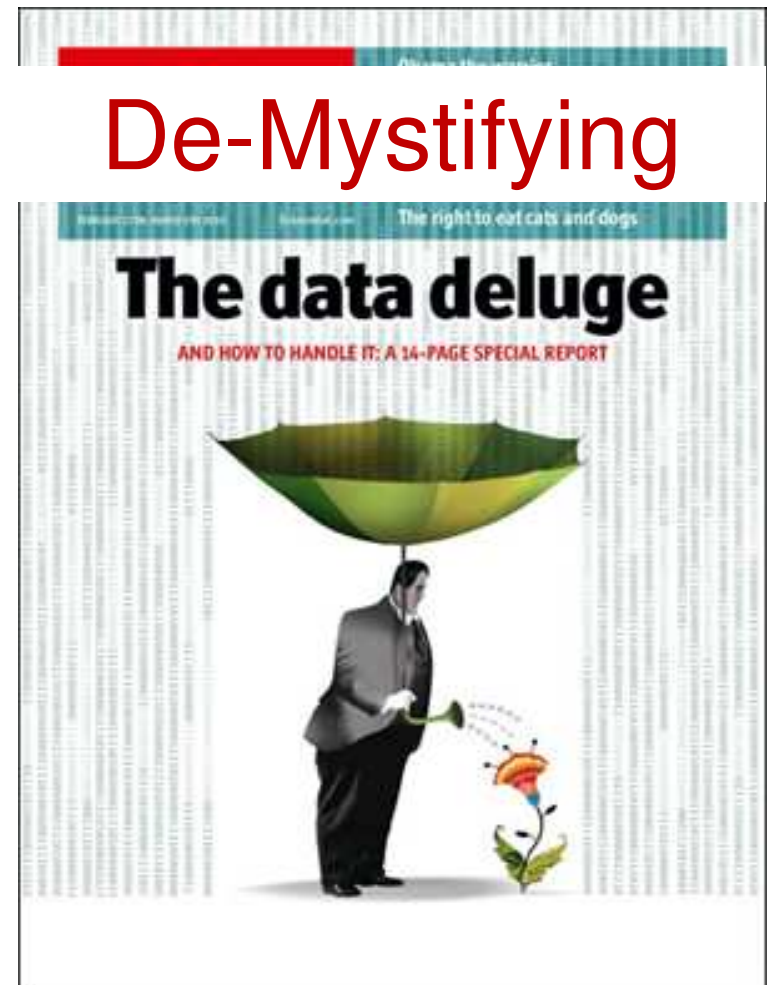# Making sense of safety data – an operational approach

ES^2 SAF Tools, 25th – 27th April 2017, ROMATSA HQ Bucharest

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ASMT Project Manager

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ASMT Operational Support

Digital data everywhere…

- Automatic data gathering tools

- …manual reporting and occurrences investigations

- How to **reconcile** the two flows of data and **exploit** them to identify **systemic** safety issues?


De-Mystifying

The right to eat cats and dogs

The data deluge

AND HOW TO HANDLE IT: A 14-PAGE SPECIAL REPORT

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Safety data…everywhere?

- But is ATM Safety facing a **data scarcity** problem?

  - How many SMIs are reported per month?
  - How many RWY incursions?
  - How many are the risk bearing ones?

- How to make data **bloom**?

