ICAO

UK Civil Aviation Authority

3rd Civil Aviation Legal Advisers Forum

26th November 2024

AI in Aviation

Legal Frameworks for an Autonomous Future

AI in aviation…
Where **won’t** it be used?

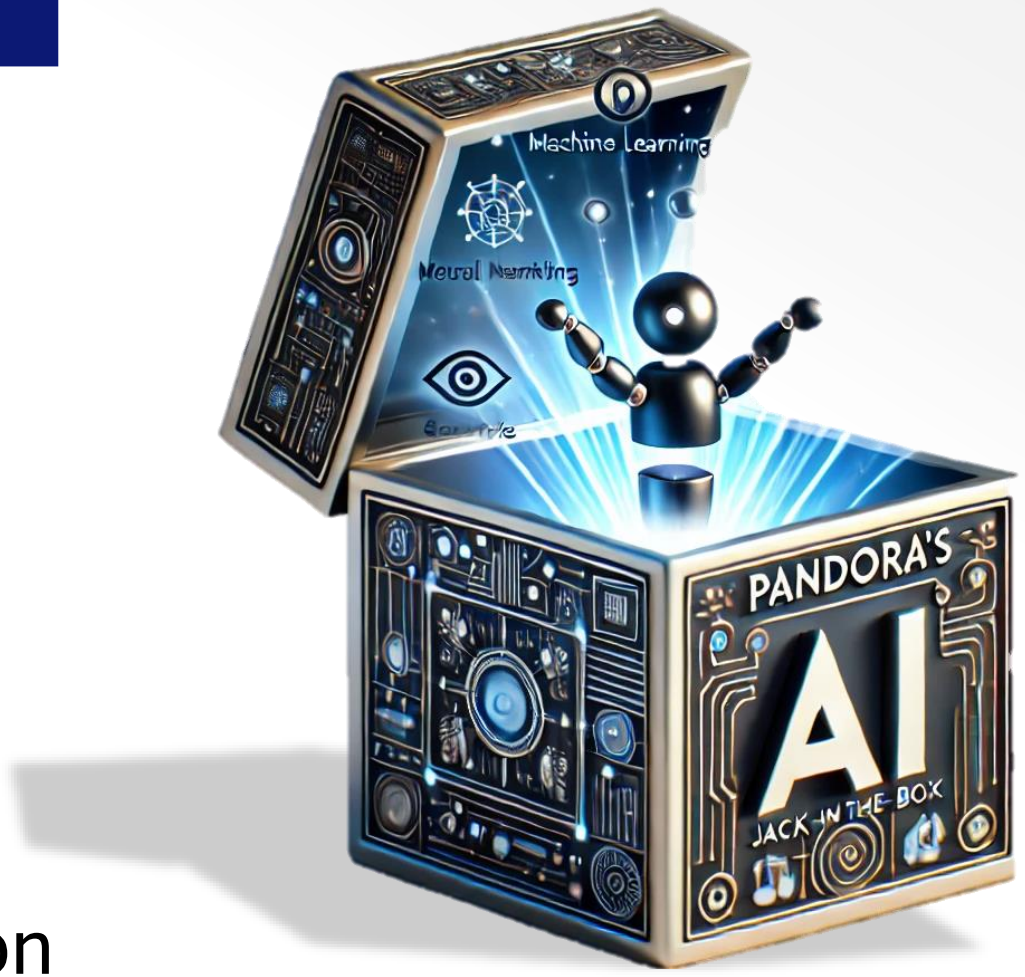
OFFICIAL - Public

Pandora's AI Jack-in-the-Box: An **Age for Agility**?

UK Civil Aviation Authority

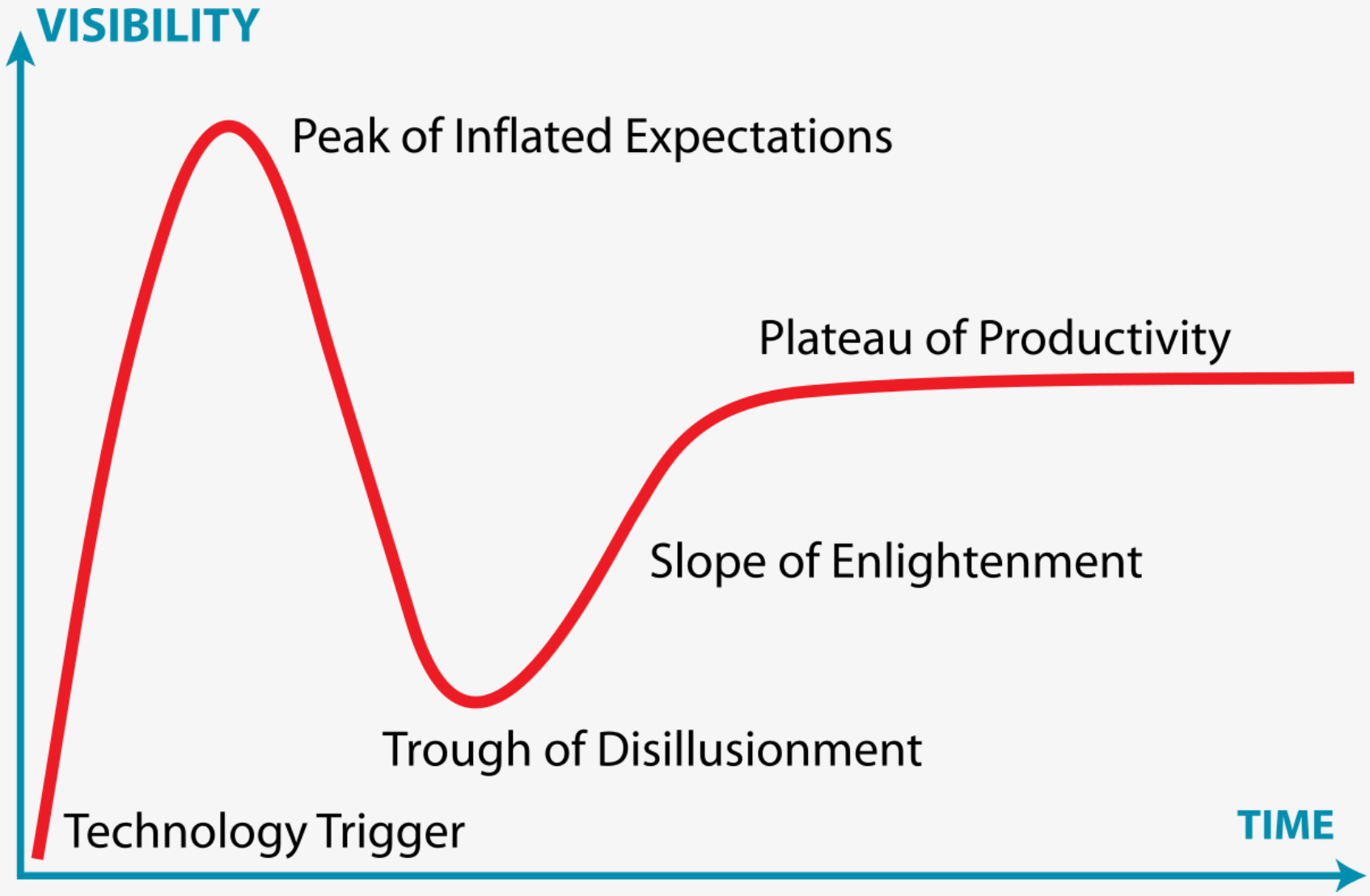
Our Reality

- Traditional regulation can't contain AI development
- We can't predict where it will spring up next
- We must move forward with pace, agility… and caution



