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Aviation Cybersecurity: Keeping the Wings On

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The Aviation Sector



Safe



Trusted



Resilient



Prosperous



Growing

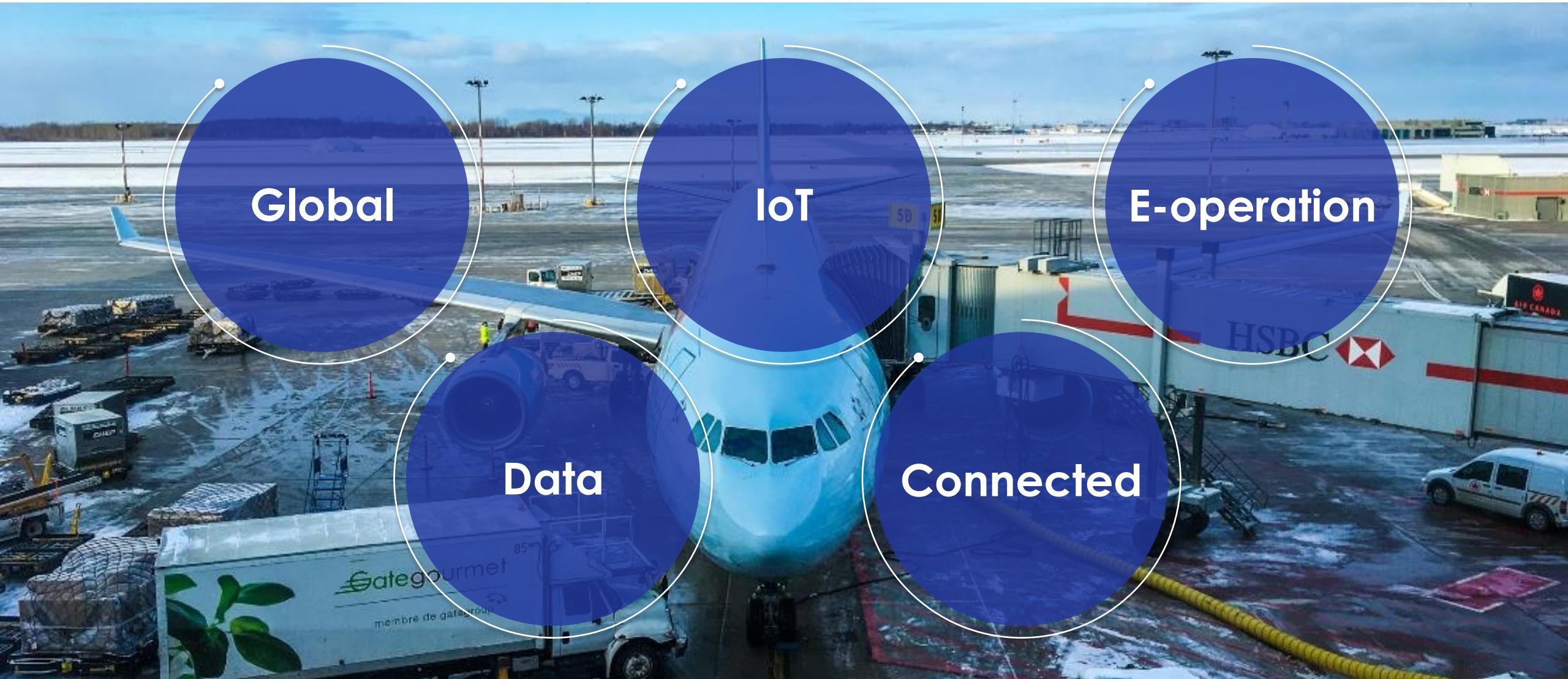


Critical

Aviation past



Aviation now and future ...with digitisation



Global

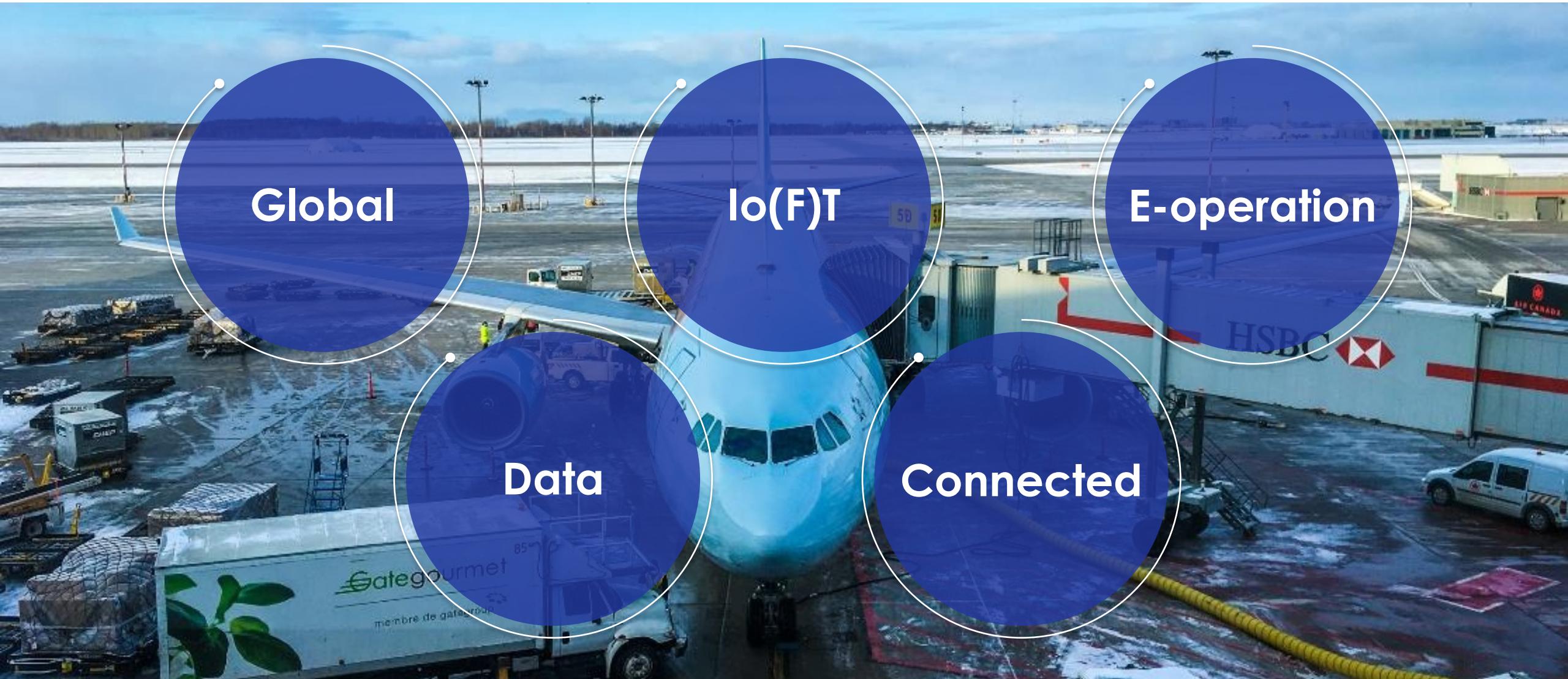
IoT

E-operation

Data

Connected

Aviation now and future ...with digitisation



Global

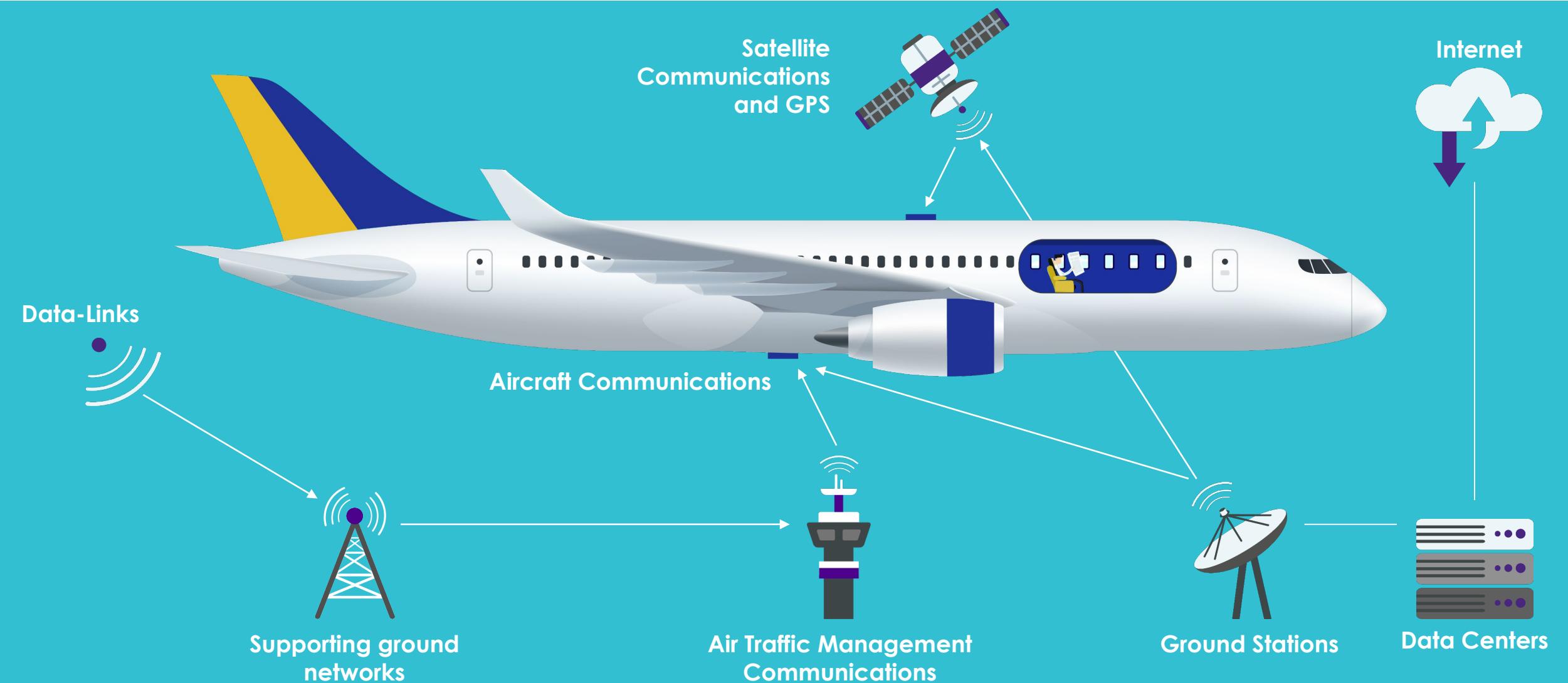
Io(F)T

E-operation

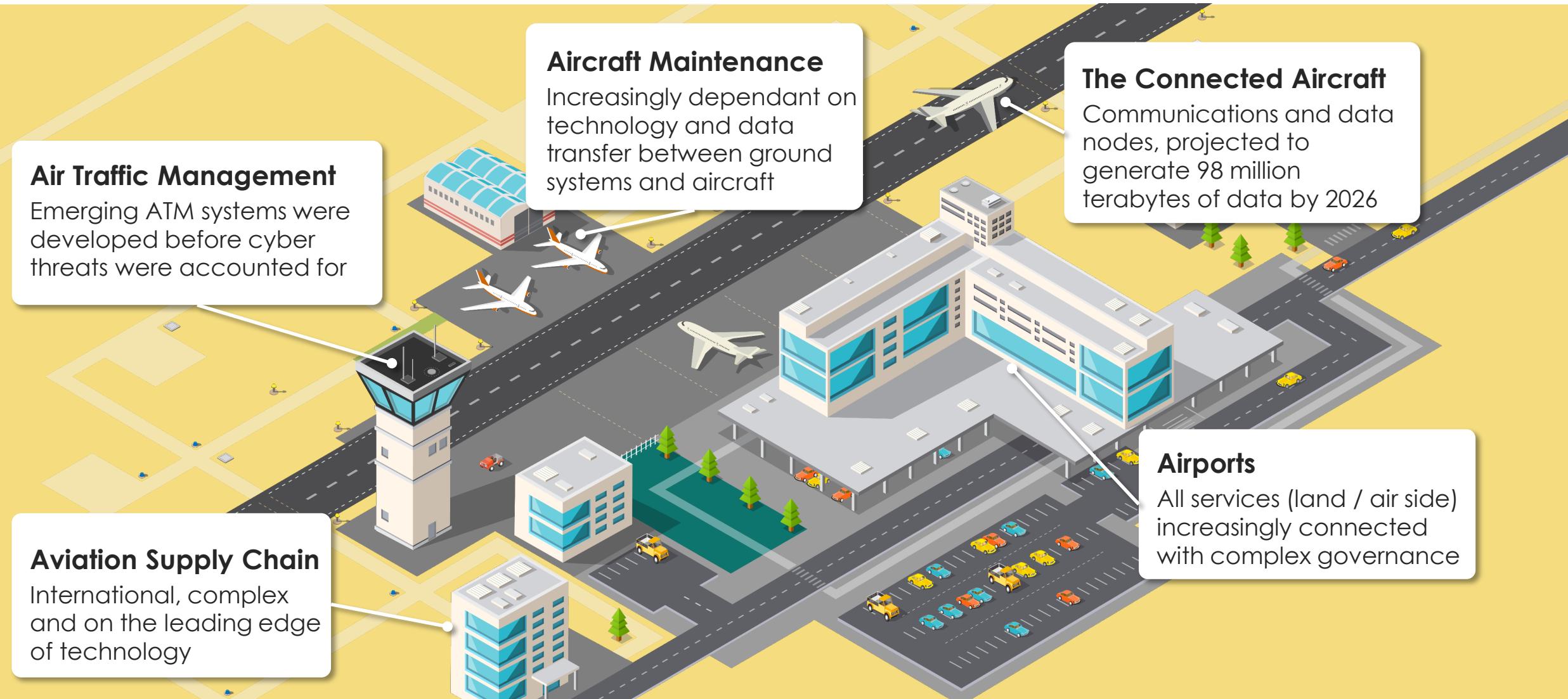
Data

Connected

