

RPAS integration in manned a/c environment

Preparing the ground for a proactive approach to safety management

Remotely Piloted Aircraft Systems Symposium

ICAO HQ, Montreal, Canada

23-25 March 2015

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RPAS: A new chapter in aviation industry...

Future aviation operations

YES DRONES



RPAS integration in manned a/c environment

Key challenges

Technological defies

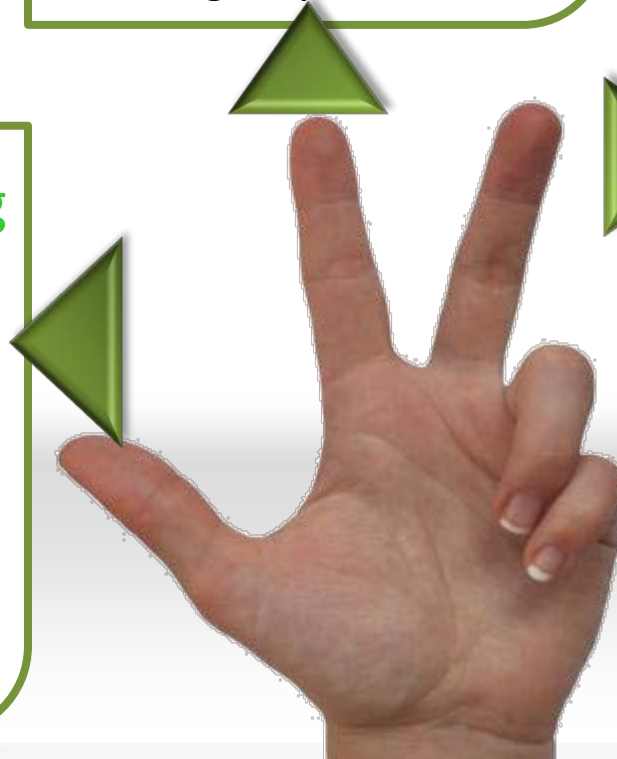
- C2 link, incl. spectrum allocation & mgmt
- DAA technologies
- HF issues as piloting
- RPA performance (*variability*)
- Contingency

