Automatic tools in support of ATM Performance Application to the validation of Airspace Design & Implementation

Bogdan DONCIU
Personal Adviser of MoT and CEO ROMATSA

romatsa

Romanian Air Traffic Services Administration

Summary

- Core activities
- Facts & Figures
- Strategic axes
- Safety Performance Monitoring Loop
- Usage of ASMT in Validation of new airspace at FAB Level

CORE ACTIVITIES

Provision of ANS for the Romanian Airspace:

- Air Traffic Services
- Communication, Navigation and Surveillance
- MET services
- Aeronautical Information Services
- Civil Military Coordination
- Search & Rescue Coordination Center

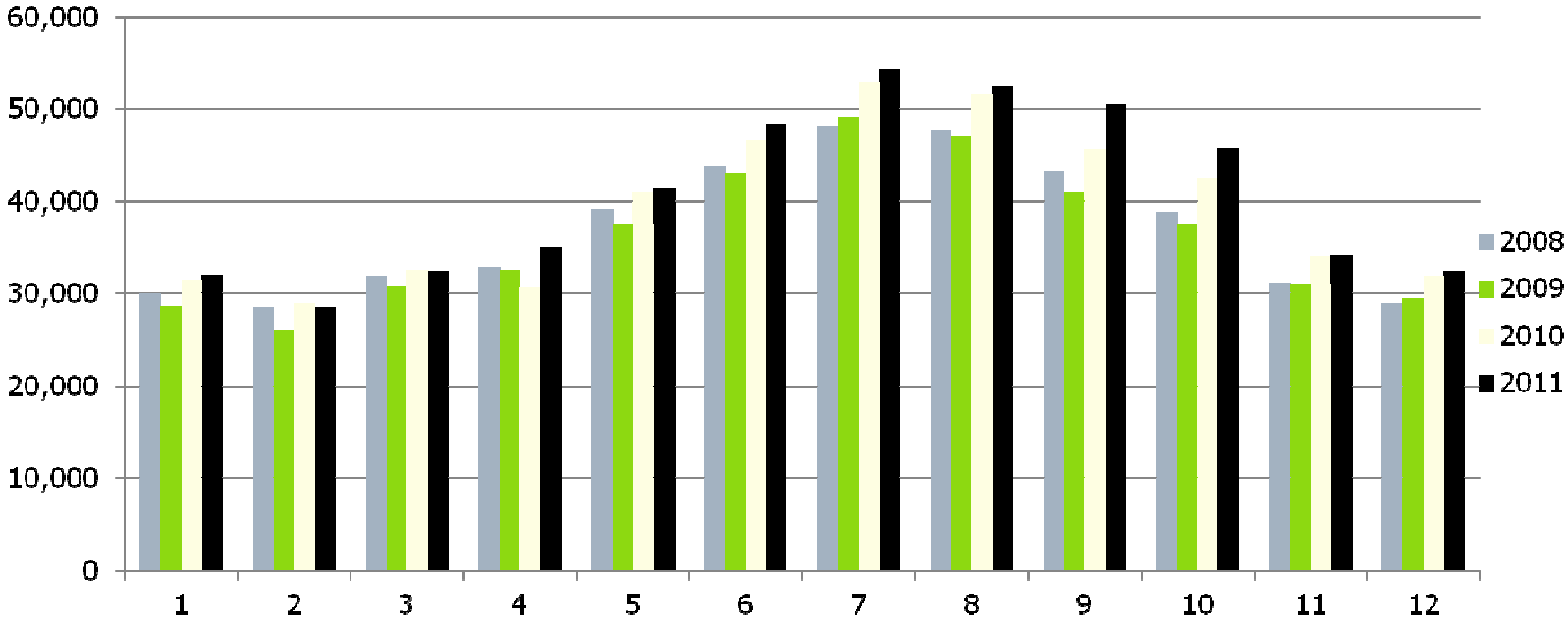
Air Traffic Services Units

- 3 AROs / 16 TWRs
- 2 APPs
- 1 ACC with 2 locations

AIS / MET Services

- MET Offices;
- 13 MET Self Briefing Offices;
- 1 MET Watch Center
- 4 ARO/BRIEFING Offices

