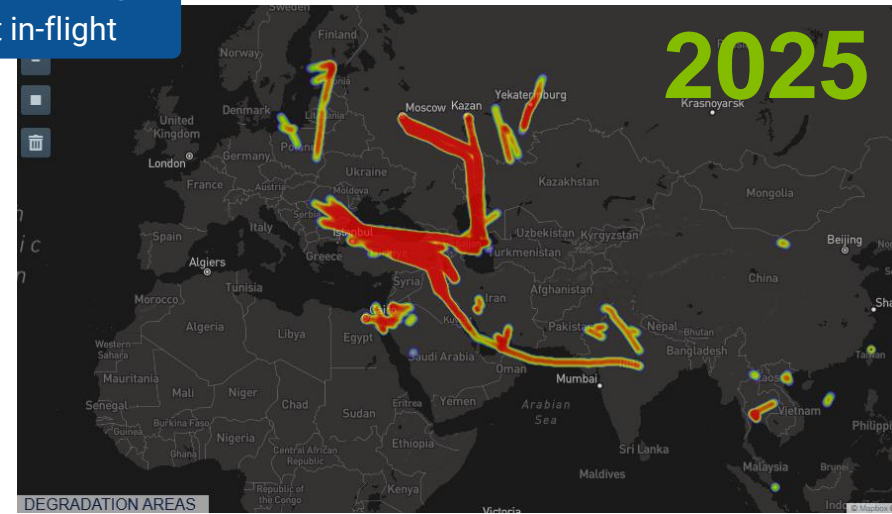
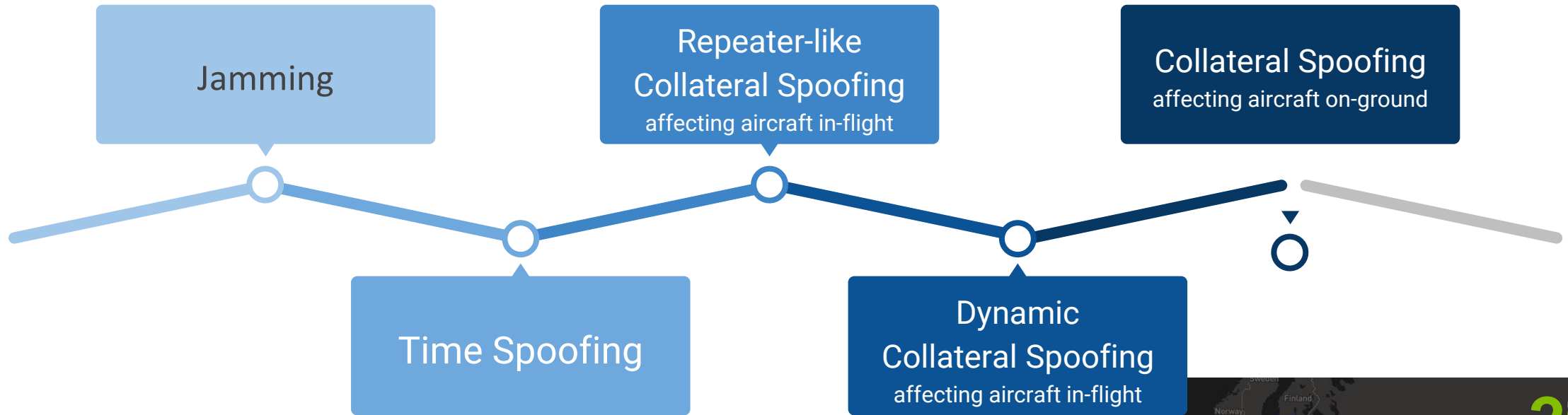


# GNSS Inteference

Seen from an Aircraft Manufacturer

HIALE-GUILHAMOU Mathieu / GNSS Jamming & Spoofing Multi-Functional Team Leader  
Thursday, 10 April