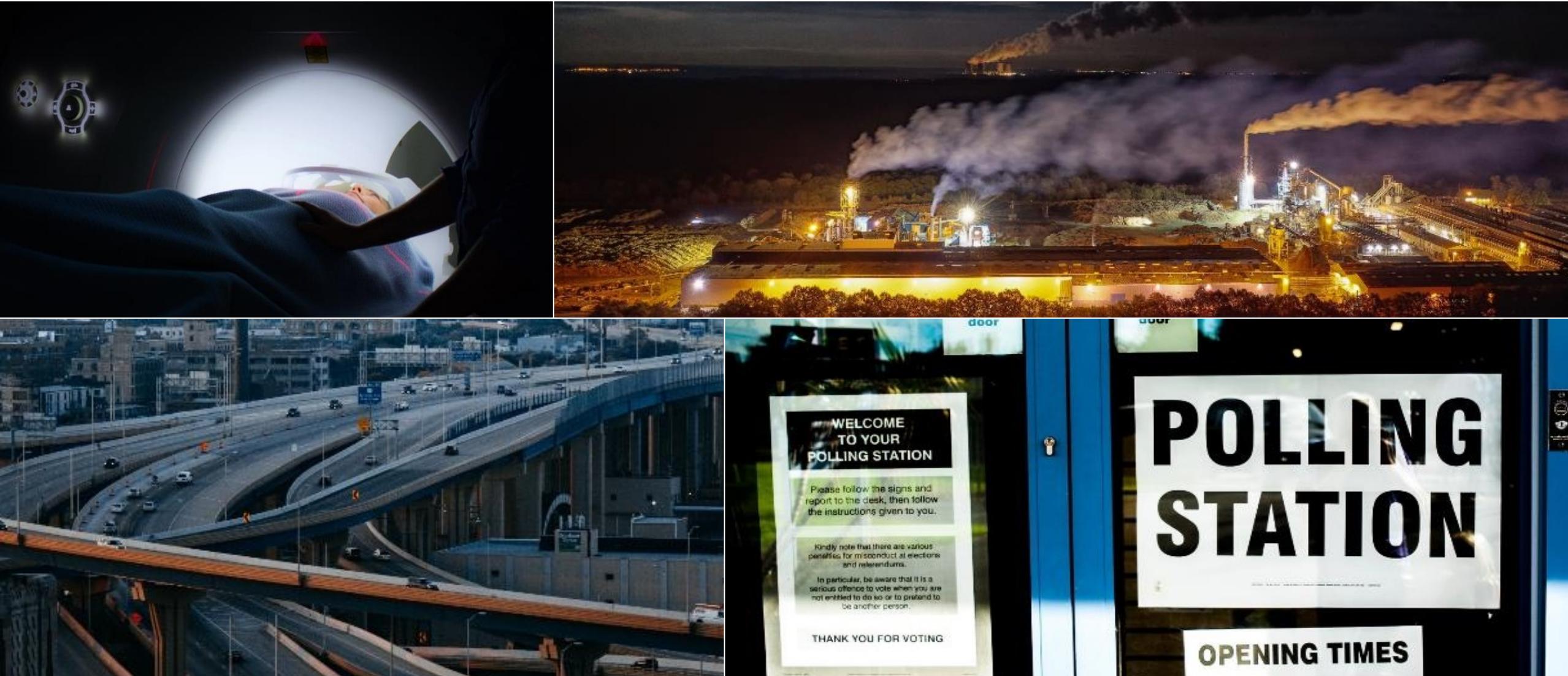
Connectivity



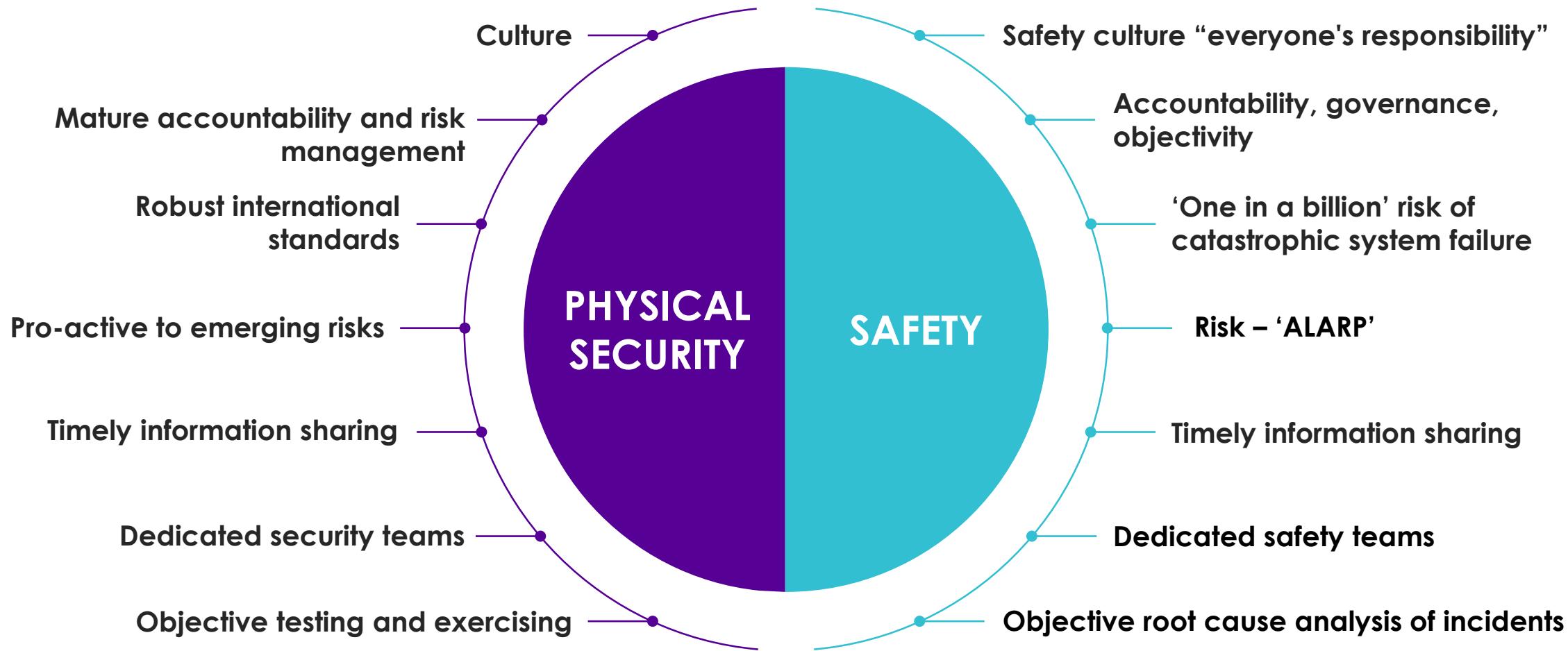
Complexity - Threat Surface in the aviation ecosystem



Similar challenges to other critical sectors....



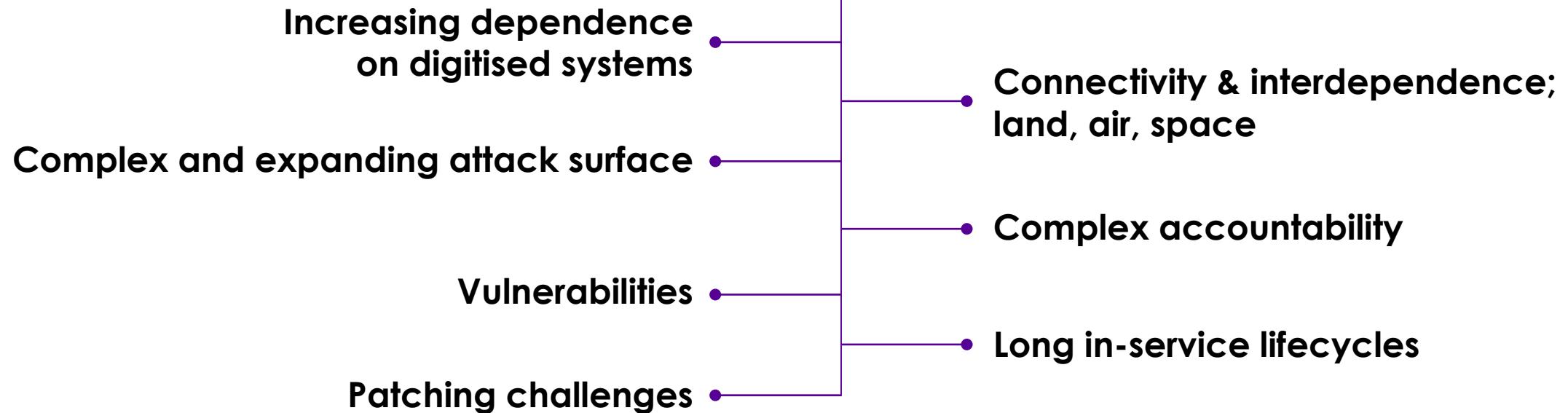
Aviation sector benefits from its DNA...



“You can’t hack an aircraft!” ...?

Pro-active, determined adversaries

Combined with...



Aviation cyber attacks



System Availability

Deny / Disrupt

Data Confidentiality

From air / ground / space
data-links to on-board wifi



Resilience, critical systems and trust