James Bell MEng CEng MIET
Innovation Strategy Lead
UK Civil Aviation Authority

Gartner **Hype Curve**



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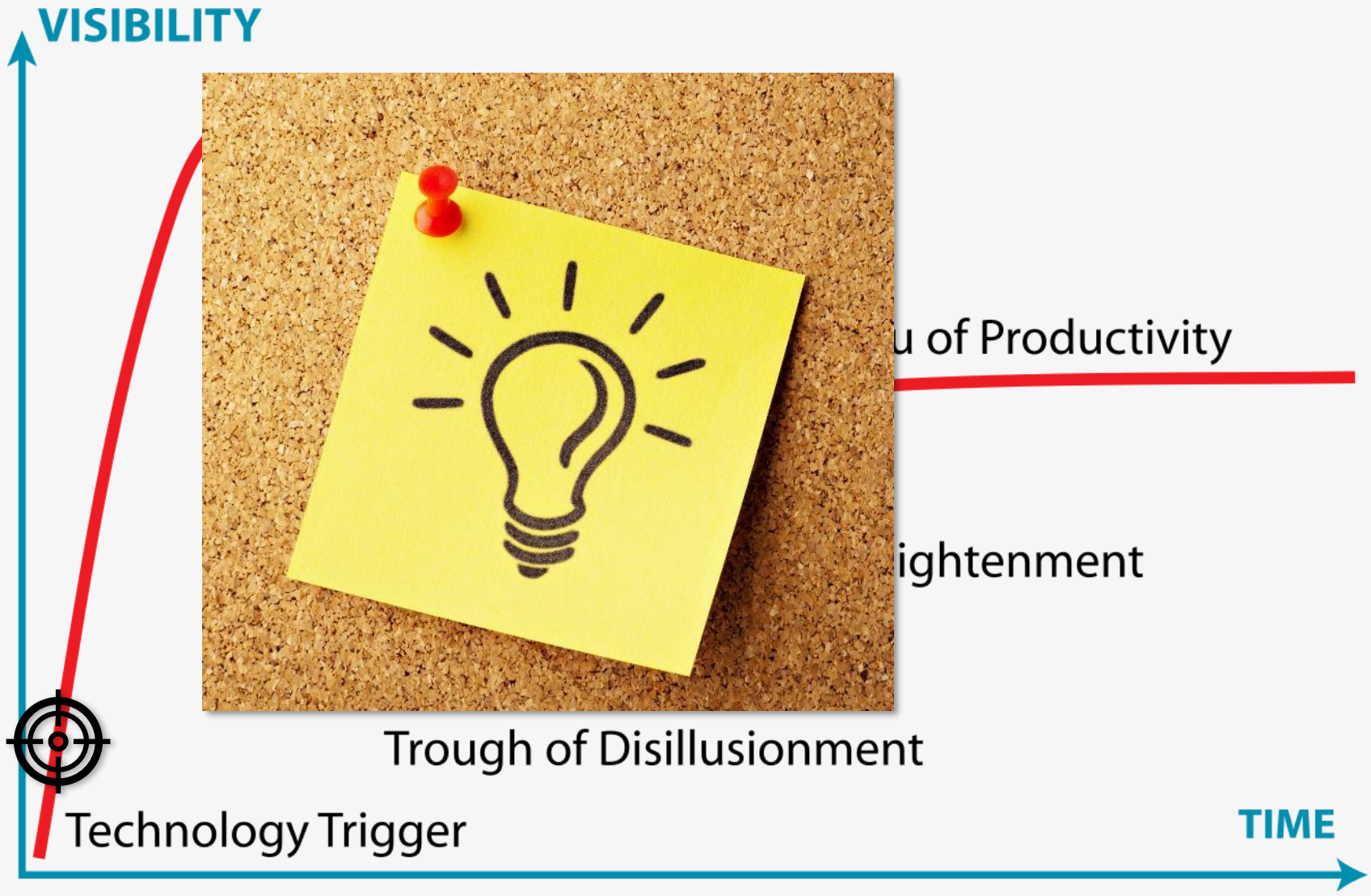

Gartner **Hype Curve**

UK Civil Aviation Authority

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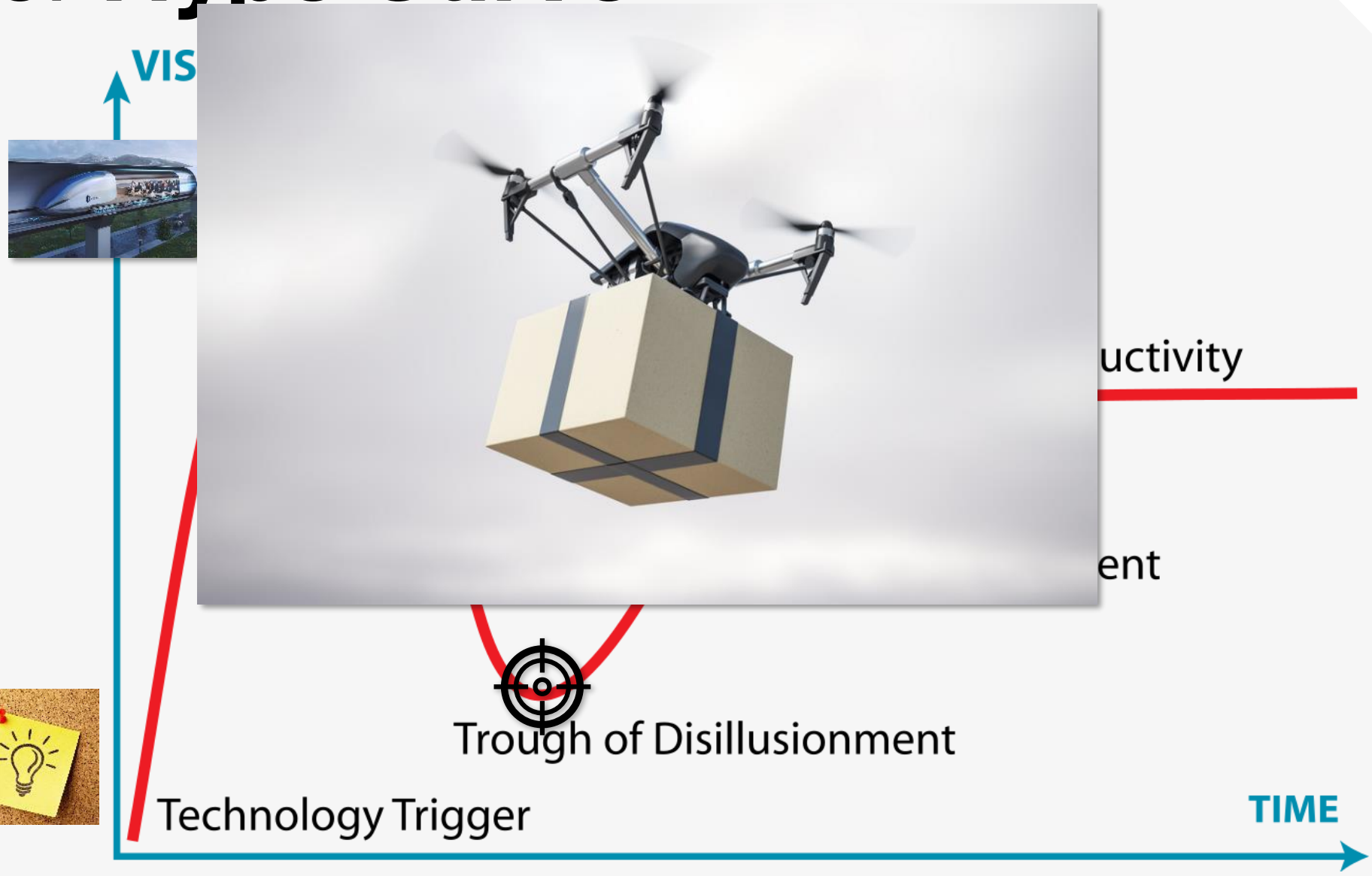

