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Welcome to the EASA AI Days 2025 High-Level Conference

27th – 28th August 2025

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Welcome to the EASA AI Days 2025 High-Level Conference

Janet Northcote

EASA Head of Communications

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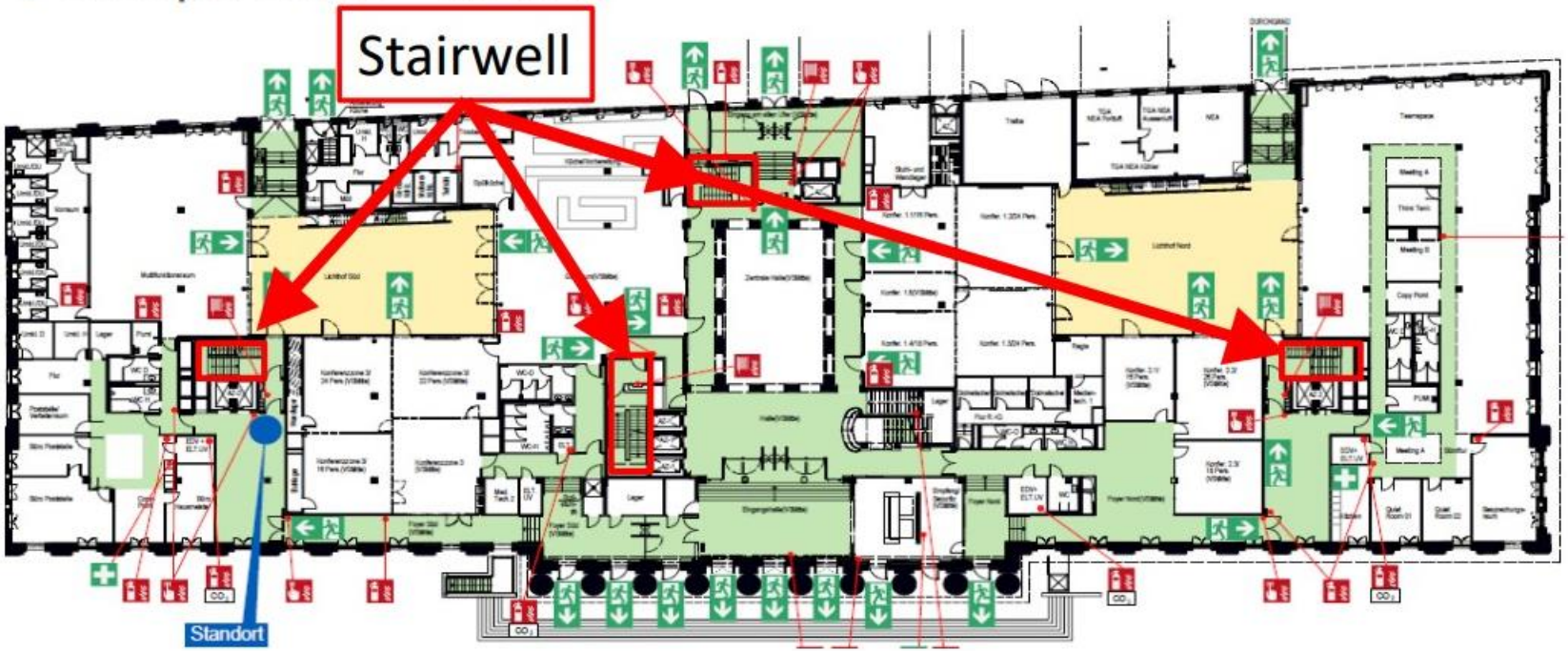
Evacuation instructions “EASA Direktion”

→ Emergency procedure

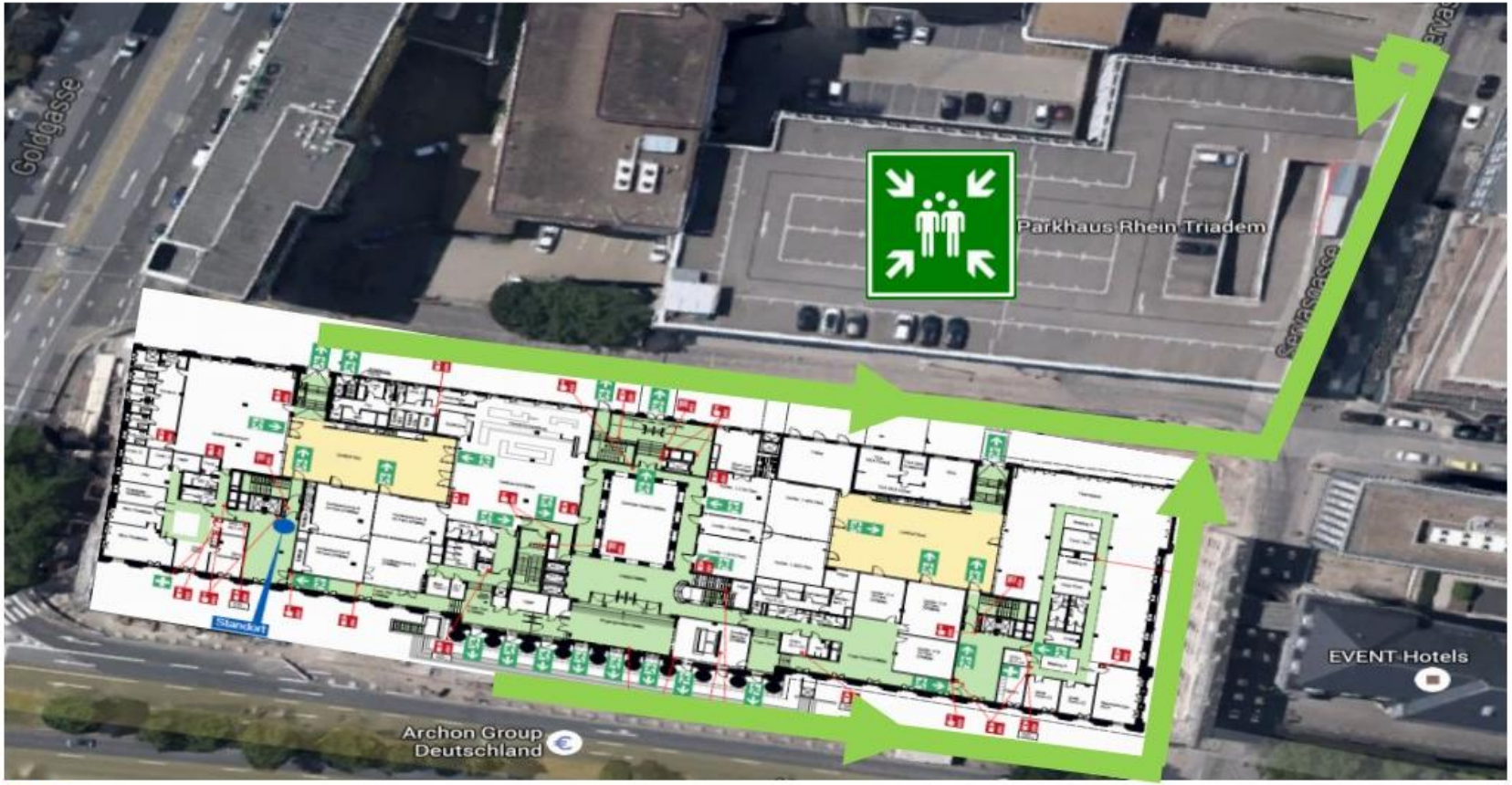
- → Alarm (acoustical & visible)
  - → With voice announcement (en/de) in the conference rooms
  - → Without announcement in the other areas)
- → Warn other employees and visitors!
- → Use the marked escape routes!
- → Do not use the lifts!
- → Do not return to your workplace!
- → The following emergency team member also take a vest and help to evacuate the building

Evacuation instructions “EASA Direktion”

→ Escape route – floor 0



Evacuation instructions “EASA Direktion”



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EASA AI Days 2025
Opening Speech

Maria Rueda
EASA Director - Safety Management
Sustainability and Global Outreach

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EASA AI Days 2025
Keynote Speech

Christine Berg
EC DG MOVE, Head of Unit – Aviation Safety

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EASA AI Days 2025
Status of the EASA AI Roadmap implementation

Guillaume Soudain
EASA AI Programme Manager

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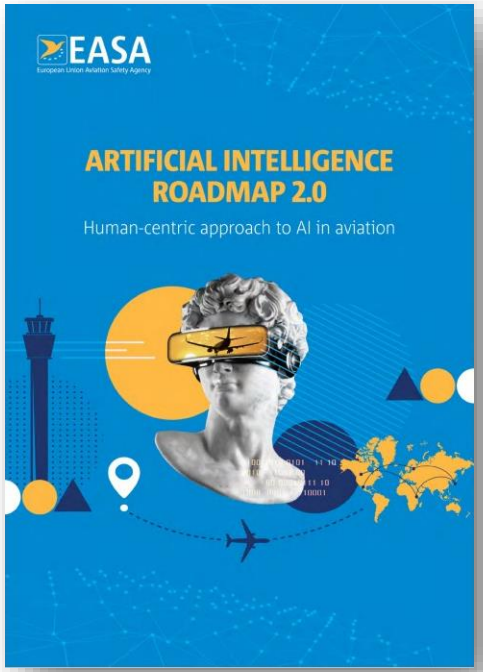
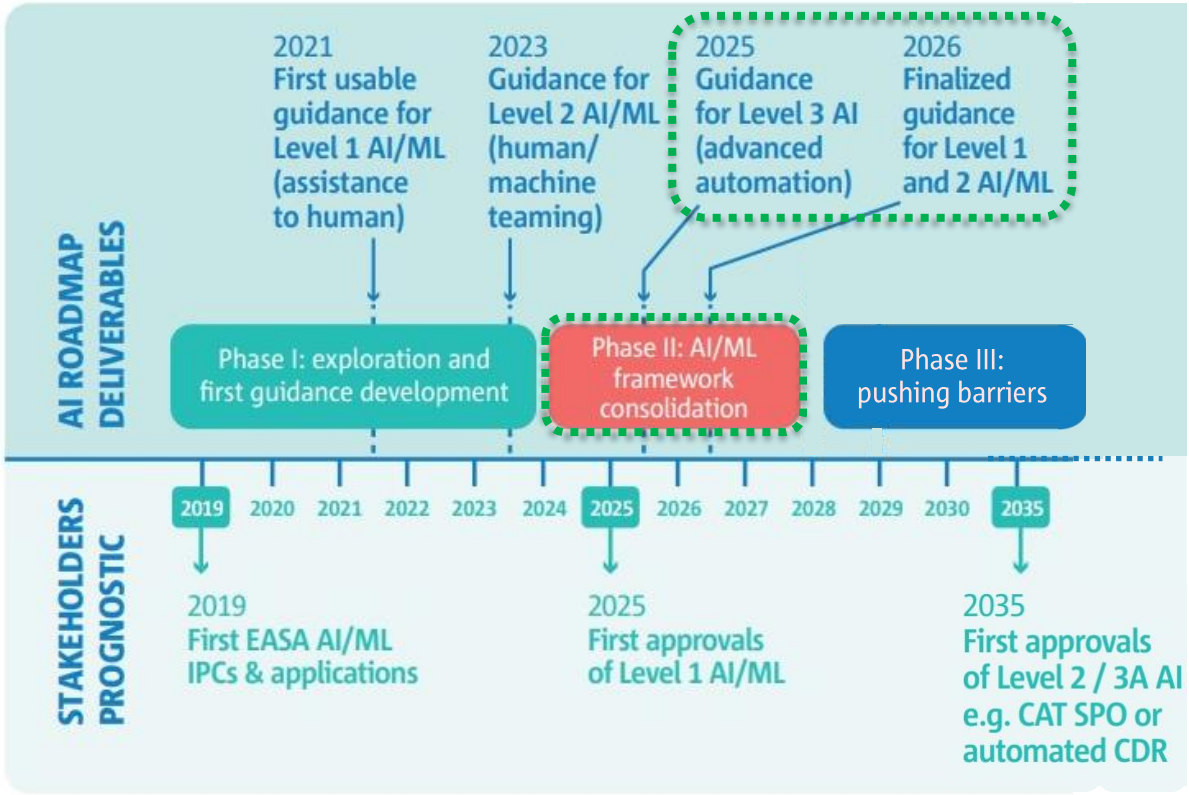
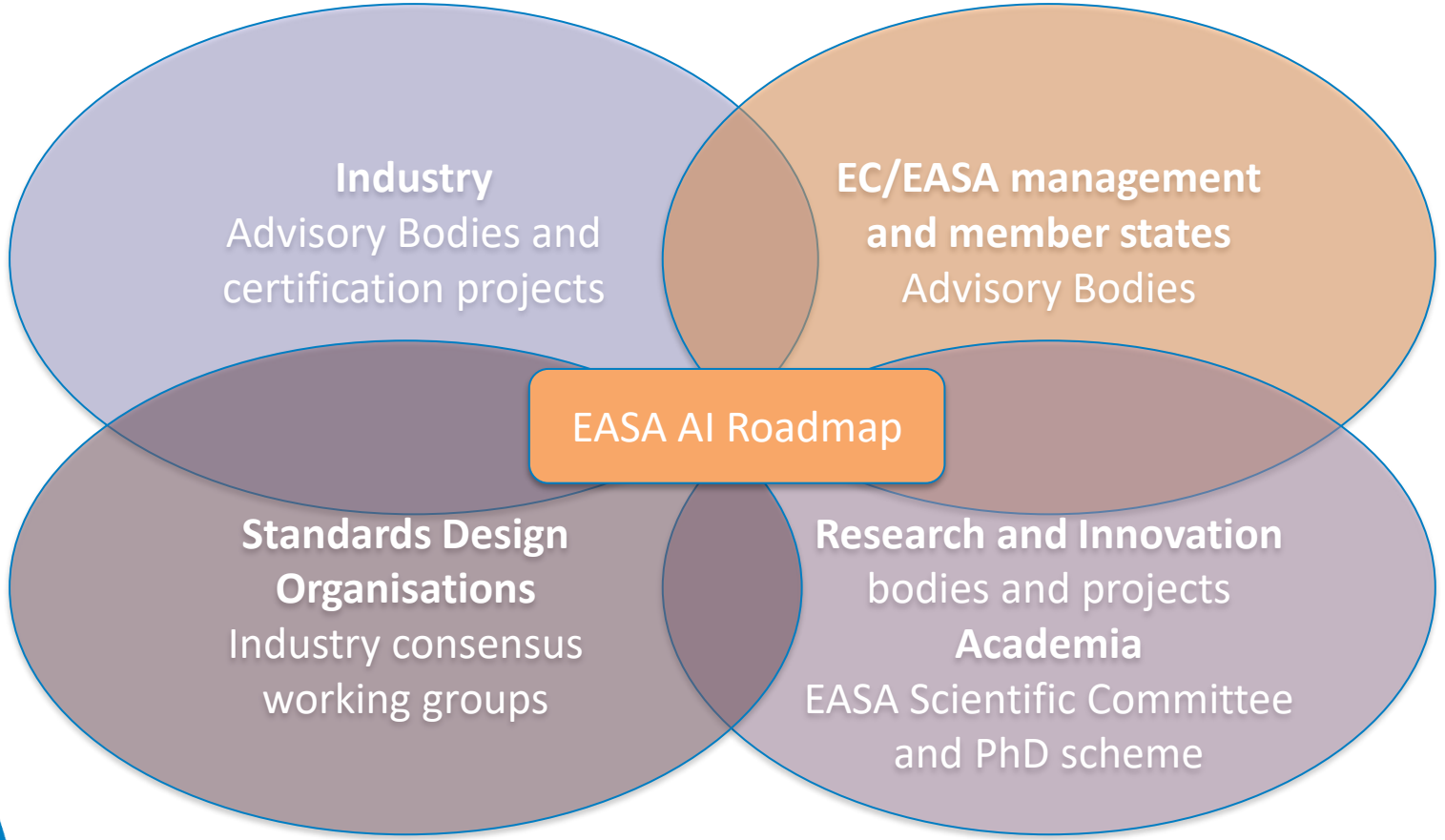
AI Roadmap 2.0: pursuing the consolidation phase