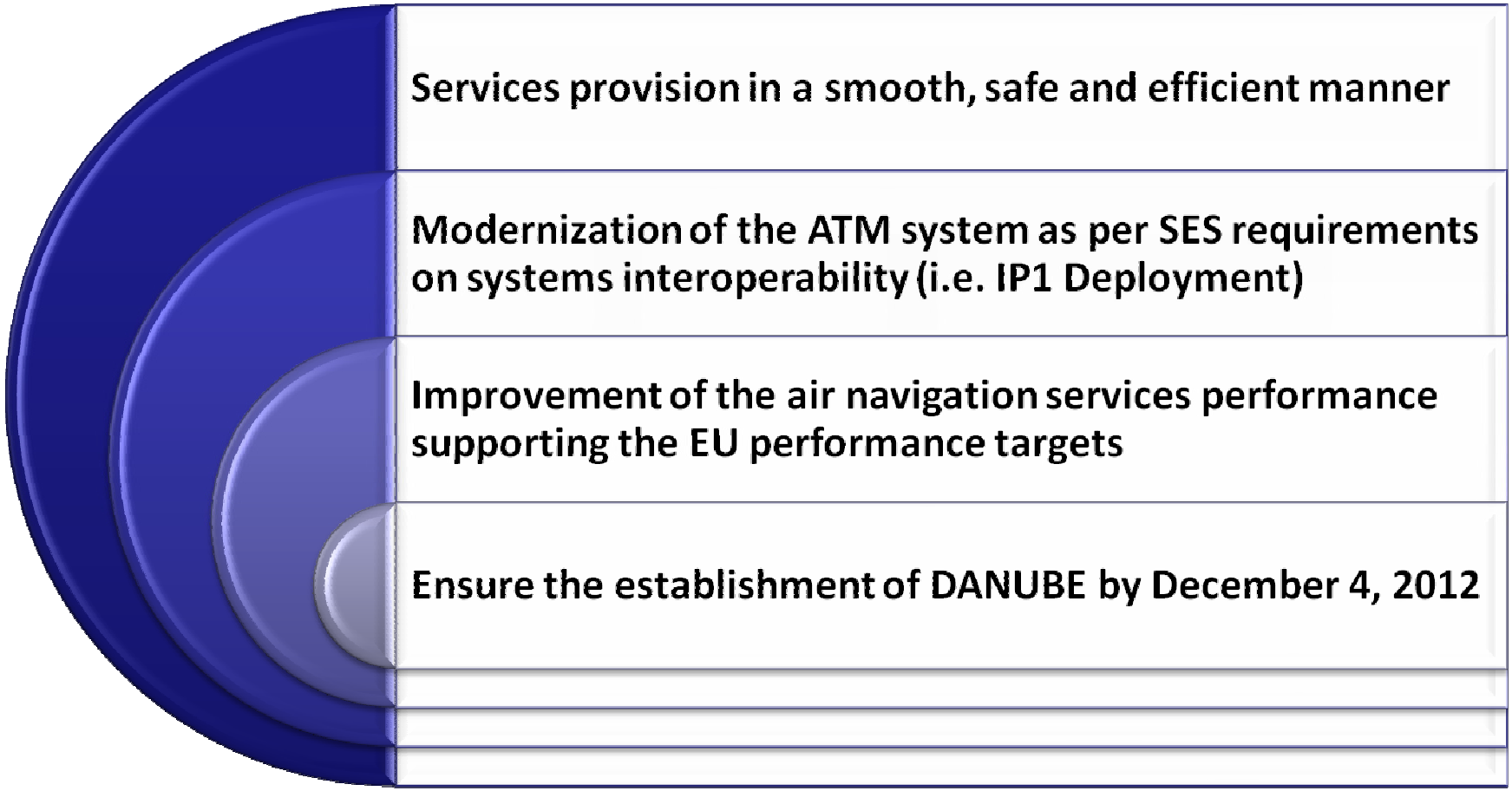
IFR traffic evolution 2008– 2011



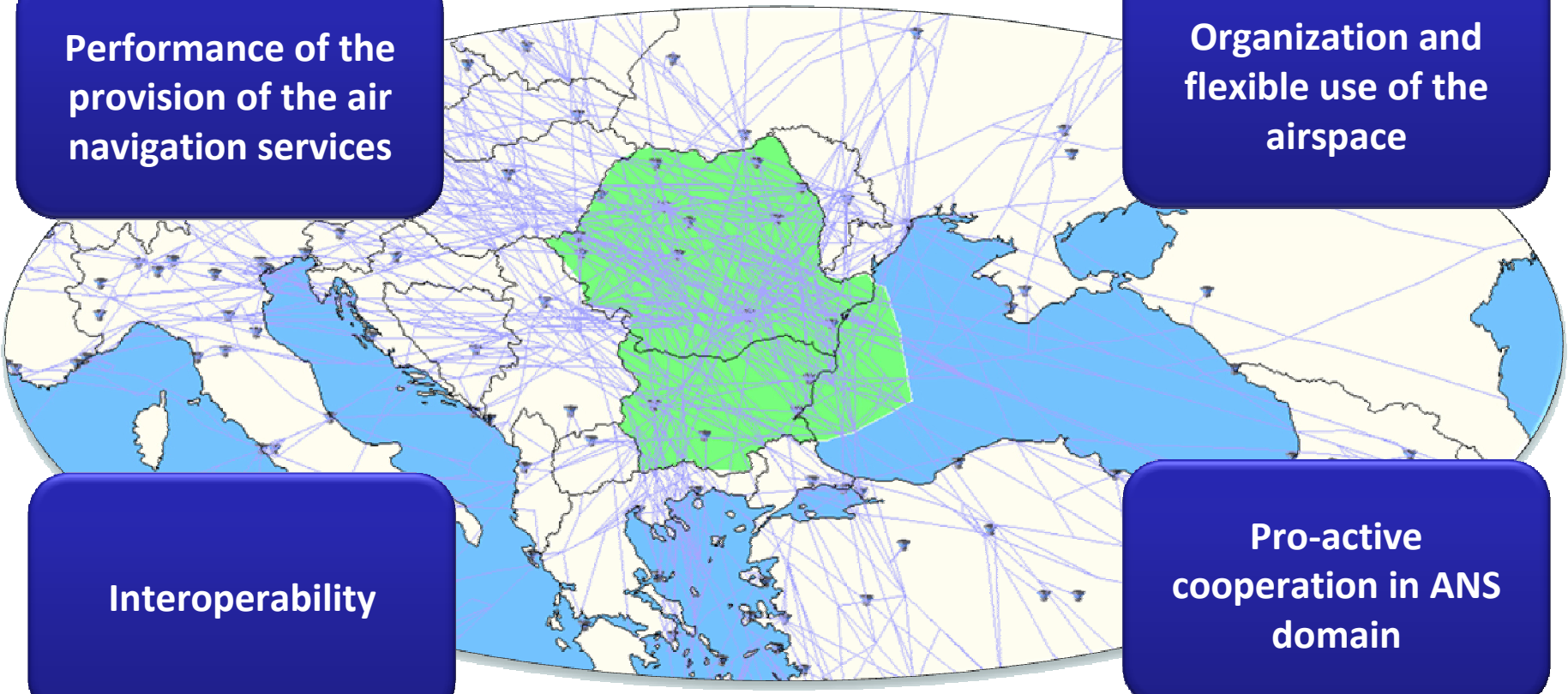
	ian	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
2008	29,942	28,531	31,844	32,844	39,126	43,877	48,206	47,679	43,320	38,818	31,153	28,953
2009	28,648	26,067	30,769	32,588	37,530	43,040	49,122	46,927	41,049	37,662	31,082	29,369
2010	31,494	28,838	32,562	30,619	41,038	46,613	52,833	51,635	45,572	42,437	34,071	31,829
2011	32,065	28,537	32,372	35,041	41,443	48,362	54,302	52,385	50,575	45,727	34,155	32,403

Traffic in Romania **increased by 4.5%** during Summer 2011 (May to October), when compared to Summer 2010 with a **maximum of 11%** in September.

Our strategic axes



Strategic action lines
Single European Sky & DANUBE FAB



OBJECTIVES

The Regulatory Context : Reg. 691/2010 – Performance Scheme

- Four Key Performance Areas
  - **Safety**
  - Capacity
  - Environment
  - Cost effectiveness
- Each KPA has a number of KPIs
- Performance Review Body is responsible for measurements

Two Period of Time – Reference Period

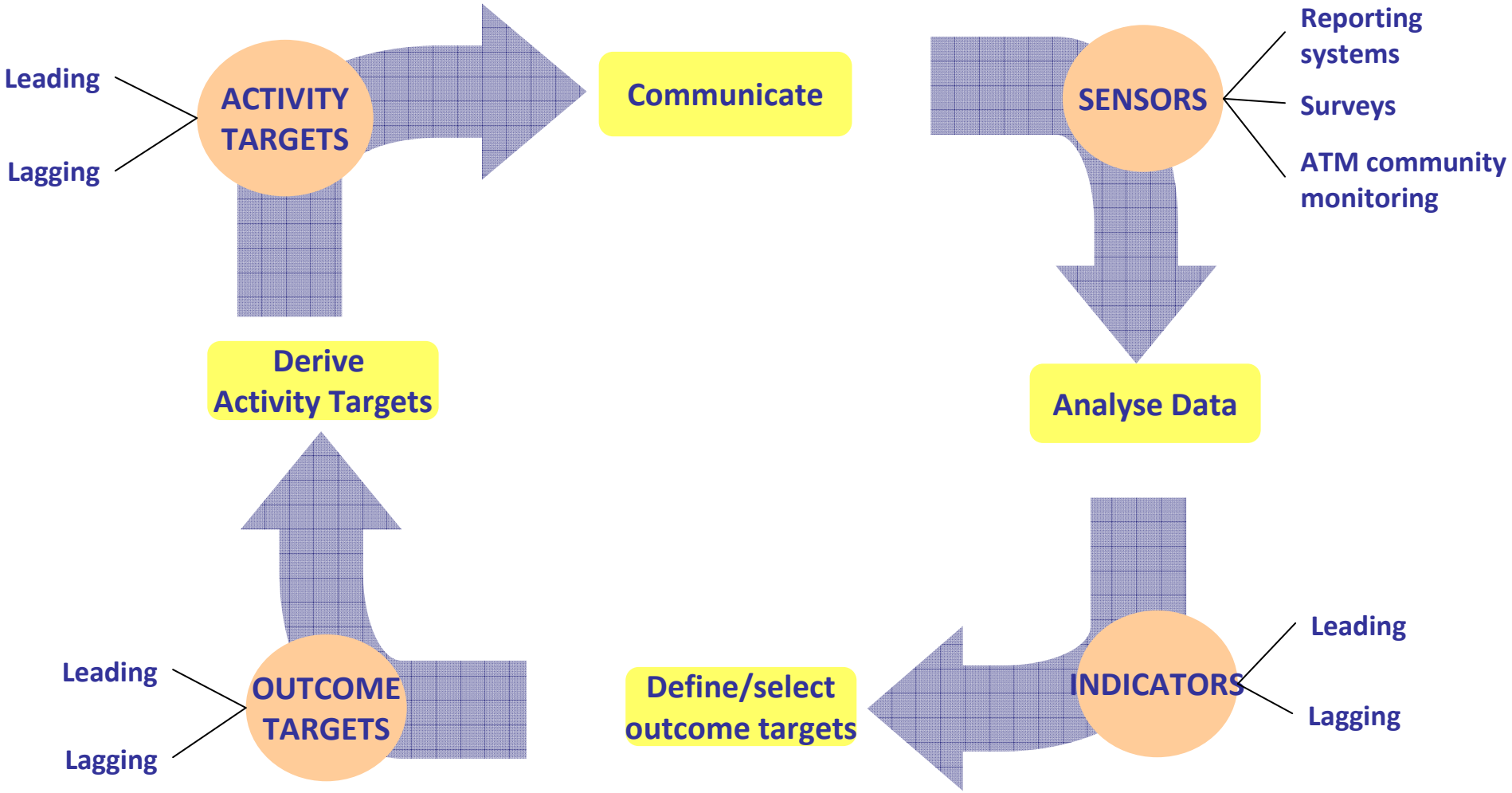
- **RP1: 2012-2014 – Safety Maturity (effectiveness of SMS), RAT, Just Culture**
  - Each KPI must have targets. Safety has no EU-wide targets for RP1.
  - KPIs set and measured at EU, FAB and National level
- **RP2: 2015-2019 - Metrics &** Target **implementation**
  - Conceptual, Need methodology
  - Will be the role of each organisation