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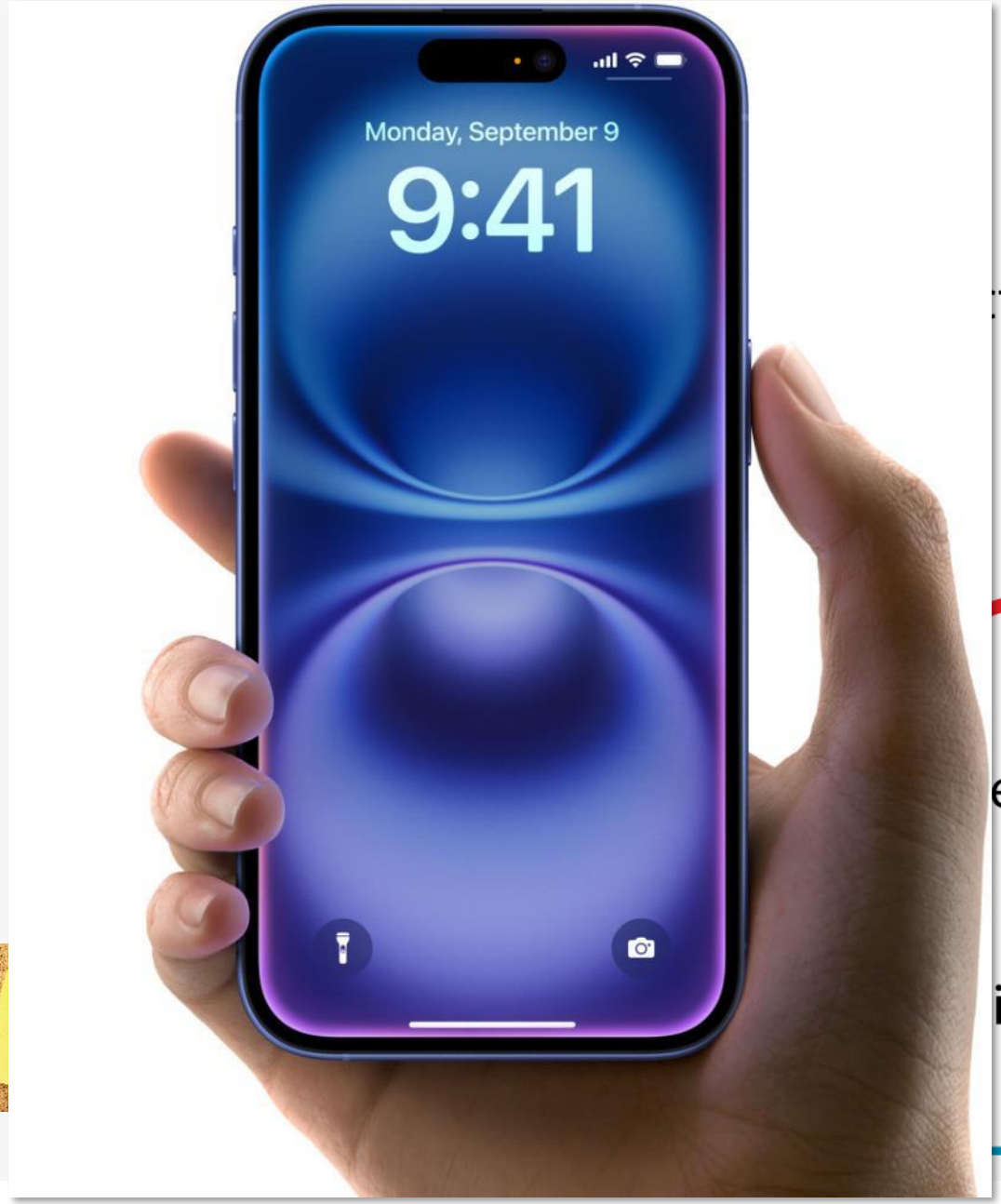

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Plateau of Productivity

e of Enlightenment

ionment

TIME

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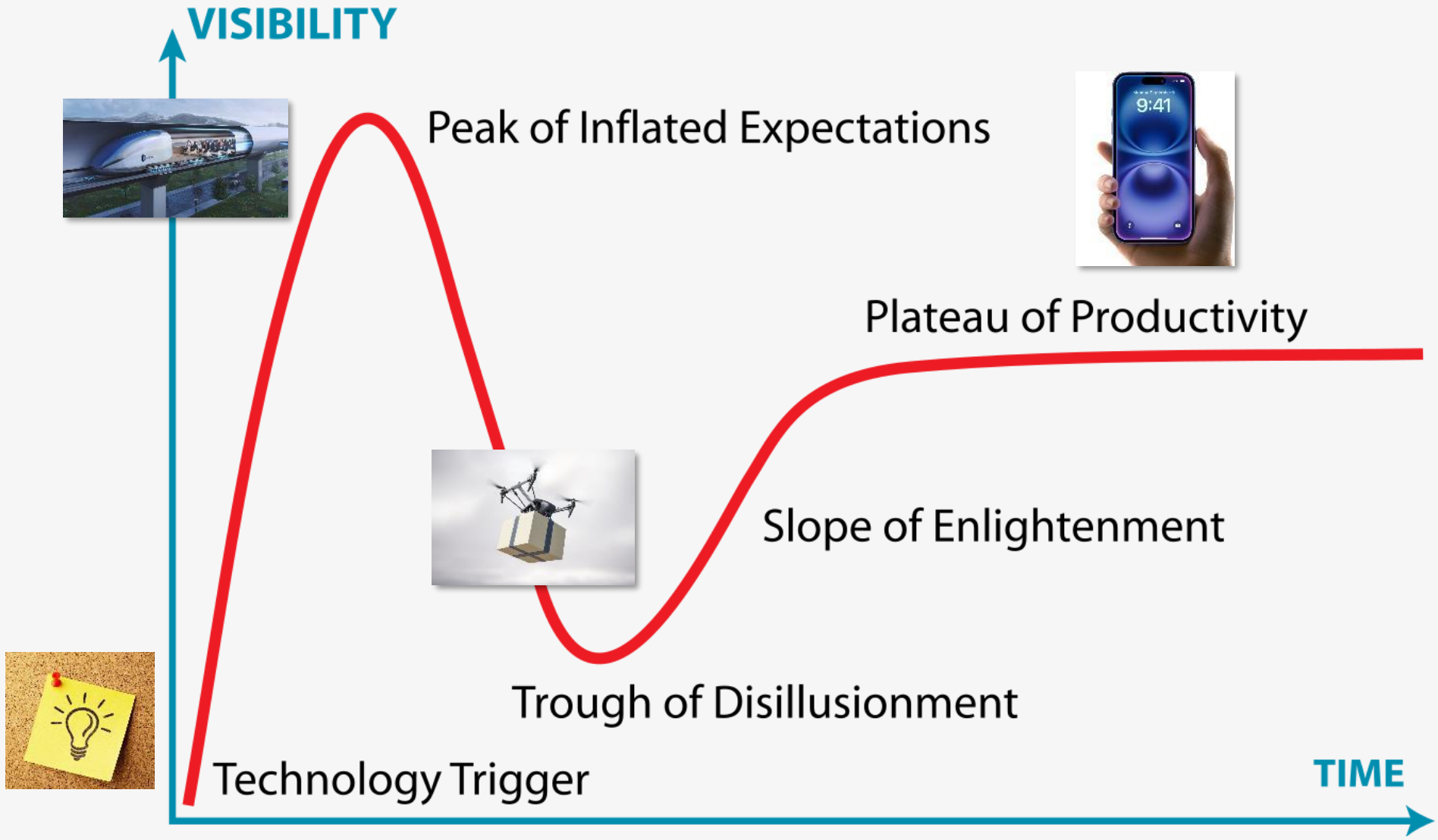
Gartner **Hype Curve**