# Threat Sophistication increased over the years



Airbus GNSS INTERFERENCES DASHBOARD  
WORLD MAPPING OF GNSS INTERFERENCE AREAS (Aircraft-derived data)

# Impact on Aircraft leading to a Safety concern

## AIRCRAFT IMPACTS

**TERRAIN**  
Loss or  
**Nuisance alerts**



Temporary or  
**permanent** loss of  
**GPS-based Navigation**



**TRAFFIC,**  
**WEATHER**  
Loss



Combined effect  
on A380/A350

**Incorrect**  
**Aircraft Position**  
& **Timing**



Example: oceanic  
operations adversely  
affected

45+ functions connected to GPS

Seen from **AIRBUS**

**800+**



Seen from a  
major airline :

**15000+**

events in 2024

**34%**

Total flights  
affected



- Risk of **Crew Complacency** with cockpit alerts leading to **non-application of emergency procedures in case of real alerts**

## Our Actions so far...

### AIRBUS

*works with  
customers*



- **Airbus documentation and FCOM procedures regularly evolve** when new effects are confirmed and/or new mitigations apply
- **Airbus communicates** through regular Webinars, **regional operator forums** , **Flight Safety Conference** since 2023

- **Continuous Airworthiness Review Item**, share current threat situation, influence GNSS **contingency measures**

### AIRBUS

*works with*



### AIRBUS

*works with  
the aviation  
community*



- Work at **ICAO** with IATA, Boeing, Air Navigation Service Providers, Air Traffic Controllers, Airlines Pilots Associations on **technical and operational recommendations**
- Airbus is contributing to **RTCA/EUROCAE Airborne standards** to incorporate **new anti-spoofing features**

# General Industry Approach to GNSS Interference

## (ICCAIA approach)

Short Term	Medium Term	Longer Term
<ul style="list-style-type: none"> <li>Update <b>technical information</b> regarding expected aircraft effects and recommended procedures</li> <li>(Automatically) <b>Report</b> and analyse GNSS interference events</li> <li><b>Continued airworthiness</b> assessments - aircraft and operational impacts</li> </ul> <hr/> <ul style="list-style-type: none"> <li>Promote awareness of <b>GNSS spoofing area</b></li> </ul> <hr/> <ul style="list-style-type: none"> <li>Update <b>Surveillance Systems</b> (e.g. Terrain avoidance systems)</li> <li>Address <b>Datalink</b> availability issue</li> </ul>	<ul style="list-style-type: none"> <li>Update <b>navigation systems</b> to detect, report and reliability recover from spoofing</li> </ul> <hr/> <ul style="list-style-type: none"> <li><b>Study &amp; standardize</b> mitigations technologies (e.g):             <ul style="list-style-type: none"> <li><b>Adaptive GNSS antenna</b> systems, i.e. Controlled Reception Pattern Antennas (CRPA)</li> <li><b>Signal authentication</b> methods (cryptographic)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><b>Deploy</b> more advanced mitigation technologies             <ul style="list-style-type: none"> <li>Introduce GNSS signal authentication</li> <li>Adaptive antennas</li> </ul> </li> <li><b>Robust time reference</b> that is independent from GNSS for applications requiring time synchronization (e.g. Datalink)</li> <li>Complementary PNT development to support <b>PBN operations without GNSS</b></li> </ul>
<p>Work at <b>ICAO</b> with IATA, Aircraft Manufacturers, Air Navigation Service Providers, Air Traffic Controllers, Airlines Pilots Associations on <b>technical and operational recommendation.</b></p>		

# Conclusions & Way Forward

- **The GNSS interference threat is active and evolving**
  - It is a global problem that is considered at industry level
  - Airbus is actively involved in forums for the evolution of regulations, standards and recommended practices in order to address short term challenges as well as develop long term solutions
- **In-service feedback is essential** for the evolution of systems design and procedures.
- **Airbus works on system design evolutions and flight ops procedures updates** to mitigate and enhance resilience to the effects of GNSS Interference



# Thank you

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