EASA
European Union Aviation Safety Agency

Panel 2 - Digitalisation in Aviation

Moderator: Jean-Marc Cluzeau

Your safety is our mission.

An Agency of the European Union

→ ERICK FERRANDEZ

- → **EASA, Head of Safety Intelligence and Performance Department & Data4Safety Programme Manager**

Big Data: What impact in the aviation system?

Expert Knowledge

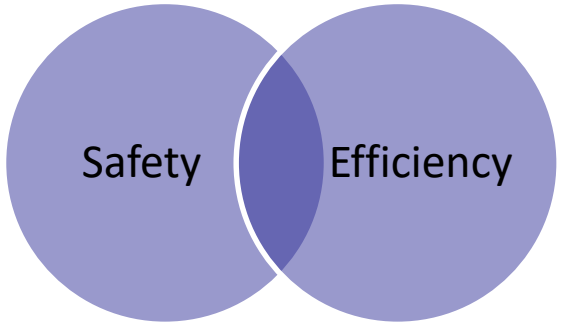
Data Technologies

IN

Data4Safety **Programme**

OUT

Enhancement of the aviation system



Connect Safety Intelligence with actions

Know where to look

See it coming

Act!

Better regulation

Appropriate resources

Data4Safety Founding Members

AESA, Airbus, Boeing, British Airways, DGAC France, EASA, easyJet, ECA (European Cockpit Association), IAA (Irish Aviation Authority), Iberia, Lufthansa, Ryanair, UK CAA

→ FRÉDÉRIC SUTTER

→ Airbus, Digital Transformation Leader

EASA Safety Conference

Frederic Sutter
Digital Transformation Leader, Airbus

AI models and advanced analytics are a MUST to address growth of in-service fleet and reported occurrences

Volume of Reported occurrences

x6

Airbus fleet in services - FH p.a.

x3

2009

2023E

=> Implementation AI / Analytics Solutions

=> Research programmes with Academics (eg. Safety Chair with ENAC)

Airlines Safety Teams are already using Big data/Skywise

- Monitor and analyse Safety events
- Transparent and objective reporting system
- Internal collaboration while maintaining crew confidentiality

E.g.:

- Simple automated reporting (eg. numbers / trends of higher severity safety events automation)
- Investigations facilitations (eg. Pre-matching AQD reports with FDM events and other operational data)
- Reports and links across airport, aircraft, etc. => good tooling (vs excel, tableau)

Aviation Industry could Foster further Collaboration around flight ops data

Get sufficient volume of data and (exhaustivity!) via more reporting or access to existing database to develop Text Mining/Machine Learning

Enable better data fusion from various sources (aircraft, weather, ATM…) to improve root cause analysis and better anticipation

Big data platforms getting scale in the industry to support data sharing across stakeholders and simplify data collection & sharing burden for airlines

