61ST CONFERENCE OF DIRECTORS GENERAL OF CIVIL AVIATION ASIA AND PACIFIC REGION

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AGENDA ITEM 3: AVIATION SAFETY

EASA'S APPROACH TO ARTIFICIAL INTELLIGENCE IN AVIATION

Presented by the European Union Aviation Safety Agency (EASA)

SUMMARY

Artificial Intelligence (AI) is becoming increasingly relevant to aviation safety, oversight and operational performance. EASA's approach is human-centred, risk-based and life-cycle oriented: AI should support useful innovation while maintaining aviation safety expectations. This paper outlines EASA's AI Roadmap 2.0, the NPA2025-07 on AI trustworthiness, the AI Concept Paper - Proposed Issue 03, MLEAP research and practical considerations for civil aviation authorities (CAAs), including assurance, data governance, transparency, human oversight, operational monitoring and international cooperation.

EASA'S APPROACH TO ARTIFICIAL INTELLIGENCE IN AVIATION

1. INTRODUCTION

1.1 Artificial Intelligence (AI) is moving from research and experimentation into practical aviation applications. It is already being explored in initial airworthiness (assistance to aircrew), air traffic management (assistance to air traffic controllers), flight operations support, drones operations, predictive maintenance, and safety data analysis. In the longer term, AI may also support more advanced automation. These applications may bring safety and efficiency benefits, but only where their intended use, performance limits and human role are properly understood. Some AI applications deliver a demonstrable safety benefit, either by reducing existing risks or by enabling safety improvements that would not otherwise be achievable using conventional methods.

1.2 For civil aviation authorities (CAAs), the question is not simply whether AI should be used. The more useful question is how AI-based systems can be introduced with evidence proportionate to their safety and operational impact. This includes the intended function, operational context, data used to develop and monitor the system, expected performance, explainability, human oversight, cybersecurity, continuing airworthiness or operational monitoring, and change management.

1.3 Proportionality should be a cornerstone of the framework: the assurance effort should be commensurate with the safety risk and with the degree of reliance placed on the AI-based system. For AI-based tools used by approved organisations, the applicable aviation safety framework should apply a domain-specific, risk-based filter to determine whether tool qualification is necessary. Tools whose outputs are fully and independently verified may not require qualification; conversely, where an output is relied upon in a safety-related activity without such verification, the tool should be qualified to a level commensurate with the associated risk.

1.4 This paper presents EASA's approach as a contribution to international exchange. It is not intended to suggest that one regulatory model should be copied unchanged. Rather, it offers practical reference points, common terminology and oversight questions that may assist authorities when engaging with applicants, operators, service providers, manufacturers or technology suppliers.

2. DISCUSSION

2.1 AI is not a single technology or a single type of aviation application. Near-term use cases are likely to be incremental rather than dramatic: on the one hand AI-based systems that can support operations or human decisions and on the other hand AI-based tools that can reveal patterns in large data sets, prioritise safety information, or help identify emerging risks. These uses may be relevant to manufacturers, operators, air navigation service providers, airports, maintenance organisations and authorities themselves.

2.2 At the same time, AI can create assurance challenges that differ from conventional software. For data-driven learning approaches, performance depends heavily on training and operational data. Behaviour may be difficult to describe fully through flow-down of requirements as for conventional system development. Systems may be sensitive to changes in operating context, data quality, cyber threats or model updates. Human operators may also over-trust or under-trust system outputs. These features make early regulatory engagement and life-cycle assurance important.

2.3 EASA's approach is human-centred, risk-based and life-cycle oriented. It seeks to enable useful innovation while maintaining the level of safety expected in aviation. Introduction of AI technology cannot lower safety expectations. Indeed, the focus is on the additional evidence, controls and oversight that are needed when AI is used in functions that can affect safety, security, environmental protection or public confidence.

2.4 The EASA AI trustworthiness framework is built around mutually supporting themes. These themes are most useful when they are considered together, rather than as separate checklists:

Theme	Practical meaning for aviation oversight
AI assurance, including data management	Evidence that the AI-based system performs its intended function safely and reliably within its declared operational domain. This includes requirements definition, verification and validation, robustness testing, performance monitoring, configuration control and a clear link to the aviation safety assessment, controls for data collection, selection, labelling, quality and representativeness. For machine-learning systems, the behaviour of the model cannot be separated from the data and learning process used to develop it.
Transparency and explainability	Information needed by users, organisations and authorities to understand the system's intended function, limitations, assumptions and outputs. The level of explanation should be fit for the safety and operational context.
Human oversight and human factors	A clear and workable human role, including training, responsibility, alerting, override and recovery. A human-centred approach recognises that simply placing a human "in the loop" is not enough.
Ethics and societal acceptance	Consideration of fairness, non-discrimination and public confidence, especially where AI may influence safety-related decisions or use sensitive operational or personal data.

2.5 The EASA AI Roadmap 2.0, published in May 2023, sets out the Agency's vision and action plan for a human-centric approach to AI in aviation. It provides the basis for conceptual guidance, research and innovation activities as well as for the consolidation through rulemaking, recognising that aviation regulation must evolve with AI technology, operational experience and stakeholder feedback.

2.6 The Roadmap distinguishes between four broad levels of AI in aviation, based on the relationship between the AI-based system and the human end user:

Roadmap level	Description
Level 0 - Non-decisional information automation	AI supports automated information acquisition and analysis without direct end-user interaction and without link to decision-making.
Level 1 - AI augmentation and assistance	AI supports human end users information acquisition, analysis or decision-making.
Level 2 - human-AI cooperation or collaboration	AI and humans cooperate or collaborate with the AI-based system performing automatic decisions or actions under human oversight.
Level 3 - advanced automation	AI-based systems may perform automated operations with limited or no real-time human end-user intervention.