Enlarging our view on SMI

- **Extend data sets**: ASMT

  - ASMT can collect data beyond what is **asked** by regulation

  - ASMT collect attributes relevant for operations like:
    - Minimum achieved separation
    - Rate of closure
    - Conflict geometry;
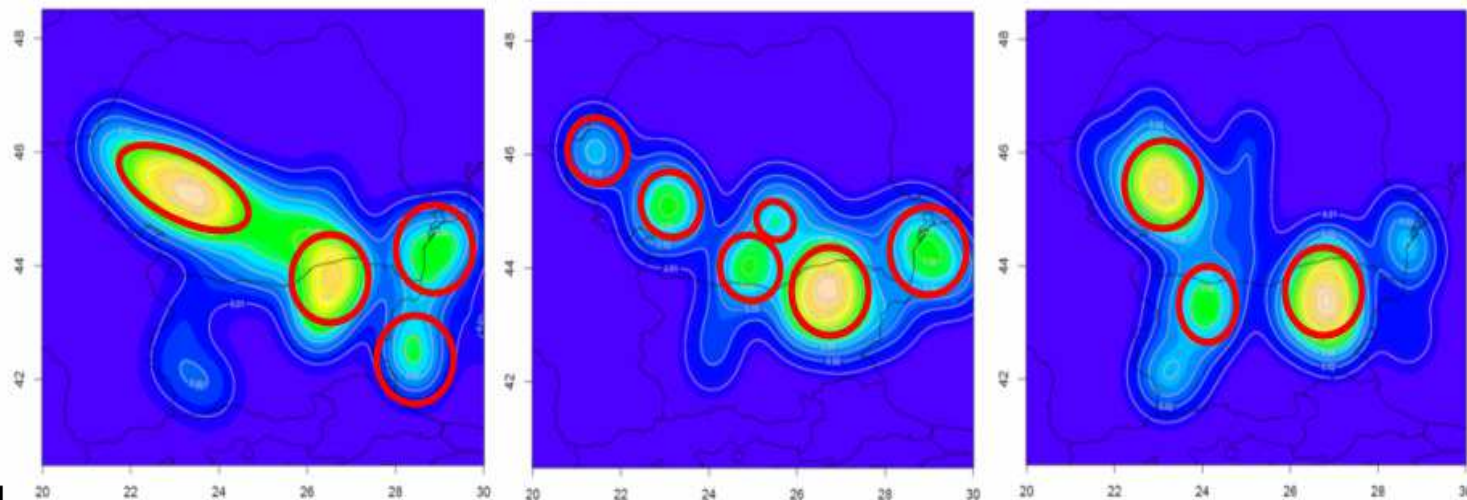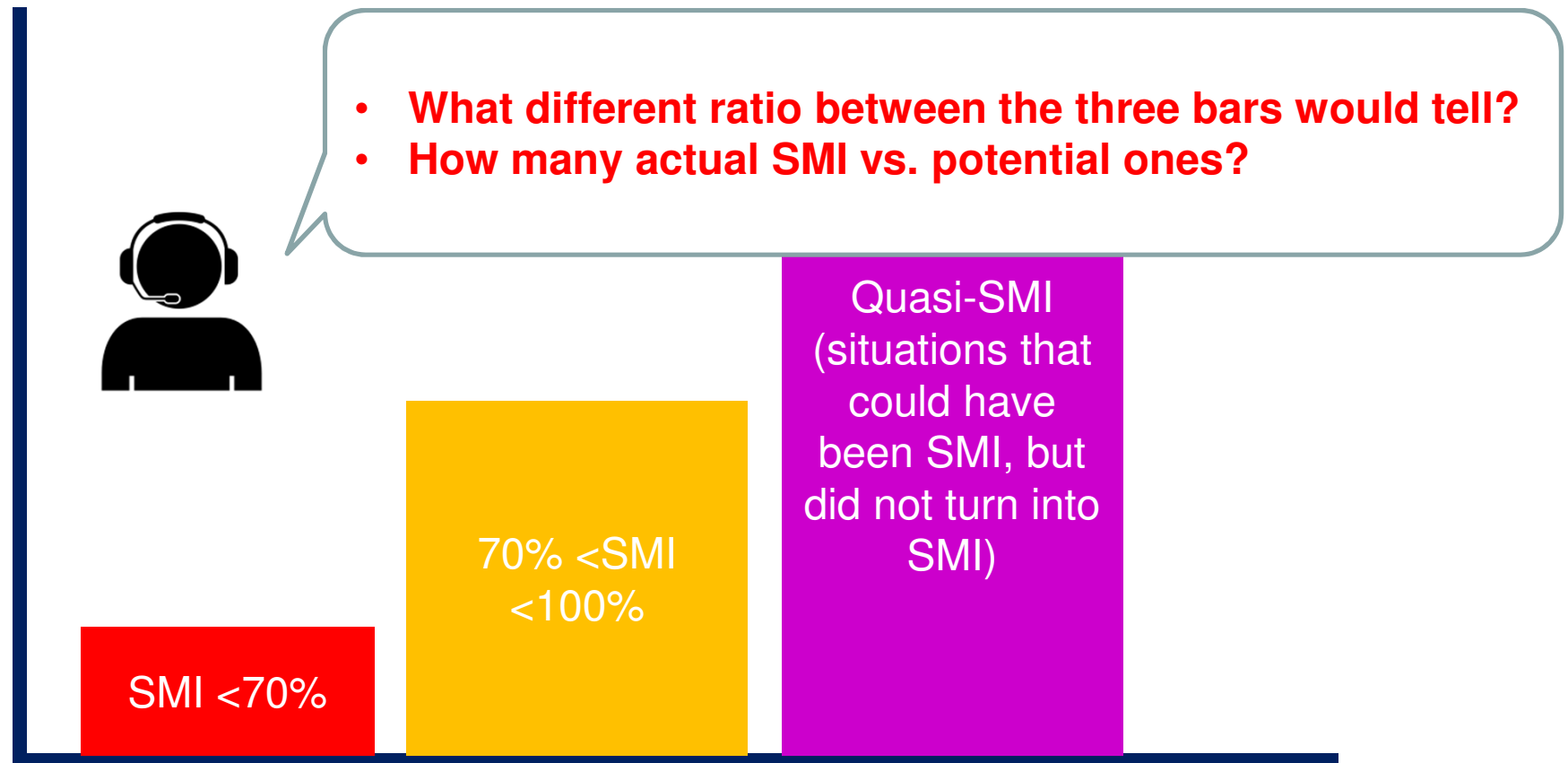   - …
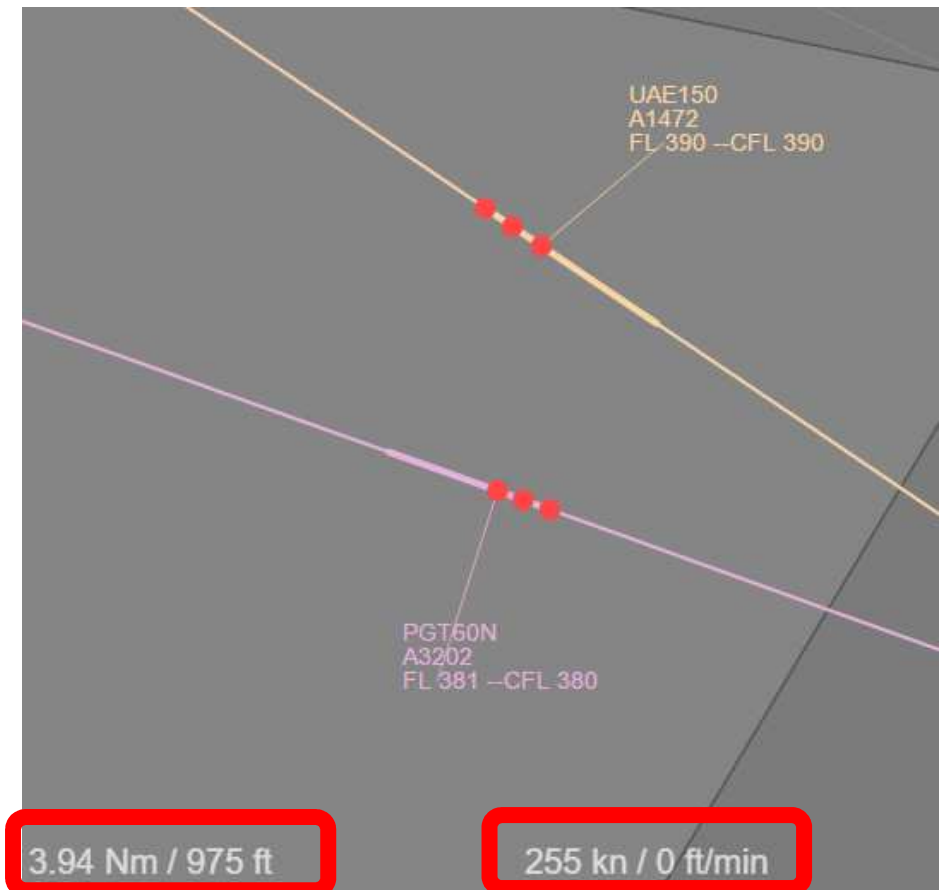
Even more: quasi-SMI