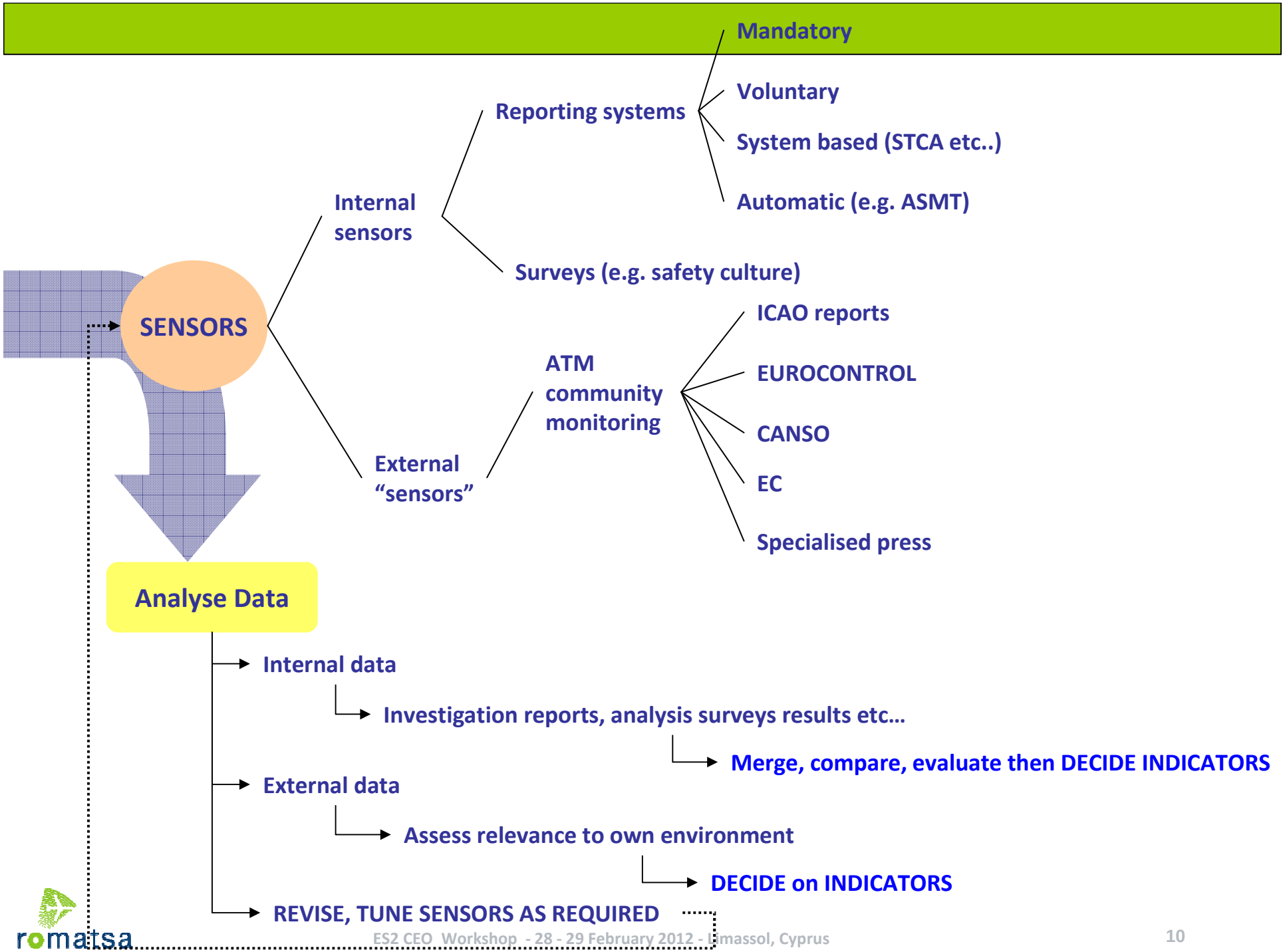
The Regulatory Context : Reg. 691/2010 – Performance Scheme

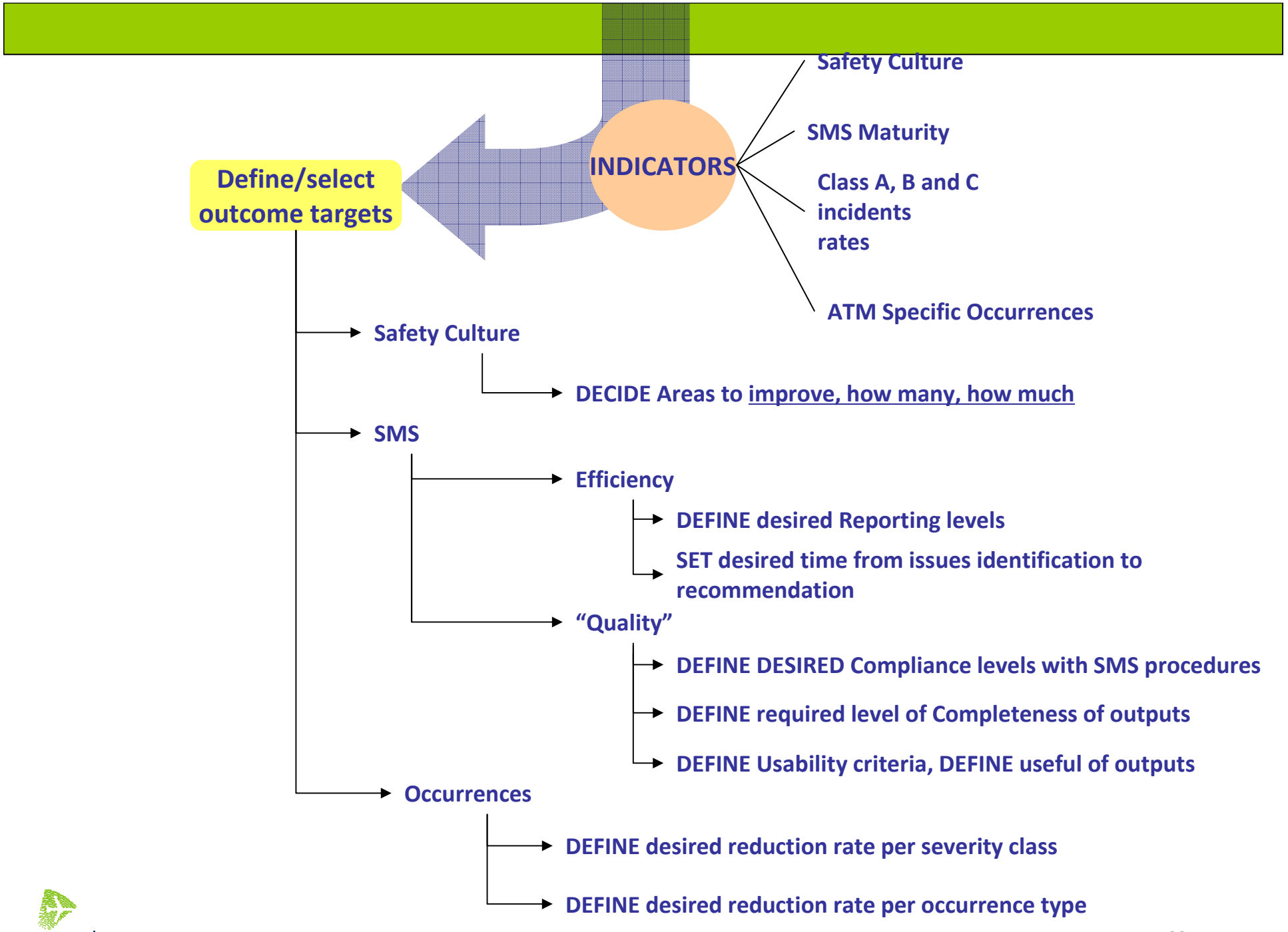
- **Achievement of ATM Performance, two (2) areas**
  - **ROMATSA Level**
  - **DANUBE FAB Level**

- **Questions**
  - **What are the enablers ?**
  - **How to aggregate data ?**

Safety Monitoring Loop




Mandatory
Voluntary
Reporting systems
System based (STCA etc..)
Automatic (e.g. ASMT)
Internal sensors
Surveys (e.g. safety culture)
SENSORS
ICAO reports
ATM community monitoring
EUROCONTROL
CANSO
External "sensors"
EC
Specialised press
Analyse Data
Internal data
Investigation reports, analysis surveys results etc…
Merge, compare, evaluate then DECIDE INDICATORS
External data
Assess relevance to own environment
DECIDE on INDICATORS
REVISE, TUNE SENSORS AS REQUIRED