Regulatory dares

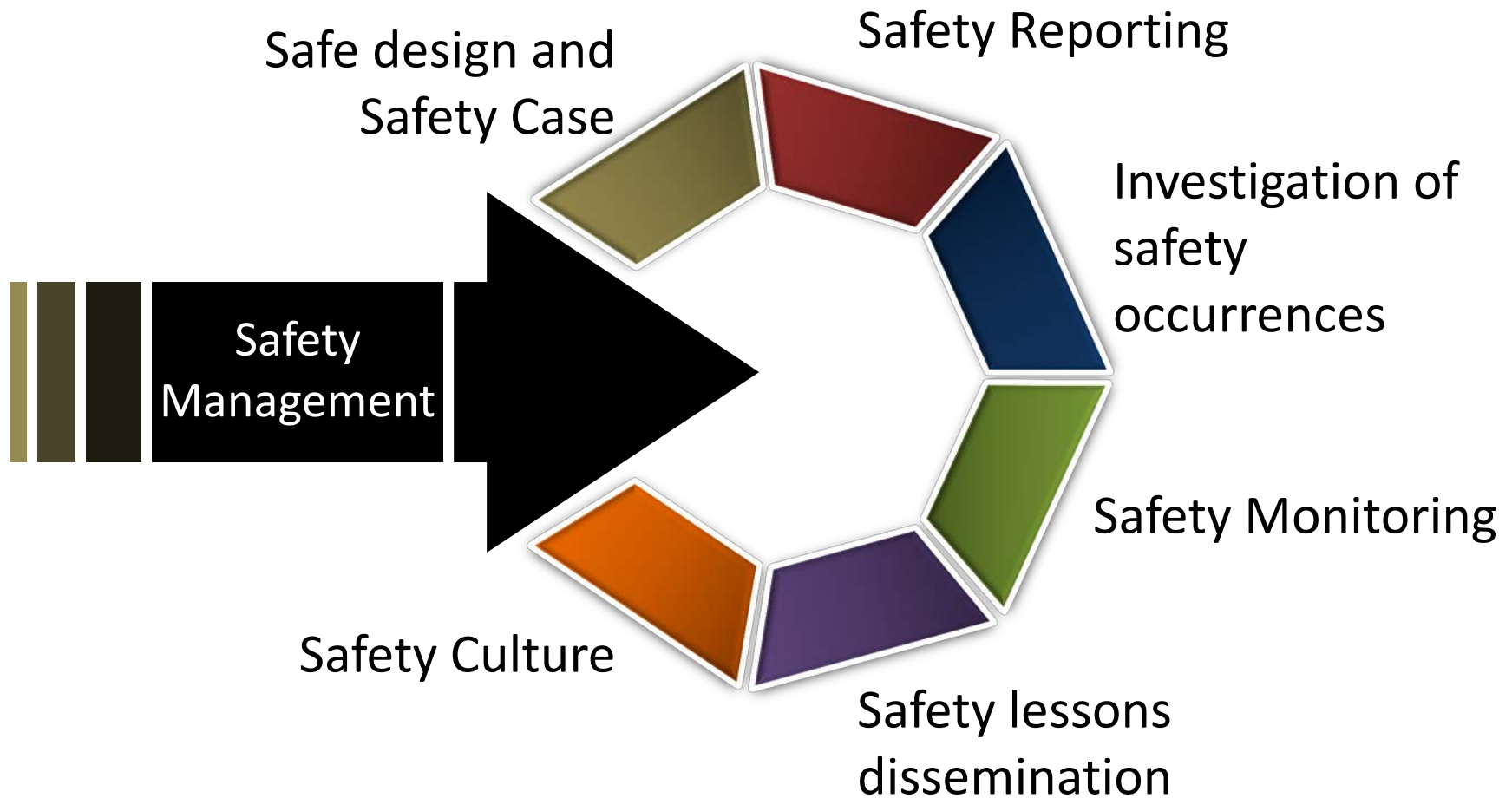
- Risk based approach to regulation

Safety demanding

- No additional hazards to existing operations
- At least as safe as manned aircraft
- Operate transparently for ATC



A proactive approach to safety management



Tailored & Proportionate

- Key Challenges

- Aviation world out-growing service providers' SMS
- Increasingly complex, interconnected & automated
- Need to be more surgical and proportionate in approach to risks

- Make how we do safety fit for the RPAS challenges of the future

- Know when enough is enough
- Understand the real risks
- Addressing them in a proportionate way
- Focus on what really matters



Interdependent relationships: the need for a Total Aviation System Approach

- Conflicts between pairs of a/c trajectories.
- Controlled flights towards terrain or obstacle
- Aircraft entry into unauthorized areas
- Aircraft encounters severe WX conditions
- Aircraft encounters wake turbulence
- Runway incursion
- Conflict between taxiing a/c, other a/c, obstacles, & vehicles

Hazards

Services

- Maintain separation within the same arrival flow
- Create & maintain separation between the arrival flows
- Create & maintain spacing / separation between aircraft in converging arrival flows
- Facilitate acquisition of the Final Approach path
- Separate arrivals and departures from terrain/obstacles
- Separate arrivals and departures from restricted airspace, etc...



RPAS: Logical approach to developing a functional safe design



Safety Objectives

Safety Requirements

Operational Environment Description

Service Model

- Pre-existing hazards
- Services / Capabilities
- Services / Users
- Safety Criteria

Functional Model

- Abstract Functions
- Interactions

Logical Model

- Human Roles and Tasks
- Logical Functions (CNS/Human actors)
- Interactions

Physical Model

- Procedures
- Training
- Equipment
- Interfaces

RPAS Concept of Operations

Level of RPAS System Representation

Appropriate human factors assessments to influence engineering and operations of RPAS

A focus on the remote pilot...