AI = Artificial Intelligence ML = machine learning

A collaborative approach to AI in Aviation



EASA AI trustworthiness framework applicability

Published on 6 th March 2024
https://easa.europa.eu/ai

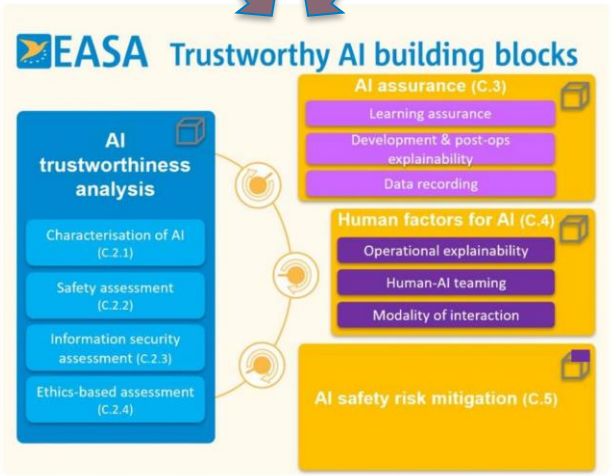
Domain-specific regulations: risk-based determination of need for AI trustworthiness (= high-risk AI)

Case 1: Product/equipment certification or conformity assessment

Case 2: AI-based tool used by an approved organisation

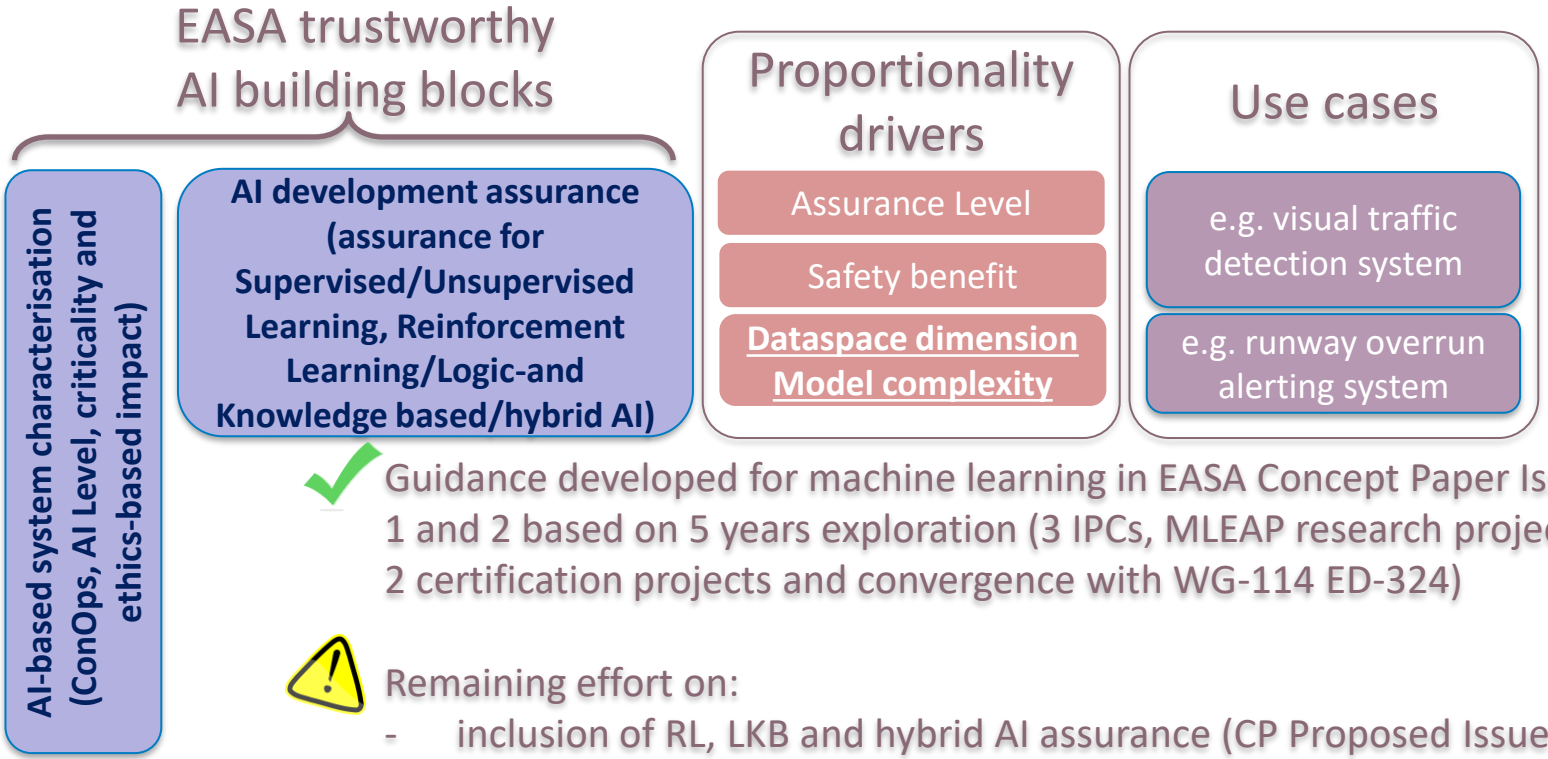
presenting a risk and without independent verification

presenting no risk or operations independently verified



No need for qualification / AI trust-worthiness

Deliverables and challenges : AI Assurance



Guidance developed for machine learning in EASA Concept Paper Issue 1 and 2 based on 5 years exploration (3 IPCs, MLEAP research project, 2 certification projects and convergence with WG-114 ED-324)

Remaining effort on:

- inclusion of RL, LKB and hybrid AI assurance (CP Proposed Issue 03)
- proportionality for low dimensional / low complexity models
- inclusion of service experience appraoch.

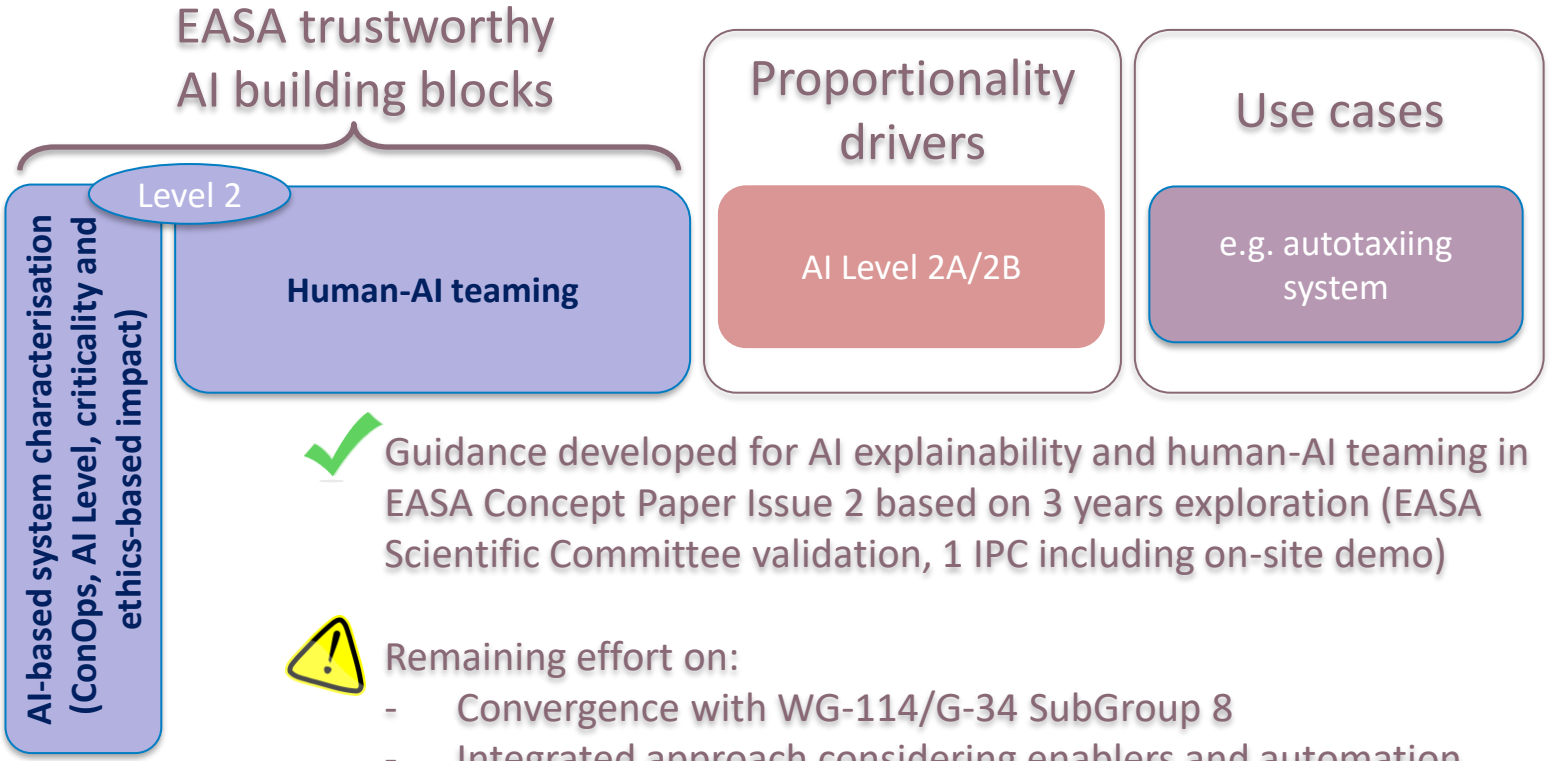
Assurance Levels and safety benefit concept

→ Progressive anticipated certifications on the example of initial airworthiness:

→ Inclusion of a safety benefit concept in the Risk Assessment AMC material in RMT.0742 AMC and in Concept Paper Issue 03:

- → **Lowering DAL by one level in case of substantiated safety benefit** of the AI-based system compared to existing operations
- → Example application: runway incursion detection system based on on-board or ground-based camera.

Deliverables and challenges: Human-AI teaming



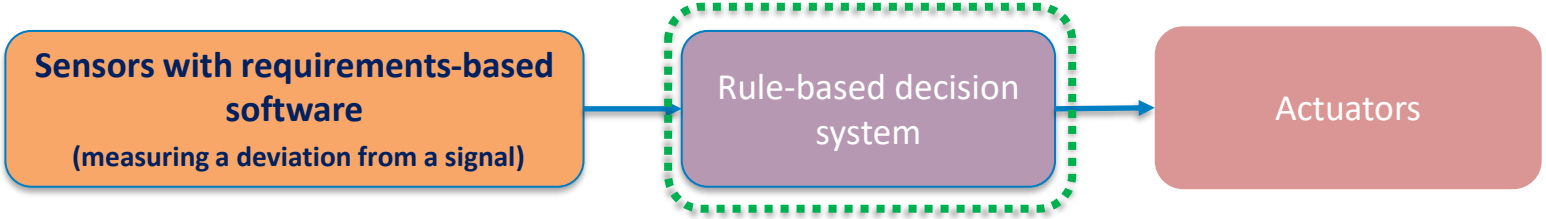
Guidance developed for AI explainability and human-AI teaming in EASA Concept Paper Issue 2 based on 3 years exploration (EASA Scientific Committee validation, 1 IPC including on-site demo)

Remaining effort on:

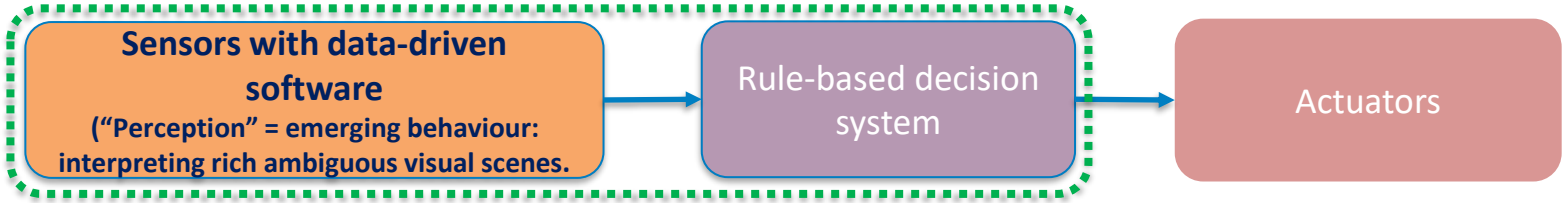
- Convergence with WG-114/G-34 SubGroup 8
- Integrated approach considering enablers and automation

Requirements-based sensors vs AI-based perception

Case 1: Sensors with requirements-based software (full tracing to code/output)

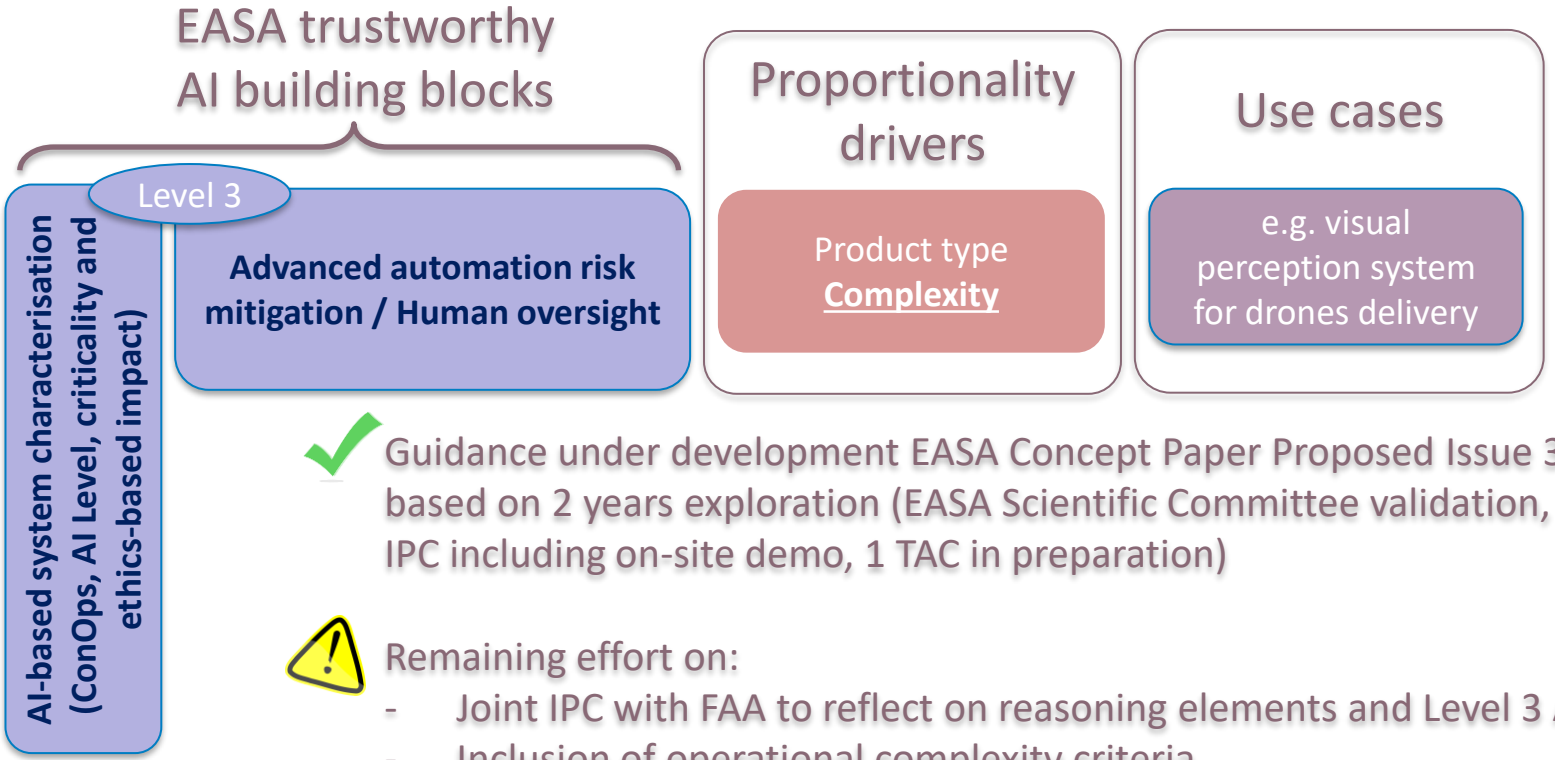


Case 2: Sensors with data-driven software (breach in traceability, semantic interpretation)



With AI/ML-enabled automation (e.g. visual autoland system), enablers and automation are probabilistically entangled: the safety case of one is meaningless without the other.
This is why the roadmap cannot be split: only a joint, integrated approach ensures adequate requirements and safety.