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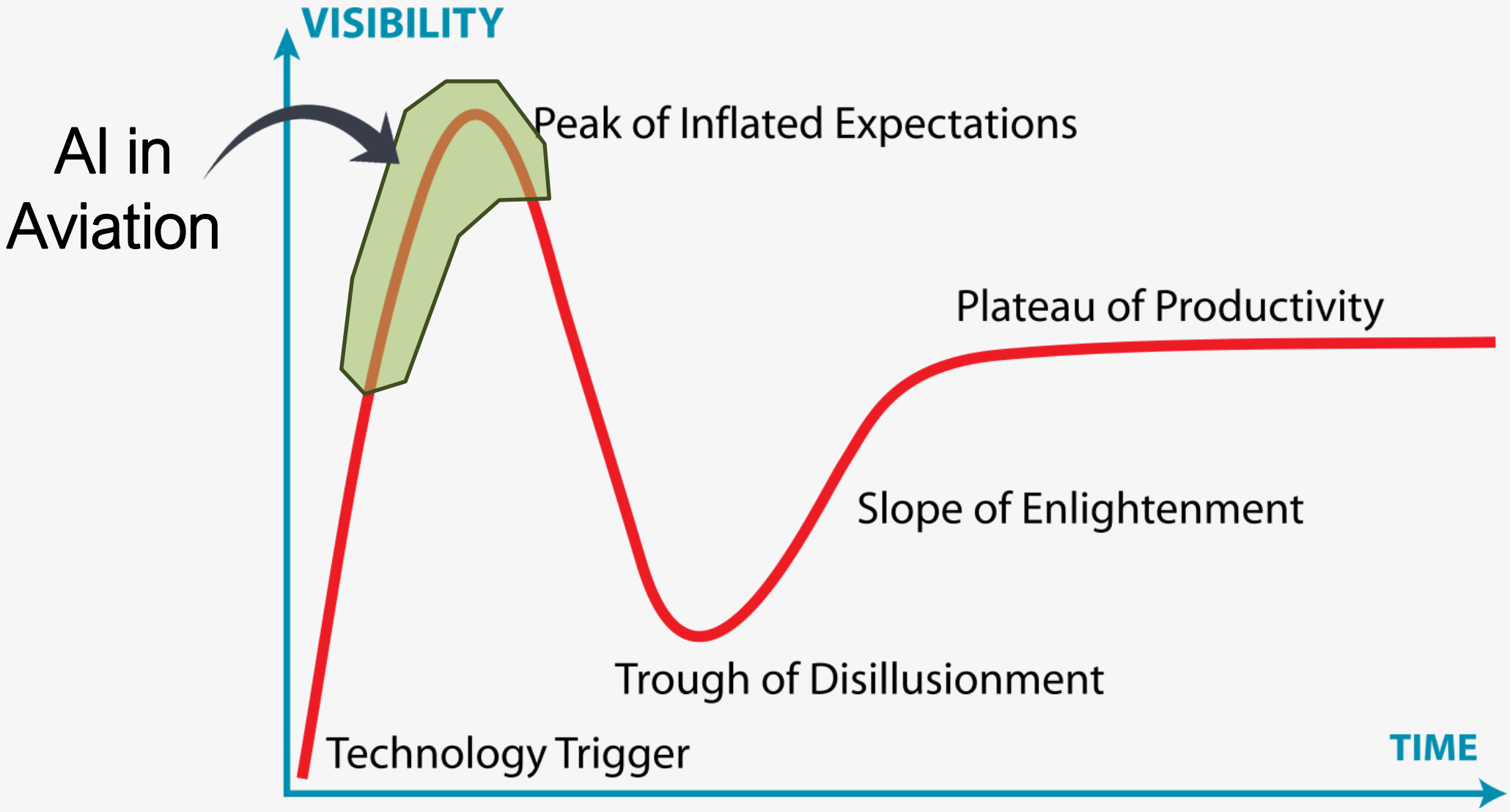


CAA use only

Autonomous Traffic Management System

UK Civil Aviation Authority

Who bears the liability?

Which jurisdiction's laws apply?

How do we evidence the system's decision?

How do we maintain trust in this new world?

UK Civil Aviation Authority

Who bears the liability?

Which jurisdiction's laws apply?

How do we evidence the system's decision?

How do we maintain trust in this new world?

What is **trust**, in the context of AI?

Transparency

Code developed through machine learning

What is **trust**, in the context of AI?

Transparency

Code developed through machine learning

+

Explainability

Can we explain ML-designed code?

What is **trust**, in the context of AI?

Transparency

Code developed through machine learning

+

Explainability

Can we explain ML-designed code?

...

Context

The public highway?
A distribution warehouse?
A nuclear energy facility?

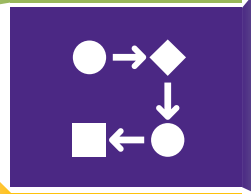
The **5 AI Principles** for building trust in AI

Safety, security, and robustness

No harm to people, things, or environment.

Transparency and explainability

Understand how AI works and why it decides.



Fairness & bias

No unfair treatment based on who you are, and free from bias.

Contestability and redress

Challenge unfair AI decisions and get help if harmed in some way.

Accountability and governance

Someone responsible for AI's actions.

AI Principles: Applied to an **AI-Automated ATM**

Safety & Robustness

- Prioritise safe separation over traffic throughput
- Reliably identify airspace infringements
- Robust to uncertainties in the data

Transparency & Explainability

- Operator documentation on application of AI
- Where, when, how?
- Explainable functions
- All actions recorded

Fairness and Equity

- Compliance with relevant regulations
- Operation in accordance with UK Rules of the Air
- Avoids unfair monopolisation of airspace

Accountability & Governance

- Clear roles and responsibilities
- Documented in Safety Management System
- Clear accountability for all actions