- **Monitoring aircraft which are separated, but that could infringe minima if no modification to the situation happens:**

    - They could become **actual SMI**
    - They could become **quasi-SMI**, e.g. 5,5 NM and 700 ft at CPA (range of interest can be set)
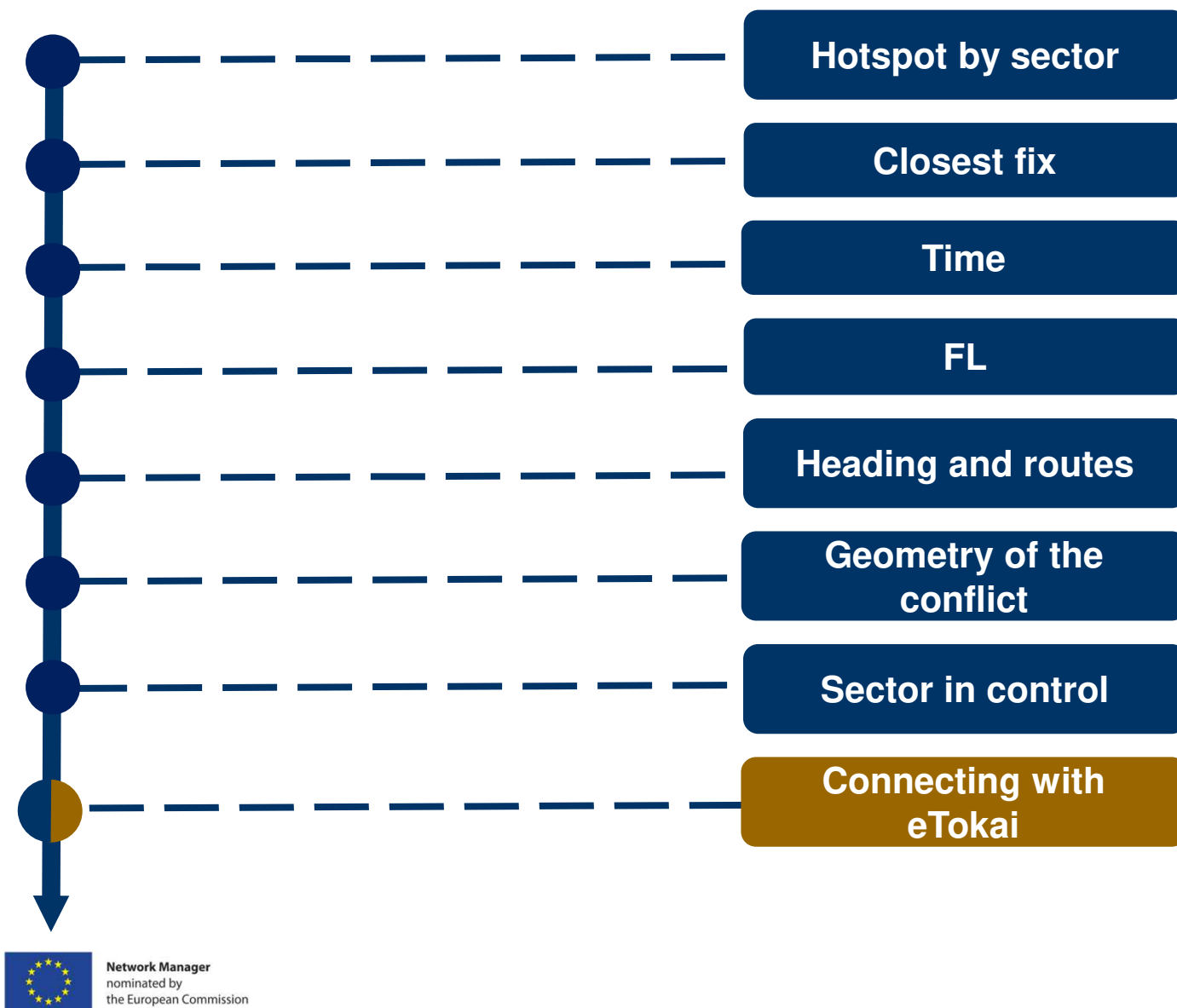
Quasi-SMI

- Why **quasi-SMI**?

