

**Keynote
Presentation**

Big Data: Powering Digital Transformation in Aviation



Big Data: Isn't it Dead?

Big Data, 3+V's

- Volume:** The sheer amount of data being generated.
- Velocity:** The speed at which data is generated and processed.
- Variety:** The diverse formats and types of data (structured, unstructured, etc.).



Given this definition, Big Data is alive. However, it underwent a transformation

- Volume:** Expensive trend: “collect and think later”. Drove cost and complexity in processing.
- Velocity:** A lack of differentiation between data and information.
- Variety:** Underestimated efforts on data transformation (ETL ...) to adapt to existing algorithms and frameworks.

Personal
Opinion

Learning. (i) Processing data is not for free, (ii) storage is not for free → business case killer.

Paradigm Changes

Paradigm Change 1

Output first,
collection second.

Paradigm Change 2

Self generated data
>> input data.

Paradigm Change 3

IT Security
(end2end)

Big Data Hype Contribution

- Sophisticated and robust tool chain.
- Examples
 - Single turn (45min): 3.5GB of video streams, 70 events / key attributes describing the turn.
At 1000 movements a day this leads to 3.5TB.
 - EQ Lights: 20.000 assets per airport, 1 message per second per asset each at 1kb
Yearly 63TB.
- Maybe not “big data” for the known hyperscalers, but still challenging for many installations.

The New Challenges (In Aviation)

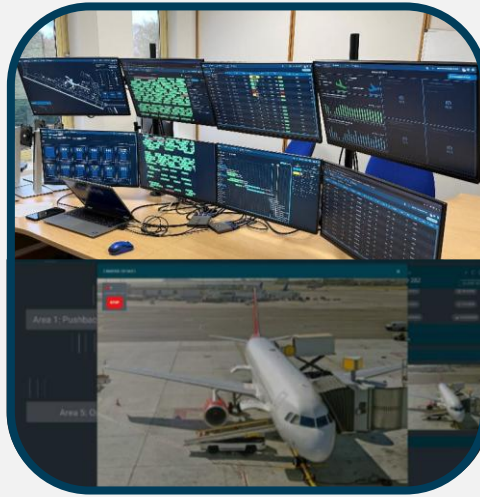
Collaboration & Probabilistic Values (AI, ML, CV)

- Collaboration: became a mantra, but moving slow
- Reasons
 - Technically: The diverse formats and types of data (structured, unstructured, etc.).
 - Operationally: Siloed areas of responsibilities, even different organizations
 - Commercially: contractual / competition issue, thin business cases, beneficiary different from investor.
- → High Impact use cases require collaboration