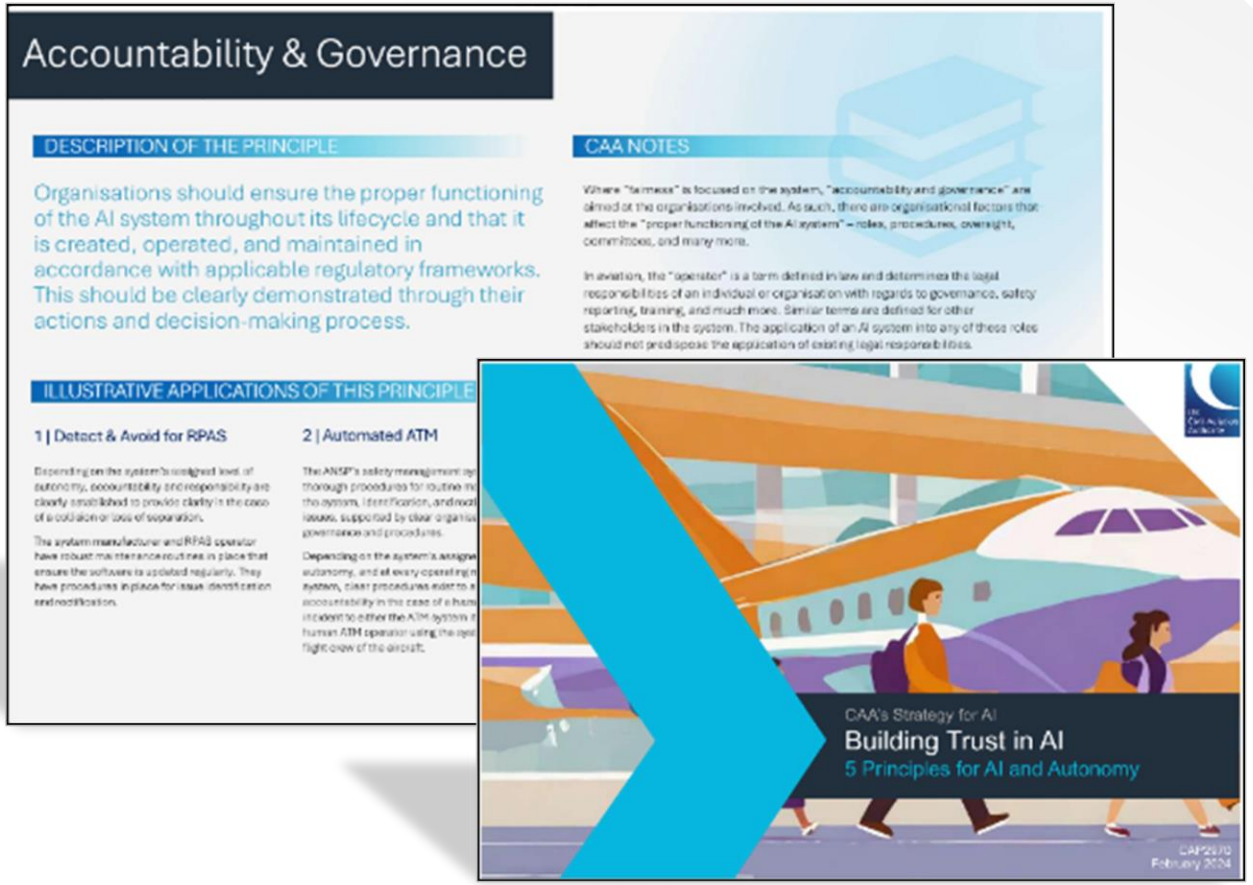
Contestability & Redress

- Clear and accessible route for raising concerns or disputes
- Disputes are prioritised over non-safety activity

BUILDING TRUST

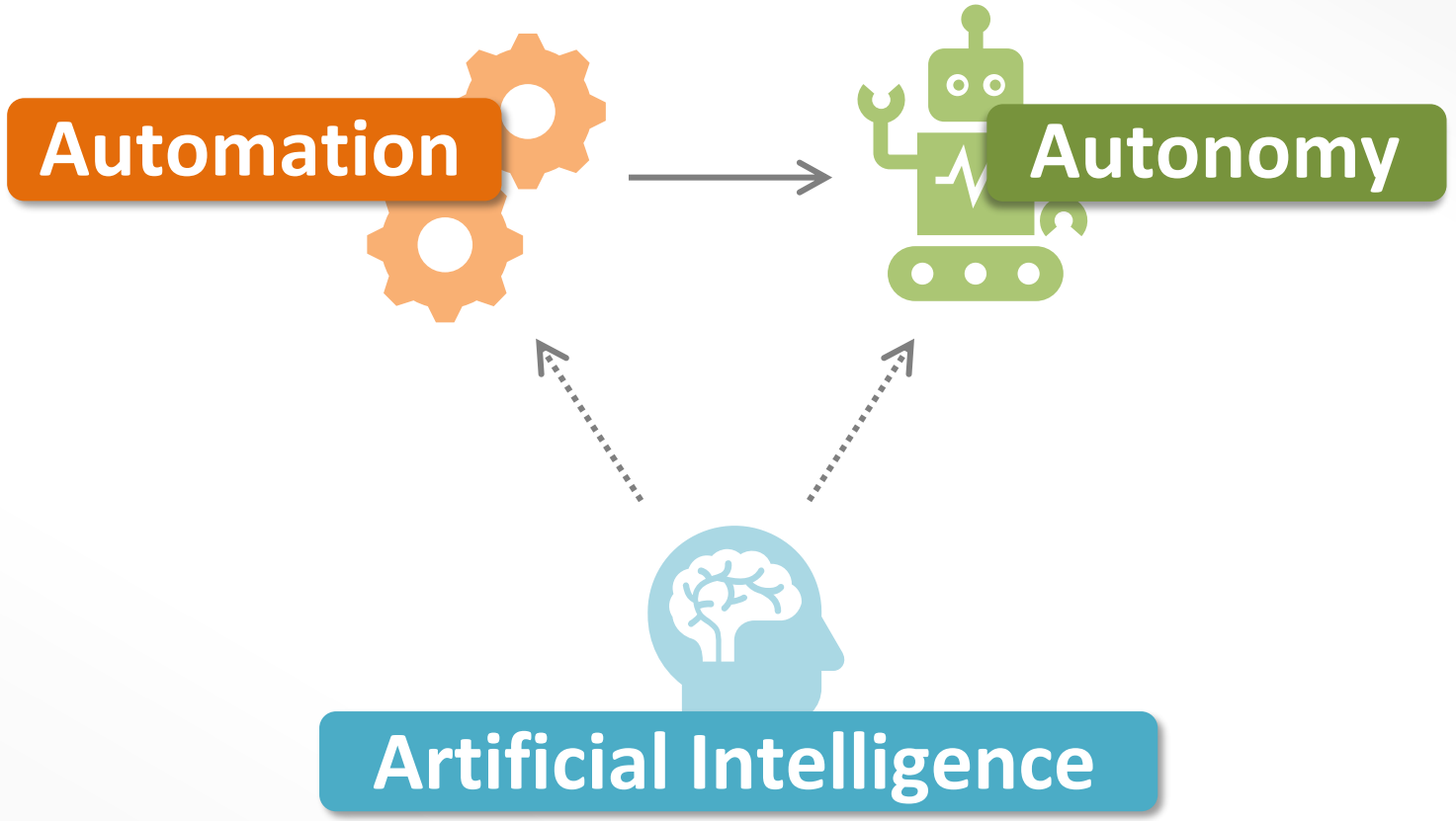
Building **trust** in aviation AI

- ✓ **Introducing 5 AI Principles** as the basis for building trust
- ✓ Describes how generic principles could be **applied**
- ✓ Outlines our **next steps**



