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AGENDA ITEM 3: AVIATION SAFETY

EASA'S APPROACH TO ARTIFICIAL INTELLIGENCE IN AVIATION

(Presented by EASA)

INFORMATION PAPER

SUMMARY

EASA's approach to integrating Artificial Intelligence (AI) into aviation balances the need for innovation with safety imperatives. By developing a solid regulatory AI trustworthiness framework, and by encouraging collaboration, EASA aims to enable the safe and responsible use of AI, improving the safety and efficiency of aviation whilst addressing the ethical challenges that AI presents. The EASA AI Roadmap 2.0 and an upcoming regional workshop in Singapore demonstrate EASA's commitment to cooperation with its regulatory partners, research institutions and the industry on the safe integration of AI within aviation.

ARTIFICIAL INTELLIGENCE IN AVIATION

1. INTRODUCTION

1.1 The European Union Aviation Safety Agency (EASA) is taking an active role in enabling Artificial Intelligence (AI) into the aviation industry. AI is changing many fields, and in aviation, it has the potential to greatly improve safety, efficiency, and overall operations. EASA's approach focuses on balancing innovation with strict safety regulation, ensuring that AI is used in a way that maintains high safety standards whilst benefiting from the safety enhancement provided by technological progress.

2. DISCUSSION

2.1 AI in aviation can be used in many ways, such as in predictive maintenance, air traffic management, autonomous aircraft, and decision support systems. These technologies can make operations more efficient, reduce human error, and optimise the use of resources. However, using AI also brings challenges, particularly concerning safety, reliability, and compliance with regulations. EASA understands that while AI offers many benefits, it must be carefully managed to avoid potential risks.

2.2 New regulatory frameworks must be developed to keep up with the rapid advancements in technology. EASA is developing human-centric regulations to guide the use of AI in aviation with a primary focus is on safety. The Agency insists that AI systems used in aviation must meet the same high safety standards as traditional technologies. To this purpose the AI trustworthiness framework will encompasses AI assurance, transparency and human oversight.

2.2.1 *AI assurance:* defines the technology specific objectives necessary to ensure the intended function of the AI-based system at a given level of performance. This includes thorough testing, validation, and certification to ensure AI-based systems work reliably in all situations, including extreme ones.

2.2.2 *Transparency:* is crucial in EASA's AI trustworthiness framework, to provide humans with understandable, reliable, and relevant information on how AI-based systems produce their results Moreover it call for clear documentation of AI-based systems. This openness is key for regulatory oversight, helping EASA to thoroughly assess AI-based systems and ensure they comply with safety standards.

2.2.3 *Human oversight:* The human-centric approach developed in the EASA AI Roadmap 2.0 is firstly driven by a classification in AI Level considering the different modes of interactions a human end user can have with an AI-based system. It is then supplemented with a proportionate human factors guidance to ensure appropriate human oversight throughout the AI-based system life cycle, from design to operation.

2.3 The EASA AI Roadmap 2.0, published in May 2023, outlines EASA's updated strategy for incorporating AI into aviation, focusing on a human-centred approach. This roadmap explains how EASA plans to ensure AI is used safely and effectively in aviation, while also considering the ethical and societal impacts of these technologies. This updated roadmap builds on the first version released in 2020 and includes feedback and developments from the past three years.

2.4 The roadmap emphasises several key areas, such as the importance of making AI trustworthy, carrying out comprehensive safety and security assessments, and integrating ethical guidelines into AI applications. EASA sees AI as a transformative technology that requires not only technical innovation but also careful consideration of how AI interacts with human operators and how it can be made transparent and easy to understand. EASA distinguishes between three levels of AI in aviation, each with different levels of human involvement:

2.4.1 *Level 1:* AI Assistance: At this level, AI assists humans, for instance in providing support to improve human decision-making. For example, AI can help pilots by optimising flight paths or detecting incoming traffic, as well as ATC controllers by improving trajectory predictions. This level of AI is currently being integrated into aviation, with some applications already undergoing certification.

2.4.2 *Level 2:* Human-AI Teaming: In this level, AI and humans work together as a team. AI takes on more significant roles, making decisions in collaboration with human end users. This level requires a deeper cooperation or collaboration between the human end user and the AI-based system, where the AI-based system and human end users may share decision-making authority. EASA is currently developing guidelines for this level, aiming for implementation around 2035.

2.4.3 *Level 3:* Advanced Automation: At this higher level, AI can make decisions and take actions independently, with limited or no human oversight. This level could involve AI-based systems managing flights automatically or handling complex air traffic control tasks. However, autonomous systems are not expected to be used in commercial aviation until after 2050, given the current state of AI technology.

2.5 Recent deliverables under the EASA AI roadmap 2.0 include the:

2.5.1 *AI Concept Paper Issue 2:* EASA has released a new concept paper providing guidelines for Level 1 and Level 2 machine learning applications. This document sets out essential principles to ensure that AI systems in aviation are trustworthy, safe, and fair.

2.5.2 *MLEAP Project Report:* As part of the Machine Learning Application Approval (MLEAP) project, EASA has issued a report identifying methods and tools to ensure the robustness, data completeness, and generalisation of machine learning models. This aims to simplify the certification process for AI systems in safety-critical applications, providing a pathway for integrating AI technologies into aviation.

2.6 EASA will regularly update the AI Roadmap to reflect new insights and stakeholder feedback. These revisions help the agency refine its approach to AI regulation, focusing on public confidence, advanced automation, and the certification of AI system.

2.7 In this effort, EASA is ensuring alignment with the recently published EU AI Act, that establishes comprehensive regulatory framework for AI systems, as well as with the European Commission's Ethical Guidelines on Artificial Intelligence. By embedding these references into its AI strategy, EASA aims to build public trust in AI and ensure that its use benefits everyone.

2.8 EASA understands that successfully integrating AI into aviation, as AI technology advances, requires working together with regulators, industry experts, and research institutions. EASA is actively involved in collaboration to develop best practices, share knowledge, and encourage innovation. The agency has launched several initiatives and partnerships to support AI research and development in aviation.

2.9 EASA will implement an EU-Asia Pacific workshop on Artificial Intelligence in Aviation on 20-21 November 2024 at Nanyang Technological University in Singapore, to which the conference is invited. This workshop will bring together key stakeholders from Europe and the Asia-Pacific region to discuss the latest developments and challenges in using AI in aviation. The event will cover EASA's AI Roadmap, AI ethics, and real-world examples of AI in aviation, showing the collaborative efforts between international regulators, academia, and industry. Interested participants can register here. There is no registration fee.

2.10 By encouraging collaboration, EASA aim to promote the safe and responsible use of AI in aviation. As AI technology continues to evolve, a proactive approach will be essential in ensuring that these innovations improve the safety and efficiency of the aviation industry whilst addressing the

ethical challenges they present.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to note the EASA AI Roadmap 2.0 and is invited to attend the upcoming EU-Asia Pacific workshop on Artificial Intelligence in Aviation on 20-21 November 2024 in Singapore.

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