→ JEAN JOURDAN

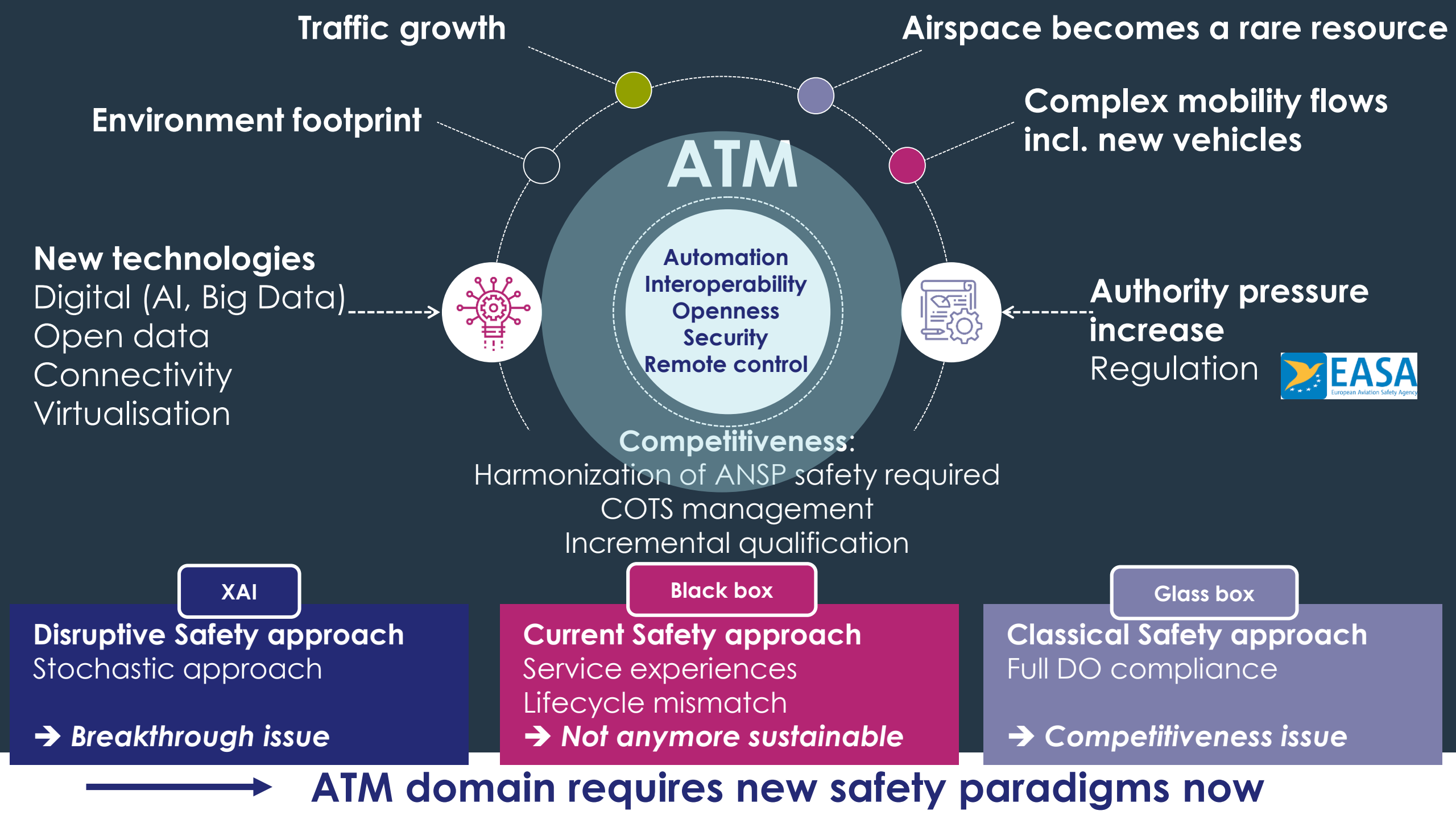
→ Thalès, Chief Technical Officer, Business Line Airspace Mobility Solutions

THALES

Panel #2
Digitalisation in Aviation

4th November 2019
EASA annual conference
Helsinki

www.thalesgroup.com


Traffic growth
Airspace becomes a rare resource
Environment footprint
Complex mobility flows incl. new vehicles
ATM
Automation
Interoperability
Openness
Security
Remote control
New technologies
Digital (AI, Big Data)
Open data
Connectivity
Virtualisation
Authority pressure increase
Regulation
EASA
European Aviation Safety Agency
Competitiveness:
Harmonization of ANSP safety required
COTS management
Incremental qualification
XAI
Disruptive Safety approach
Stochastic approach
➔ Breakthrough issue
Black box
Current Safety approach
Service experiences
Lifecycle mismatch
➔ Not anymore sustainable
Glass box
Classical Safety approach
Full DO compliance
➔ Competitiveness issue
ATM domain requires new safety paradigms now

Roadmaps on Digital Aviation Perspectives

AVIATION PLATFORMS

- From aviation data platform to interoperable operational platform and digital virtual ATM system

SAFETY CONSTRAINTS

- Disruptive safety paradigms to enable new perspectives

OPERATIONAL BENEFITS

- Operational business perspectives with AI

THALES INTERNE

OPERATIONAL BENEFITS
Resilience monitoring
Weak signal analysis, ML based anomaly detection
Airspace complexity
Workload assessment, optimal allocation, Environment footprint assessment
Support to ATCO
Efficiency, pressure assessment
Conflict resolution
quickly identify possible solution to solve conflicting traffic
Traffic forecast
Optimised ETA, ETO, CTOT
Weather event forecast
Robustness improvement
Infinite testing capacity, permanent testing, better coverage, hundred millions of validation tests
Current ATM operational platform
Open ATM operational platform
Safety critical interoperability means
Real Time Digital enhanced ATM operational platform
Real time safety critical interoperability means
Data for Safety (D4S)
Aviation Data and ATM Digital Services
ATM Digital Twin platform
What-if test benches, simulation, training
Real Time ATM Digital Twin platform
Safety, security, real time constraints
AVIATION PLATFORMS
SAFETY CONSTRAINTS
Classical safety approach
Engineering judgement
Failure approach focused on hazards analysis
Improved safety method
AI discovered hazards based on weak signals analysis
Dual safety approach
Augmented safety with operators advices
(decision aids tools integrating Data validity domain)
Non Interference Analysis safety method
Failure approach focussed on critical chains augmented with integrity controls
Improved safety method
Failure approach enhanced with success cases
Unified safety approach
Classical safety evidences + XAI explanation for digital computation to support Safety case of Digital automation