  - More numerous than SMI

  - **Back up subjective reports** from ATCO about conflict hotspots they feel

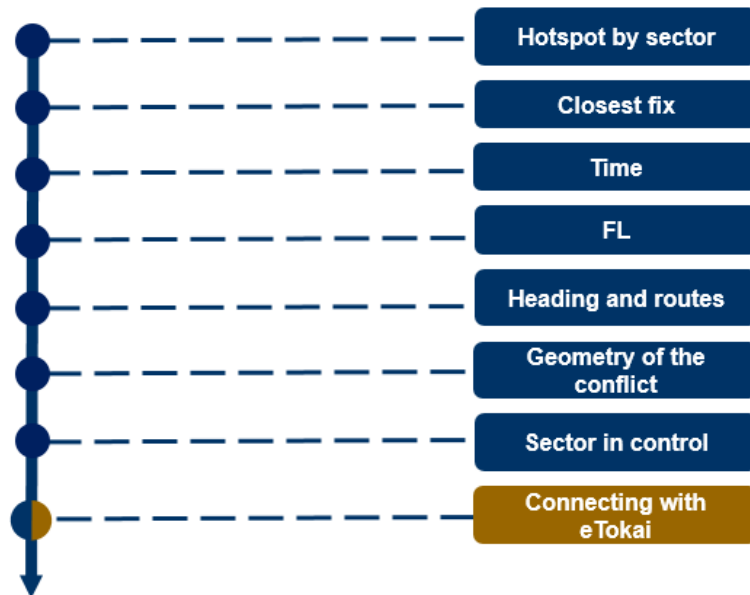 - **Starting point** for investigating **systemic causes behind**

Looking at ratios

- **What different ratio between the three bars would tell?**
- **How many actual SMI vs. potential ones?**

SMI <70%

70% <SMI <100%

Quasi-SMI (situations that could have been SMI, but did not turn into SMI)

From hotspots to most frequent root causes

Hotspot by sector

Closest fix

Time

FL

Heading and routes

Geometry of the conflict

Sector in control

Connecting with eTokai

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Drilling down into safety data

- **Hotspot by sector**
- **Closest fix**
- **Time**
- **FL**
- **Heading and routes**
- **Geometry of the conflict**
- **Sector in control**
- **Connecting with eTokai**

- This box will tell what **information ASMT** can provide

- This box will tell what **operational knowledge** can be derived

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Step 1 - Hotspot by sector
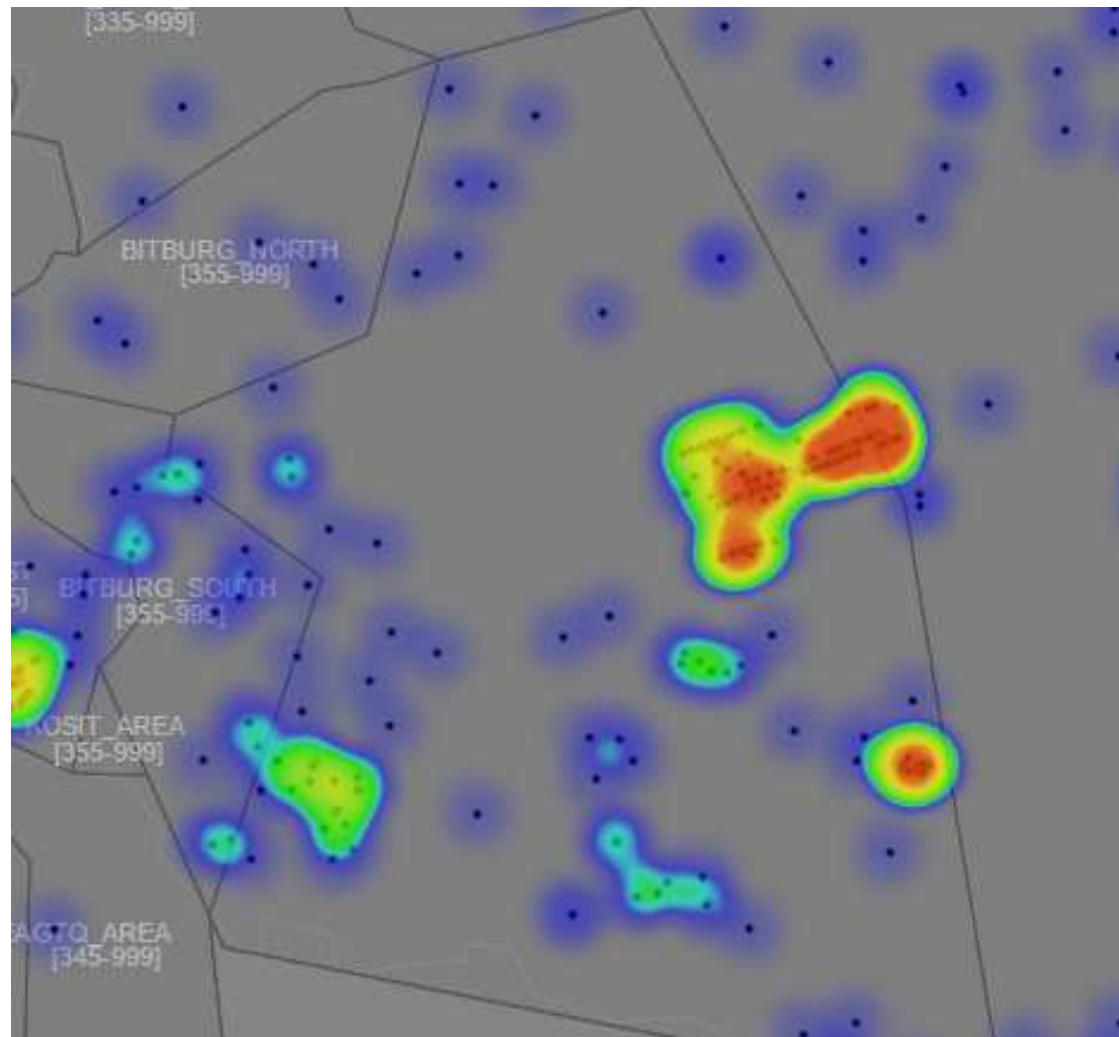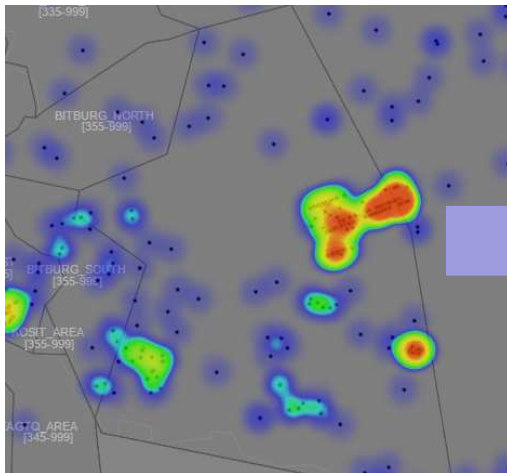
Step 1 - Hotspot by sector