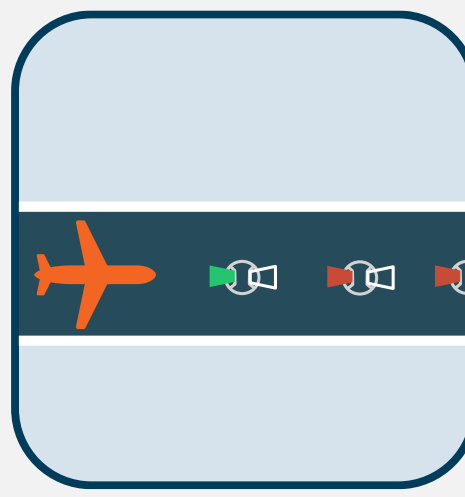
Use Cases



Predictive
Maintenance



Remote
Marshalling



Dynamic
Holding Pos

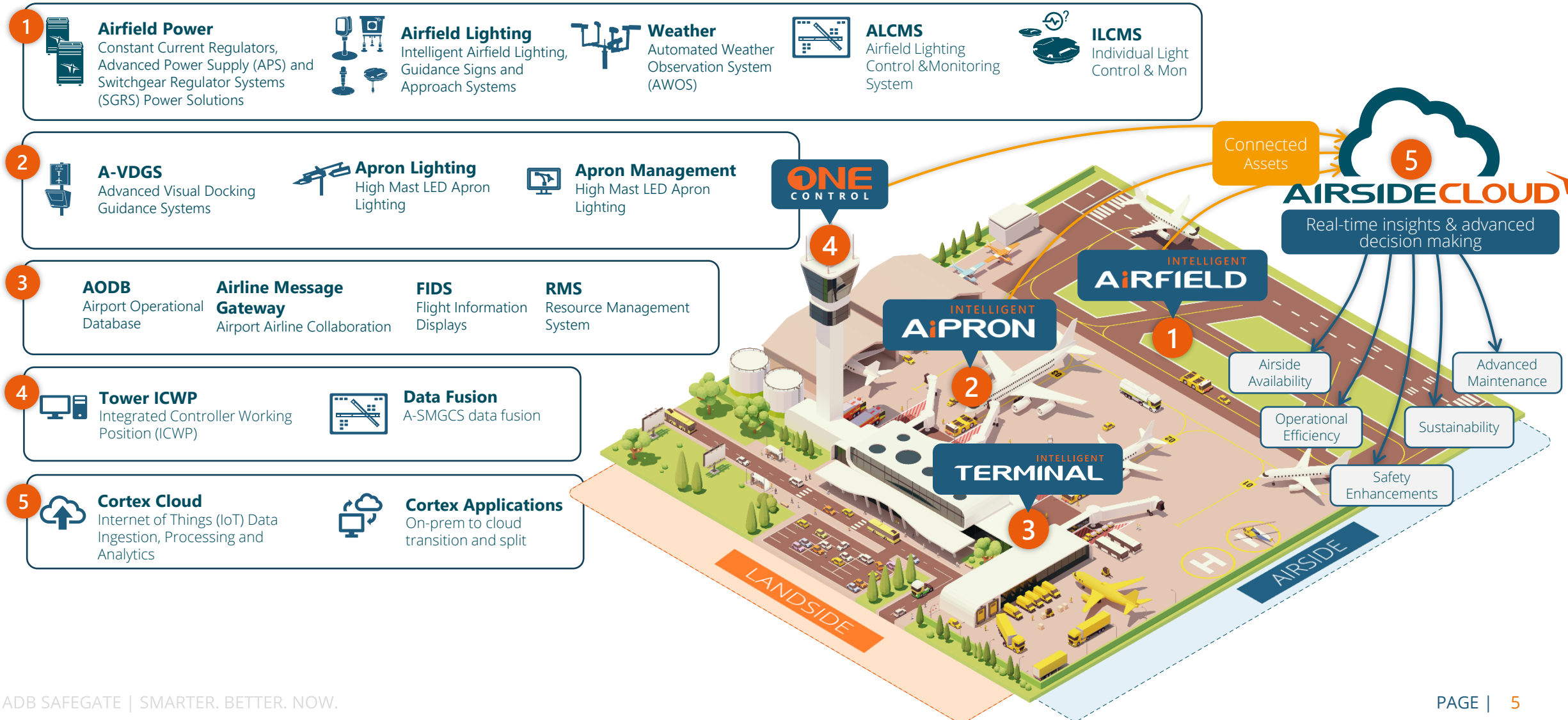


Incursion
Detection

Crossing
Monitoring

AIRSIDE 4.0[®]

The Airside Ecosystem



Strong Value Chain

From Device to Collaborative Use Cases

3 Challenges

- * Upwards Compatible Technology
- * Change Management
- * Regulatory Dependencies

Smart

- Generate Raw Data

DEVICE

Hardware & Software

Interface between the physical asset and the server

Descriptive

- What is happening now
- Data mining
- Real-time dashboard

CONNECTIVITY

"Gateway"

Device connection to the internet and transfer data based on IoT

Diagnostic

- What is happening & why
- Analytics dashboard

CLOUD

Ingestion & Processing

Secured internet-based data centers

Predictive

- What might happen
- Forecast based on past patterns

APPLICATIONS

End User Interface

Applications running within the cloud platform or on-premise systems

Prescriptive

- What actions to take
- Rules & recommendations for next steps?