→ PIERRE JOUNIAUX

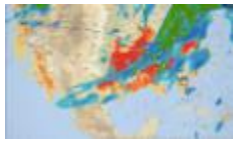
→ Safety Line, Chief Executive Officer

SAFETY LINE
Big Data applied to Aviation

BIG DATA

TO IMPROVE SAFETY AND EFFICIENCY OF AVIATION OPERATIONS

FLIGHT DATA



WEATHER DATA

RADAR DATA

OPTI FLIGHT
In-flight guidance

AIRSIDE WATCH
Radar data at work

FUEL SAVINGS
IN ALL FLIGHT PHASES

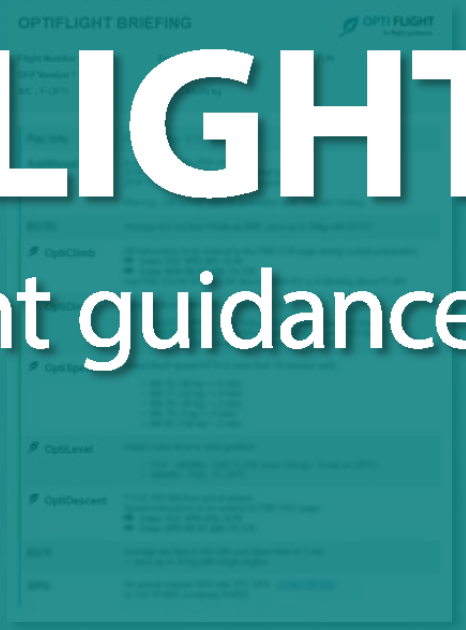
AIRPORT
SAFETY & EFFICIENCY

DATA SCIENCE IN THE COCKPIT

OPTI FLIGHT
In-flight guidance

- Speeds
- Altitudes
- Weights

OPTI FLIGHT BRIEFING



COMPATIBLE WITH eWAS

WEATHER APP

OPTI FLIGHT

In-flight guidance

DATA SCIENCE IN THE COCKPIT

OPTI FLIGHT
In-flight guidance

- Speeds
- Altitudes
- Weights

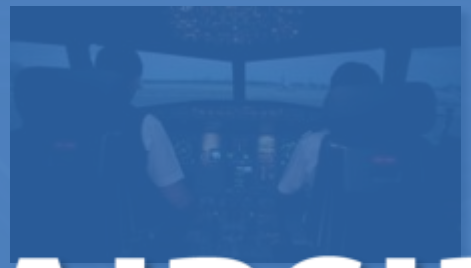
OPTI FLIGHT BRIEFING

COMPATIBLE WITH eWAS Solution

WEATHER APP

ECO-FRIENDLY TAXIING

Push
