation minima at transfer of control	0,087	1,33	0,11571	0,71	0,0821541
Introducing Free route operations (limited in geographical and/or time scope)	0,113	1,67	0,18871	0,717	0,13530507
Modifying the upper limit of controlled airspace above FL460 (upmost FL to be decided)	0,050	1,33	0,1603	0,57	0,037905
Modifying ATCO Training according to best practice in the FAB	0,125	1,04	0,0425	0,725	0,0308125
Implementing a new ATS route	0,080	1,36	0,10906	0,812	0,08855672
Changing the division FL between upper and lower airspace (FL195)	0,058	1	0,058	0,551	0,031958
Improving the coordination process between ACC Units (automatic - OLDI)	0,081	0,34	0,02754	0,658	0,01812132
Improving surveillance coverage in FIR boundaries	0,068	0,02	0,00136	0,732	0,00099552
Changing the Radar Data Processing software to use ASTERIX format	0,053	1,33	0,07049	0,545	0,03841705
Implementing a FAB Safety Management System (based on best practices)	0,084	0,84	0,07056	0,72	0,0508032
	1,0		**1,1**		**0,8**

In this example, it is demonstrated that the foreseen changes can be implemented, in the framework of the FAB, with apprx. 30% reduced risk

Thank you

Questions ?

Contact…

Petros Stratis, (Safety WP Leader)
pstratis@dca.mcw.gov.cy

More info @…

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