- **Produce hotspots for SMIs and quasi SMIs** over a week period, monthly period, annual period, in relation to a specific sector

"In which **sectors** are **safety issues concentrated?**"

It is the starting point for our journey: what are the common latent conditions behind this concentration of events?
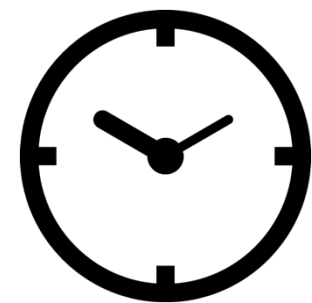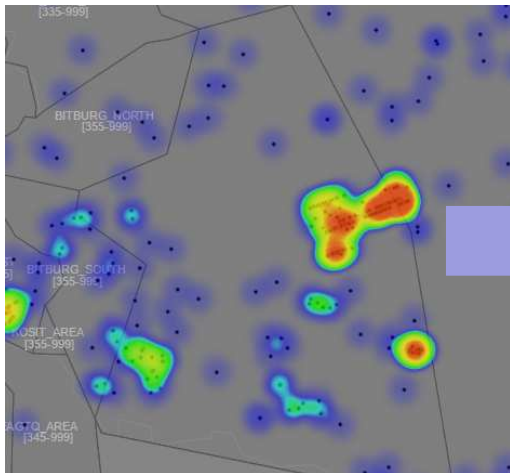
Step 2 – Closest fix
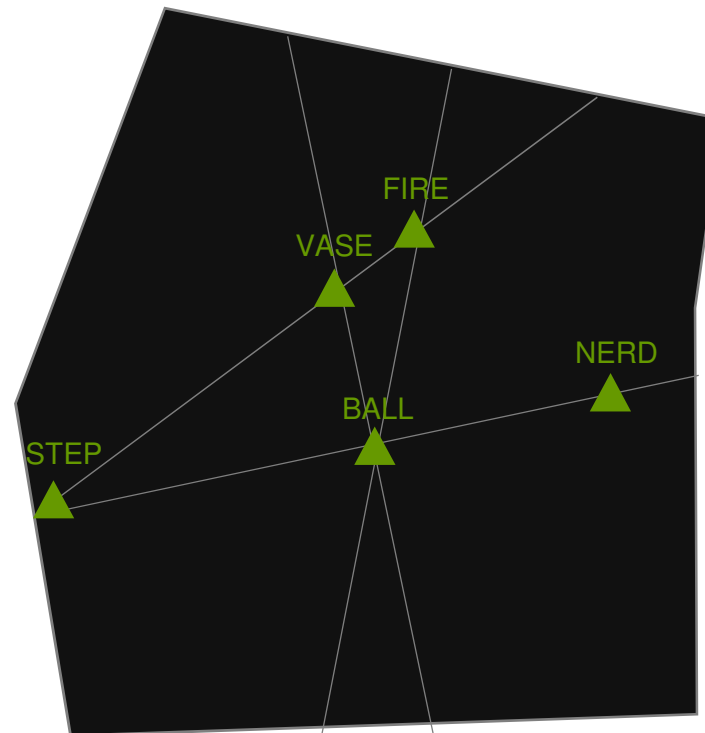
Step 2 – Closest fix

- By using **closest fix information,** it identifies the position of the events in relation to a reference point **well-known** to ATCOs

"Which is the navigation point where **most events** occur?"

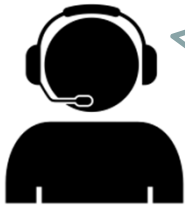"What do I know about **traffic complexity**, **need for coordination** and **procedures** in that area?"