2.7 Recent EASA deliverables and activities include the following:

a) *AI Concept Paper Issue 2:* published in March 2024, this refined guidance for Level 1 applications and further developed learning assurance, AI explainability and ethics-based assessment. It also provided guidance for Level 2 applications and the concept of human-AI teaming.

b) *AI Concept Paper - Proposed Issue 03:* published on 3 June 2026, this proposed issue represents a further step in developing EASA's human-centric AI trustworthiness framework. It supports continued consolidation of guidance and future rulemaking activities.

c) *NPA 2025-07:* published on 10 November 2025, this Notice of Proposed Amendment proposes a new set of detailed specifications on AI trustworthiness for the safe use of AI in aviation in response to Regulation (EU) 2024/1689 (the Artificial Intelligence Act) Chapter III, Section 2.

d) *Machine Learning Application Approval (MLEAP):* this research project addressed

practical methods and tools for machine-learning model generalisation, data completeness and representativeness, and algorithm and model robustness. These topics are central to making AI assurance practicable for aviation.

e) *Ethics for AI in Aviation:* EASA has also gathered aviation professional views on ethics and AI, helping to ensure that technical guidance remains connected to operational experience and public trust.

2.8 EASA is ensuring coherence with the wider European regulatory context. The EU AI Act entered into force on 1 August 2024 and establishes a horizontal, risk-based framework for trustworthy AI, with phased application of obligations. This horizontal framework, amending Aviation Basic Regulation (EU) 2018/1139 through its Article 108, must be applied coherently with sector-specific aviation safety rules, certification processes and oversight responsibilities.

2.9 For Asia-Pacific CAAs, the practical value of this work may lie less in adopting a single regulatory model and more in developing common questions, terminology and evidence expectations. The region is diverse, with different operational contexts, market structures and levels of digital maturity. International cooperation can help authorities compare approaches while leaving room for national and regional priorities.

2.10 The following lines of enquiry may support early discussions between authorities and applicants or regulated entities:

Area	**Possible regulatory questions**
Intended function and operational context	What high-level task is the system intended to support? What decision or action may it influence? What are the boundaries of its intended operational domain? What should the system not be used for?
Safety impact and assurance	What is the risk introduced by the AI-based system? What validation evidence is available, and does it cover normal, abnormal and edge-case conditions? How is the evidence linked to the safety assessment?
AI Assurance	How were datasets selected, labelled, protected and representative? How is the AI model verified to meet its intended function at an appropriate level of performance and meeting generalisation and robustness properties?
Human role	How are alerts, explanations, override and training addressed? Is the expected human role realistic in normal and abnormal operations? Who remains responsible for the decision or action in the case of advanced automation?
Operational monitoring	How are performance degradation, data drift, cyber threats, misuse, incidents and unexpected behaviour detected and managed after deployment?
Authority capability and access	What expertise, documentation, audit access and test evidence does the authority need in order to exercise proportionate oversight? What can be reviewed directly, and what may need independent assessment?

2.11 A practical starting point for CAAs may be to focus on a small number of near-term actions that build readiness without creating unnecessary burden. These may include:

a) identifying where AI is already being used or proposed in safety-related aviation activities, including within authority processes;

b) establishing an internal focal point or cross-disciplinary group covering safety, operations, certification, data, cybersecurity, legal and human factors expertise;

c) asking applicants to describe the intended function, operational limits, human role, data sources, validation evidence and post-deployment monitoring before discussing detailed approval routes;

d) using early, non-binding technical exchanges to understand new use cases and to

avoid late surprises in certification or oversight; and

e) sharing lessons through regional and international fora, especially where systems, suppliers, data flows or operations are cross-border.

2.12 Continued international exchange is important because AI-based systems, supply chains, data and aviation operations are often cross-border. EASA welcomes cooperation with Asia-Pacific partners through technical exchanges, research dialogue, industry engagement and regional fora. EASA AI Days 2026, to be held as a hybrid event on 8-10 September 2026 in Cologne, will provide a further opportunity for authorities and industry to discuss AI assurance, human factors, ethics-based assessment and emerging technologies such as reinforcement learning, large language models and logic- or knowledge-based AI.

2.13 EASA will continue to update its AI guidance in light of operational experience, stakeholder feedback, research results and regulatory developments. The objective is to support innovation that improves aviation safety and efficiency, while ensuring that AI-based systems remain trustworthy and subject to effective oversight throughout their life cycle.

2.14 Further information can be found at:

a) EASA Artificial Intelligence Roadmap 2.0

b) EASA Artificial Intelligence Concept Paper - Proposed Issue 03

c) NPA2025-07 on AI trustworthiness

d) Machine Learning Application Approval (MLEAP)

e) EASA Artificial Intelligence Days 2026

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to:

a) note the EASA AI Roadmap 2.0 and the publication of EASA NPA2025-07 (RMT.0742) and of the EASA Artificial Intelligence Concept Paper - Proposed Issue 03;

b) recognise the importance of a human-centred, risk-based and life-cycle approach to AI in aviation;

c) encourage continued exchange among CAAs, industry, research organisations and international partners on AI assurance, data governance, transparency, human oversight, operational monitoring and ethics; and

d) invite interested States and administrations to continue cooperation with EASA through existing technical cooperation channels, regional exchanges and relevant hybrid events.

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