Deliverables and challenges: delegated oversight



Guidance under development EASA Concept Paper Proposed Issue 3 based on 2 years exploration (EASA Scientific Committee validation, 1 IPC including on-site demo, 1 TAC in preparation)

Remaining effort on:

- Joint IPC with FAA to reflect on reasoning elements and Level 3 AI
- Inclusion of operational complexity criteria

Perspectives and next steps

- → Roadmap consolidation phase: the next two years will be decisive!
  - → Publication of the first WG-114/G-34 standard for machine learning is expected in 2026
  - → Recognition through an AI trustworthiness AMC and deployment in the relevant domains should follow by end 2027.
  - → Publication of Proposed Issue 03 of the EASA AI Concept Paper will enable the technical scope extension and advanced automation guidance, preparing next RMT.0742 steps through an extension of the RMT scope (additional subtasks).

- → This should secure a first stable regulatory state, unless new AI breakthroughs emerge in the meantime…

- → “Pushing barriers” phase 3 will then take over to consider
  - → Completing extension of the RMT scope and
  - → removing limitations, in particular in criticality and in adaptivity.

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EASA AI Days 2025

Coffee break – 10:00 to 10:30

www.sli.do

 # aidays2025

Passcode: kd7z53

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EASA AI Days 2025
AI trustworthiness for Aviation: AI Assurance

François Triboulet
Project Manager ‘AI Assurance’

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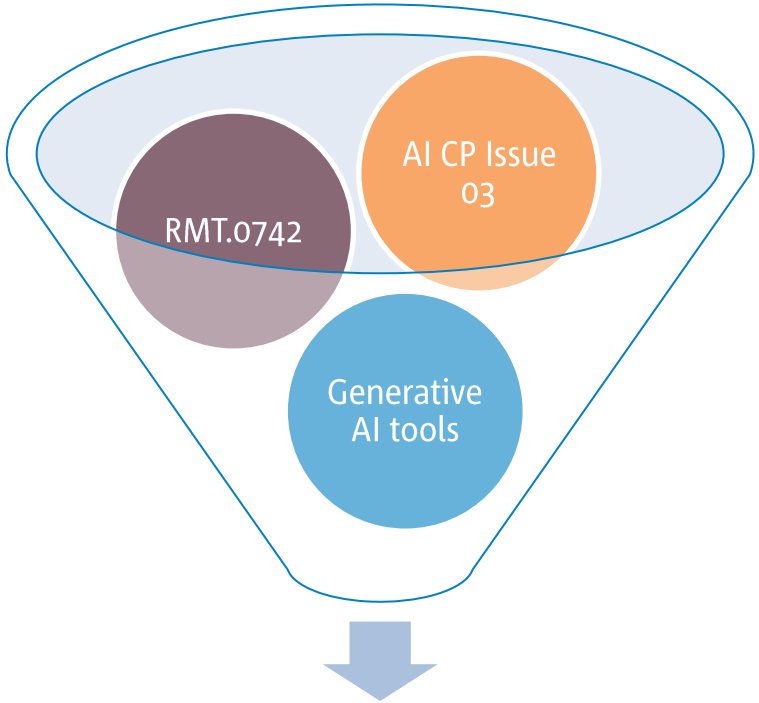
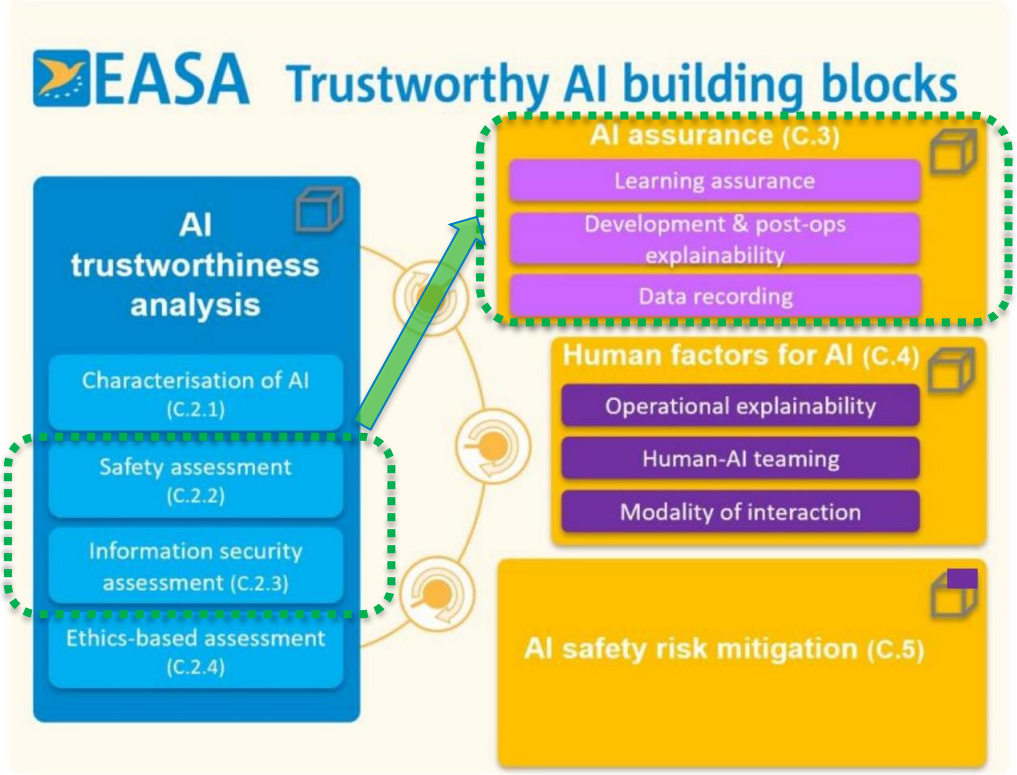
AI Roadmap ‘consolidation phase’ overview

- → Rulemaking
  - → RMT.0742
- → Continued exploration
  - → AI Assurance technical scope
  - → Human factors for AI
  - → Ethics-based assessment
  - → Advanced automation
- → Generative AI and tools
  - → Operational use