with an oper
disconnected

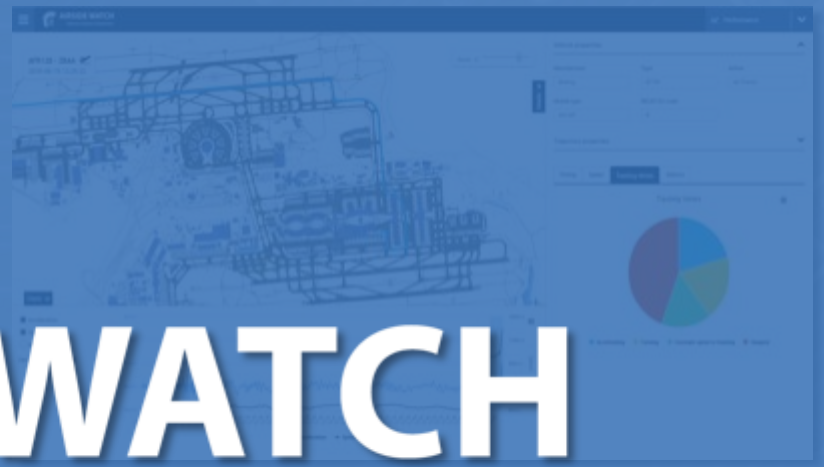


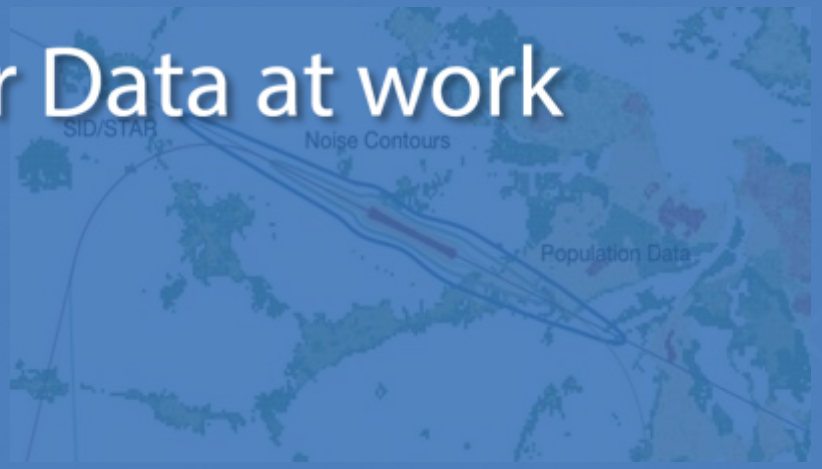
Pilot Solution
e Train Structure
and look for their way (mistakes !!)

Air Traffic Controller
manages all the aircraft on the ground - Visual separation, transmitted by voice

Marshaller
undergoes the arrival of aircraft with availability and efficiency issues

AIRSIDE WATCH
Radar Data at work





AIRSIDE WATCH
Radar data at work

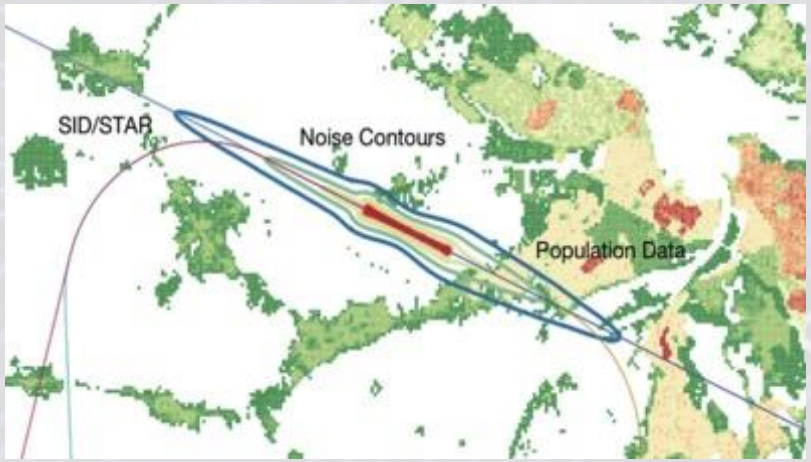
ECO-FRIENDLY TAXIING

Pushback
with an operator connected/ disconnected from the aircraft

Pilots follow the ATC instructions
and look for their way (mistakes !!)

Air Traffic Controller
manages all the aircraft on the ground - Visual separation, transmitted by voice

Marshaller
undergoes the arrival of aircraft with availability and efficiency issues