A photograph from the perspective of a passenger looking through the window of an airplane. Two pilots are visible in the cockpit, wearing headsets and focused on their work. The cockpit is filled with various control panels, screens, and instruments. The aircraft is on a runway, and the landscape outside shows trees and a clear sky.

What is
it we are
securing?

Resilience, critical systems and trust



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Resilience, critical systems and trust



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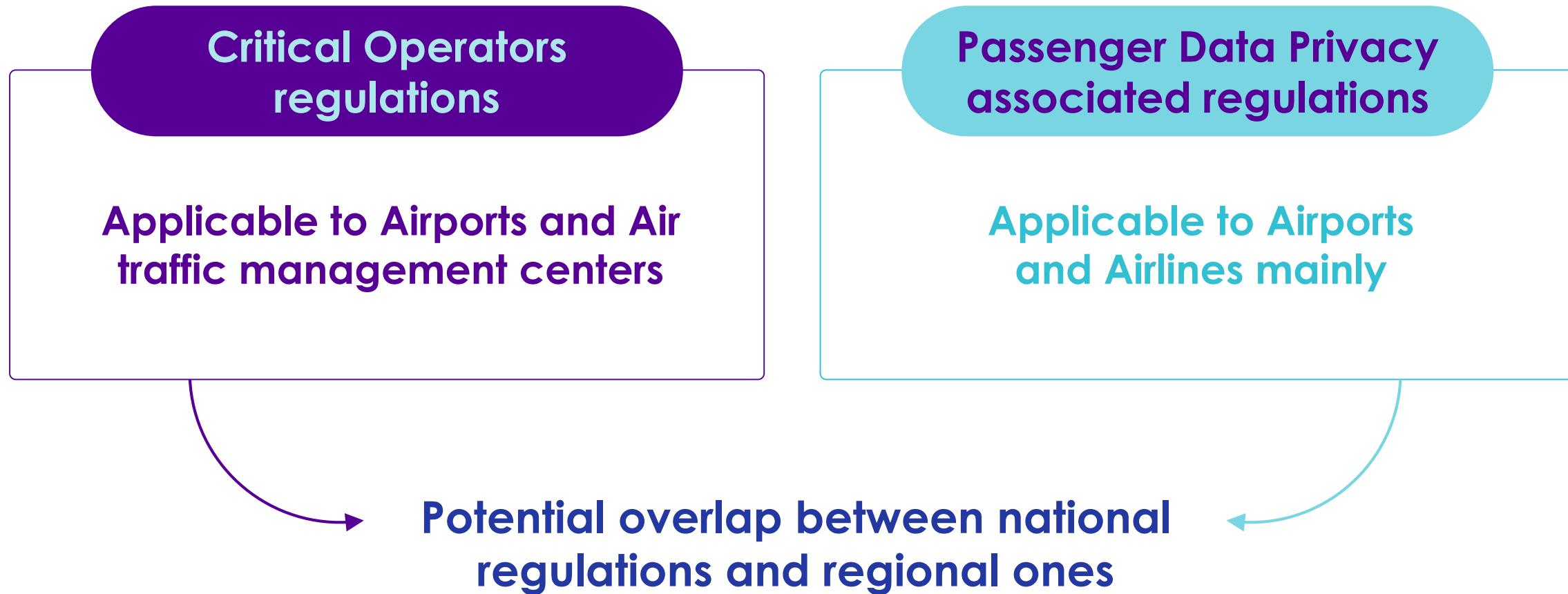
Resilience, critical systems and trust