Step 3 – Time

Step 3 – Time

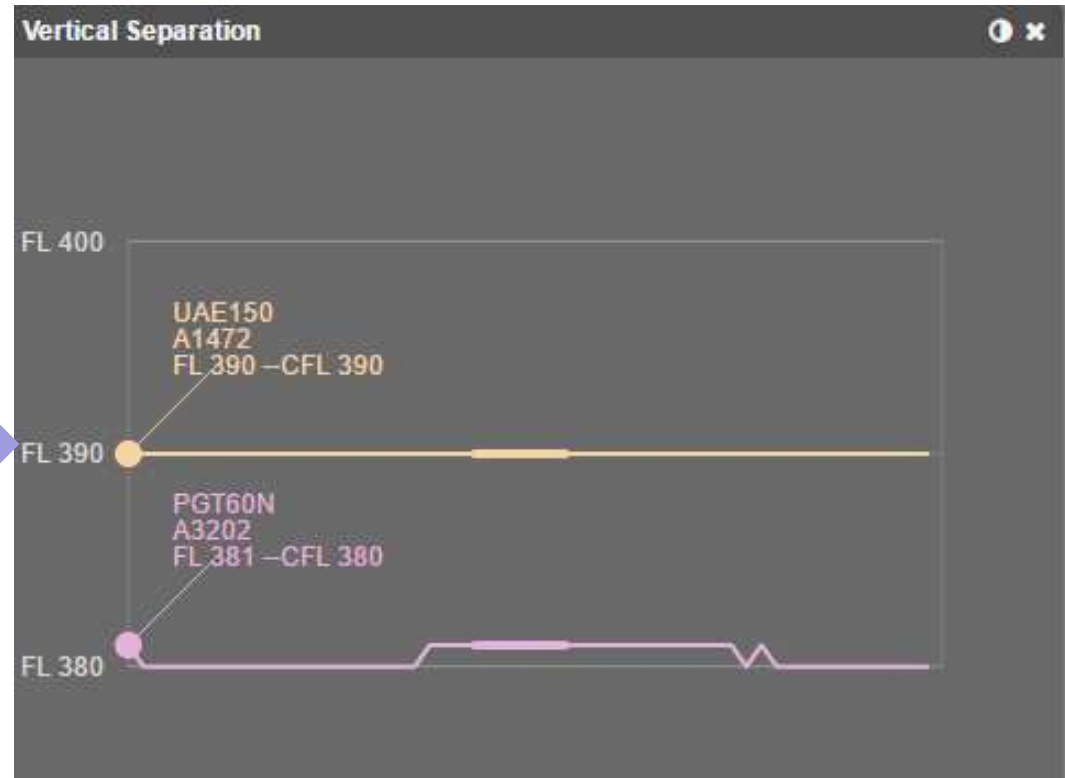- By using **time information,** it identifies when (month, day, hour) most of the events occur
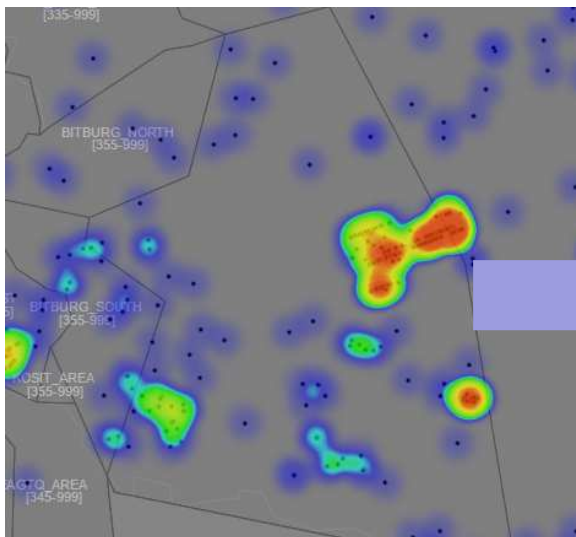
> "What are the **common traffic flows** at that time of the day?"
>
> "What **procedures** were in place on that week?"
>
> "Was any **Ops room maintenance** taking place on at that time of the day?"

Step 4 – FL

Step 4 – FL

- By using **FL information,** it identifies the position of the events on the vertical plan

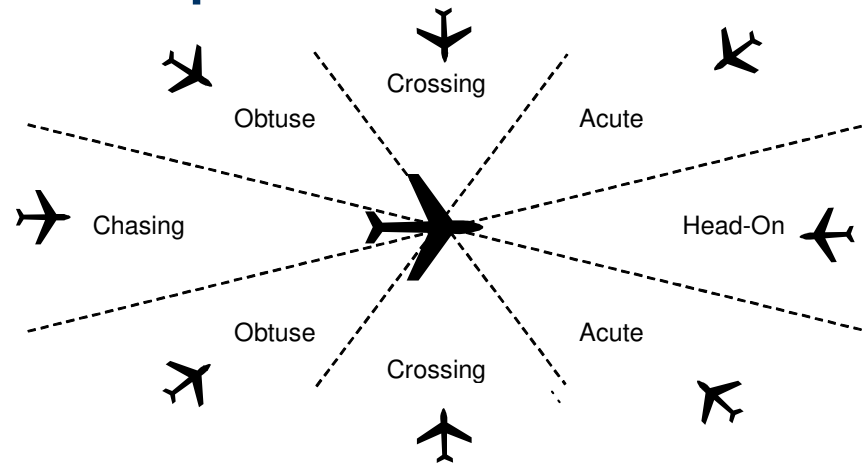"Are events at high FL, enroute?"