Safety Culture
SMS Maturity
INDICATORS
Class A, B and C incidents rates
ATM Specific Occurrences
Define/select outcome targets
Safety Culture
DECIDE Areas to improve, how many, how much
SMS
Efficiency
DEFINE desired Reporting levels
SET desired time from issues identification to recommendation
"Quality"
DEFINE DESIRED Compliance levels with SMS procedures
DEFINE required level of Completeness of outputs
DEFINE Usability criteria, DEFINE useful of outputs
Occurrences
DEFINE desired reduction rate per severity class
DEFINE desired reduction rate per occurrence type

Safety Culture

LOOK at safety culture stoppers and SET a strategy to remove them

SMS

Efficiency

LOOK at reasons for less than desired Reporting levels and DEFINE an action plan

LOOK at reasons for poor re-activeness and DEFINE actions to remedy

Quality

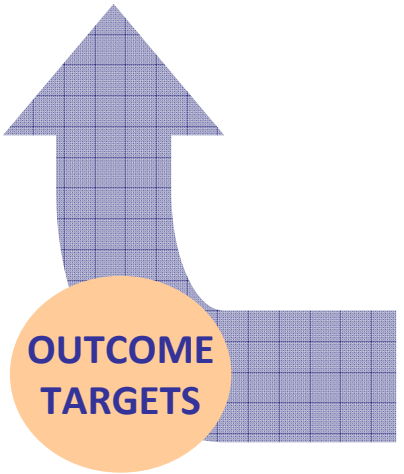
LOOK at reasons for non compliance and DEFINE actions

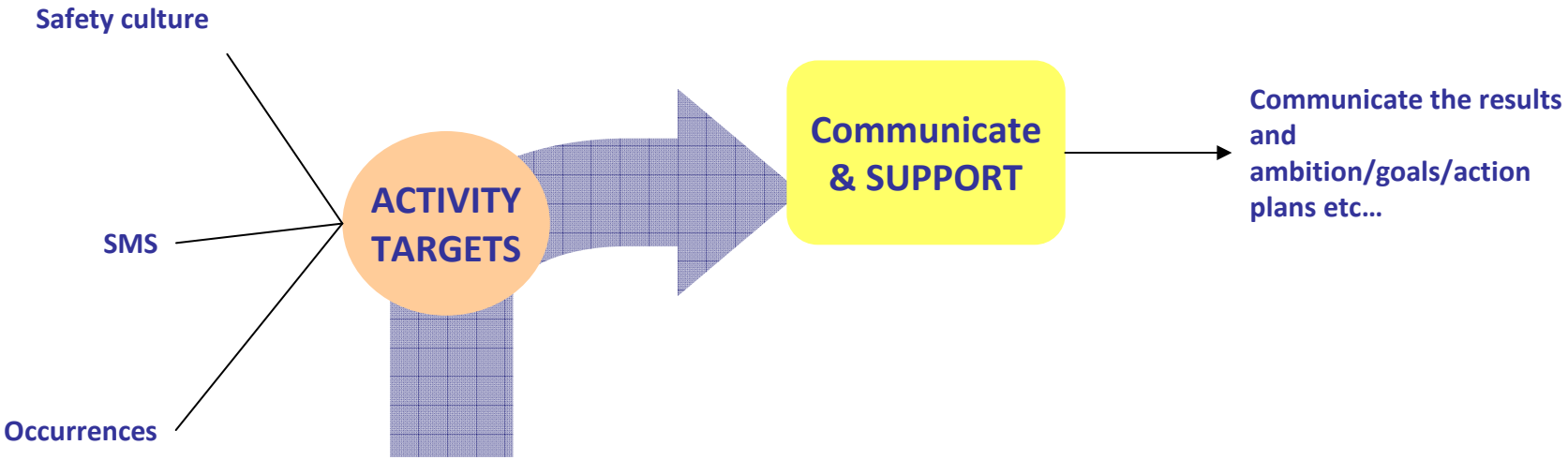
LOOK at reasons for delays and DEFINE ways to reduce them

Occurrences

LOOK at causes and DEFINE reduction rate per CAUSE(s)

Derive Activity Targets




Safety culture
SMS
Occurrences
ACTIVITY TARGETS
Communicate & SUPPORT
Communicate the results and ambition/goals/action plans etc…

Application to the Validation of a new / re-structured airspace

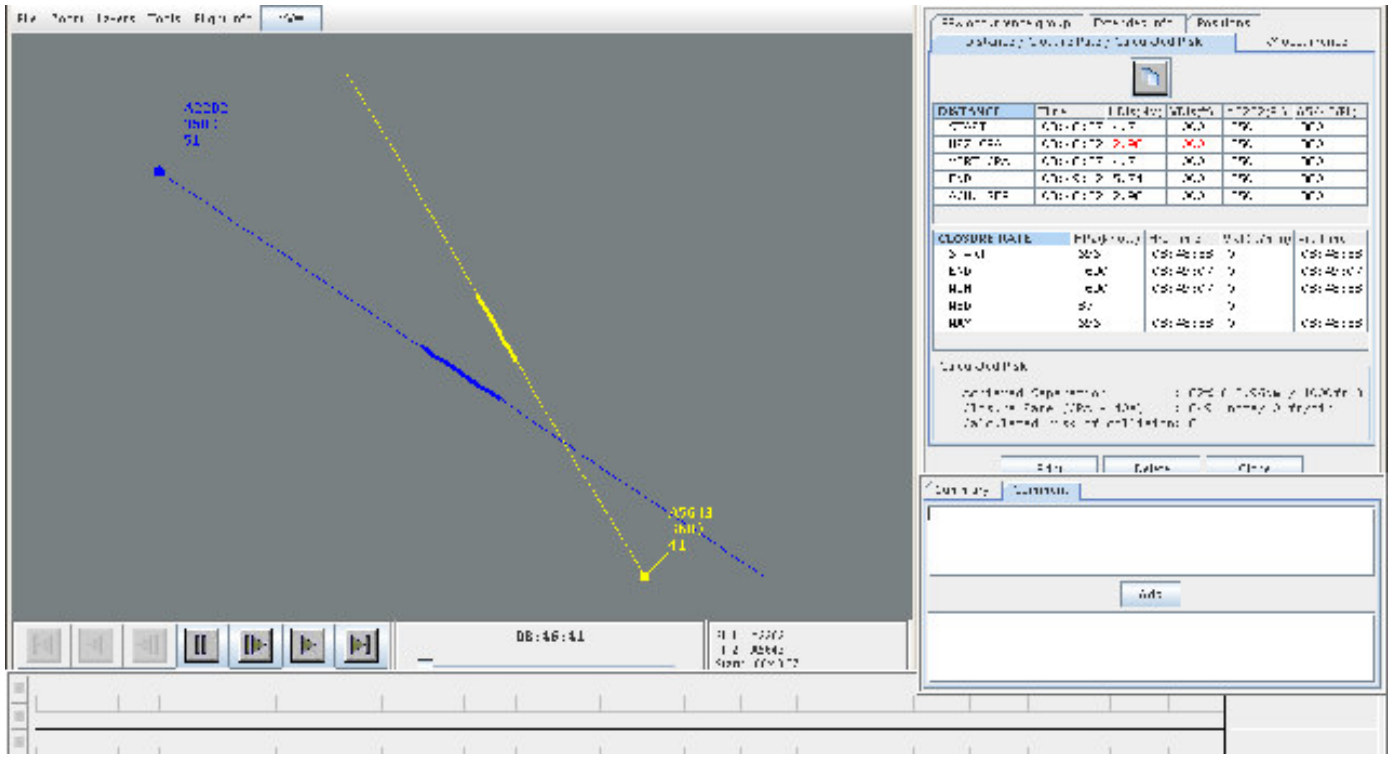
ASMT Application to the Validation of Airspace Design

ASMT is the EUROCONTROL Automatic Safety Monitoring Tool

- **What does it do?**
  - Identifies & Records safety events

Safety Event recorded

- ✓ **PRX:** losses of separation minima
- ✓ **AP:** airspace penetrations – infringements of reserved areas
- ✓ **STCA** (Short Term Conflict Alert)
- ✓ **APW** (Airspace Penetration Warning)



ASMT Application to Validation of Airspace Design

- **For Real Time Simulation**, to support the validation of airspace design providing **safety evidences or issues of concerns** based on:
  - **Factual evidences** on safety levels as a consequence of the exhaustive data gathering performed
  - **Big picture** of the **geo-localisation** of safety events (hotspots)
  - Identification and focus on **systemic factors** like **ATS geography** and **procedures**

- **For migration into operations,** to provide **safety feedback** in quasi-real time to monitor step by step
  - Comparing simulation results (post objectives risk pictures), and
  - Quasi real time results (objectives risk pictures)