Balancing culture, compliance and assurance



From cybersecurity regulations



And dedicated aviation specific certifications—Right?



US (FAA) Special Condition on Connected Aircraft



Europe (EASA) impose a Certification Review Item



At international level,
Not yet an ICAO rule
But working groups

We need a coherent global approach



Supported by new Standards...for compliance...?

ED-201 – Aeronautical Information System Security Framework Guidance (2015)

ED-202A / DO-326A



Airworthiness Security
Process Specification
(2014)

ED-203A / DO-356A



Airworthiness Security
Methods and
Considerations (2018)

ED-204 / DO-355



Information Security
Guidance for
Continuing
Airworthiness (2014)

ED-205



Groundworthiness
Security
(Not released)

What can we do to reach cyber resilience?

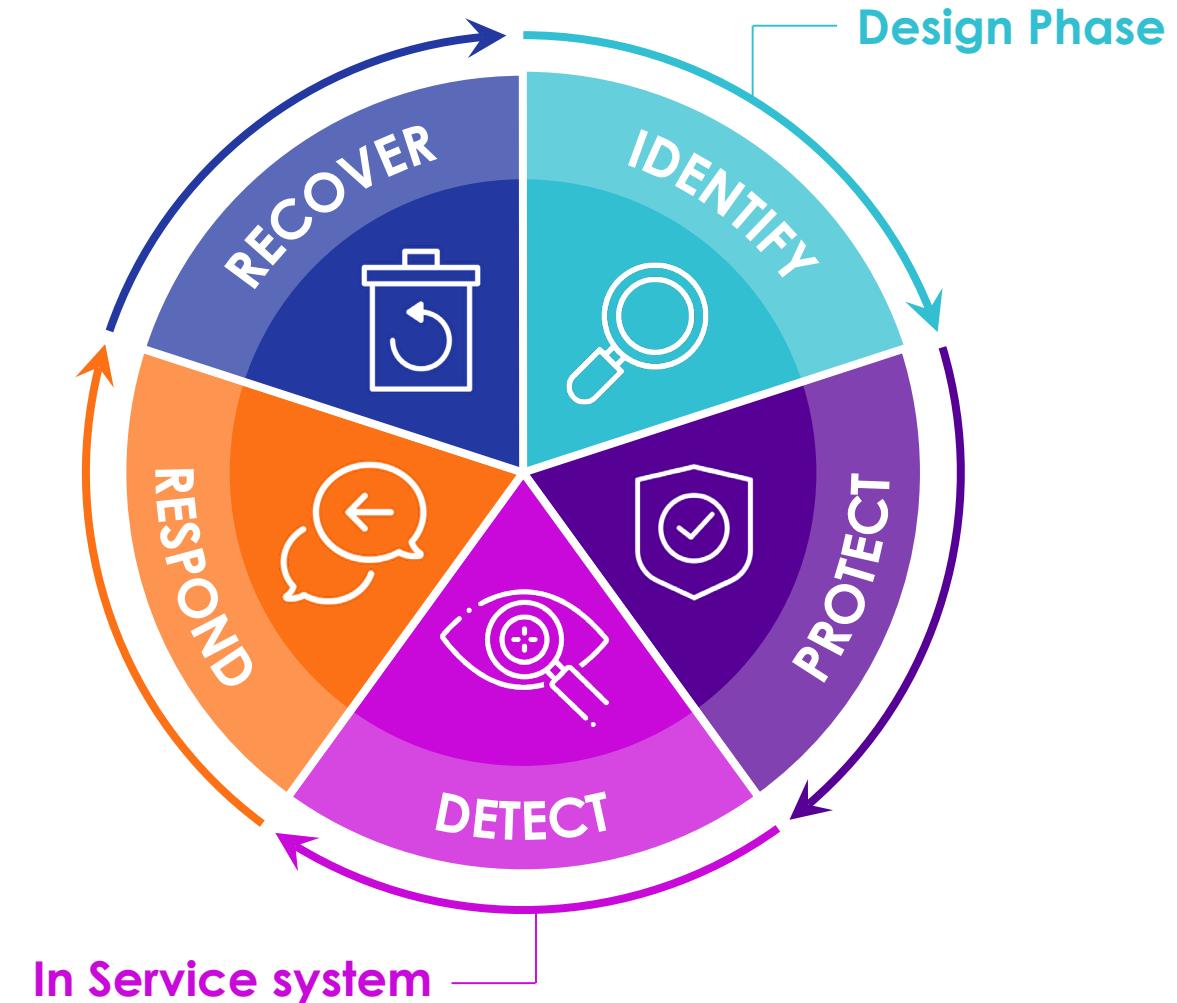
After identifying the risks

The challenge remains to

- Set-up tailored protections
- Conduct cyber health monitoring
- Recover & response

At design phase....

...and for in service systems



Preventing availability & integrity impacts ...

SAFETY

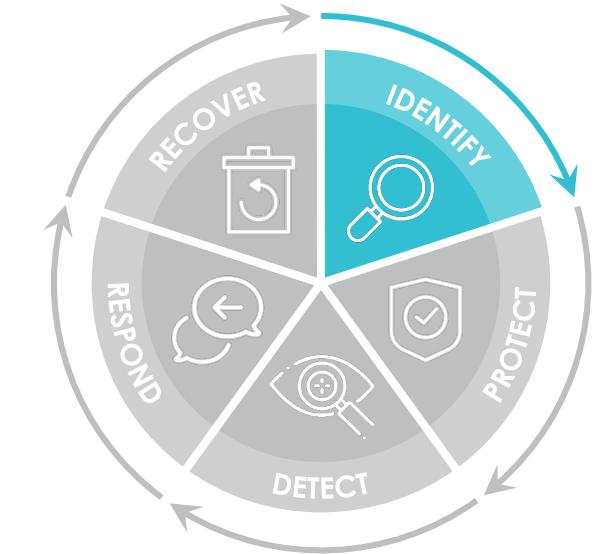
=

accidental
events

CYBERSECURITY

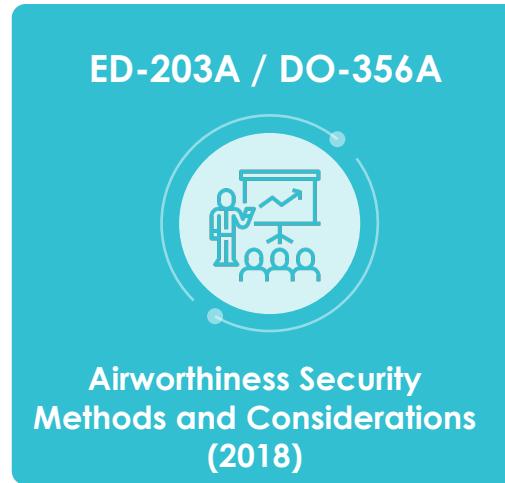
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deliberate malicious
cyberacts