EASA AI trustworthiness framework consolidation

Risk assessment

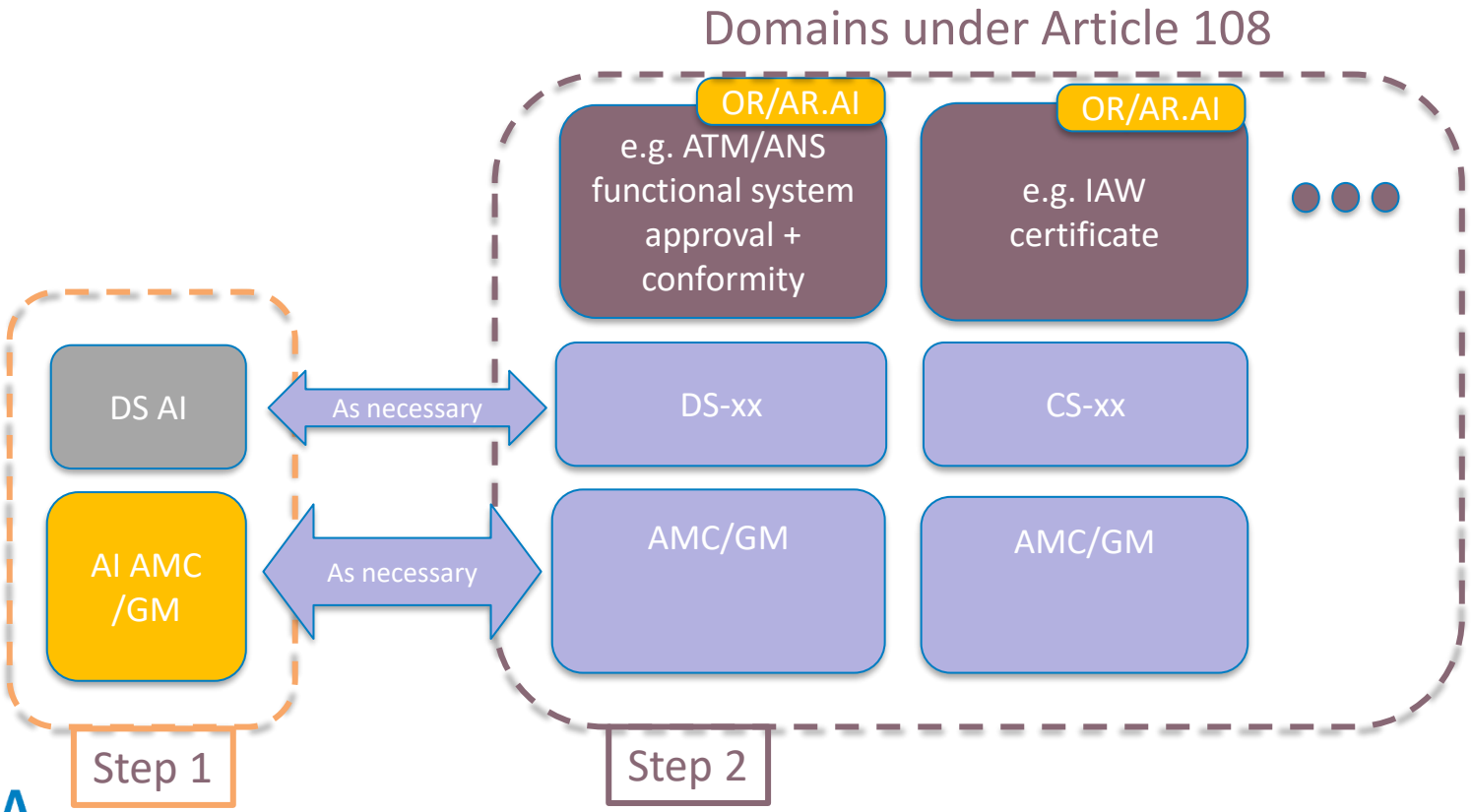


AI/ML intended behaviour

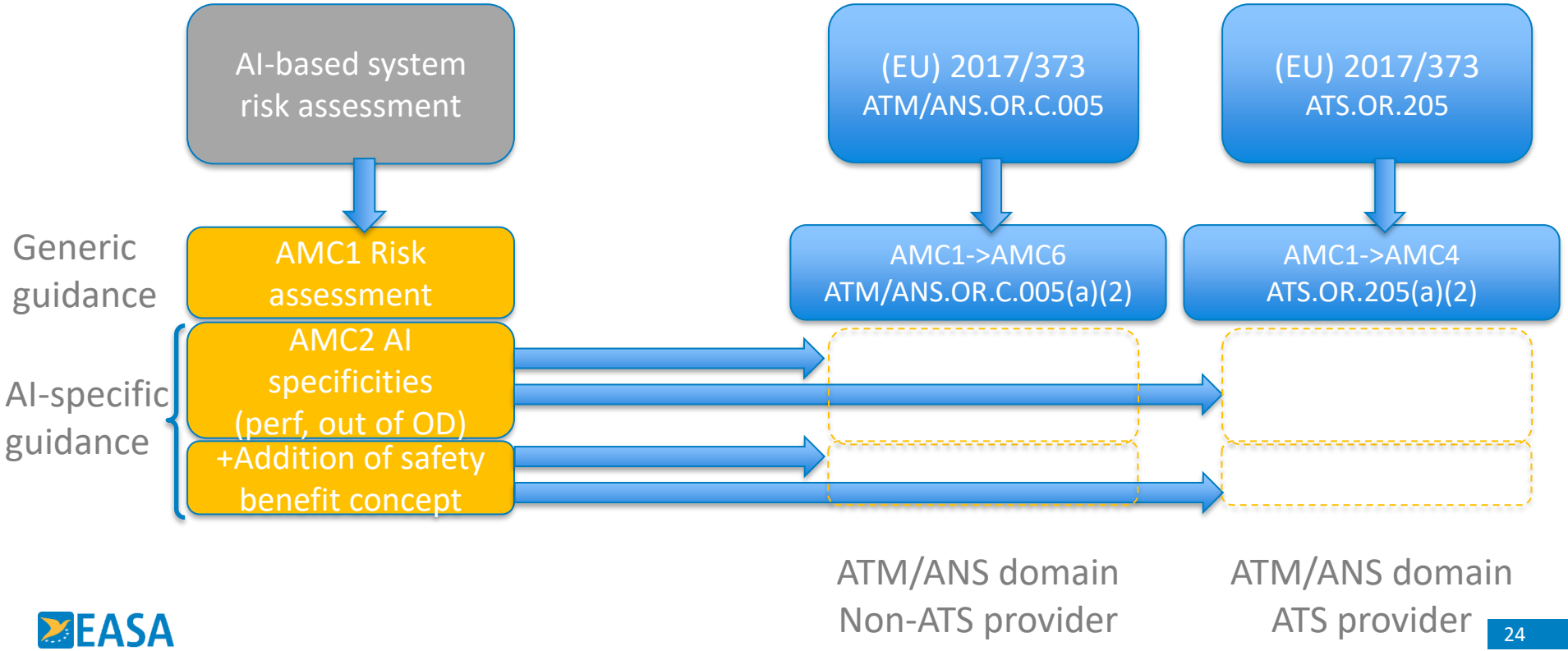
Continuous SA

Figure 3 — EASA AI trustworthiness building blocks

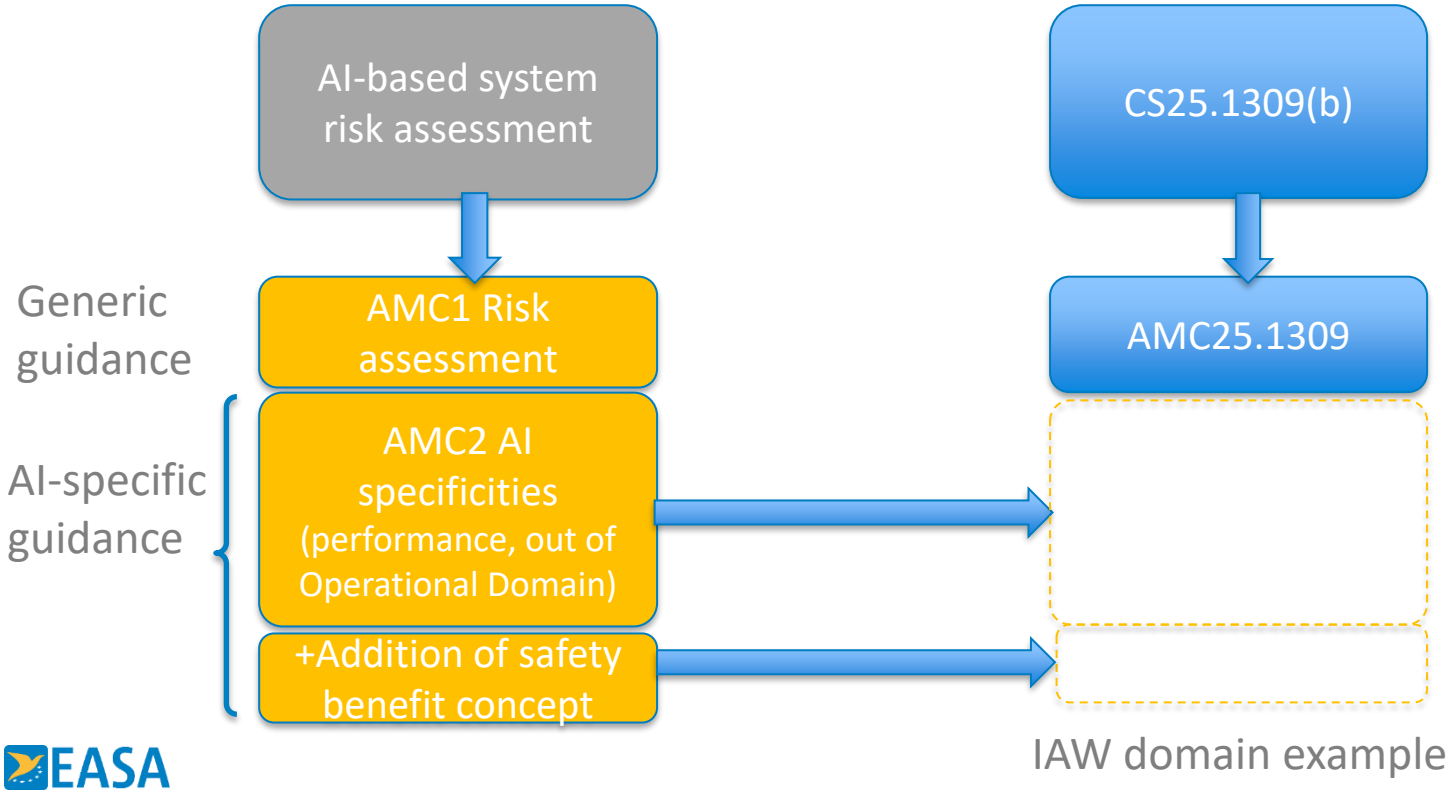
AMC structure from the rulemaking proposal



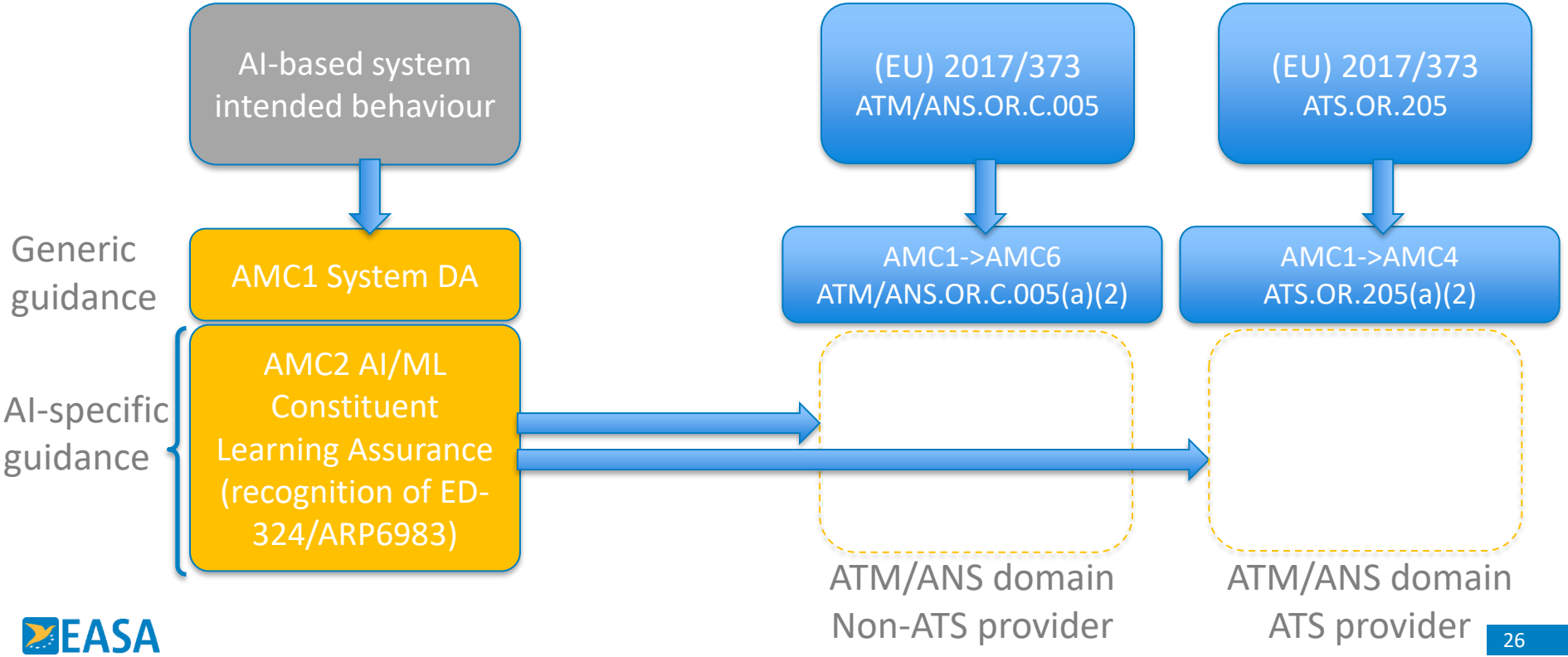
Anticipated AMC structure: Risk assessment (1/2)



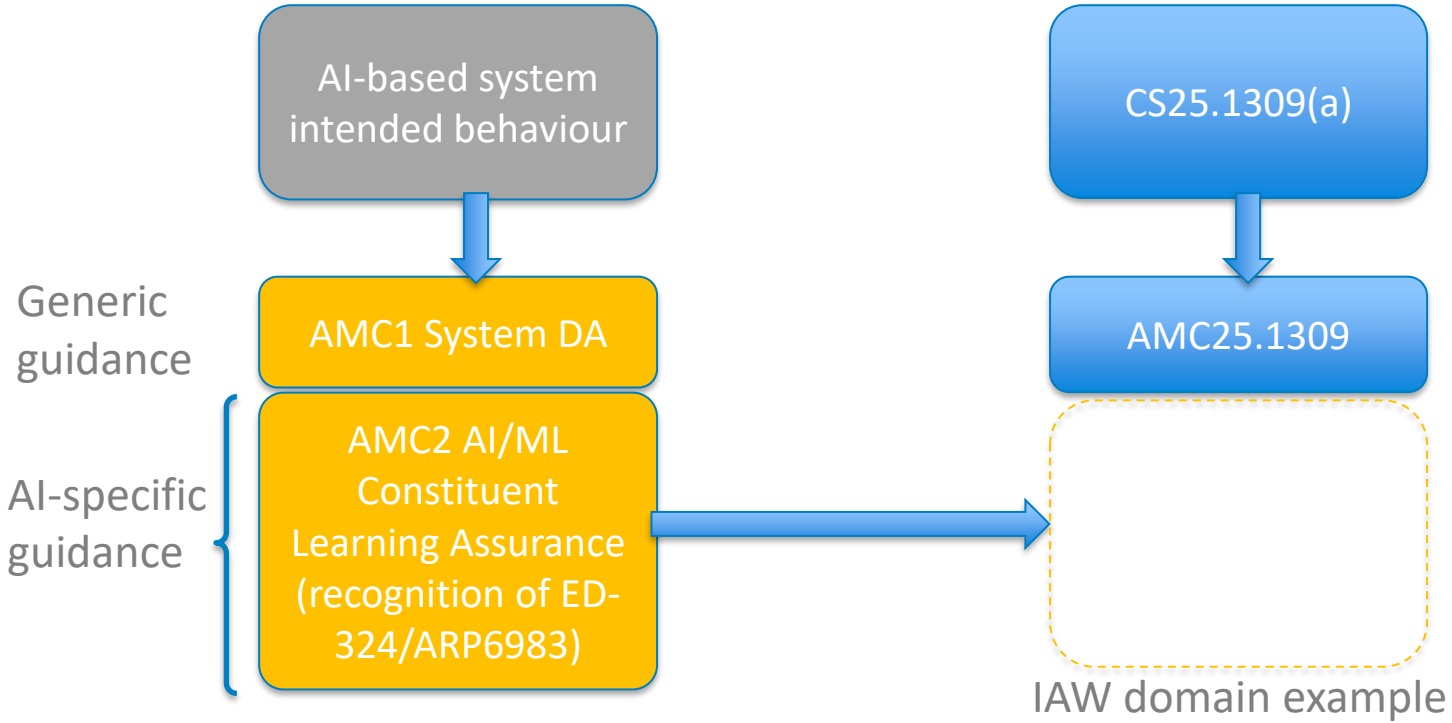
Anticipated AMC structure: Risk assessment (2/2)



Anticipated AMC structure: Development Assurance (1/2)

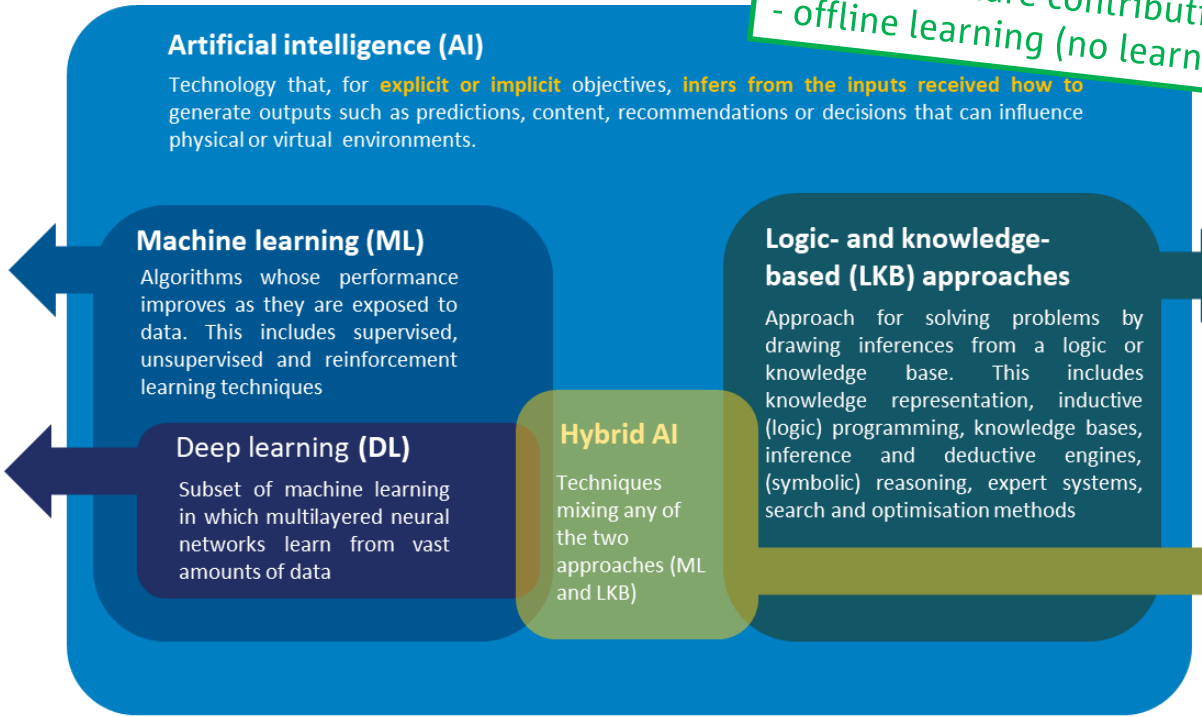


Anticipated AMC structure: Development Assurance (2/2)



Scope extension in Concept Paper Issue 03

Scope limited to a safe subset:
- ≤ major failure contribution*
- offline learning (no learning in operations)



E.g. Regression analysis or clustering

E.g. Computer vision (CNNs) or natural language processing (RNNs)

E.g. knowledge representation and reasoning system

E.g. neuro-symbolic reasoning, Physics Informed Neural Networks (PINN), or Large Language Models (LLM)

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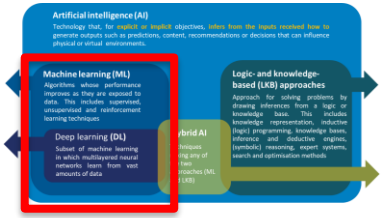
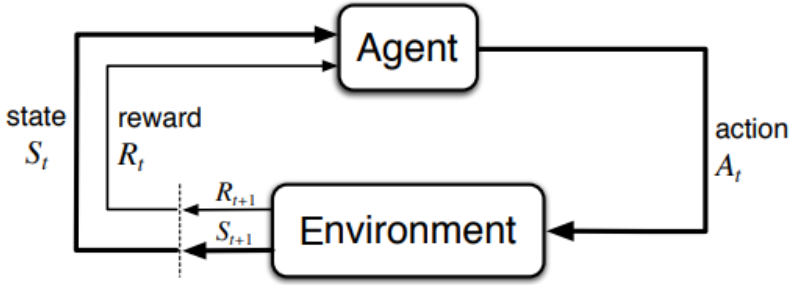
* Or limited to minor or no safety effect for certain technologies

Reinforcement Learning in control systems

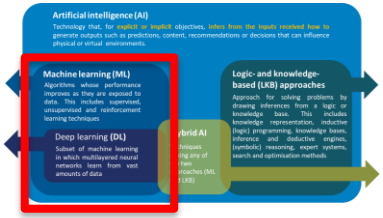


- Most of RL solutions implement the Markov Decision Process (MDP) paradigm

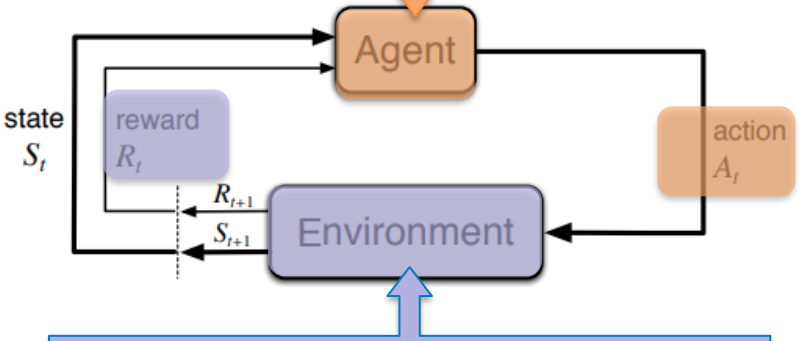


- RL is significantly different from Supervised Learning (SL)
  - Sequential decision making
  - Trial and error
  - Not only data, but based on scenarios
- Specific context for the aviation industry
  - No online learning (model frozen before the inference model is in operation)

Additional assurance considerations with RL



Defining, implementing, and managing an agent which will be robust to and capable of generalizing to unseen scenarios comes with another set of challenges.



Defining, implementing, and managing a simulated environment for reinforcement learning that closely mirrors the real world can be quite challenging.

Complexity and scaling: number of variables describing the OD, including dependencies.

Uncertainty: The OD is full of uncertainty and randomness.