Subjective feedback: Controller airspace operations knowledge

Vs

Objective feedback: what really happened in reality

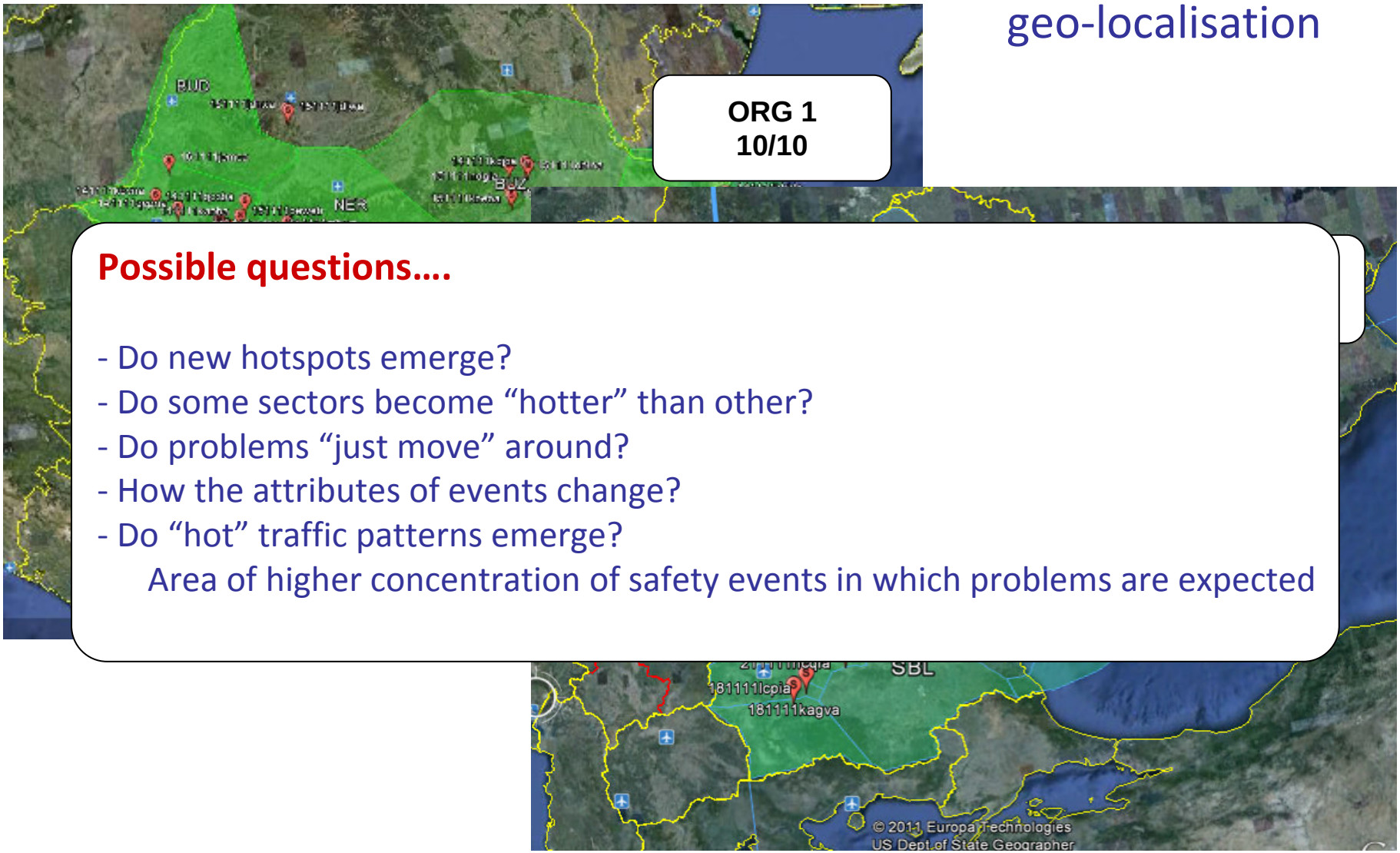
ASMT Application to Validation of Airspace Design

Providing Factual Evidences of Safety Levels

- **Safety events are what actually happened in the airspace during the simulation exercises** and not feelings or (expert) opinions
- **These facts are exhaustively gathered -** All events from **very low risk potential** to higher risk potential **are collected with no interference from human input**

- Advantages of objective evidences:
  - **Safety events collected are objective symptoms** of systemic issues in the ATM processes (e.g. airspace design)
  - Confirm whether **hotspots are actually placed where they have been assessed to be** and new hotspots have not been identified
  - Safety events collected and their attributes **can be measured and compared across different Organisations**
  - **Evidence-based and intuitive communication with management** and people far from the "first-line" operations
    - E.g. by using maps, graphs etc.

Big picture of geo-localisation

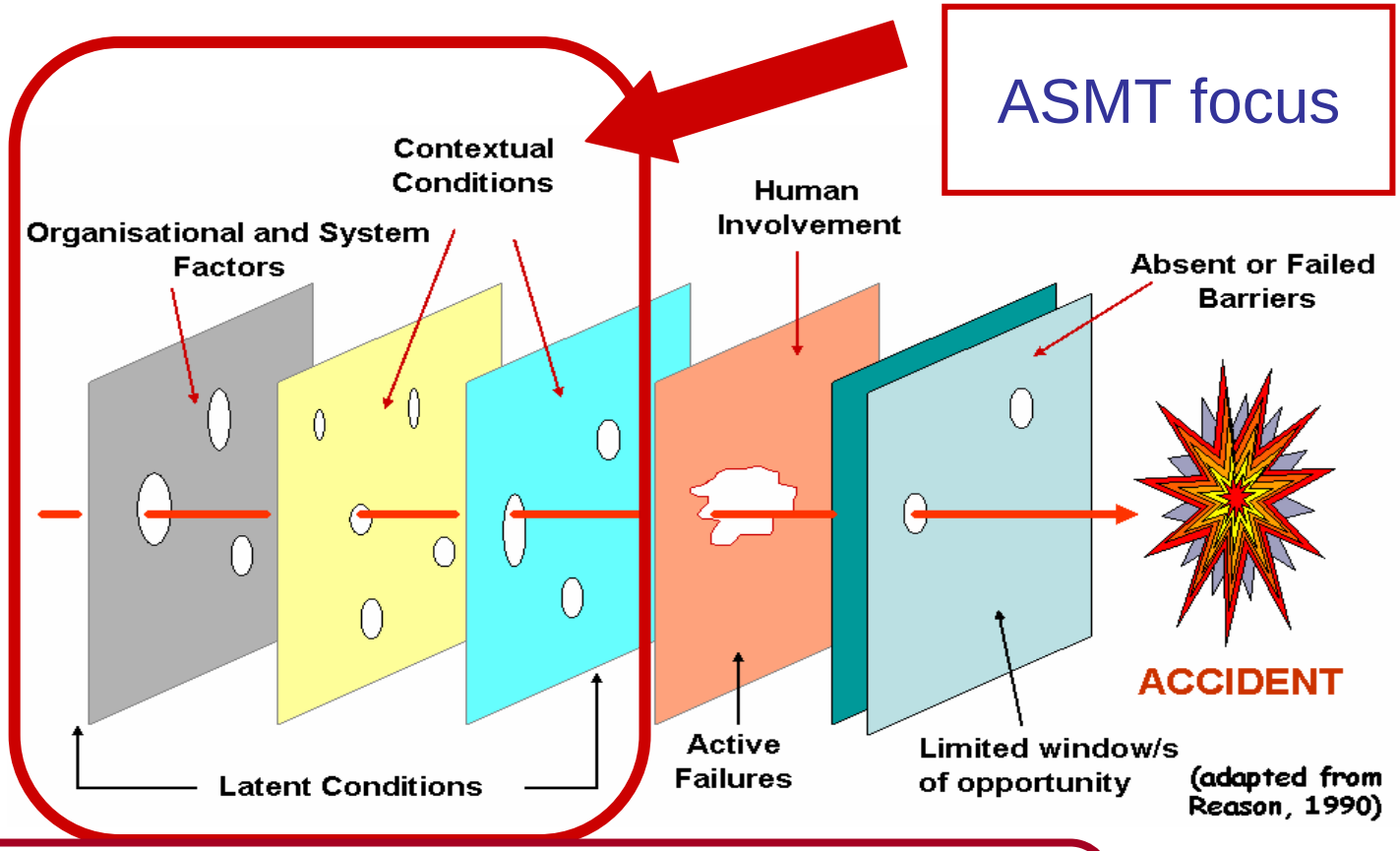


Possible questions….