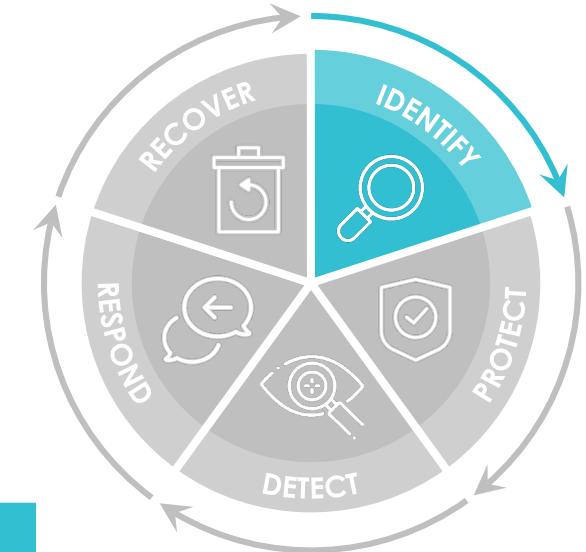


Identify whatever can happen accidentally or can be caused deliberately
...the potential safety impact may be the same

But Only Safety impact is covered



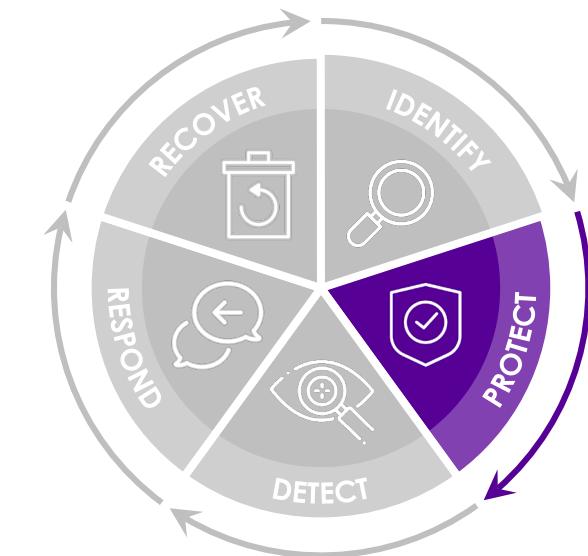
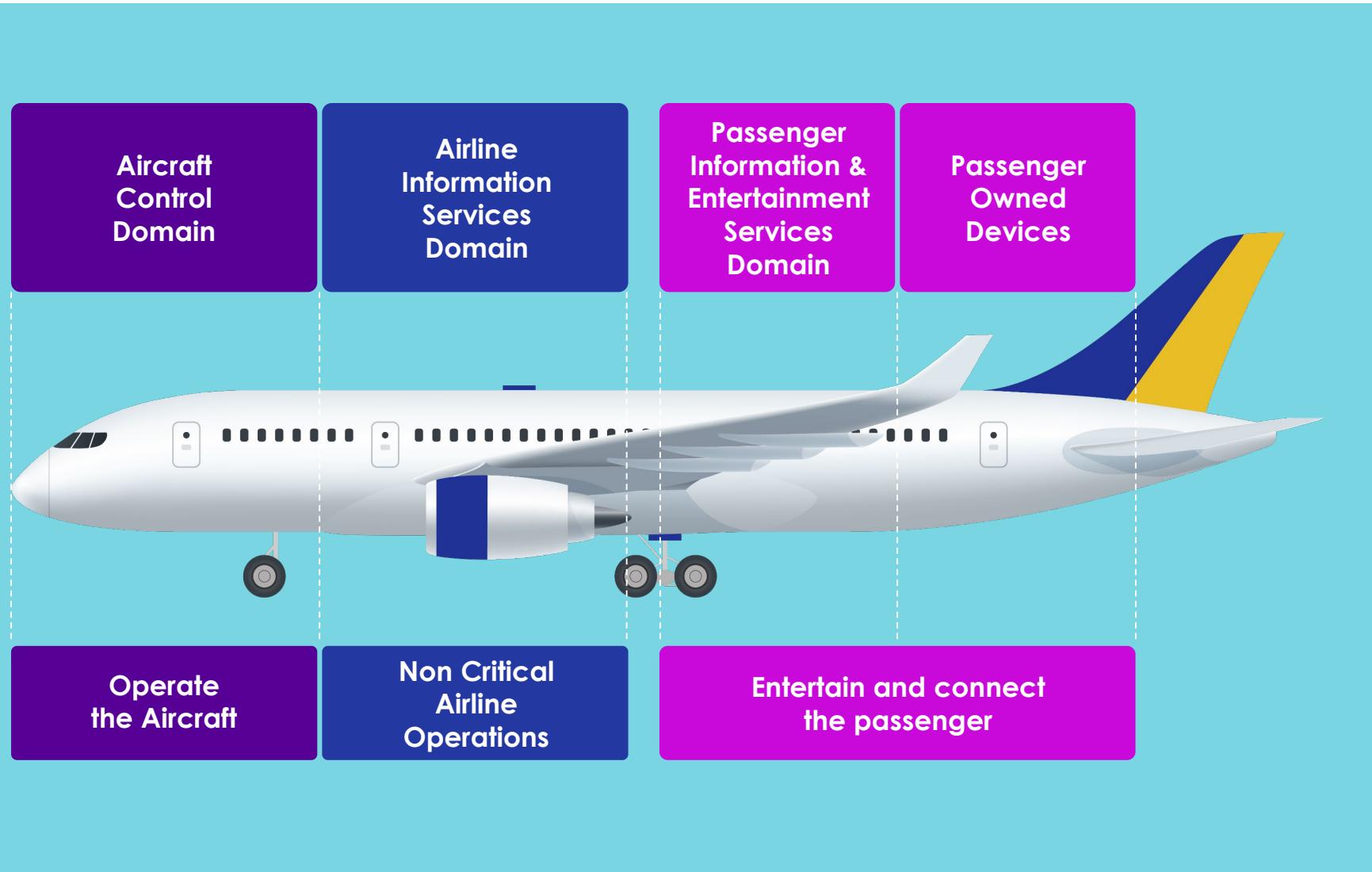
Airworthiness Security



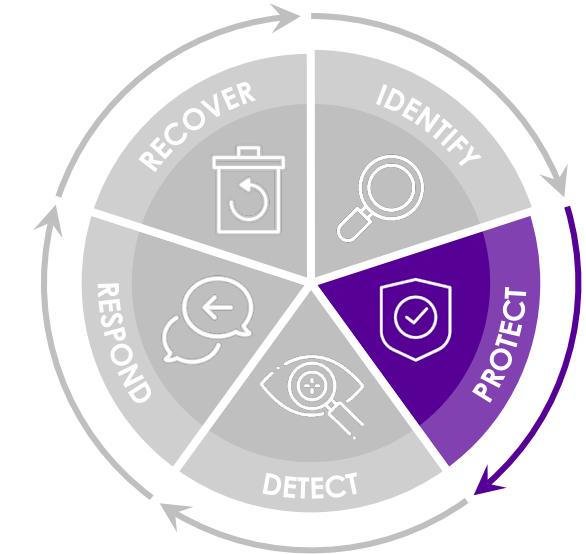
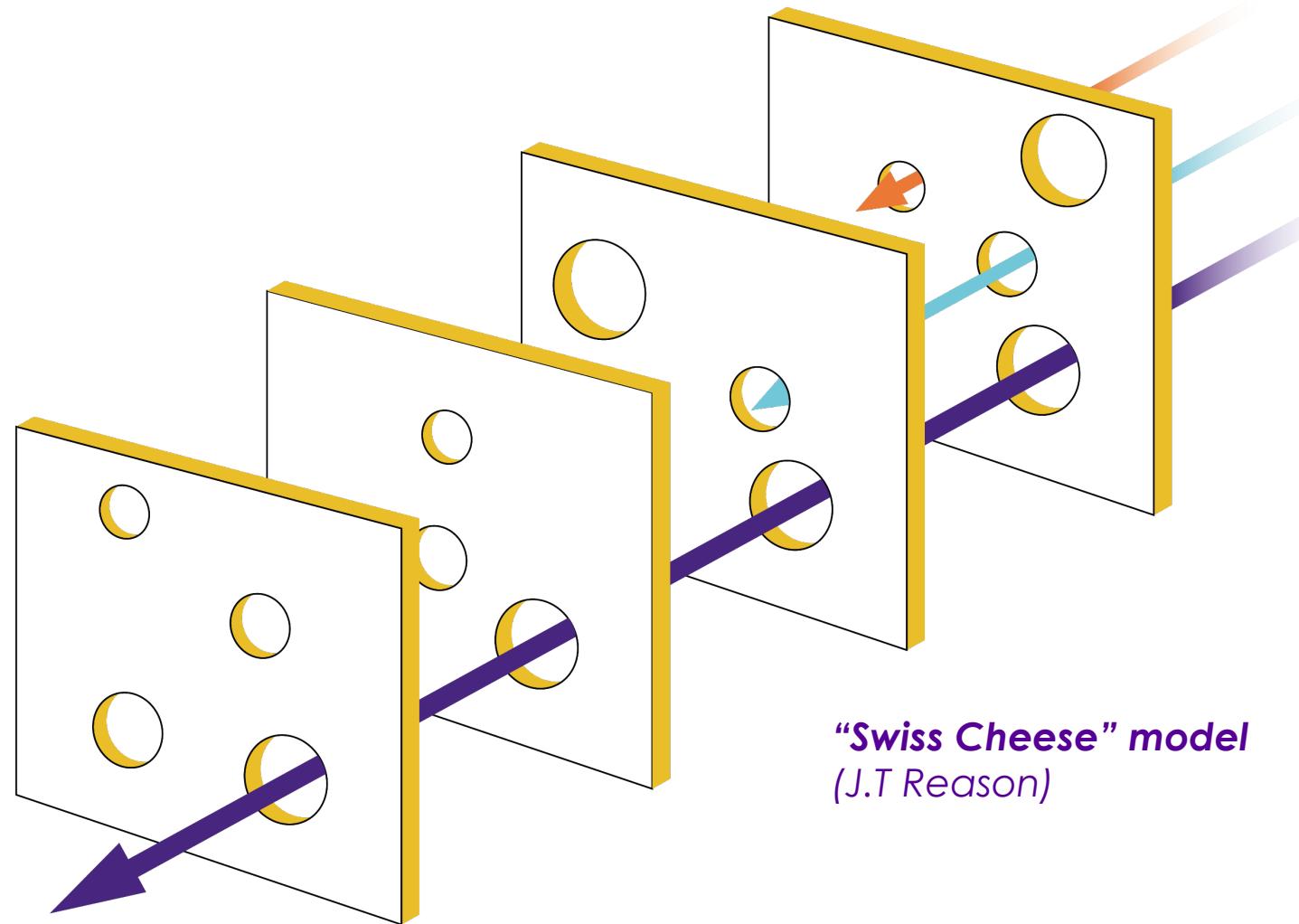
Level of Threat	Severity of the Threat Condition effect				
	No Effect	Minor	Major	Hazardous	Catastrophic
Very High	Acceptable	Acceptable	Unacceptable	Unacceptable	Unacceptable
High	Acceptable	Acceptable	Unacceptable	Unacceptable	Unacceptable
Moderate	Acceptable	Acceptable	Acceptable	Unacceptable	Unacceptable
Low	Acceptable	Acceptable	Acceptable	Acceptable	Unacceptable
Extremely Low	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable



Safety segregation aims to prevent threat propagation



Layered security to enhance resilience

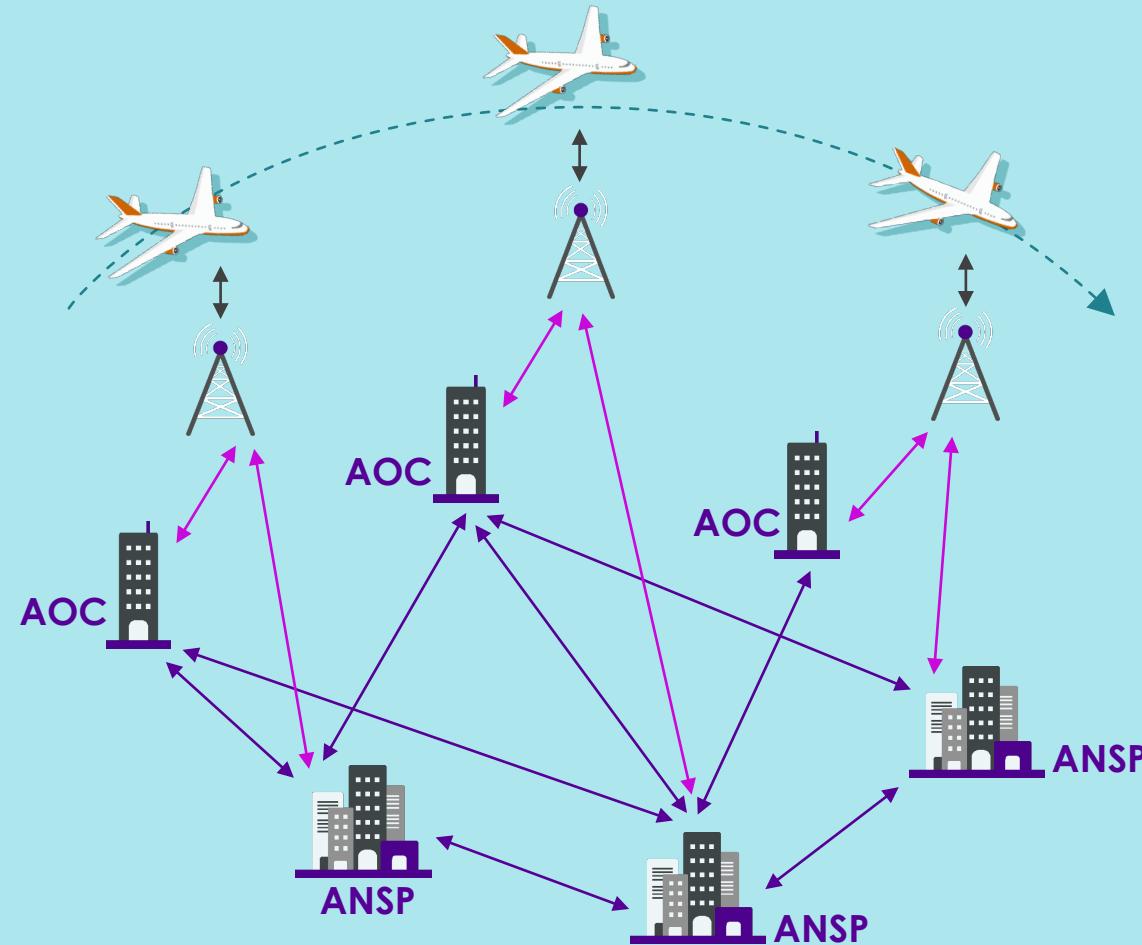


The actual challenge: Securing aviation data

Innova

All data

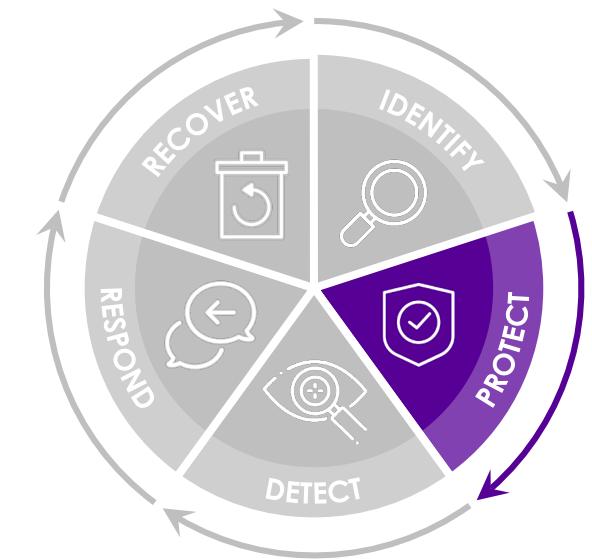
- Not just safety



AOC: Airline Operation Center/ANSP: Air Navigation Service Provider

(extract from ICAO ATB and ANB)

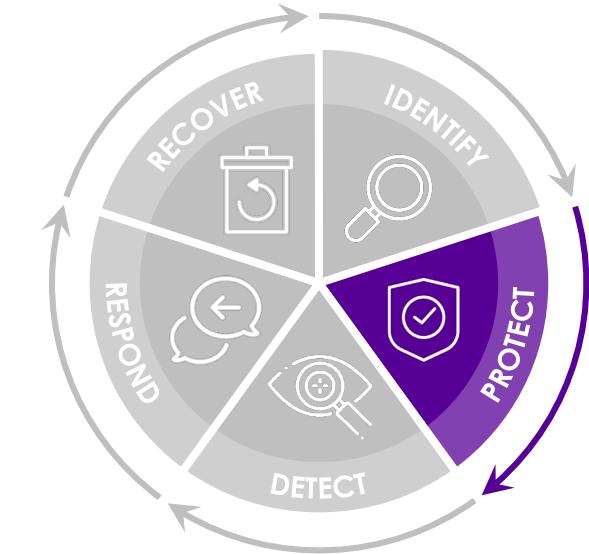
Progress being achieved in relation to developing the strategy on cyber safety and cybersecurity **25 of September 2017**



Developing tailored cyber security solutions

A connected aircraft is a group of flying IoT devices

- Embedded systems
 - Limited connectivity
 - Specific technology
- Autonomy
 - Autodefensive



Do you think that standard information security solutions work for aircraft security?