Sensing and perception: simulating the capabilities of sensors.

Resilience to 'concept drift': Be ready to simulate evolving OD.

Reward engineering: Designing a reward function that is representative of the appropriateness of the action taken.

Mono vs Multi-agent Environments: selecting between mono vs multi agent (cooperating or competing) solution.

Action Space Design: Continuous vs discrete vs mix discrete/continuous.

Partial observability: limitations on the situation representation of the agent.

Balancing Exploration and Exploitation: Identifying the right strategy for exploration vs exploitation.

Conformal prediction: ensuring predictions or decision advisories are acceptable by the end user.

Sim-to-real gap challenges

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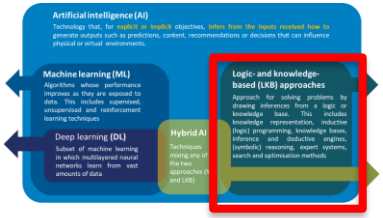
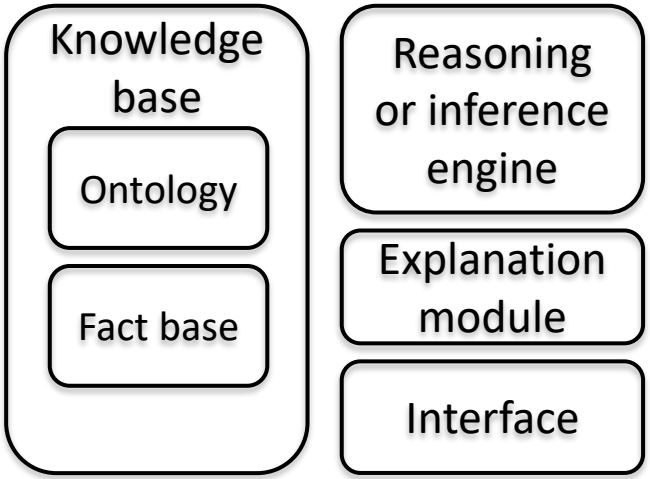
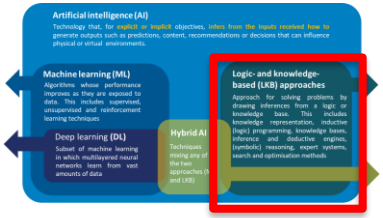
Logic- and Knowledge-based AI (LKB)



→ The following could be a representation of the logical architecture of AI-Based systems implementing LKB solutions:

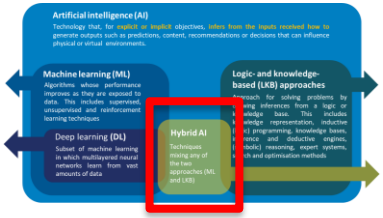


Challenges with Logic- and Knowledge-Base (LKB)



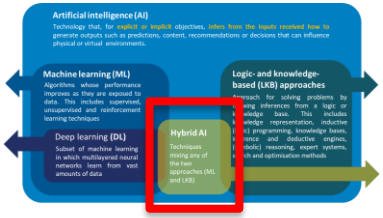
- → LKB comes with its specific challenges that are quite different from ML:
  - → Identify the boundary for the LKB AI versus approved traditional systems.
  - → Knowledge Representation: accurately and comprehensively representing the domain knowledge in a way that the reasoning (or inference engine) can utilize effectively.
  - → Complexity and Scalability: Manage the computational complexity that arises from reasoning over large and complex logic- or knowledge-bases. Such systems can be particularly sensitive to the combinatorial explosion of possibilities when reasoning.

Hybrid AI



- By nature, Hybrid AI covers many different situations
  - Mixing ML technologies or mixing ML with LKB
    - Among these architectures, some attention should be given to PINNs (or Physics Informed Neural Networks)
  - LLM (Large Language Models)
    - With their extensions for ‘agentic AI’ dedicated to specific aviation domains
    - Some attention should be given to techniques such as:
      - RAG, or Graph RAG,
      - or even fine-tuning of general purpose LLM

Challenges with Hybrid AI



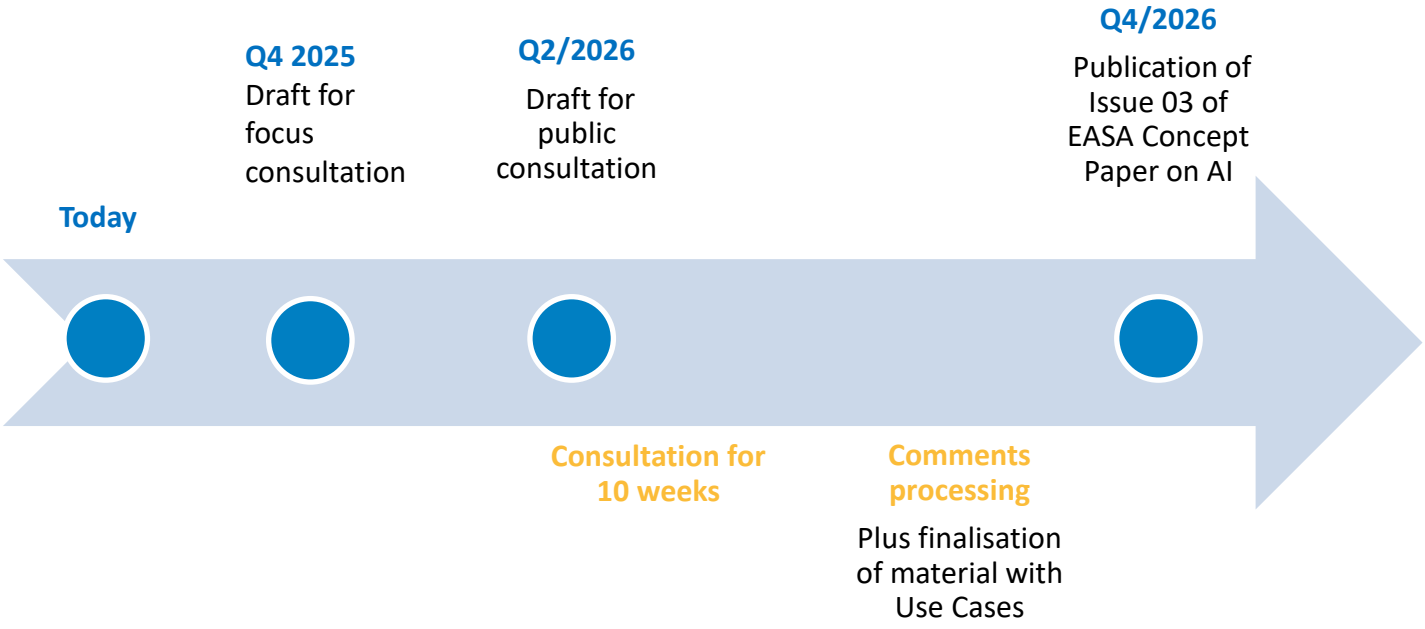
- Large Language Models (LLM) usage comes with (dedicated) challenges:
  - The challenges identified for ML and LKB will largely apply
  - Emergent behavior and unexpected outputs (with a subtype also referred to as “hallucination”)
  - Missing guidance for ‘large COTS’ approaches.

Perspectives

- Re-use of the main objectives related to the « characterisation of the AI application »!
  - Identification of the high-level task,
  - Identification of the ConOps and OD.

- Benefit from industry prospective Use Cases as well as research groups
  - Reinforcement Learning use cases from the SESAR programme,
    plus other use cases from the ATM/ANS domain (industry and research)
  - Logic- and Knowledge-based use cases from SESAR
  - LLM use case for safety critical application(s).

Timeline for Issue 03 of EASA AI Concept Paper



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EASA AI Days 2025
AI trustworthiness for Aviation: Human Factors for AI

Renée Pelchen-Medwed
Project Manager ‘Human Factors for AI’

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EASA AI trustworthiness framework

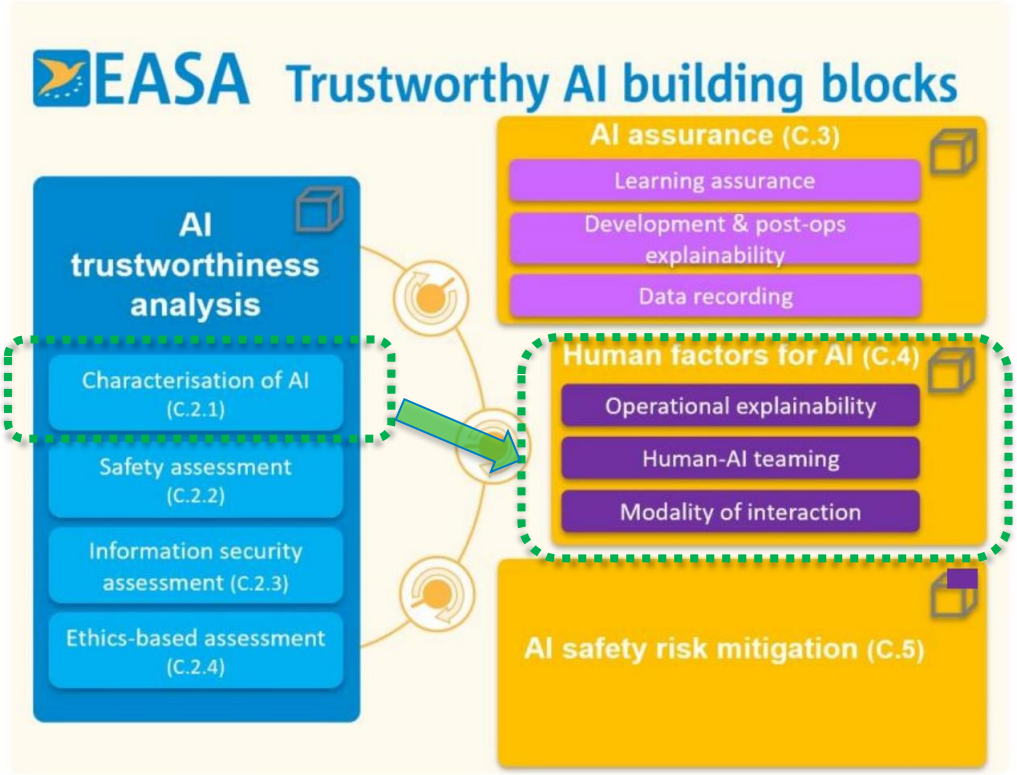


Figure 3 — EASA AI trustworthiness building blocks

Classification of AI-based systems

No automatic decision-making at high-level task

Increasing Automation with cooperation or collaboration

Advanced automation

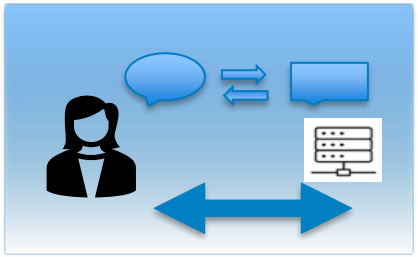
AI level	Function allocated to the system to contribute to the high-level task	Authority of the end user
Level 1A Human augmentation	Automation support to information acquisition	Full
	Automation support to information analysis	Full
Level 1B Human assistance	Automation support to decision-making	Full
Level 2A Human-AI cooperation	Directed decision and automatic action implementation	Full
Level 2B Human-AI collaboration	Supervised automatic decision and action implementation	Partial
Level 3A Safeguarded advanced automation	Safeguarded automatic decision and action implementation	Limited, upon alerting
Level 3B Non-supervised advanced automation	Non-supervised automatic decision and action implementation	Not applicable

Increased authority of the machine

Human AI Teaming objectives in Concept Paper Issue 02

→ Situation awareness/ Situation representation

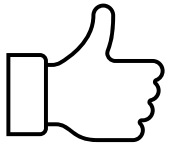
→ Validation



→ Spoken natural language

→ Spoken procedural language

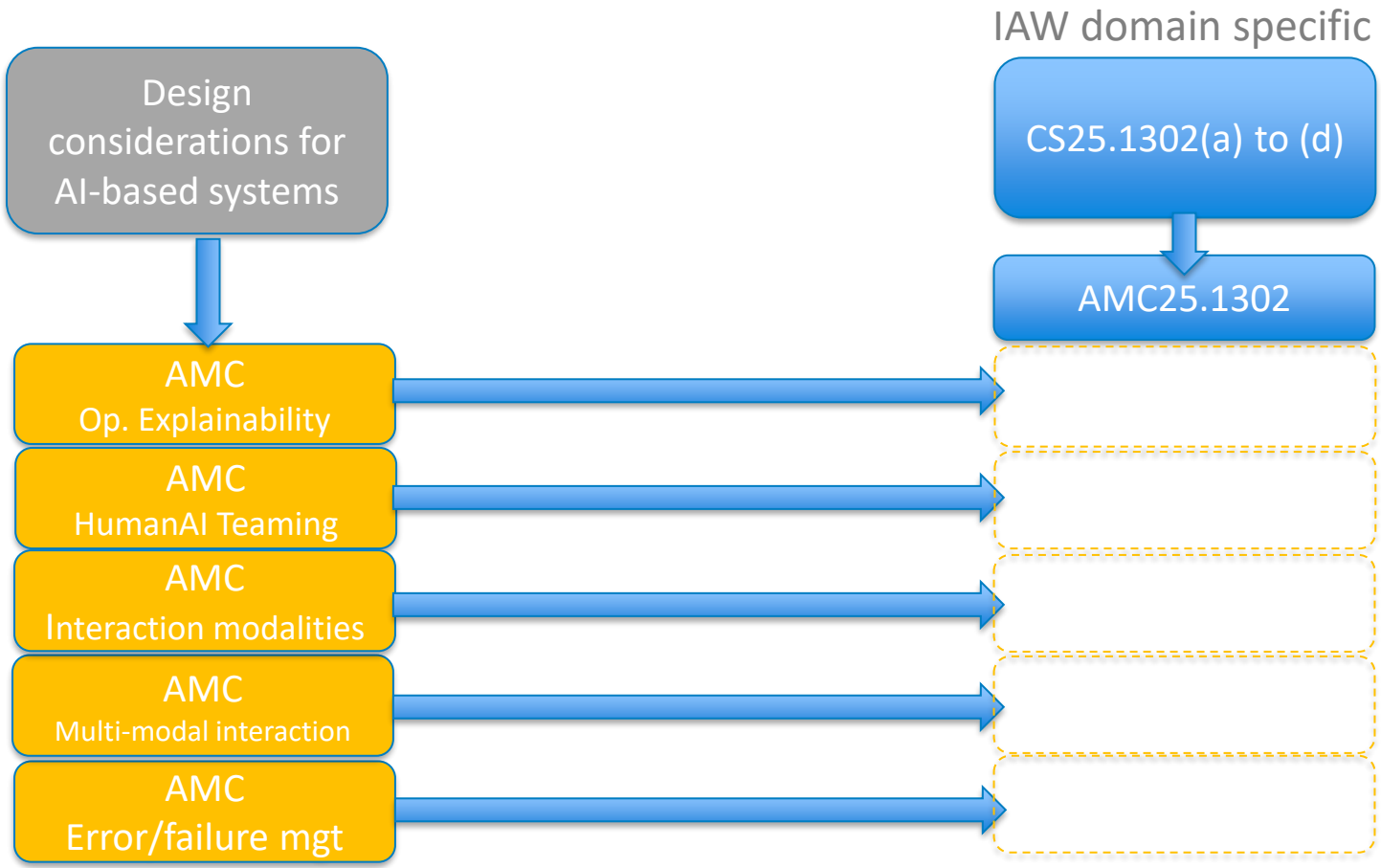
→ Gesture language



→ Multimodal interaction

→ Error/failure management

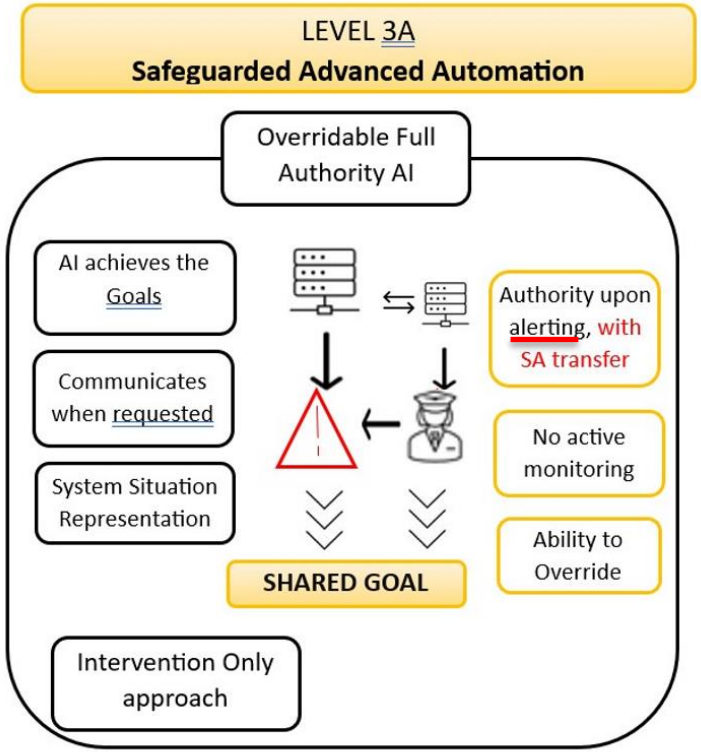
Anticipated AMC structure (Human Factors for AI)



Level 3 AI in Concept Paper ‘Proposed Issue 03’

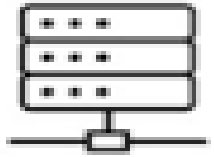
- **Level 3 AI** concerns “**advanced automation**”: the use of systems that, under specified conditions, **functions without human intervention**

- It is not to be mixed with “**autonomy**” which characterises a **system that is capable of modifying its intended domain of use or goal without external intervention, control or oversight,** and for high-risk systems is not compatible with EU AI Act Article 14!