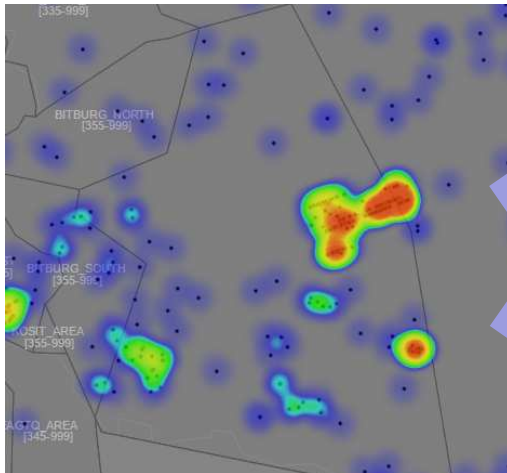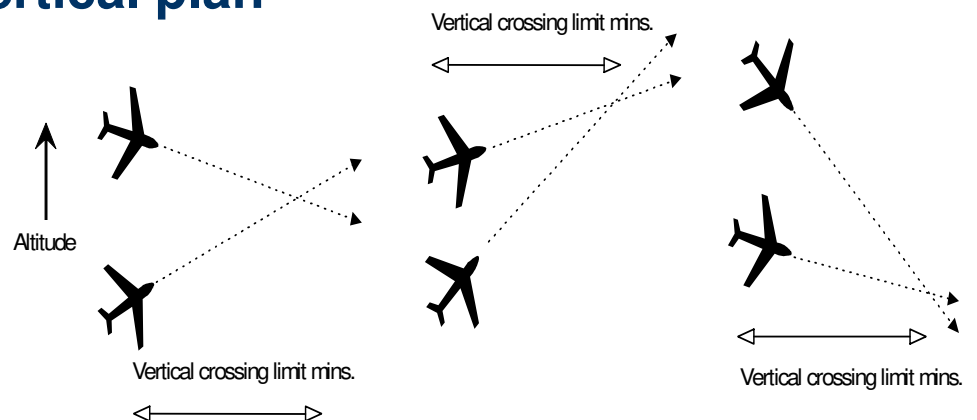«Are they almost at TMA boundary?»

«Are they close to top of descent?»

Step 5 – Geometry of the conflict

Horizontal plan

Crossing

Obtuse

Acute

Chasing

Head-On

Obtuse

Acute

Crossing

Vertical plan

Vertical crossing limit mins.

Altitude

Vertical crossing limit mins.

Vertical crossing limit mins.
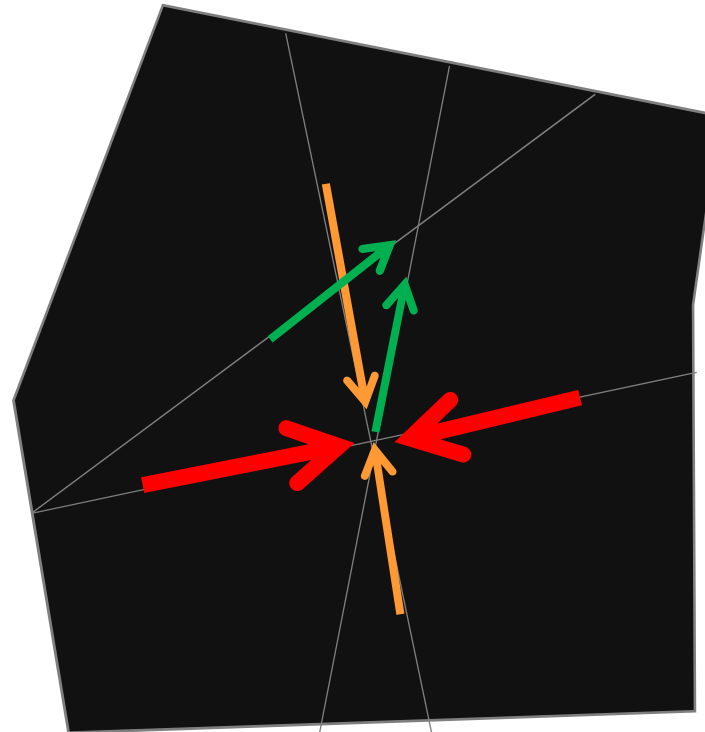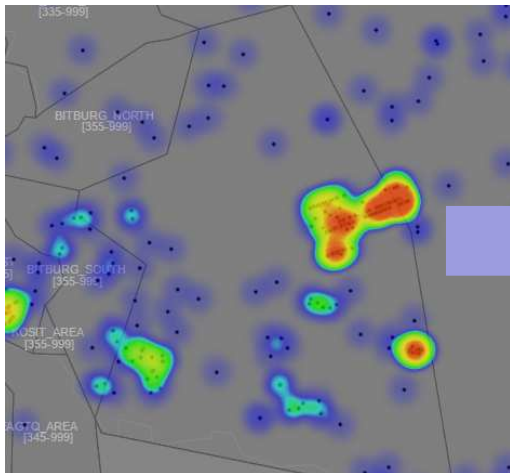
Step 5 – Geometry of the conflict

- Identify what are more **frequent horizontal and vertical geometries** of the collected events

"What are the **most frequent types** of conflict? Is that in line with my expectations?"

"If there is a **recurrent type** (e.g. mostly head-on, one climbing/other descending), what can I say about possible causes behind?"

Step 6 – Headings and routes

Step 6 – Headings and routes

- By using **heading information,** it identifies among the types of conflicts, which are the most frequent routes (or flows) involved

"What are the **routes** / **flows** which «*generate*» most events?"

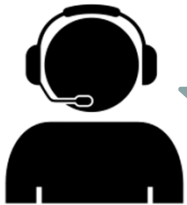"If there is a **recurrent route** / **flow involved**, what can I say about possible causes behind?"