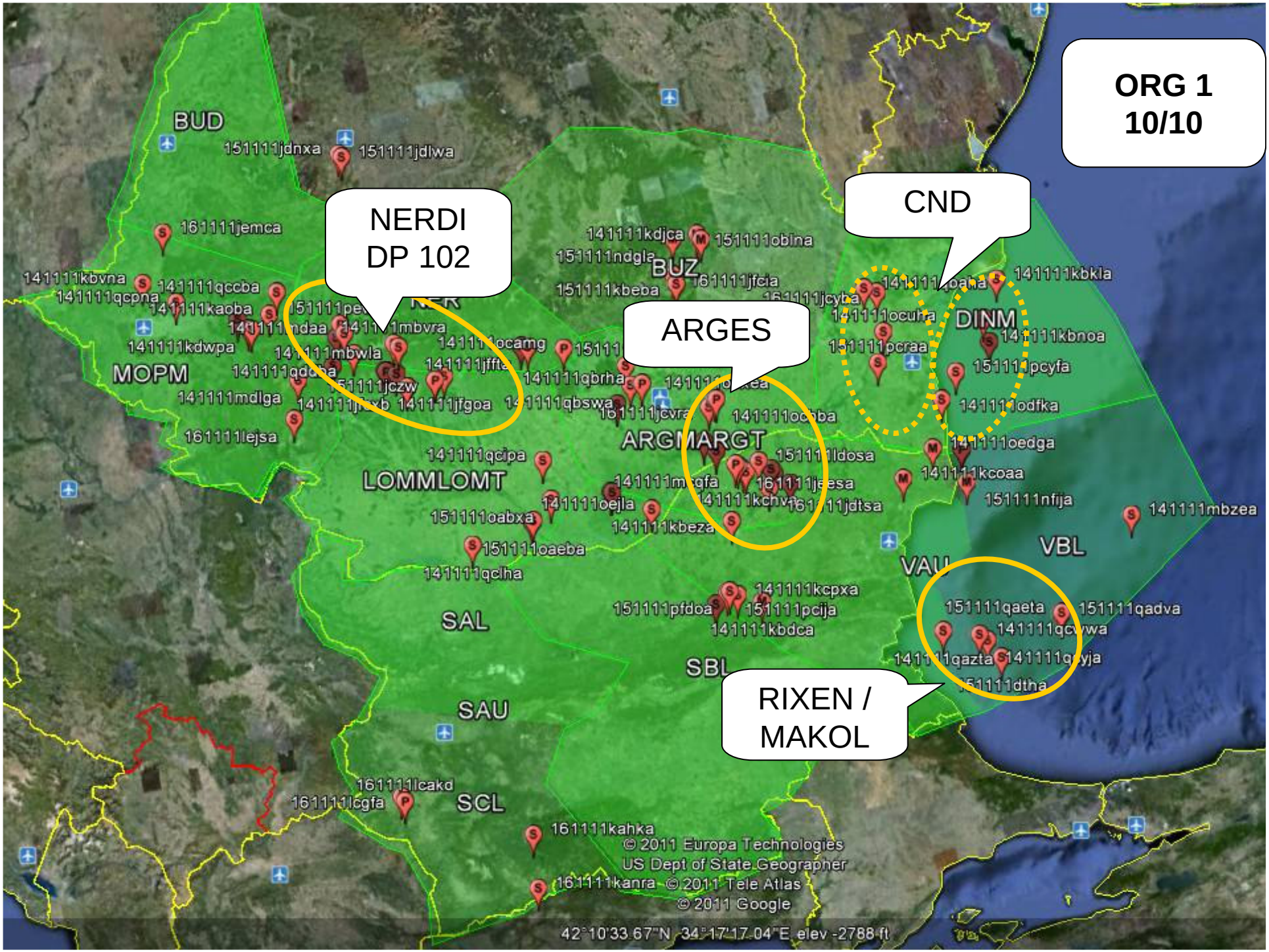
- Do new hotspots emerge?
- Do some sectors become “hotter” than other?
- Do problems “just move” around?
- How the attributes of events change?
- Do “hot” traffic patterns emerge?

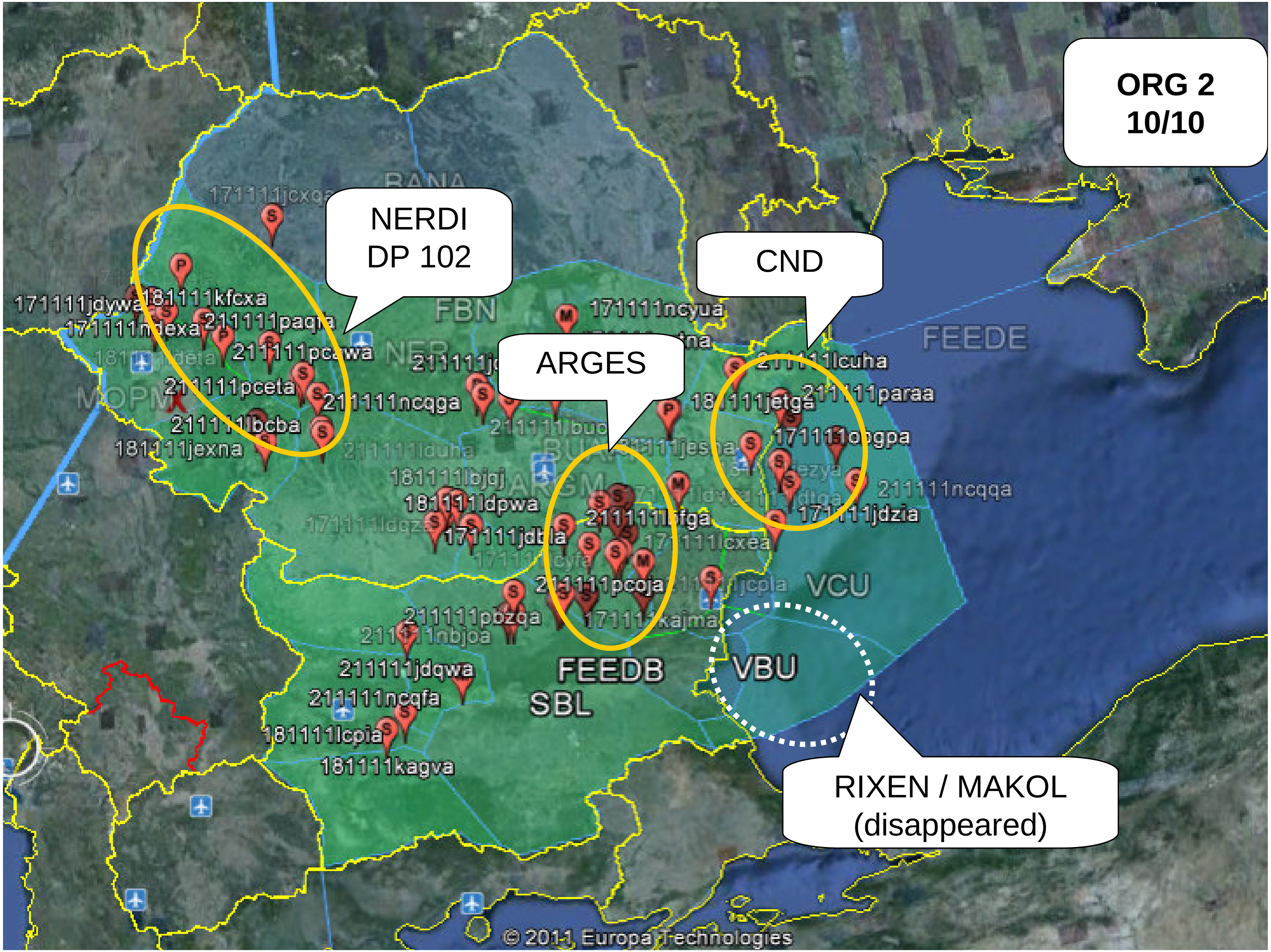
  Area of higher concentration of safety events in which problems are expected