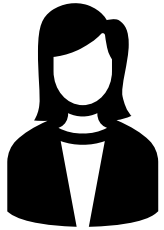
SA = Situation Awareness

HF consideration in AI level 3A



ALERTING

Design considerations: Easy to detect, Understandable, acknowledgeable, …



Can assess consequences; detect degradation of the system , …

Situation representation

Situation awareness

Communication

Intervene/ override/ switch off in a timely manner

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AI trustworthiness for Aviation: Ethics-based assessment

Ines Berlenga
Project Manager ‘Ethics for AI’

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EASA AI trustworthiness framework

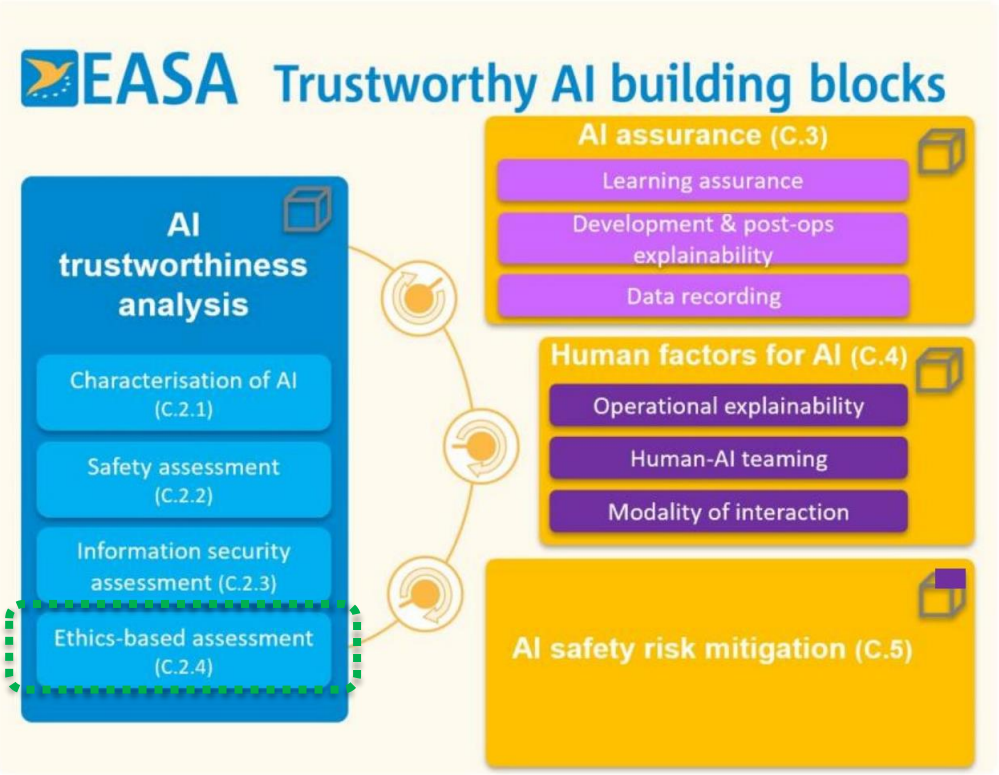
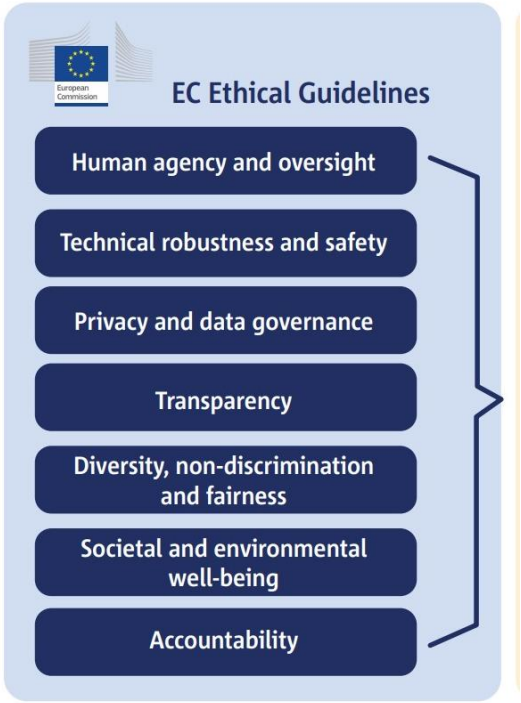


Figure 3 — EASA AI trustworthiness building blocks

What was our starting point?

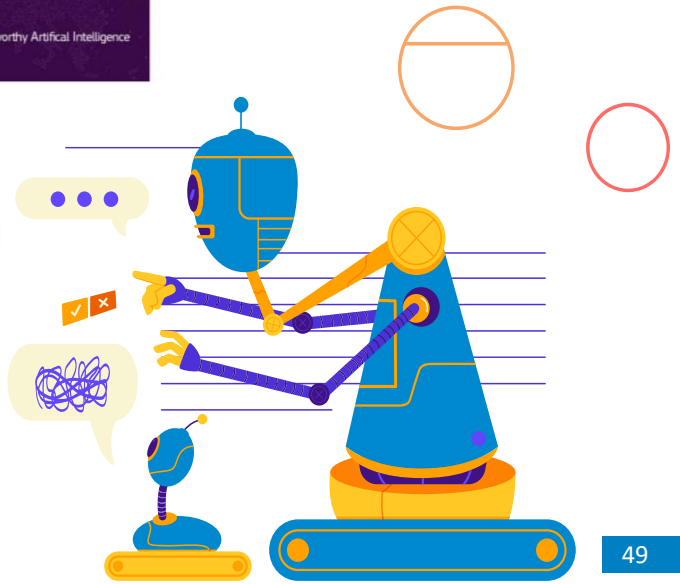
Assessment List for Trustworthy Artificial Intelligence (ALTAI) for self-assessment



Related topics

Artificial intelligence

Advanced Digital Technologies



Chapter 2 Article 9

Risk management system health and fundamental rights

…risks ***that the high-risk AI system can pose to health, safety or fundamental rights when the*** high-risk AI system ***is used in accordance with its intended purpose;***

Chapter 2 Article 10

Data and data governance

…data governance and management…(b) **data collection processes and the origin of data, and in the case of personal data, the original purpose of the data collection**;

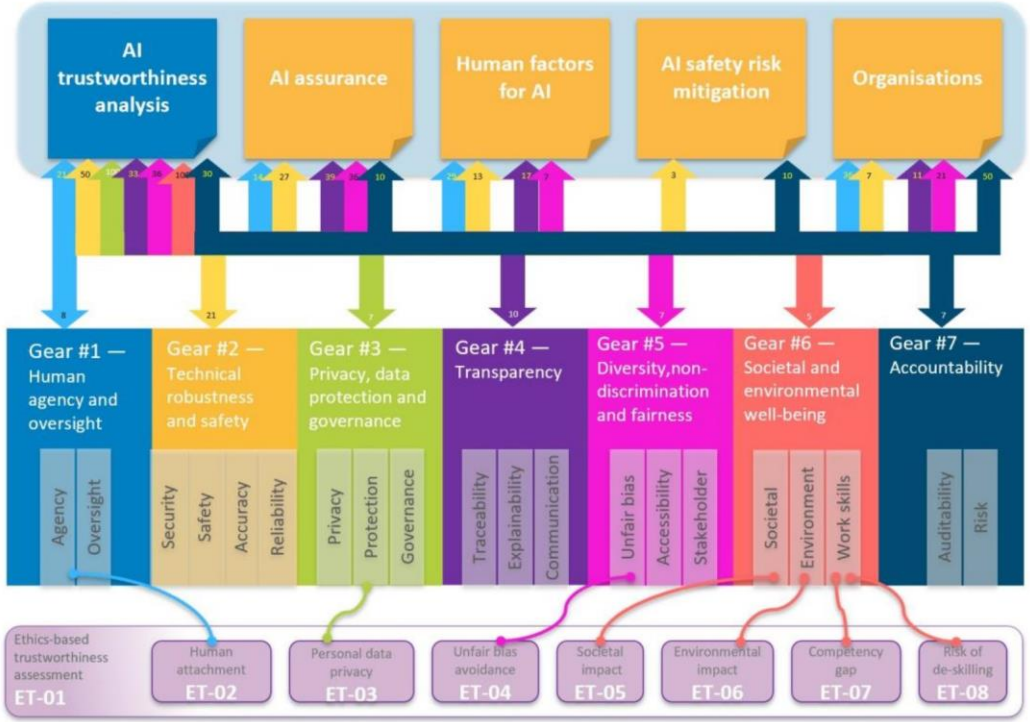
(f) examination in view of possible biases that are likely to affect the health and safety of persons, have a negative impact on fundamental rights or lead to discrimination…

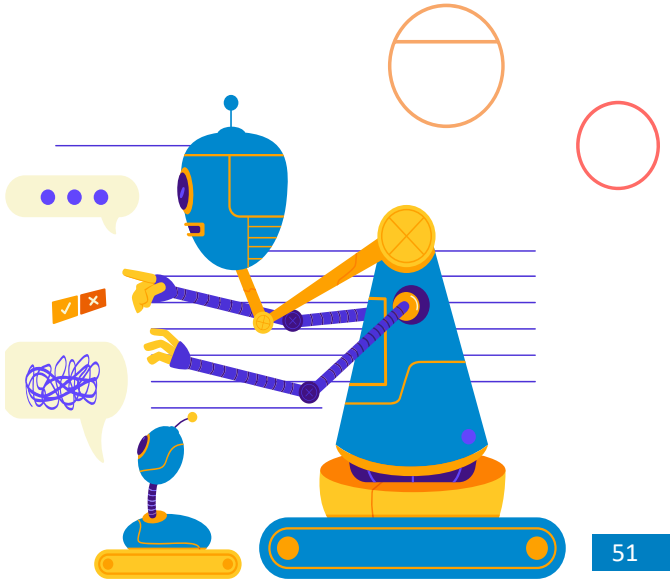
Chapter 2 Article 14

Human oversight

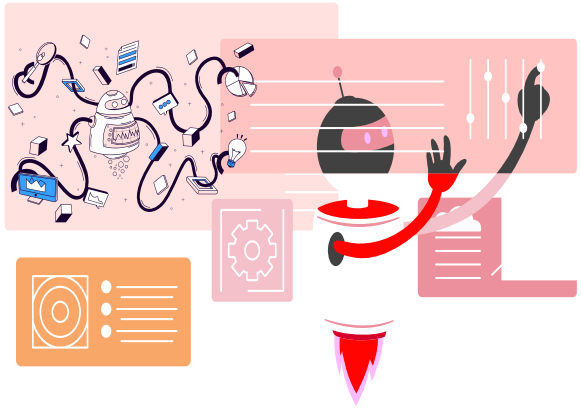
4 (b) **possible tendency of automatically relying or over-relying on the output produced by a high-risk AI system (automation bias)**, in particular for high-risk AI systems **used to provide information or recommendations for decisions to be taken by natural persons;**

3. What was our starting point?





How do Aviation professionals will take AI-based system – do they have Ethical concerns?



To listen to the people directly.

People's consideration about Ethics kye concepts in AI for certain specific concrete situations in the Aviation context.

- **Comfort**: How much are we comfortable with the situation meaning *comfort* as the feeling of being relaxed and **free from tension and negative thoughts,**

- **Trust**: How much do we trust on it meaning *trust* the **belief that something is safe and reliable**, and

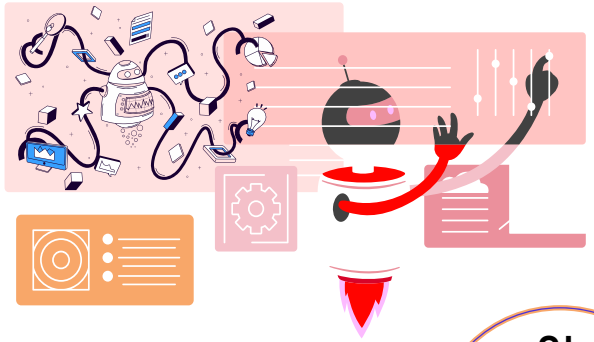
- **Acceptance**: How much will we be willing to accept the situation meaning *acceptance* as the fact that you **can agree and approve something.**

1 Pilot physiological data monitoring

2 Pilot support in ‘go-around’ situations

3 Maintaining aircraft structures

4 Airport allocation of airlines to a terminal



EASA survey on Ethics in Artificial Intelligence for Aviation

Fields marked with * are mandatory.

Welcome to the EASA survey about Ethics in Artificial Intelligence for Aviation

EASA
European Union Aviation Safety Agency

EASA is preparing the second edition of the AI Concept Paper for future applications concerning the certification or approval of AI-based products for aviation. Safety assurance remains the most important stream of action, and now new areas of interest can be discussed such as the ethical impact of the introduction of such products.

We count on you to share your position and thoughts about the topic by replying to this survey. All your replies are anonymous and confidential, and we are very interested in your honest and personal opinion.

The survey is divided on two sections: the first section with a set of situational cases, and the second section with a set of social, psychological and demographic indicators. It will take circa 60 minutes of your time.

The conclusions of this study will be published on the EASA website at https://www.easa.europa.eu/ai and will be incorporated in the drafting of the AI Concept Paper to be published in 2024.

If you want to have more information, please drop us an email to ai@easa.europa.eu.
We thank you in advance for your participation.