7. Working environment

Due consideration to the lack of sensory information

6. System support

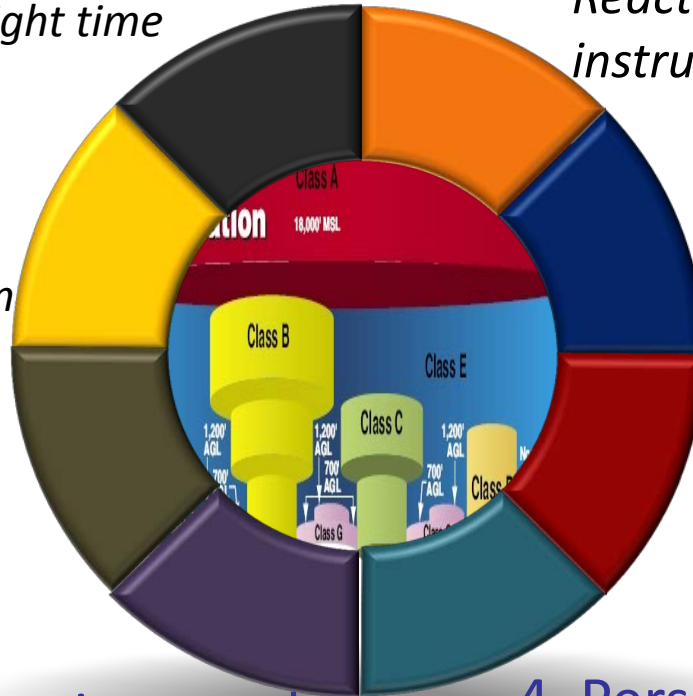
- Control Interface
- Communication response time

5. Information needs

Situational awareness (navigation, surrounding traffic, aerodrome marking, terrain proximity, severe WX conditions, etc.)