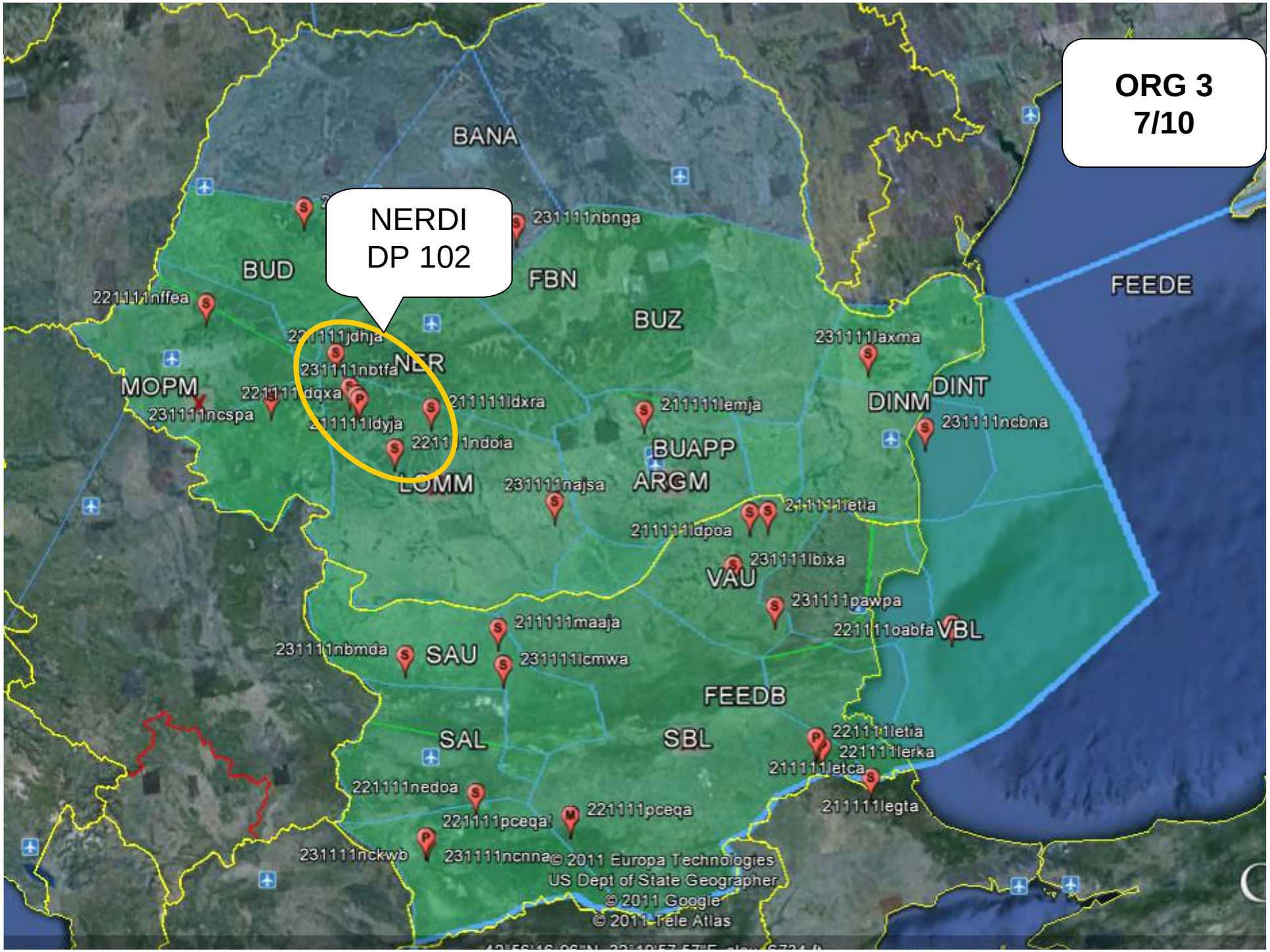
Focus on systemic issues



Quantitative description linked to operational analysis in order to identify systemic factors affecting safety performance per organisations:
Airspace design, Procedures, Traffic Flow / Sector Capacity

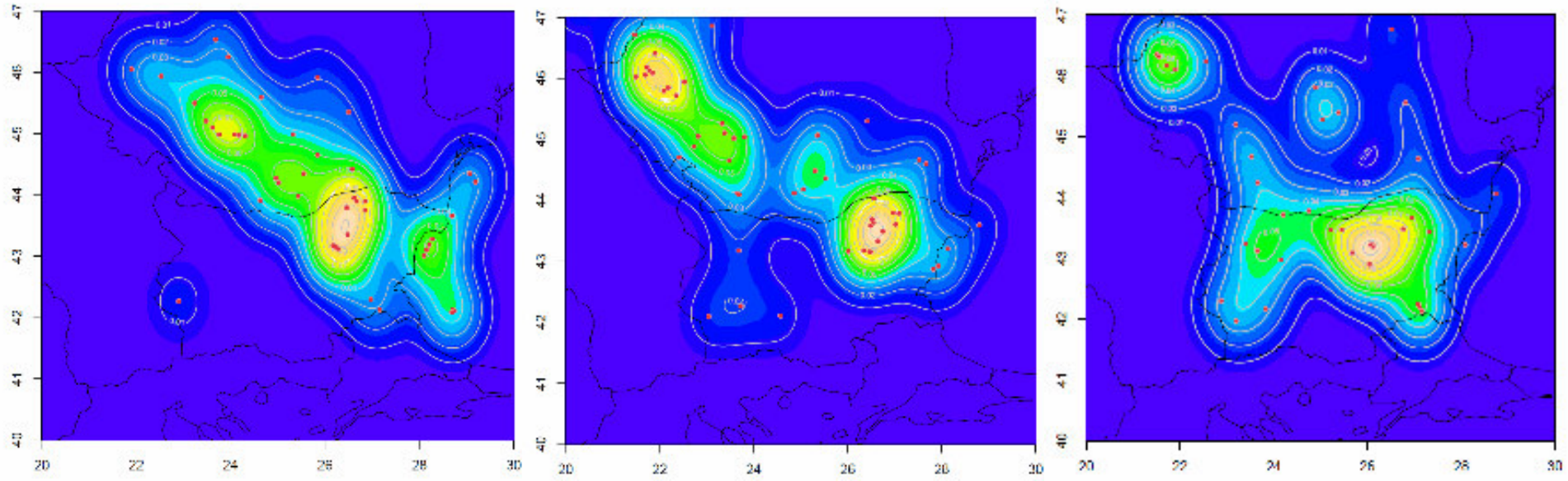

ORG 1
10/10
NERDI
DP 102
CND
ARGES
RIXEN /
MAKOL
BUD
BUZ
DINM
MOPM
LOMMLOMT
ARGMARGT
VAU
VBL
SAL
SBL
SAU
SCL
151111jdnxa
151111jdlwa
161111jemca
141111kbvna
141111qccba
141111qcpna
141111kaoba
141111kdwpa
141111mbvra
141111mbwla
141111jfgoa
161111lejsa
141111mdlga
141111kdjca
151111obina
151111ndgla
151111kbeba
161111jfcia
141111kbkla
141111kbnoa
151111pcyfa
141111odfka
141111oedga
141111kcoaa
151111nfija
141111mbzea
151111ldosa
141111qcipa
141111oejla
151111oabxa
151111oaeba
141111qclha
141111kbeza
141111kcpxa
151111pfdoa
151111pcija
141111kbdca
151111qaeta
151111qadva
161111lcakd
161111lcgfa
161111kahka
161111kanra
© 2011 Europa Technologies
US Dept of State Geographer
© 2011 Tele Atlas
© 2011 Google
42°10'33.67"N 34°17'17.04"E elev -2788 ft


ORG 2
10/10
NERDI
DP 102
CND
ARGES
RIXEN / MAKOL
(disappeared)
FBN
FEEDE
VCU
VBU
FEEDB
SBL
© 2011 Europa Technologies


ORG 3
7/10
NERDI
DP 102
BANA
BUD
FBN
BUZ
FEEDE
NER
MOPM
DINM
DINT
BUAPP
ARGM
LOMM
VAU
VBL
SAU
FEEDB
SAL
SBL
231111nbnga
221111nffea
231111jdhja
231111nbtfa
221111ldqxa
231111ncspa
211111ldxra
211111ldyja
221111ndoia
231111laxma
211111lemja
231111ncbna
231111najsa
211111etla
211111dpoa
231111lbixa
231111pawpa
221111oabfa
211111maaja
231111nbmda
231111lcmwa
221111letia
221111lerka
211111letca
211111legta
221111nedoa
221111pceqa
221111pceqa'
231111nckwb
231111ncnna
© 2011 Europa Technologies
US Dept of State Geographer
© 2011 Google
© 2011 Tele Atlas

What areas are most dense of safety events (hotspots)?

