

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

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AGENDA ITEM 3: AVIATION SAFETY

**ADVANCING SAFE CROSS-BORDER UAS OPERATIONS
THROUGH REGULATORY SANDBOX AND REGIONAL
COLLABORATION**

(Presented by The Republic of Indonesia)

SUMMARY

The rapid advancement of Unmanned Aircraft Systems (UAS) is creating new opportunities across various sectors while introducing regulatory and operational challenges, particularly for future cross-border operations. In response, ICAO has established a global framework for UAS integration through Standards and Recommended Practices (SARPs), and guidance material. At the regional level, this is complemented by the latest initiatives of the Asia-Pacific AAM-UAS Workstream to support harmonized implementation of emerging aviation technologies across the region.

To facilitate innovation while maintaining aviation safety, Indonesia has established a Regulatory Sandbox Framework that enables the evaluation of emerging UAS technologies and operational concepts through controlled pilot projects tailored to different operational use cases. The sandbox provides operational evidence to support risk-based regulatory development and future UAS integration.

This paper proposes strengthened regional collaboration under the Asia-Pacific framework to exchange best practices, enhance interoperability, and support the safe, secure, sustainable, and efficient implementation of future cross-border UAS operations.

ADVANCING SAFE CROSS-BORDER UAS OPERATIONS THROUGH REGULATORY SANDBOX AND REGIONAL COLLABORATION

1. INTRODUCTION

1.1 The aviation sector is undergoing significant transformation driven by rapid technological innovation. Among the most notable developments is the emergence and proliferation of Unmanned Aircraft Systems (UAS), which are increasingly being utilized in many sectors.

1.2 As UAS technology continues to mature, future operations are expected to evolve from localized domestic activities toward routine operations over longer distances, including those involving cross-border missions. Such developments offer significant economic and societal benefits while simultaneously introducing new operational and regulatory challenges.

1.3 Recognizing these developments, ICAO continues to advance the global integration of UAS through the relevant Standards and Recommended Practices (SARPs), and guidance material. At the regional level, this is complemented by the latest initiatives of the Asia-Pacific AAM-UAS Workstream, as reflected in the *Asia-Pacific Reference Materials for Regulators to Facilitate Advanced Air Mobility Operations*. Collectively, these initiatives encourage States to adopt performance-based, risk-informed regulatory approaches while promoting interoperability and harmonization across international aviation

1.4 While considerable progress has been achieved, differences in national regulations, operational approval processes, safety oversight capabilities, and technological implementation continue to present challenges to seamless UAS integration, particularly for future cross-border operations.

1.5 Indonesia considers that regulatory innovation is essential to bridge the gap between rapidly evolving technologies and conventional regulatory development. In this regard, the implementation of a Regulatory Sandbox Framework provides an effective mechanism for evaluating innovative technologies and operational concepts within a controlled environment before wider operational implementation. Beyond supporting domestic innovation, the regulatory sandbox also generates operational evidence that may contribute to regional harmonization and the implementation of ICAO's vision for safe and interoperable UAS integration.

2. DISCUSSION

2.1 Indonesia has established a regulatory framework to facilitate the implementation of Regulatory Sandbox for emerging aviation technologies, including UAS and Advanced Air Mobility (AAM). The framework is intended to provide a structured mechanism through which innovative technologies, operational concepts, and regulatory approaches can be evaluated before broader operational deployment.

2.2 The implementation adopts a whole-of-ecosystem approach involving the DGCA, ANSP, airport operators, industry, technology developers, UAS operators, and other relevant stakeholders. This collaborative framework enables operational, technical, and regulatory considerations to be assessed in an integrated manner while supporting evidence-based regulatory development.

2.3 To accommodate different operational objectives, Indonesia has designated three Regulatory Sandbox locations at Budiarto Airport–Curug, Kertajati International Airport, and

Banyuwangi Airport. Each location developed according to its operational characteristics and intended use cases. These pilot projects support a range of activities, including the development of the domestic UAS industry and innovation ecosystem, Beyond Visual Line of Sight (BVLOS) operations, UAS operations over water and remote areas. Collectively, these pilot projects provide valuable operational experience under representative operational environments while supporting the progressive development of regulatory provisions.

2.4 As of June 2026, Indonesia has issued 14,080 Remote Pilot Certificates, registered 8,970 UAS, and granted 1,643 operational approvals for UAS operations. The rapid growth of UAS activities highlights the need for adaptive regulatory mechanisms capable of supporting innovation while maintaining effective safety oversight.

2.5 Prior to establishing each sandbox, comprehensive evaluations are conducted covering technical feasibility, operational concepts, safety risk assessments, airspace compatibility, security, emergency response, and other operational considerations. The operational data generated through sandbox activities provides valuable evidence to refine regulations, validate safety measures, and support future implementation consistent with ICAO's safety management and performance-based regulatory principles.

2.6 As UAS applications continue to expand, future operations are expected to extend beyond domestic airspace into regional and cross-border environments, supporting activities such as logistics, maritime surveillance, humanitarian assistance, disaster response, and infrastructure inspection. These operations introduce new challenges related to regulatory interoperability, operational approvals, digital information exchange, and coordination among aviation authorities and the stakeholder.

2.7 Indonesia considers the Regulatory Sandbox as an important stepping stone toward addressing these challenges. By evaluating innovative technologies and operational concepts within controlled environments, the sandbox generates practical experience for BVLOS operations, over-water missions, contingency management, and inter-agency coordination. These lessons provide valuable operational evidence to support future regulatory development and facilitate interoperable cross-border UAS operations in line with ICAO's global framework.

2.8 Given the rapid evolution of UAS technologies across the Asia-Pacific Region, closer regional collaboration is essential to promote safe, secure, and interoperable operations. In line with ICAO's global UAS framework and the Asia-Pacific AAM-UAS Workstream, Indonesia believes that the APAC framework offers an effective platform for States to exchange experiences and strengthen regulatory readiness.

2.9 Collaboration may focus on sharing lessons learned from regulatory sandbox implementation, safety assessment methodologies, operational data, operational approvals, and cross-border coordination. Such cooperation would support evidence-based policy development, reduce duplication of effort, and contribute to the development of harmonized approaches for future cross-border UAS operations across the Asia-Pacific Region.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to:

- a) encourage ICAO APAC Member States to exchange experiences, lessons learned, and best practices relating to regulatory sandbox implementation;
- b) support enhanced regional collaboration in addressing emerging challenges

associated with cross-border UAS operations, including safety oversight, operational interoperability, digital information exchange, and risk-based regulatory approaches; and

- c) encourage continued dialogue within the Asia-Pacific Region to identify common principles and collaborative approaches that support the safe, secure, sustainable, and efficient integration of cross-border UAS operations into the international aviation system.

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