8. Staffing

Flight time



1. Responsibilities / coordination

React in a timely manner to ATC instructions

2. Knowledge

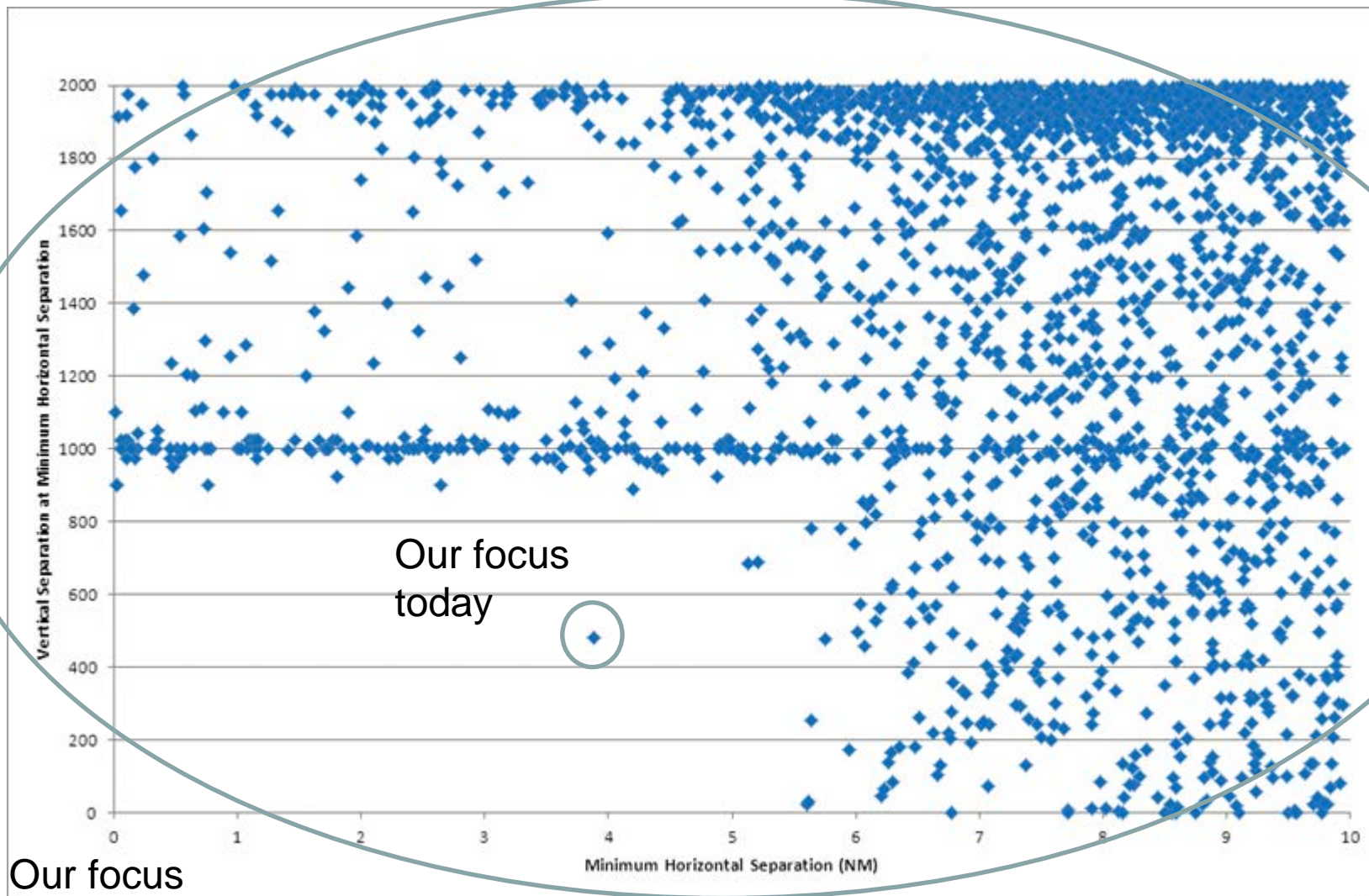
- RPS handover procedures
- Contingency and Emergency Procedures

