

# optics<sup>2</sup>

Observation Platform for  
Technological and Institutional  
Consolidation of research in  
Safety & Security

## 2<sup>nd</sup> Workshop

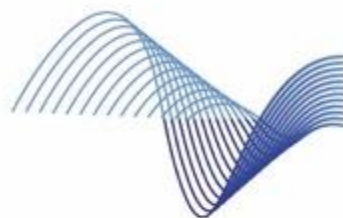
*Data Science for Aviation Safety*

Workshop Outcomes



European  
Commission

OPTICS2 is a Coordinated Action funded by the European Commission under the Horizon 2020 Programme. Grant Agreement n° 770138



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*Data Science for Aviation Safety*

The AIRBORNE Team



European  
Commission

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**CHALLENGE 1:** How do we certify AI? How to maintain AI certification?

**CHALLENGE 2:** How can we improve basic flight skills? How can data support EBT?

**CHALLENGE 3:** Safety benchmarking for common standards towards the  $10e-7$  goal



**CHALLENGE:** How do we “certify” AI as part of a safety-critical system?

**PROPOSED SOLUTION:**

Two-fold solution

1. Certify as a technical system: Prove that probability of failure is sufficiently small
2. License and train as a human crew: train to gain confidence by experience

Start with less critical systems; e.g. speech recognition



**CHALLENGE:** How can we improve basic flight skills?  
How can data support EBT?

**PROPOSED SOLUTION:**

- There is enough data, however there can be even more
- Ensure that simulator data reflects reality
- Proper interpretation and meaningful conclusions (actionable insights)
- Use new data analysis techniques (e.g. AI) to detect hidden relationships

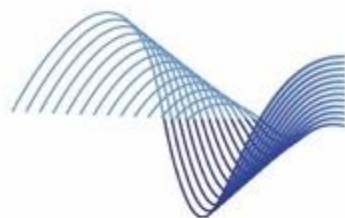


**CHALLENGE:** Safety Benchmarking for common standards towards  $10^{-7}$

**PROPOSED SOLUTION:**

Anonimized data sharing; benchmarking (empirical distribution) and EASA imposing standards!





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*Data Science for Aviation Safety*

The AIRPORT Team



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**CHALLENGE 1:** ...How to maintain / improve safety levels while increasing capacity & airport performance [How to predict risks before they happen (operational monitoring)]

**CHALLENGE 2:** ...How do we get more agile security – safety checks ? (landside)

**CHALLENGE 3:** ... What can data science deliver if airport organisations / aviation stakeholders share data?







# #1 | Increase safety and capacity

**CHALLENGE:** ... How to maintain / improve safety levels while increasing capacity & airport performance [How to predict risks before they happen (operational monitoring)]

**PROPOSED SOLUTION:** Take a whole system approach – define profiles (e.g. an aircraft approach, aircraft turnaround, de-icing, fuelling) for all operations in the airport, using data from all stakeholders, to find the weak links and react quicker (and in advance)





**CHALLENGE 2:** How do we get more agile security – safety checks ? (landside)

## PROPOSED SOLUTIONS:

- Flow management (pax, lugages) : dynamic queuing, dealing with uncertainties
- Resource management: shared constraints – dynamic analysis - allocation though APOC
- Changing passenger interaction: guiding – friendly support – differentiated (frequebt flyer, culture, language)
- Risk – abnormal situation prediction (precursor monitoring), reporting of events, exploitation
- Facilitation of reaction: less disruption, coordination platform, crisis management, first aids
- Detect spoofing – intentional interferences and counter measures



**CHALLENGE:** ... What can data science deliver if airport organisations / aviation stakeholders share data?

**PROPOSED SOLUTION:** Compare historical with real-time data (especially airside) from all stakeholders, to derive live measures for use cases – e.g. go-around – linking these to other airport stakeholders (e.g. ground handling), to manage capacity and safety. Will require data fusion, etc. Share data between airports to speed up learning.





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*Data Science for Aviation Safety*

The AIR TRAFFIC MANAGEMENT Team



European  
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**CHALLENGE 1:** Drones in airspace

**CHALLENGE 2:** Predict future risks and strength of barriers

**CHALLENGE 3:** Can we use the airspace in a better way?



**CHALLENGE:** Drones in airspace - Can we safely and efficiently manage drones in mixed airspace in 2025.

**PROPOSED SOLUTION:**

- ML tools for ATCO to predict loss of separation
- ML tools to predict what drones will do in case of loss of separation

**BARRIERS & RISKS:**

- Availability of data and certification of black box algorithms



**CHALLENGE** : Predict future risks and strength of barriers

**PROPOSED SOLUTION:**

Get more of the available data (ECAC-wide, SWIM, CDM, incident data) mainly to focus on precursor events.