COLLABORATION

Cohesive Airside Ops.

System integrations and data analysis

PHASE 1 | COMMERCIALIZED

PHASE 2 | STRATEGIC ROADMAP

Big Data & Collaborative Use Case

Harsher Weather Conditions Meeting Leaner Operations



New York City, New York. Snowstorm



Naples, Florida. Hurricane Ian '22 [6]

Weather conditions became harsher, disrupting Airside operations [2, 3]

- Strong impact on US: (Snow) storm NY, Hurricanes Naples, ...
- Int. 18% more hail and heavy rain '23 vs '22. 41% more ATFM delays '24 vs. '23 [4]
- ACI survey: 70% [participants] pointed out the impact of adverse weather events [5]

1

... resulting in

- reduced airside access and mobility, increased # IROPS situations
- Impact to airline networks leading to general disruption and unpredictability at airports
- Airports' safety services ... if more exposed to unforeseen weather conditions [3]

2

At the same time, we target **Lean Airside Operations** and suffer from **Shortage in Staff**

- Limiting redundancy in staff and equipment
- ... risking growth [1]
- Increasing # IROPS situations
- ... and demand to efficiently deal with the unknown

3

A (i) throughput / economic, (ii) safety and (iii) customer experience challenge **driving Airside automation.**

[1] EUROCONTROL FORECAST UPDATE 2024-2030. [2] Climate Change 2021 The Physical Science Basis. [3] EASA.europe.eu Managing the impact of climate change on aviation. [4] The Weather Company. [5] ACI - CLIMATE CHANGE RESILIENCE AND ADAPTATION SURVEY REPORT. [6] <https://airportimprovement.com/>

Use Case: JFK's Airport Integration T1 (NTO)



Goals

- * 30% faster recovery from IROPS
- * Improved apron capacity in peak hours (and bad weather)
- * Seamless integration of systems from runway to terminal

Virtual (APRON) Tower

ITOCC – Integrated Term. Operations Control Center for Terminal and Airside

AiPRON Suite + Computer Vision + ML

ICWP – DMAN, Flight Strips, A-SMGCS L4, FtG, SDF++

ADAL – Dynamic Holding Positions, Lead In Lights

Service Road Warning Lights (virtual wing walker)

A-VDGS + IoT – Ground Equipment Integration

Airside Self Kiosk to mitigate congested ground frq

Floodlight Dimming based on situational context

Airside Integration

Data Driven Collaboration



JFK New York International Airport

End2End

AIRSIDE4.0

Includes ADB SAFEGATE core portfolio:
Airfield, Gate, Terminal, Tower

Multiyear support and expansion projects

Design and Build
2024 - 2026







Partners

PANYNJ (End user), NTO (DBO): Ferrovial, Carlyle, Tishman (maincon), Faith Group (engineer of record), ADB SAFEGATE: Searidge (Virtual Tower), Leonardo, Aero Group, MUSCO, MSIA (Master system integration alliance): ADB SAFEGATE, SITA, Schneider

From Big Data to AI

Are we at Risk of Repeating Mistakes?

Overhyping Technology without Clear ROI

"Over 40% of agentic AI projects will be canceled by the end of 2027, due to escalating costs, unclear business value or inadequate risk controls", Gartner, 06.2025

Data Ownership, Monetizing Data

Data Quality Neglect

Underestimating Scalability and Infrastructure Challenges

Ignore Ethical Concerns

"The ethics of artificial intelligence: Issues and initiatives", EU Parliament

Lack of Domain Expertise Integration

Vendor Lock-In and Tool Proliferation

Neglect Need to Upskill

Focusing on Technology over Change Management

*"Change management in the gen AI age asks employees to become active participants rather than just users".
McKinsey*

Failure to measure success



Thank you for your attention



7GVGEC



Dr. Thorben Burghardt,
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