- **Density maps per ORG (loss of separation) – Traffic sample: 451/482 Aircraft/hour**



ORG 1 + mil **ORG 2 + mil** **ORG 3 + mil**

Where the risk of collision (ROC) is higher/lower?

- **Geographical distribution of Loss of separation with ROC**

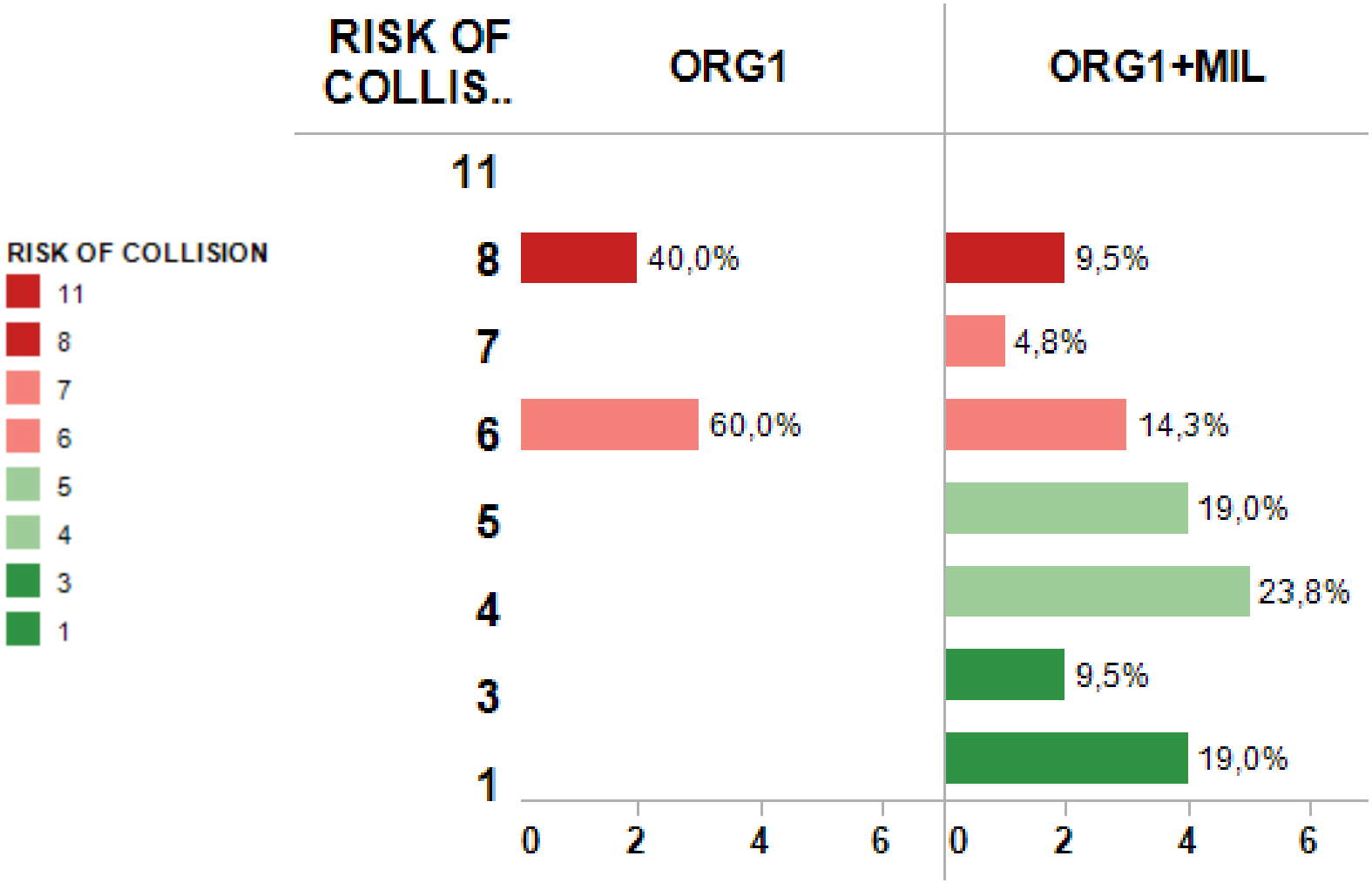
Org 1 + Org 1 Mil

RISK OF COLLISION

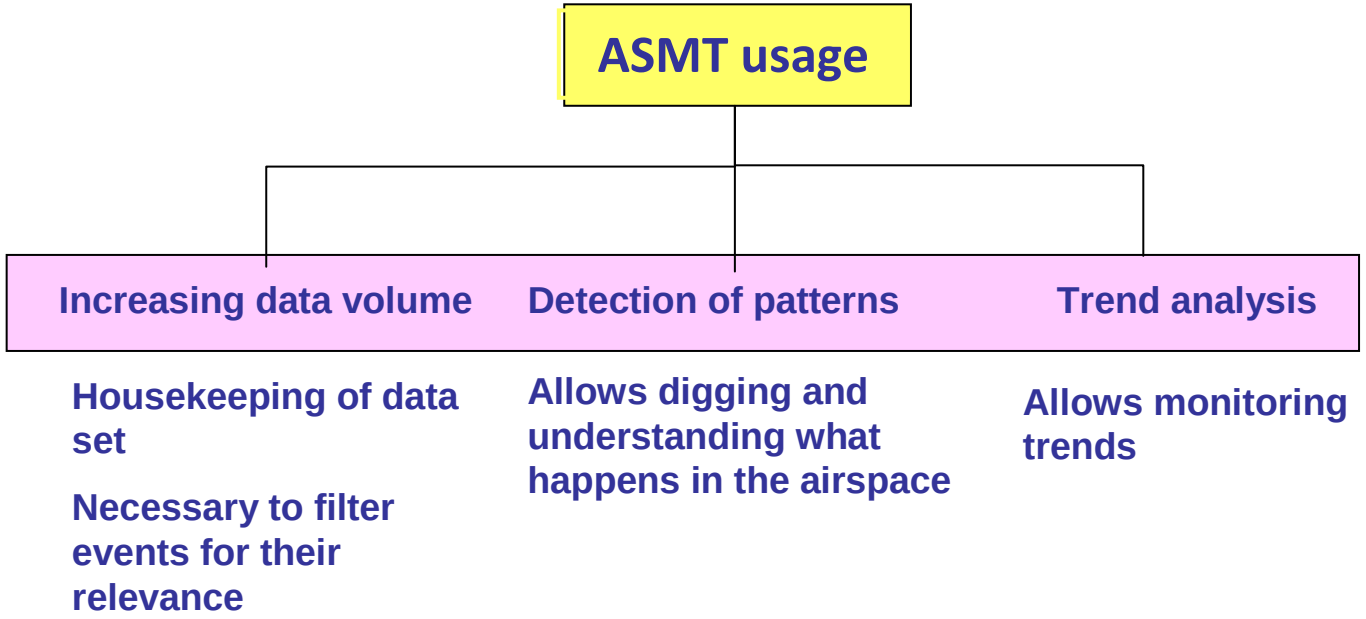
- 1
- 3
- 4
- 5
- 6
- 7
- 8
- 11

How the ROC changed across the Orgs? How it was distributed?

- **Geographical distribution of separation losses with ROC**



A Powerful Tool for the measurement of ATM Performance



- ✓ **Provide statistical capabilities (*Filter by FL / Geometry / Risk of collision)* by post processing data**
- ✓ **Provides the means to understand an event in full, as might have occurred, STCA-PRX-ACAS RA to**
  - **To get hot spots from different perspectives including risk of collision, then**
  - **To get the real picture of what happen in the airspace considered,**
    - **identify & quantify operational risks by highlighting when non standard, unusual or unsafe circumstances occur (increases in occurrence rates in certain areas, new event types or new locations is detected unexpectedly)**

Feeding into Key Performance Indicators

✓ **The introduction of ASMT represents a shift of paradigm in the way safety Management and ATM Performance are approached**

- Breakthrough in Just Culture opening discussions at all levels of the organisation balancing safety and accountability through commitment of non punitive safety policy ensuring also confidentiality of data

- Close monitoring of safety-related indicators to reach proactive approach to safety performance monitoring, heightening SMS efficiency and effectiveness

- Combine both, daily monitoring of safety and medium to long term basis for trends and statistics, safety learning, comparison of year to year performance,

- Harmonise the approach for the management of recorded safety events and operational safety analyses that eases exchange of safety data between FAB partners

- Feed into operational and technical KPIs (RAT, Safety Maturity & Culture studies) and making sense of them (alignment of day-to-day indicators and targets with ATM Community)

www.romatsa.ro