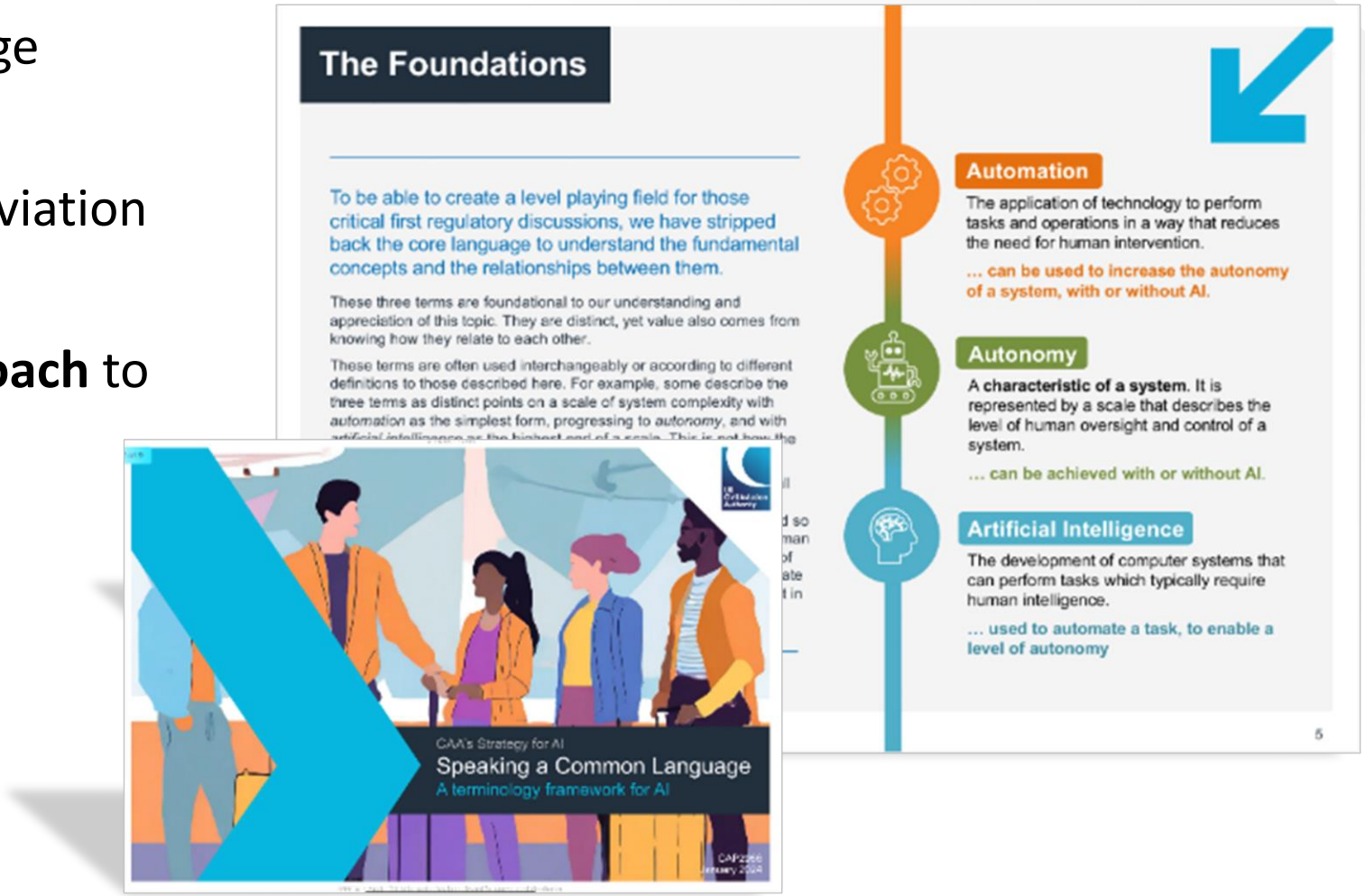
UK CAA Innovation
AI Strategy

Using a **common language**



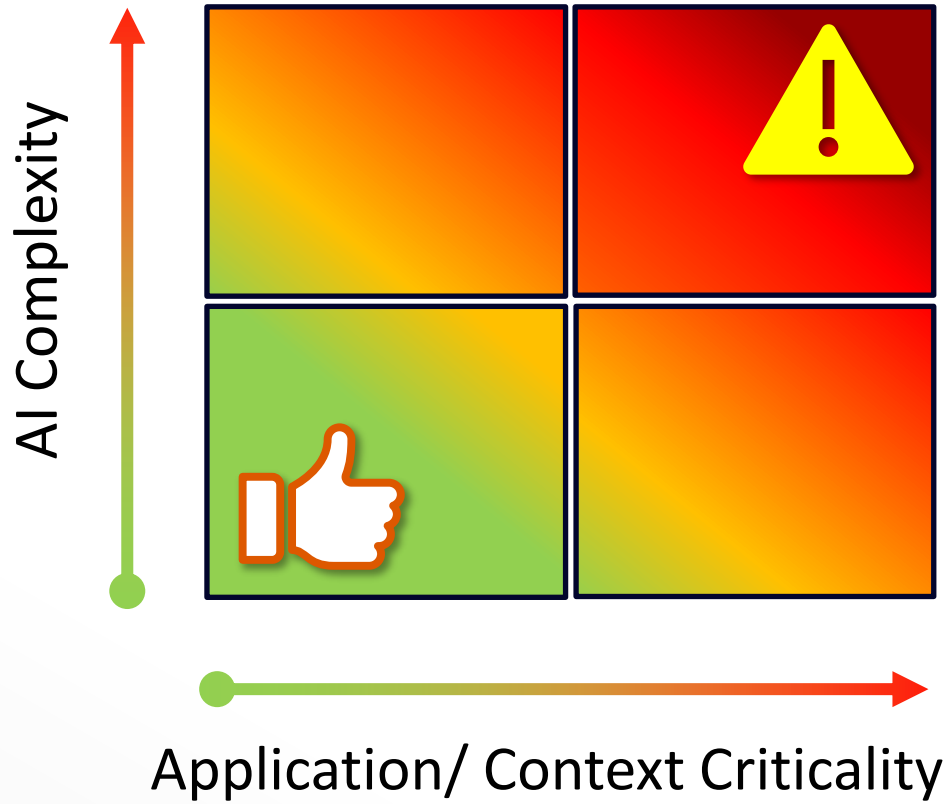
Using a **common language**

- ✓ **Clear, straightforward** language
- ✓ Alignment with **international standards** while focusing on aviation regulatory needs
- ✓ Supporting a **risk-based approach** to AI oversight

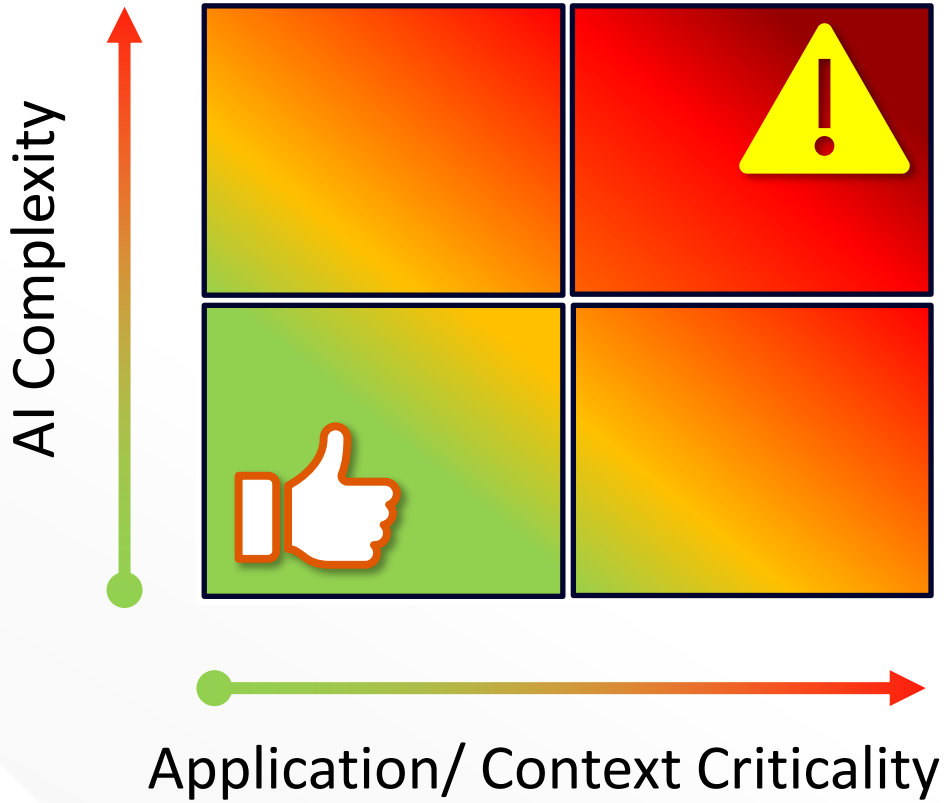


UK CAA Innovation
AI Strategy

Using a **Common Language** - But what really matters?



Using a **Common Language** - But what really matters?