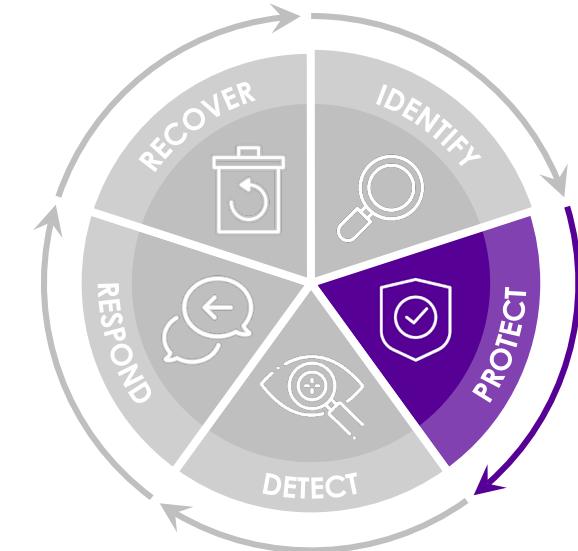
Is Anti-virus a solution for Aircraft Systems?

The answer is yes... and no

Segregated systems

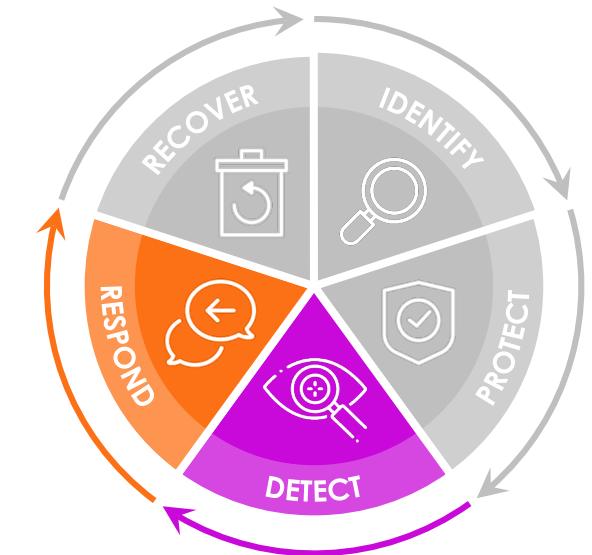
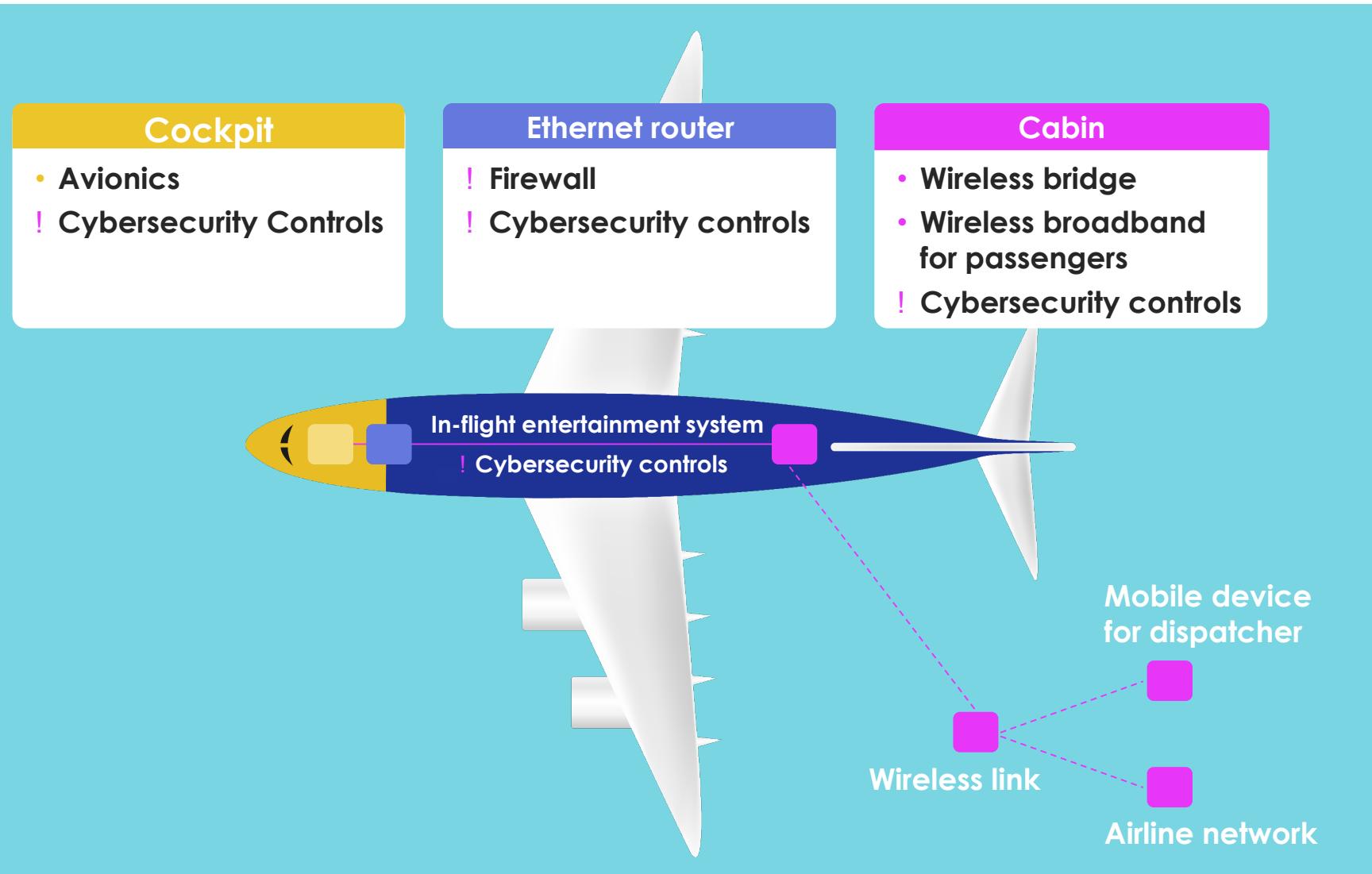
No standard operating systems