5 Airline crew members attribution to flights

8b Responsibility & accountability when teaming with AI

8a New competencies when teaming with AI

7 Risk of de-skilling

6 Speech recognition in voice communication

Sociodemographic characteristics of these 231 professionals:

circa 80% male, 20% female,

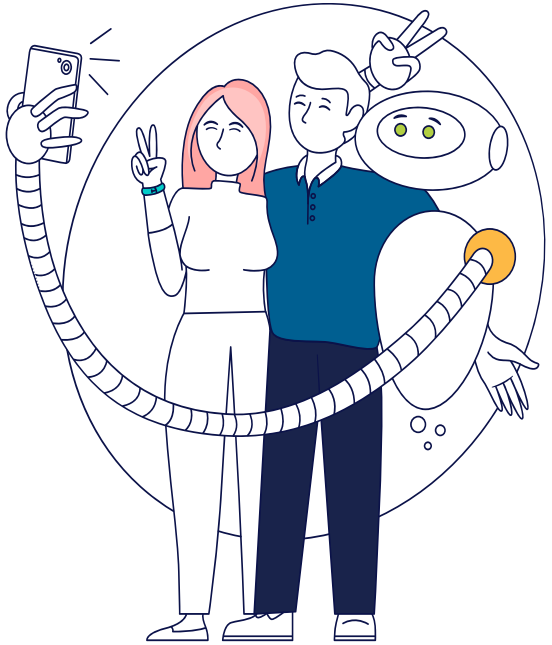
62% between 40 to 59 years old.

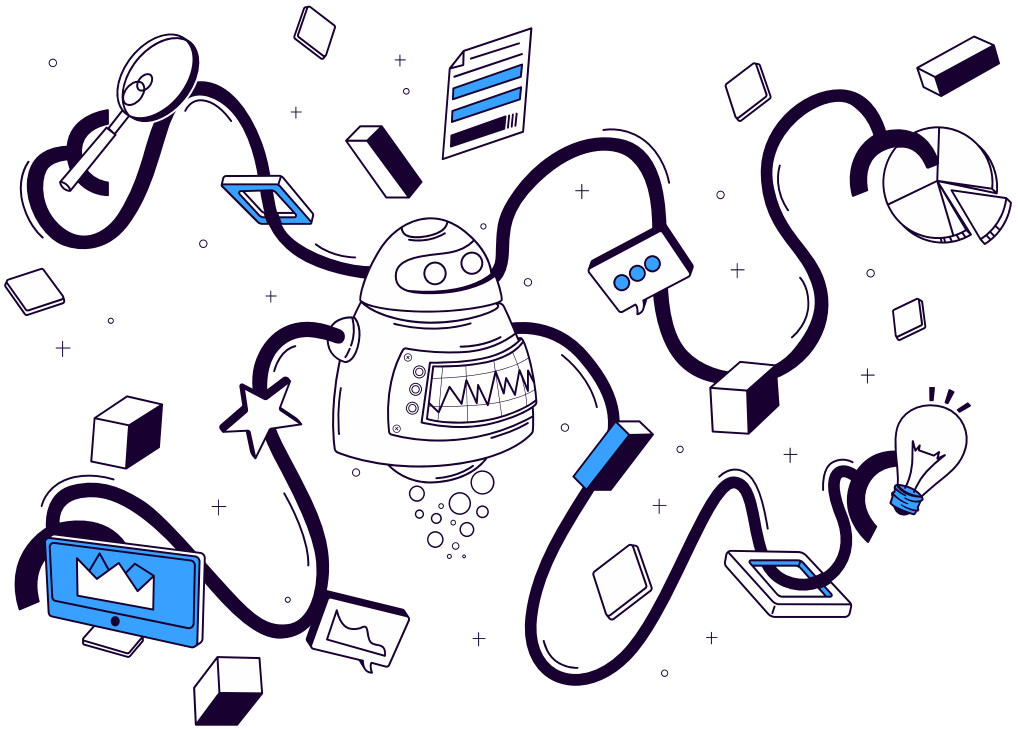
Mainly seniors meaning with more than 10 years of professional experience, considering themselves as having a good understanding of AI for aviation, and saying that their teams detain a medium understanding of AI in Aviation.

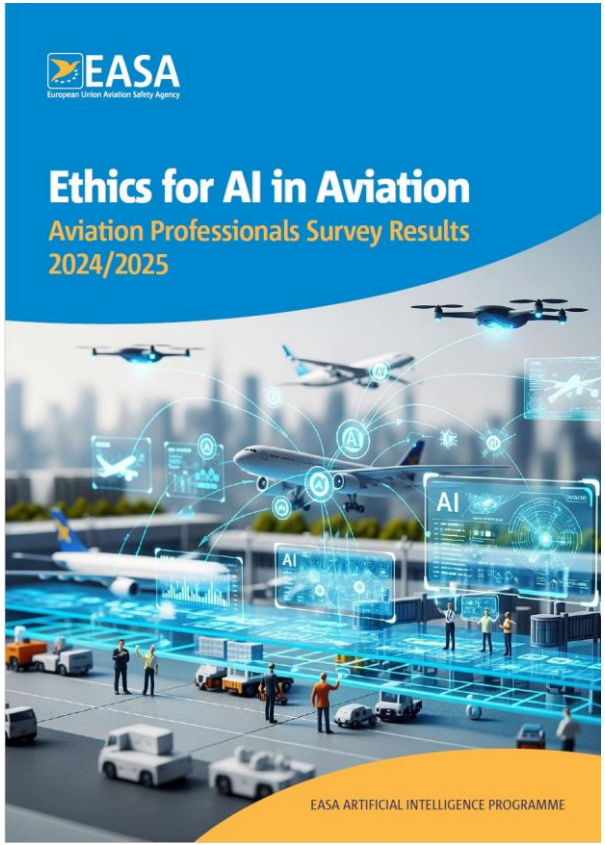
Circa 80% work in different technical aviation domains and 20% belong to the National Aviation Authorities.

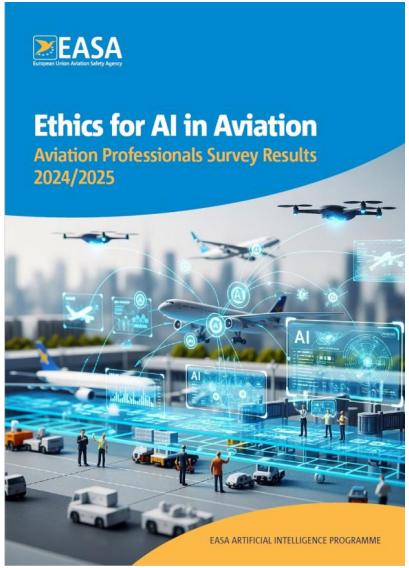
Working directly with AI-based systems 76,2% (being the biggest group 20% users of AI-based systems).

Feeling quite satisfied with their own work.

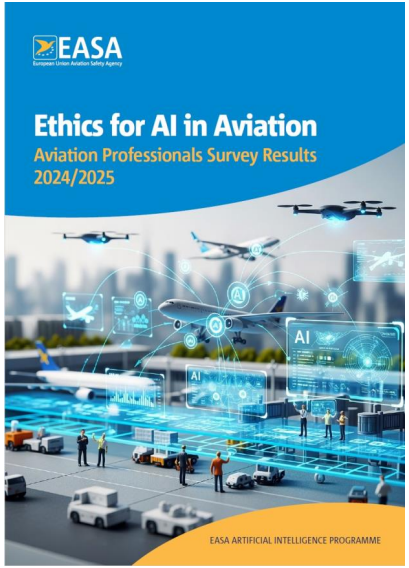




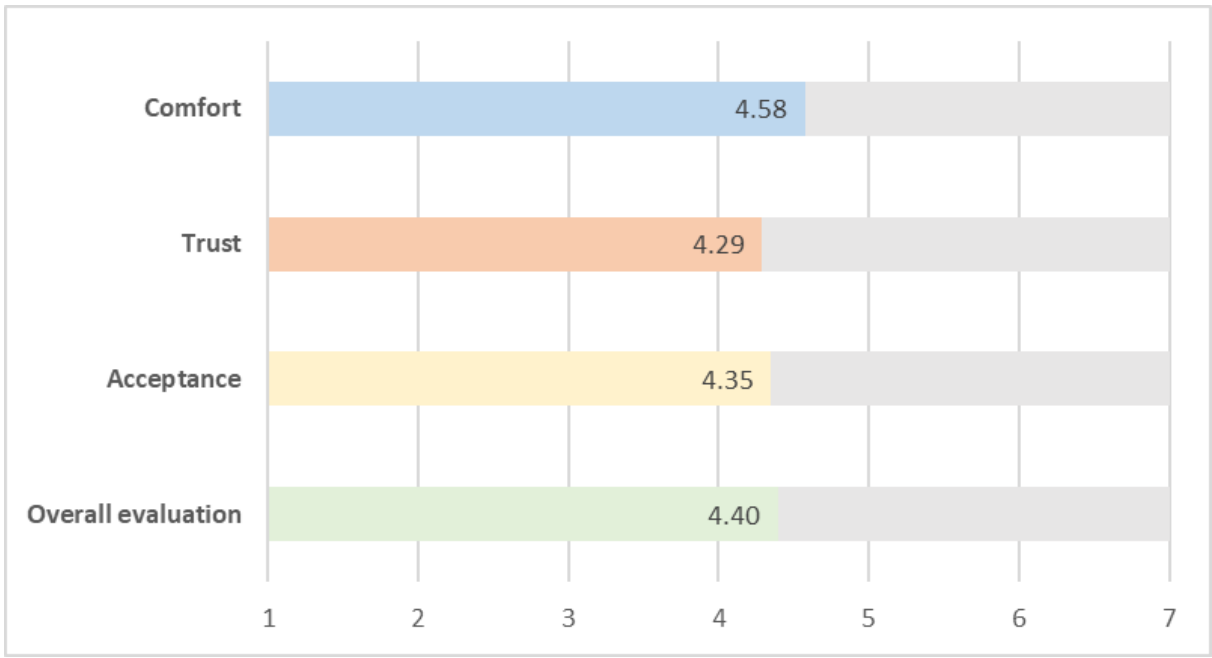

EASA
European Union Aviation Safety Agency
Ethics for AI in Aviation
Aviation Professionals Survey Results
2024/2025
AI
AI
EASA ARTIFICIAL INTELLIGENCE PROGRAMME

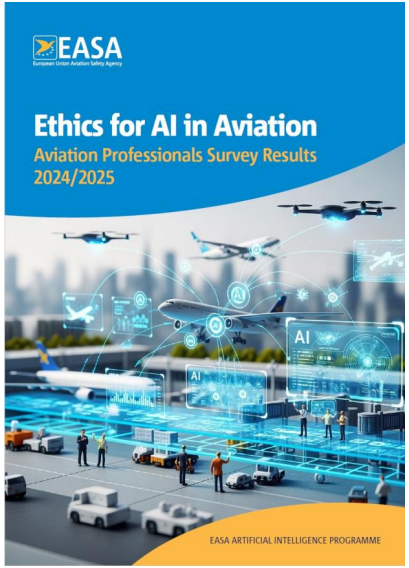


Ethical scale concerning AI-based systems for Aviation:

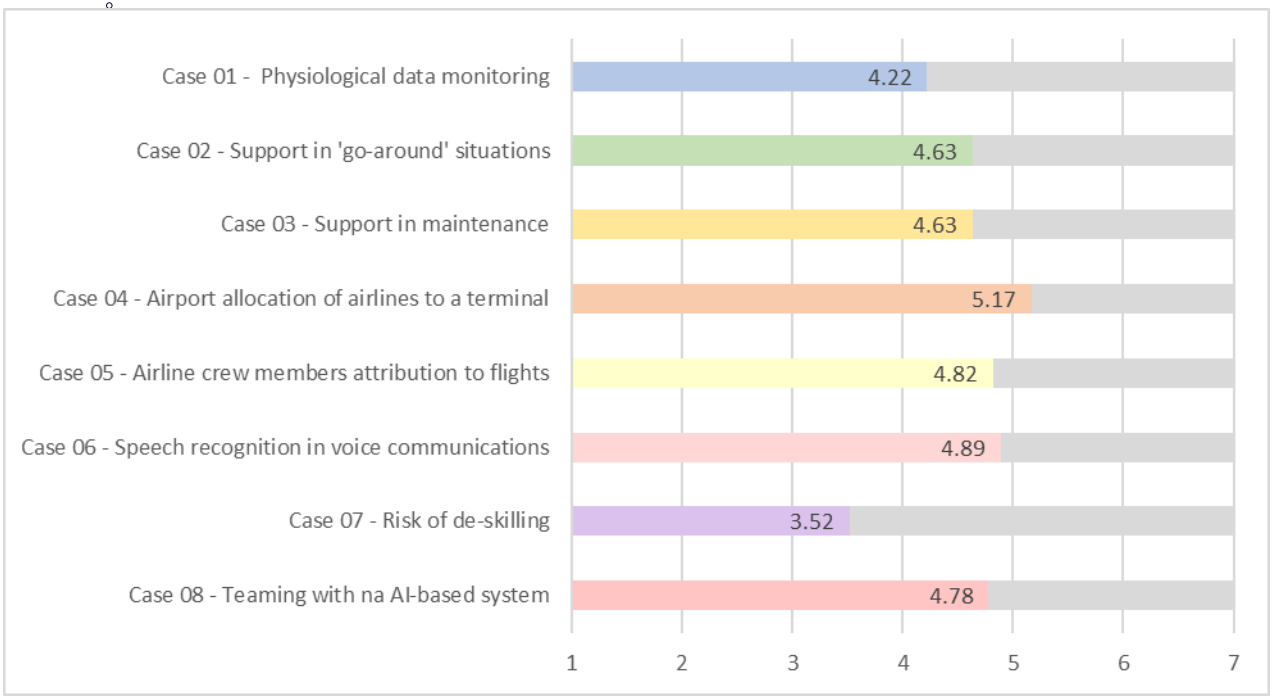


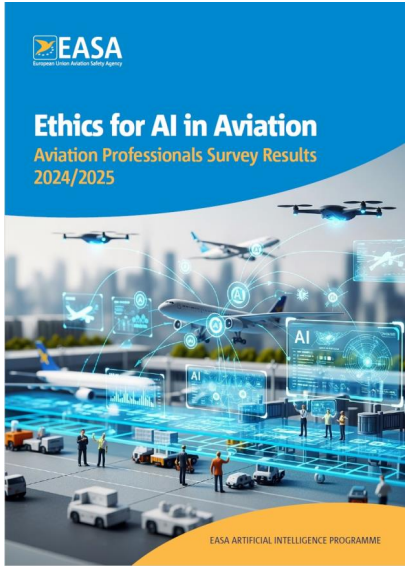
Ethical average for all cases:



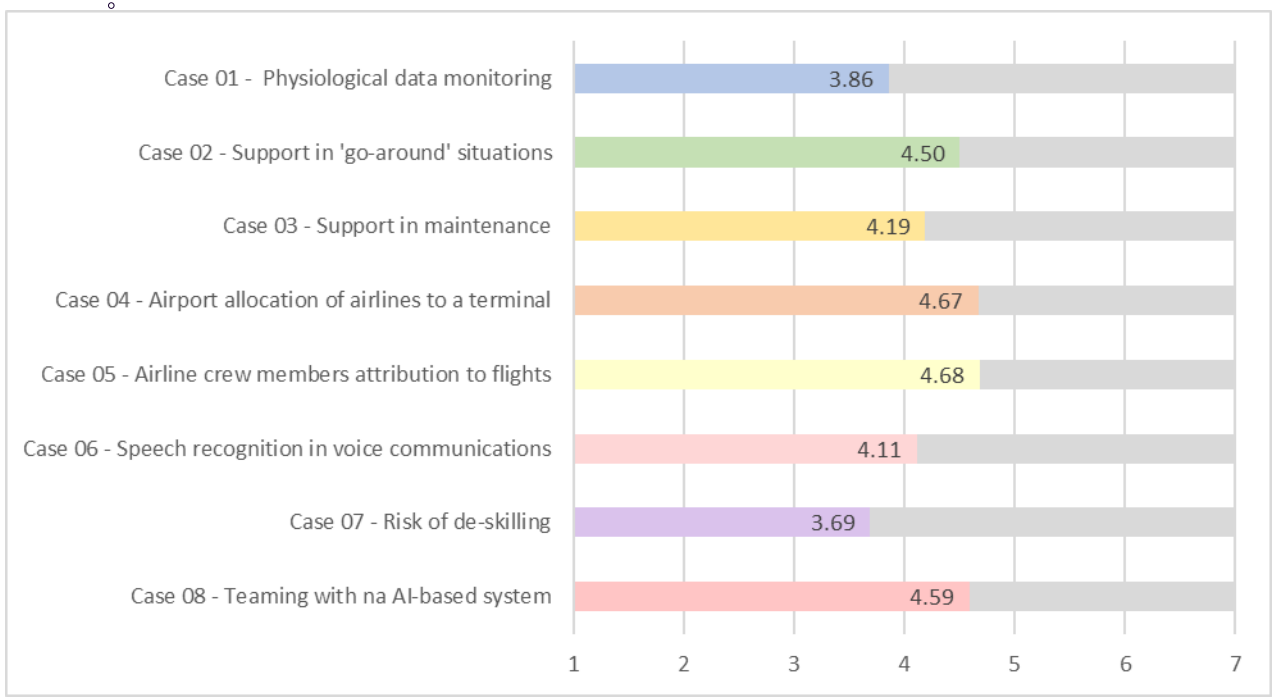


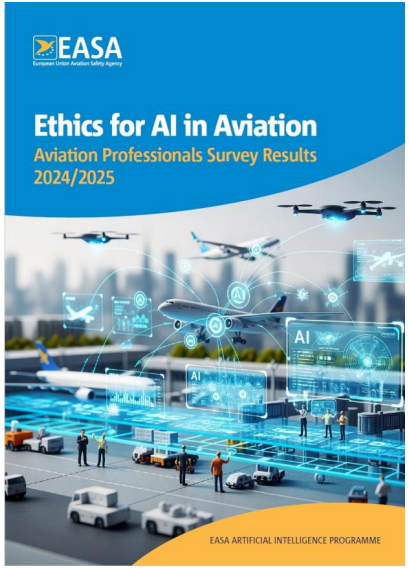
Comfort average for all cases:



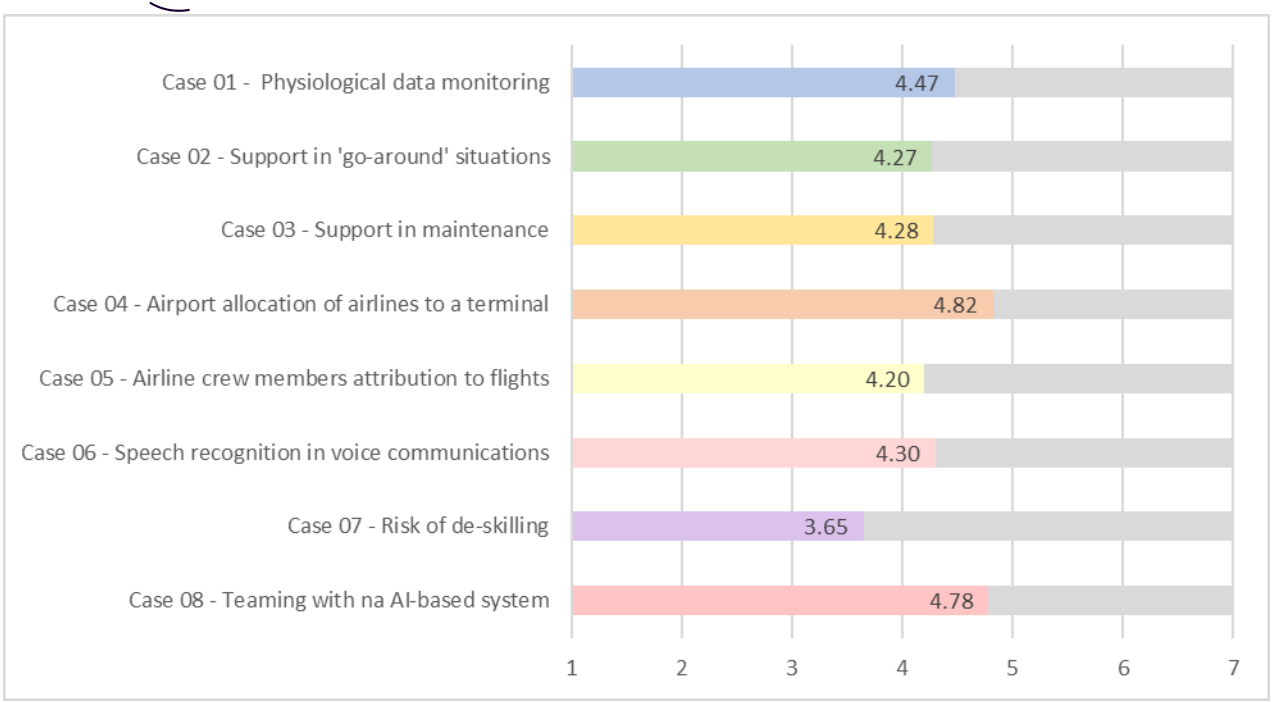


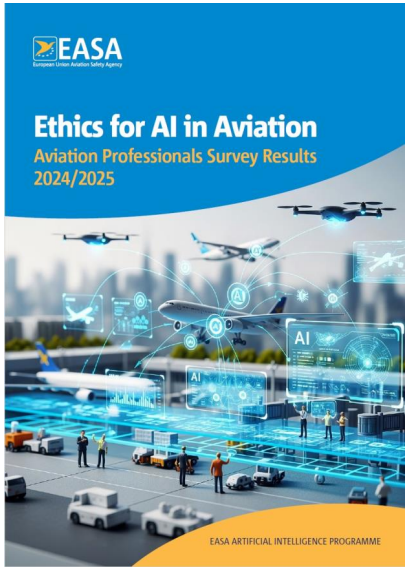
Trust average for all cases:





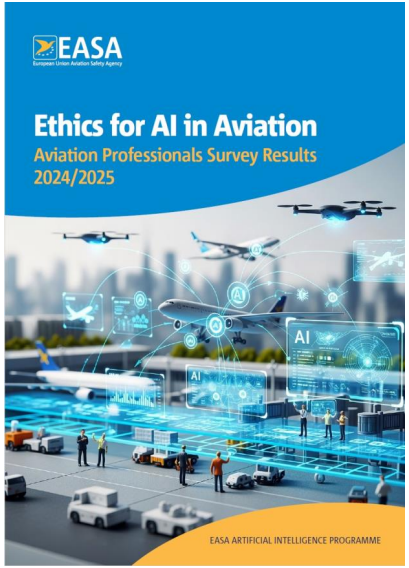
Acceptance average for all cases:





Need for Regulation % results:

	Pilot physiological data monitoring CASE 01	Airport allocation of airlines to a terminal CASE 04	Airline crew members attribution to flights CASE 05	Speech recognition in voice communication CASE 06	Risk of de-skilling CASE 07	Teaming with AI CASE 08
NO	6,9	19,5	17,3	12,1	10,8	1,7
YES	93,1	80,5	82,7	87,9	89,2	98,3
Total	100,0	100,0	100,0	100,0	100,0	100,0
EASA doing oversight	60,1	58,6	51,8	58,8	76,5	68,0



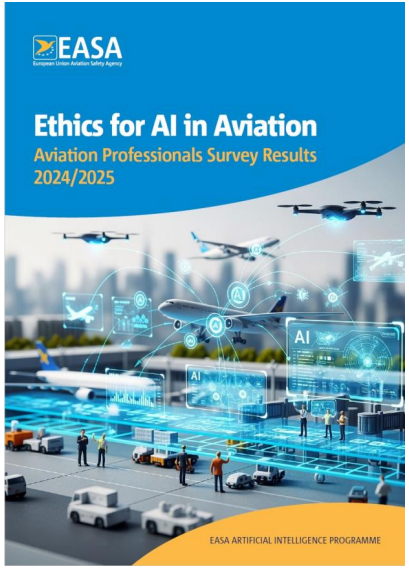
2395 reasons for not accepting AI in Aviation:

Aviation professionals have mainly ethical concerns about:

- the **AI-based system itself** (30 %),
- the consequent **negative impact on humans** when using such systems (28 %),
- **how their data is used** by the technology (11 %), and
- about AI-based systems **putting aviation safety at risk** (6 %).

In the logic of protecting ethical values, expect from first-line aviation industry to ensure:

AI-based systems are **transparent, explainable, reliable and perform to the standards** they are supposed to perform.



More to know:

- humans should **remain autonomous** when **making decisions** and **overseeing systems**,

- should **have the power** to **maintain their autonomy**.

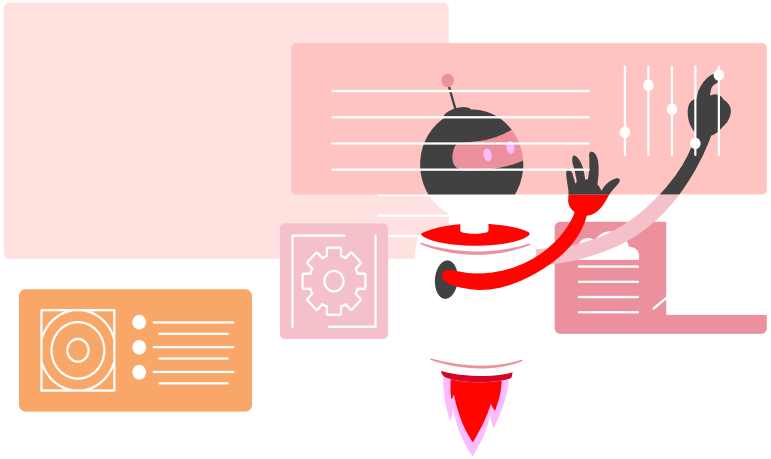
- They should **not feel psychologically uncomfortable** and be able to face an **AI-based system as merely a machine**.

Should not compromise the ability of humans to:

- **perform their job**,
- should not lead or pose a **risk of deskilling**, and
- should not jeopardise employment by **replacing human roles**.

What next?

Rulemaking exercise:



AI-based system ethics-based assessment

An ethics-based assessment for the AI-based system should be performed to identify potential risks introduced by these system.

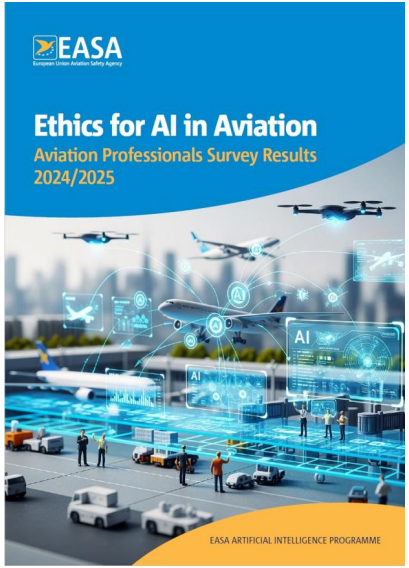
- EU data protection regulations on personal data privacy (e.g. GDPR).
- Impacts of the AI-based system on the environment throughout its life cycle (development, deployment, use, end of life), to reduce or mitigate negative impacts.
- Taking care of unfair bias during the operations involving the AI-based system
- Prevent risk of creating attachment, stimulating addictive behaviour, or manipulating the end user’s behaviour.
- That the AI-based systems do not present socially unacceptable characteristics

Concept:

- To have a first step analysing if an Ethical based assessment is necessary in your case;

- Through the form of a initial checklist;

- This will give you a clear idea of what you should consider for the Ethical based assessment that will/will not follow.



For continuing the discussion with the stakeholders in view of Proposed Issue 03 of the EASA AI Concept Paper:

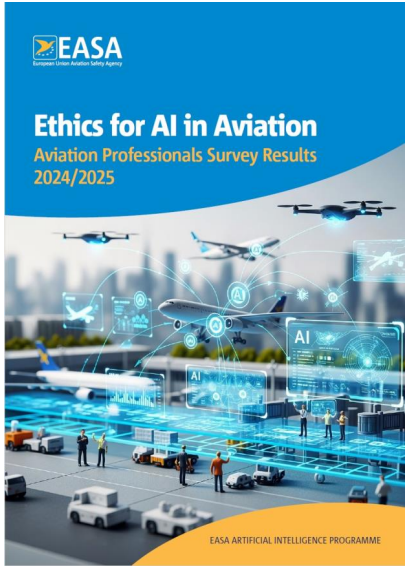
Professional development must be ensured:

- maintaining and/or developing professional competencies;

- gaining experience with AI-based systems;

- maintaining manual practice

- a sound process for competence assessment and relevant training should be in place.



For continuing the discussion with the stakeholders in view of Proposed Issue 03 of the EASA AI Concept Paper :

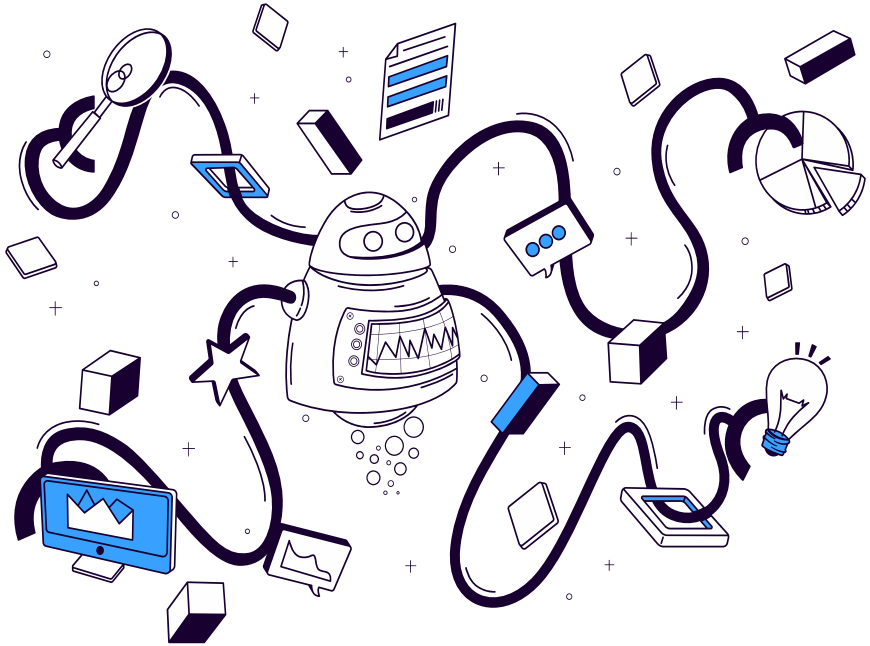
- a very clear line should be drawn between responsibility and accountability of the human element versus the AI-based system,

- and such clear definition should apply especially in situations of shared responsibility.

- individuals' privacy should be ensured and the General Data Protection Regulation should be implemented.

- unbiased AI-based system behavior should be ensured: unfair bias should be identified, monitored and eventually eliminated.

EASA



What are the next steps?

- **Continuing discussing with partners on the rulemaking exercise;**
- **Concept paper proposed issue 3**
- **Launch study for the general public on Ethics in AI for Aviation**

EASA
European Union Aviation Safety Agency

EASA AI Days 2025

Lunch break – 12:30 to 13:30

www.sli.do

 # aidays2025

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An Agency of the European Union