Example Factors

- Safety criticality
- Domain of operation
- Voluntary or non-voluntary subjection
- Risk of externalities
- Degree of human oversight

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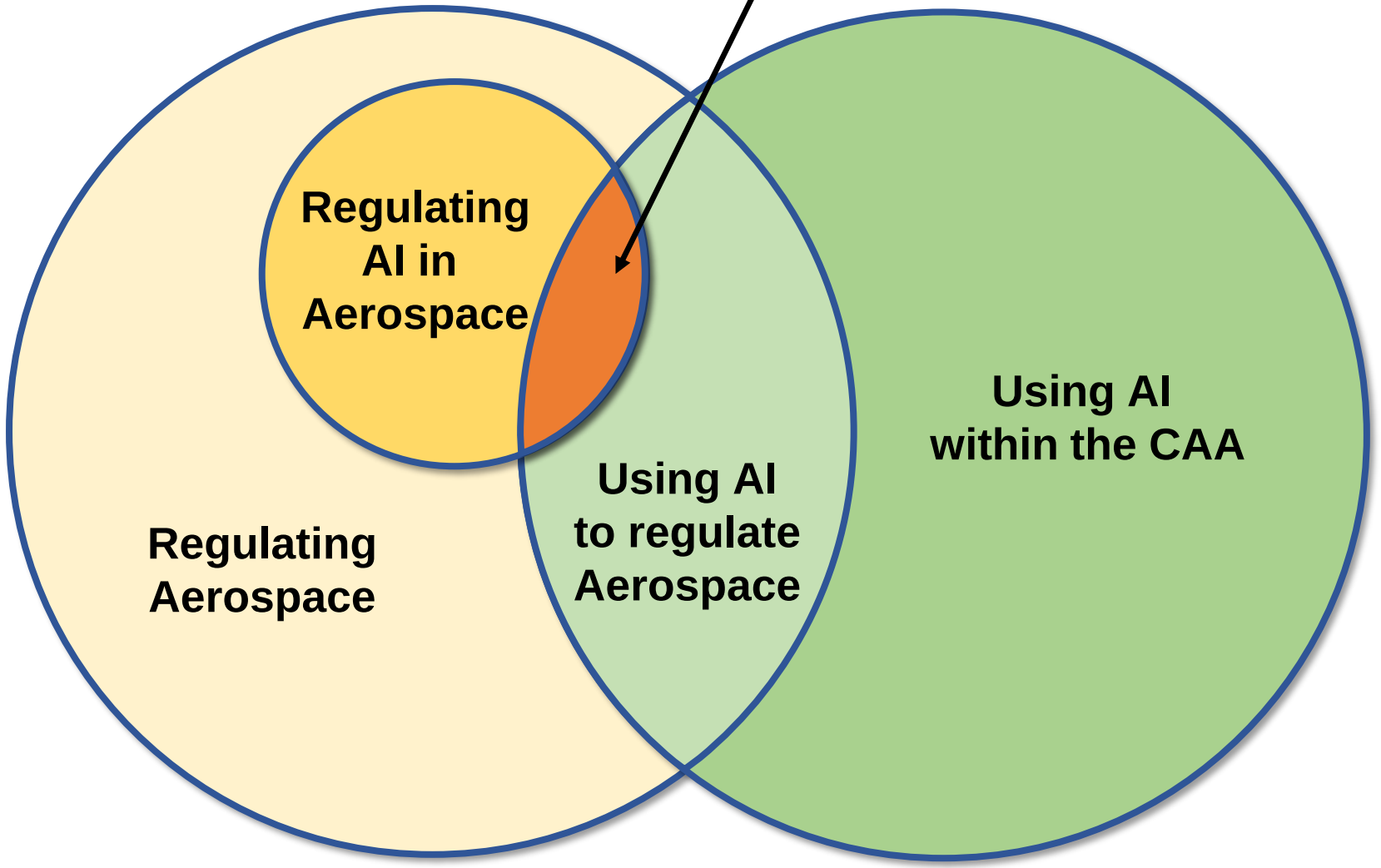
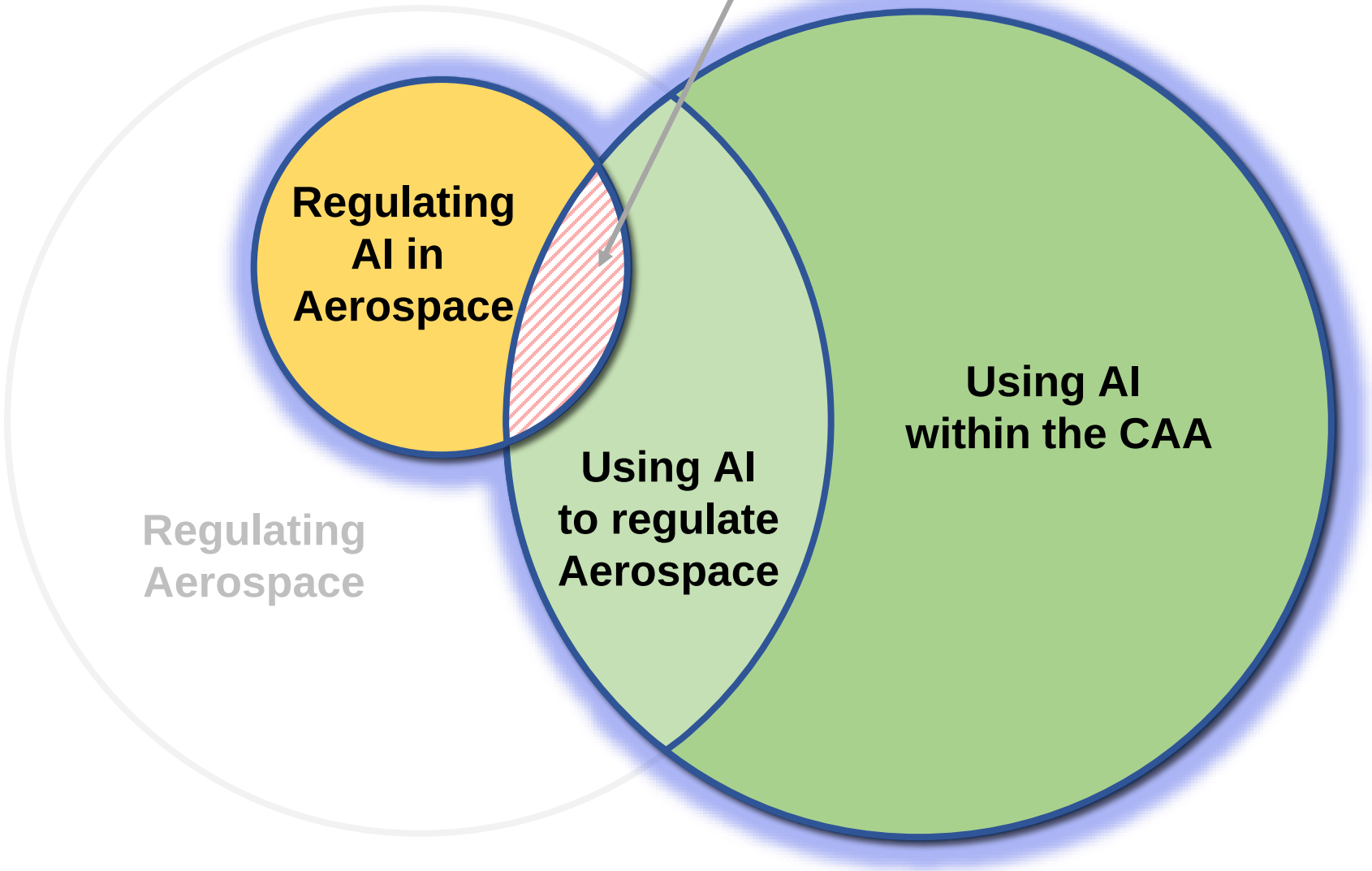
The CAA's Response to AI-Enabled Automation

The **scope** of our response to AI-enabled automation



The **scope** of our response to AI-enabled automation



Creating an AI Portfolio

Aerospace Industry

Consumers & the Public

UK Government

The CAA

Response

CAA's Response to AI-Enabled Automation

Strategies

Strategy for **Regulating AI** (Part A)

Strategy for **Using AI in the CAA** (Part B)

Portfolio

Safety

Security

Consumer

Environment

Regulatory use

Business use

Everyday use

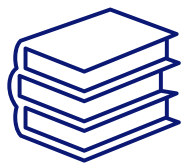
Legal Framework for **Aviation Autonomy**

Law Commission
Reforming the law

UK Civil Aviation Authority

A review of the law around **autonomous flight**, to support the safe development of rapidly advancing technology

Current aviation laws



Future of Flight

Drones
Electric Vertical Take-off
Traffic Management

Recommendations for reform

Legal Framework for **Aviation Autonomy**

Law Commission
Reforming the law

UK Civil Aviation Authority

A review of the law around **autonomous flight**, to support the safe development of rapidly advancing technology

Rules of the Air

Rely on human judgement and interpretation.