AIRSIDE WATCH
Radar data at work

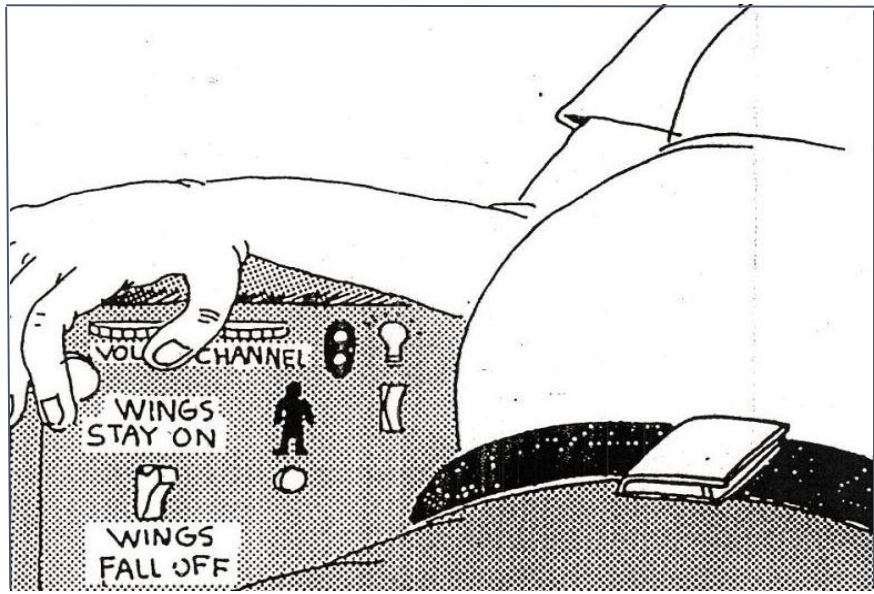
→ LUUK VAN DIJK

→ **Daedalean AI, Chief Executive Officer and Founder**

DAEDALEAN
APPLIED INTELLIGENCE

The next century of flying

"Human error
is a symptom of a system
that needs to be
redesigned."
Dr. Nancy Leveson (MIT).



New challenges

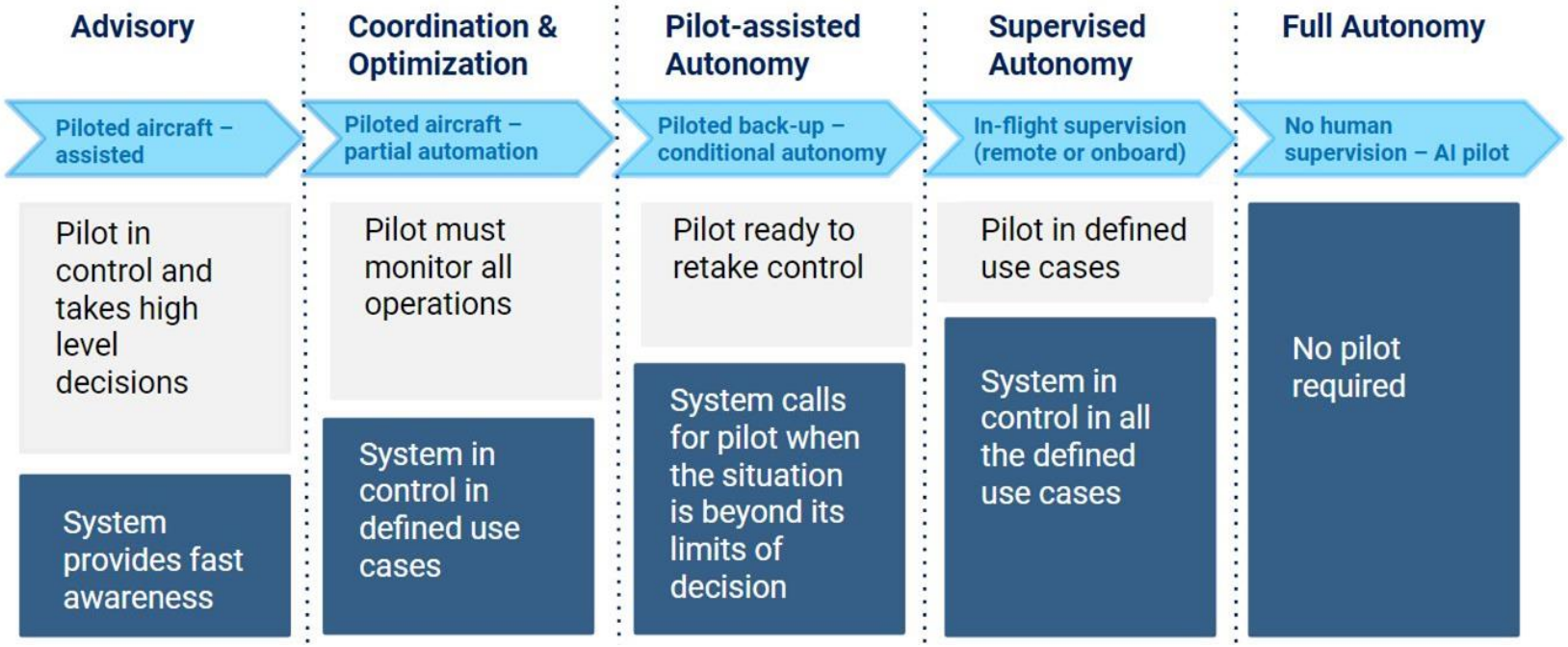
higher density use of airspace

And new risks

human is the new weakest link

DAEDALEAN
APPLIED INTELLIGENCE

Automation, autonomy and safety



Autonomy is
a high level requirement
for the future of aviation,
AI is
one of the tools to fulfill that.

It's a sliding scale

lower layers – automation, higher layers – autonomy

Opportunities now

autonomy is the *conditio sine qua non* in the near future