Size Weight And Power (SWAP) issues

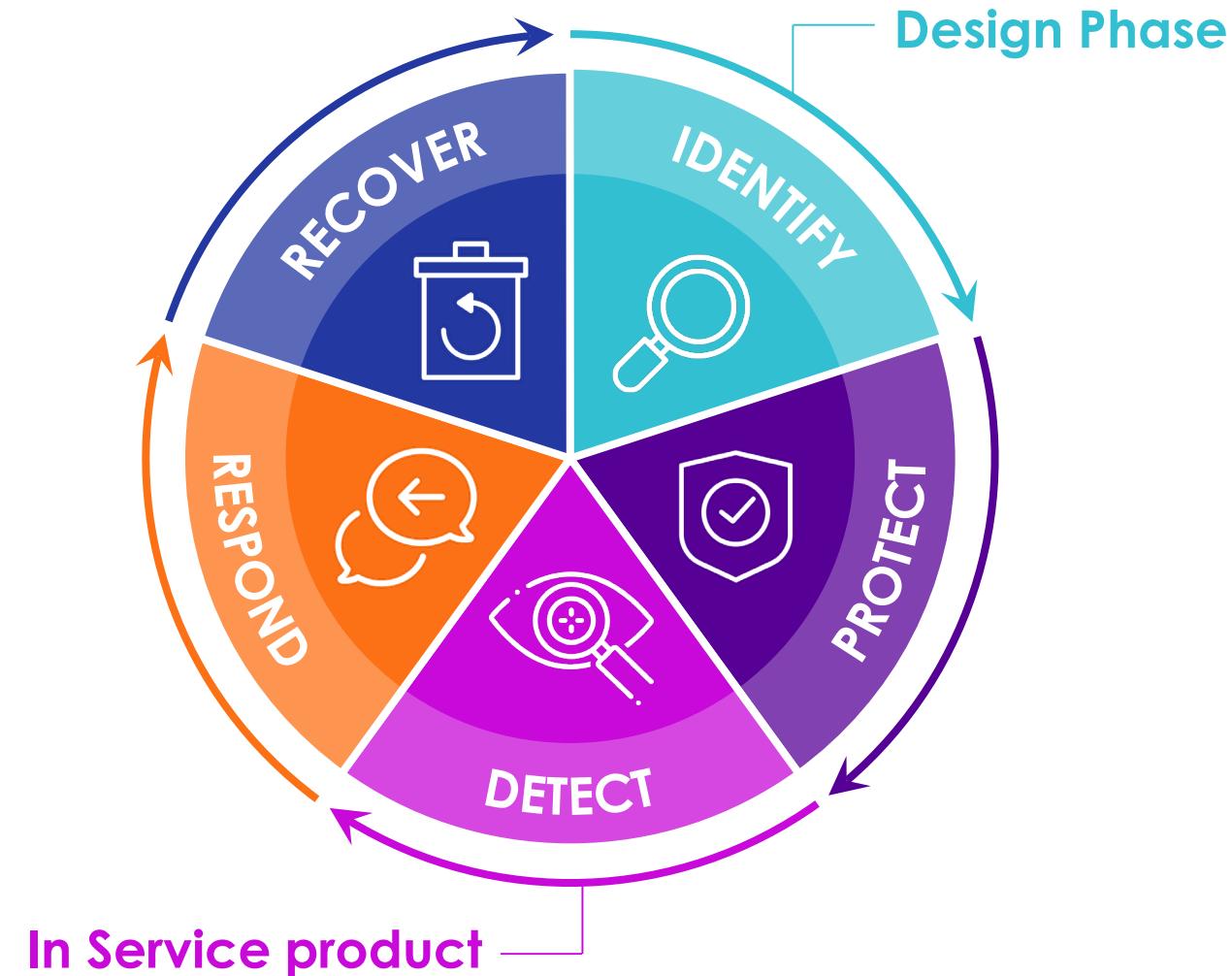


Specialised anti-intrusion technology fits better to embedded aircraft systems

Pave the way to cyber health monitoring



Shifting to a lifecycle cyber security approach



Monitoring the threats and incidents: ISACs



AVIATION ISAC

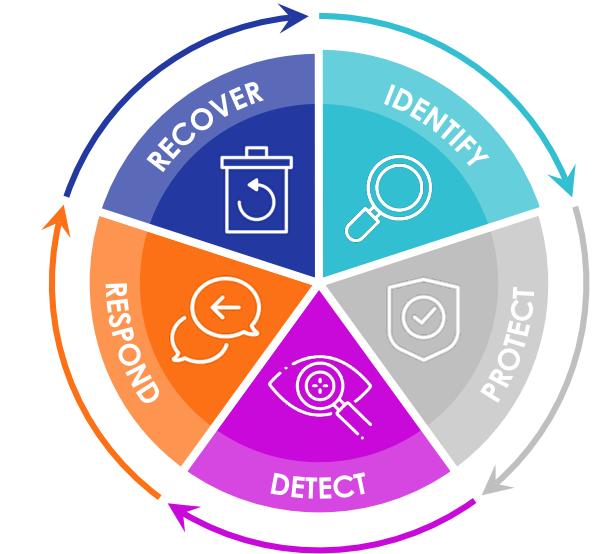
Information Sharing and Analysis Center
for Incident information sharing
for Threat intelligence data sharing



Pilot Phase

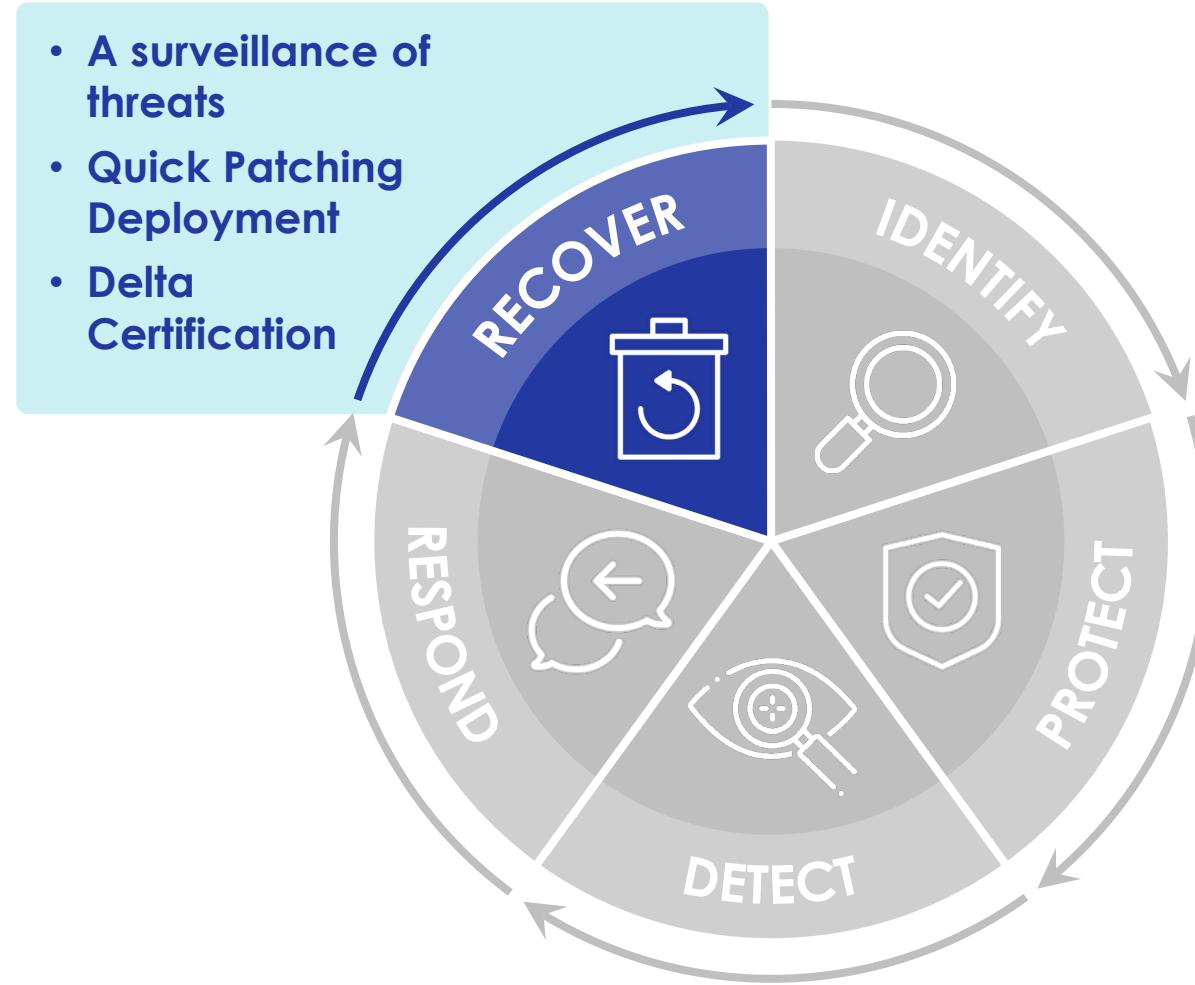
EUROPEAN CENTER FOR CYBERSECURITY AVIATION

To provide information and assistance
to EU Aviation stakeholders in order
for them to protect critical asset
to the safety of Civil Air Transport



Resolving Patching issues

- A surveillance of threats
- Quick Patching Deployment
- Delta Certification



Threats are constantly evolving

The challenge
is the management
of continuous security

And managing operational continuous security



Understand the Vulnerabilities & threat landscape



Vulnerability Exposure & Management

Threat Intelligence



Detect/Maintain and respond to incidents

Train & control



Security Policy Deviation Control

Log Management & Archiving

Training for involved teams

Conclusions

We are on the cusp of a digital revolution that will transform the aviation sector

Aviation now looks like any other digitized, connected industry
Much the same technology, vulnerabilities and adversaries

We must secure stakeholder trust as well as safety critical systems

We must also learn across sectors to be safer, faster, together

What can other sectors learn from aviation?



Speed of technological development can outstrip your ability to understand, find and fix vulnerabilities

The value of risk culture as well as regulation and compliance

Info sharing and collaboration can be more than a bullet point...

Leadership, accountability and governance are critical...

The strength of an international approach and the risk of regionalisation in a global industry

What can the aviation sector learn / do?



- The benefits of an open dialogue across all stakeholders about risks and opportunities
- Collaborate with other sectors, we have the same challenges, supply chains and potential solutions
- Apply the foundations of safety and physical security to the cyber security challenge
- Resilient trust is as essential as resilient systems
- Secure today's aviation sector but also securely design tomorrow's



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Questions?

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