3. Skills

Plan, execute & control flight profiles

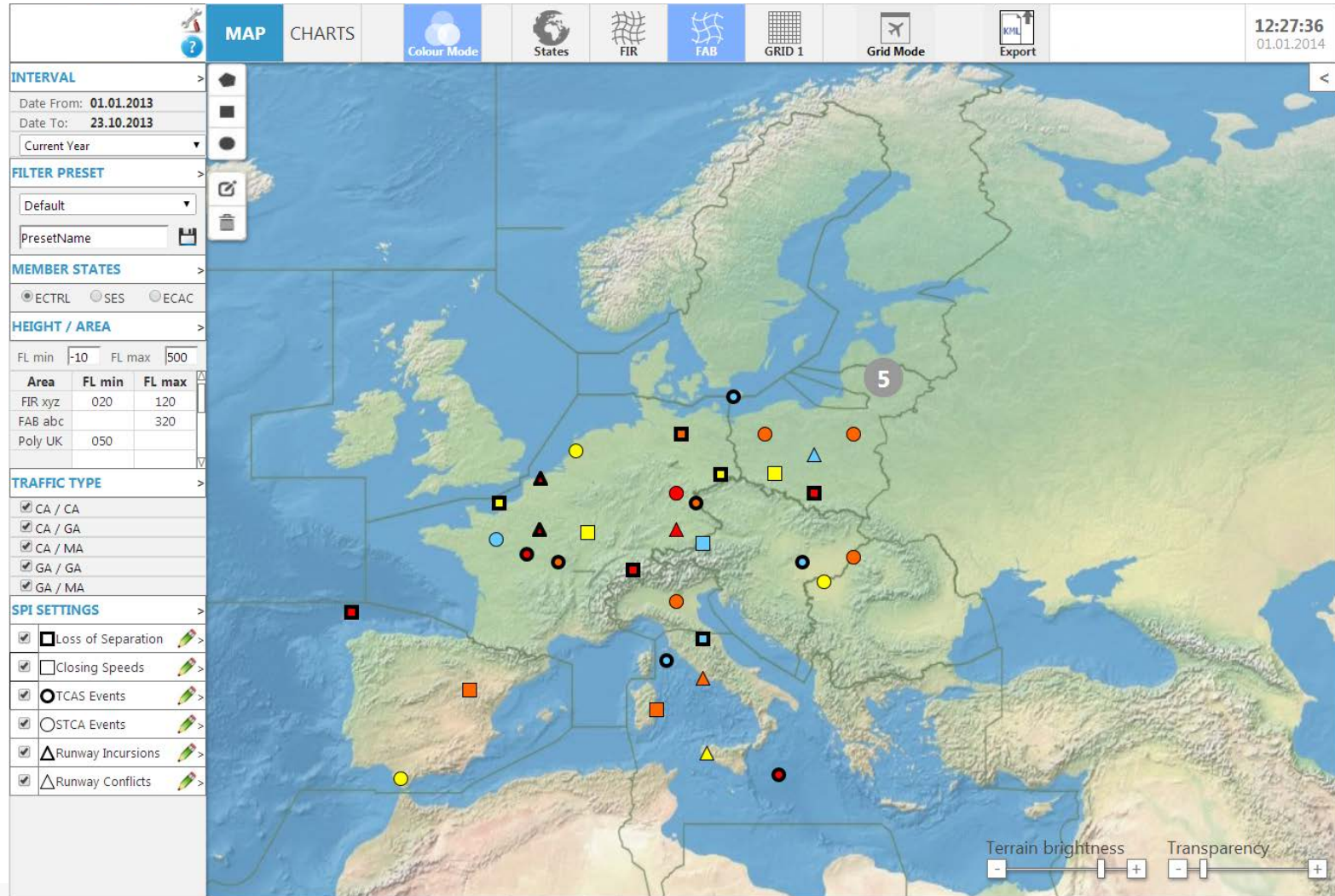
4. Personality Traits

- *As for manned aircraft: emotional stability, decisiveness, flexibility, discipline, motivation and work ethics*