Generate artificial model/simulation of the socio-technical ATM-system. This gives a lot of data on which to train a future risk prediction model.





**CHALLENGE:** Can we use the airspace in a better way?

**PROPOSED SOLUTION:** ...

Method to evaluate competing strategies for airspace management.

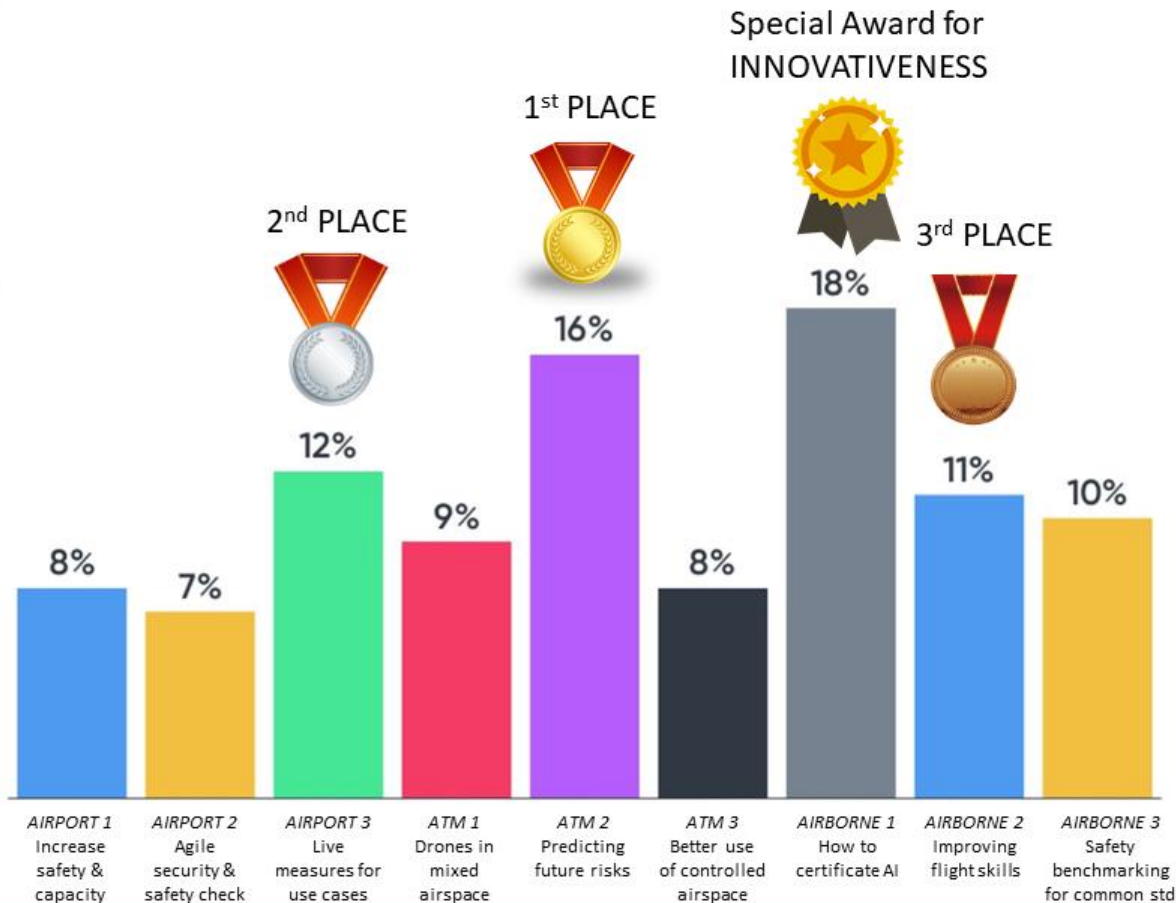
Open Access to Environment Data (API?)

Publication of toy data example

Legacy documentation -> API



## OPTICS2 2<sup>nd</sup> Workshop: *Data Science for Aviation Safety*



... For the EXPERTS

... For the AUDIENCE

**MOST PROMISING RESEARCH AVENUES...**