How can autonomous systems be accommodated?

Liability Frameworks

As the human's role shifts from pilot, to remote operator, to overseer.

Where is responsibility attributed when things go wrong?

Legal Framework for **Aviation Autonomy**

Law Commission
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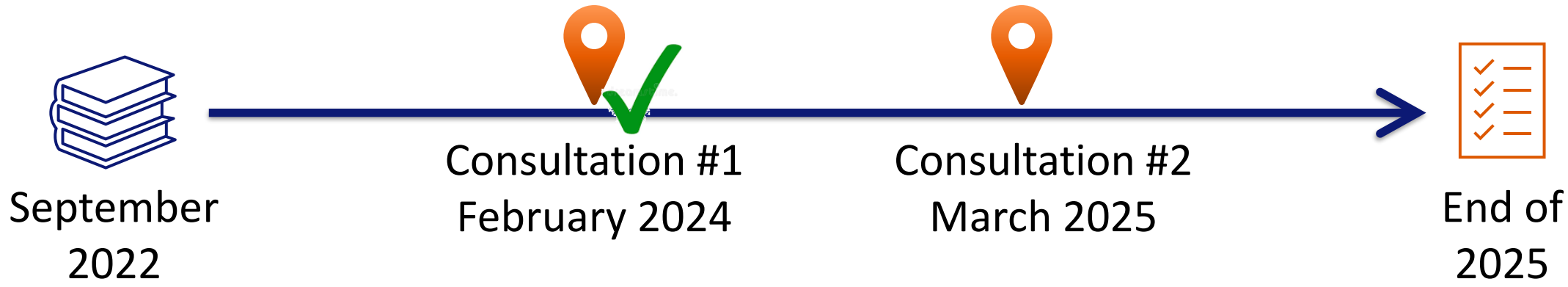
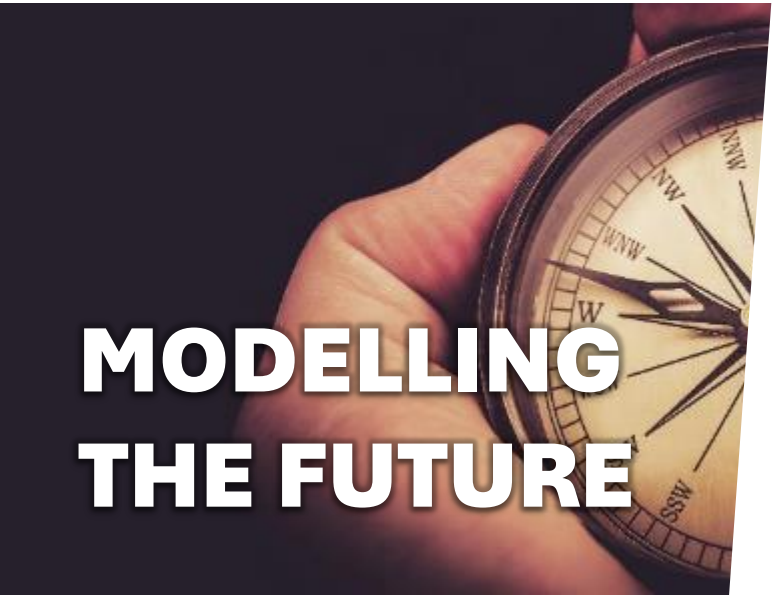
A review of the law around **autonomous flight**, to support the safe development of rapidly advancing technology



Using AI within the CAA

Using AI within the CAA



ANALYSING
DATA

MODEL
THE FUTURE

DECISIONS

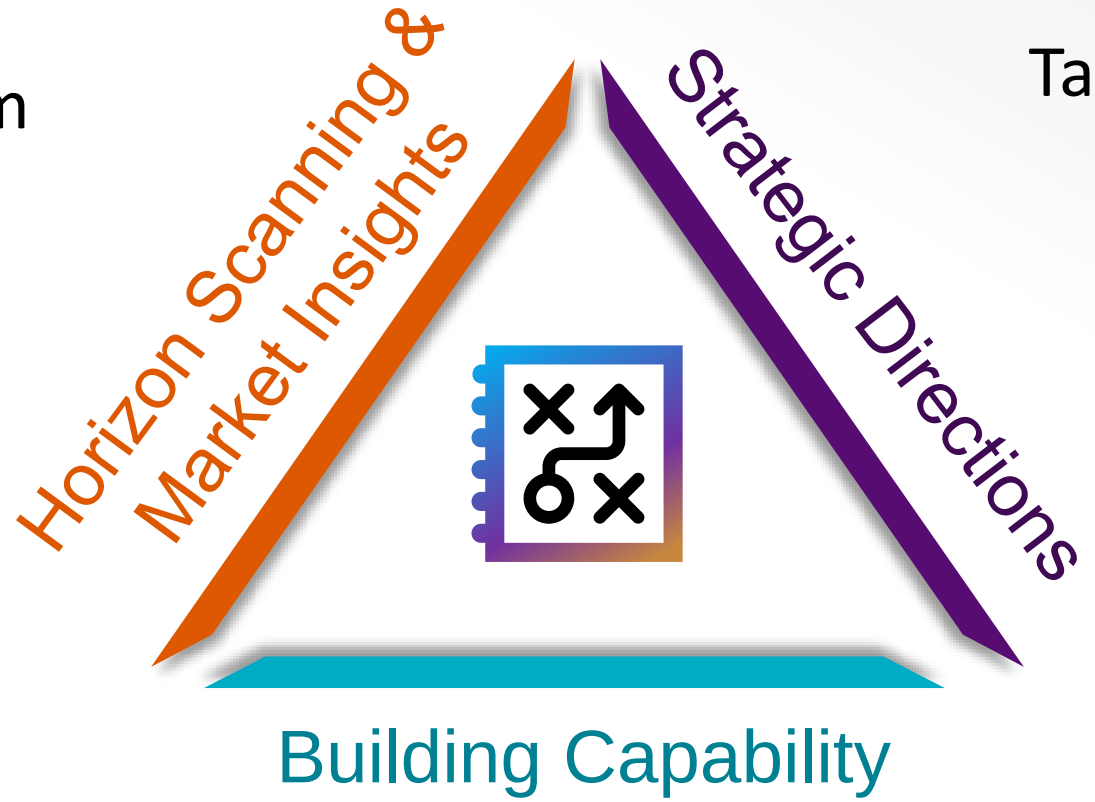
AGING
KNOWLEDGE

Improving Communication & Engagement

AI tools provide new ways to **inspire people** and communicate important messages.

NotebookLM

Evidence to inform and influence the strategy



Targeted action prioritised by market & strategy

Implementation in 2025/26 across 3 areas

Ensuring the UK CAA has the right skills and resources needed

ICAO

Aviation Authorities

Collaboration is critical

Industry

The public

Research Institutions

Government

Consumers

UK Civil Aviation Authority

Launching the UK CAA's

Response to AI-Enabled Automation

28th November 2024

UK Civil Aviation Authority

Thank you for listening – let's talk...

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caa.co.uk/AI