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Step 7 – Sector in control
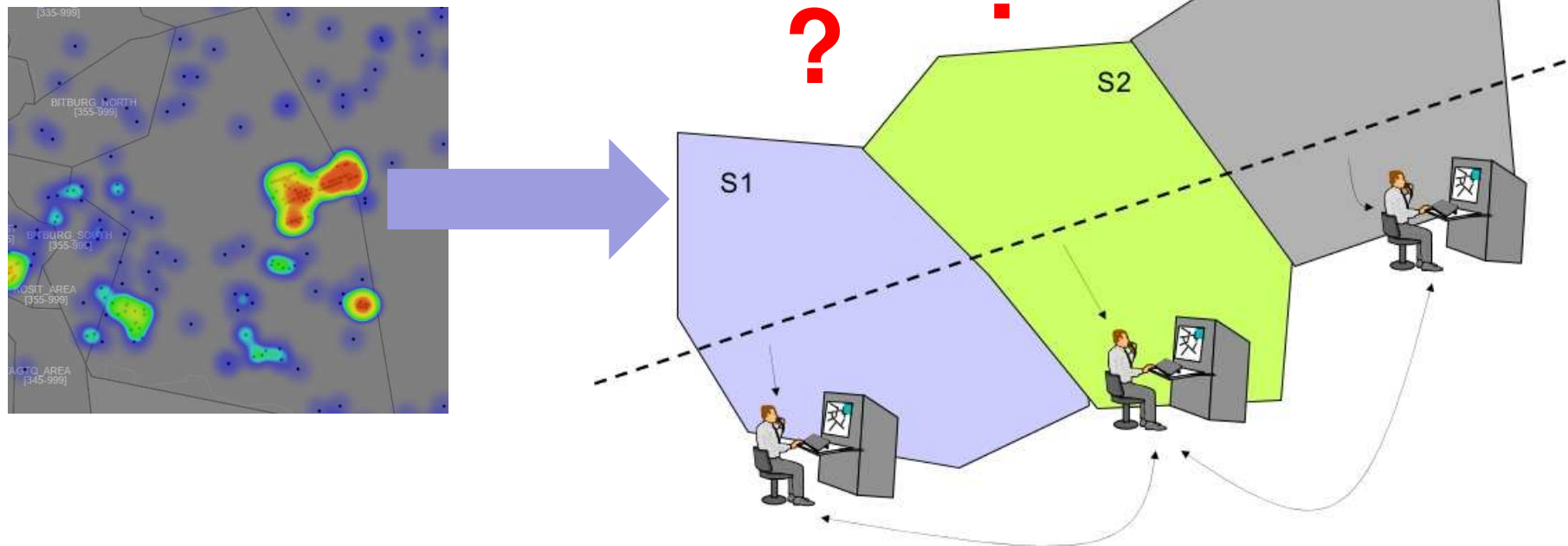
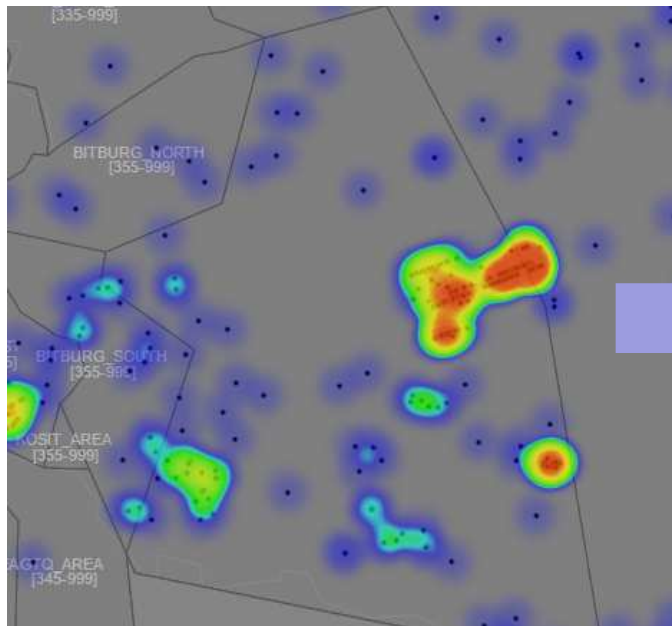Control Sector

Step 7 – Sector in control

- By using **control position ID information**, it identifies what is the sector in control of which aircraft

"What is the most frequent case? **Same sector controlling both aircraft**? Or **different** sectors?"

"In the second case, what does this tell me about possible **coordination issues**?"

Step 8 – Connecting with eTokai

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- By connecting **ASMT with eTokai**, it would be possible to associate all the information provided by humans to most frequent events inside the hotspots

"What are the **most frequent contributing factors**? Procedures? Environment? What was the status of the equipment?"

What you could find out?

- Most quasi-SMI and marginal SMI are in sector **UUA**

- Most of those in **UUA** are close to **BALL** fix, which is at the border of the sector

- Most of the conflicts have **one a/c steady en-route** and **one climbing, just transferred from ULA**

- Most of those at that FL band have **crossing trajectories at 90 degree angle (one a/c northbound, one a/c westbound)**

- Most of the aircraft involved are controlled by **the same sector**

What you could find out?

- Checking in eTokai **two SMI are recorded**, in both cases **OJT was taking place**

- After inquiring with Shift supervisors and OJTIs, the safety manager could establish that **OJT on UUA often lead to quasi chaotic situations** at a certain time of the day due the numerous conflicts of this type

- **Recommendation to evaluate solutions** including e.g. limiting the climb of aircraft proceeding from ULA and further climb being granted after Way Point BALL

What next?

Outcome of 8-step approach

List of typical events and contributing factors

Safety department initiative(s)

Expert analysis and/or questionnaire to OPS staff

Impact on Ops

REMEDIAL ACTIONS

Conclusions

- ASMT can **enlarge the amount of safety data** you can collect
  - All SMI, quasi-SMI and more

- We proposed an **approach for identifying and grouping events** on the base of Ops attributes
  - Ops experts are the only ones that can **make sense** of the information extracted

- The integration with eTokai helps understanding more about **underlying causes**