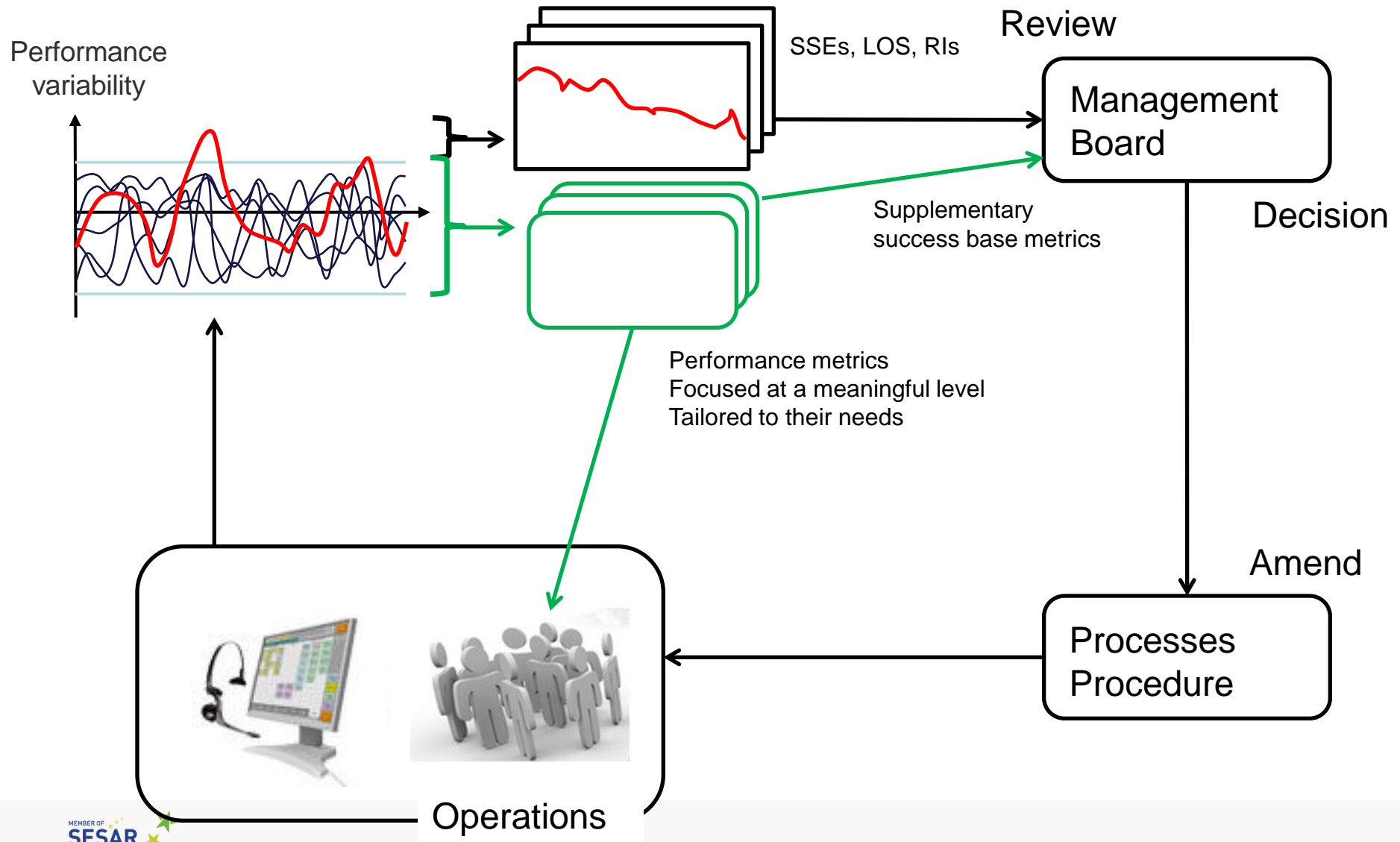


Our focus tomorrow





NECESSARY – YES – BUT SUFFICIENT??

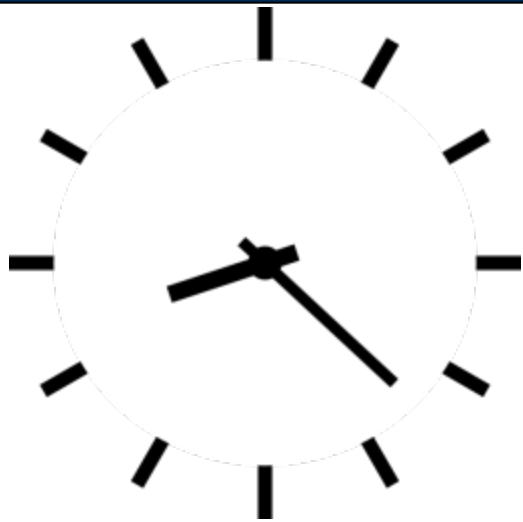


Current practice & next steps... Safety Intelligence & People Create Safety



Conclusions

-  **1** | Tailored & proportionate safety management approach
-  **2** | Total Aviation approach with all participants (ATC, manned a/c)
-  **3** | Human Factors Integration within safe design & Safety Case
-  **4** | Need for adequate SPIs tailored to operators



THANK YOU

