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Agenda Item 4: Emerging technologies, new business models and other associated aspects 4.1: Economic regulatory frameworks on emerging technologies

BUILDING REGULATORY WORKFORCE CAPABILITY FOR EMERGING AVIATION TECHNOLOGIES

(Presented by Thailand)

EXECUTIVE SUMMARY

While the International Civil Aviation Organization (ICAO) Policy on Innovation and Assembly Resolution A42-24 emphasizes the necessity of adaptive regulatory frameworks to accommodate emerging aviation technologies, institutional readiness remains hindered by critical workforce and competency deficits within civil aviation authorities. To bridge this gap, this paper advocates for a strategic alignment between the ICAO Policy on Innovation and the Next Generation of Aviation Professionals (NGAP) Strategy by expanding its scope to encompass the regulatory and oversight workforce. By equipping regulatory personnel with technical competencies through modernized training and inter-agency collaboration, States can eliminate administrative bottlenecks, ensure proportional risk-based oversight, and foster sustainable commercial market growth while safeguarding rigorous safety standards.

Action: The Conference is invited to consider the paper and endorse the actions in section 5.

<i>Strategic Goal:</i>	This working paper relates to Strategic Goal: <i>The Economic Development of Air Transport Assures the Delivery of Economic Prosperity and Societal Well-Being for All.</i>
<i>Financial implications:</i>	None
<i>References:</i>	<i>Resolutions Adopted by the 42nd Session of the Assembly, Provisional Edition, October 2025 (ICAO Assembly Resolution A42-24)</i> ICAO Policy on Innovation Next Generation of Aviation Professionals (NGAP) Strategy

1. INTRODUCTION

1.1 At the Resolutions adopted at the 42nd session of the assembly provisional edition, State recognized the Resolution A42-24 that qualified, competent, and diverse aviation professionals are vital to sustain global connectivity, noting that critical workforce shortages and talent drain in developing states pose severe risks to aviation safety and the International Civil Aviation Organization's (ICAO) strategic goals. To operationalize this global mandate, this Working Paper proposes expanding the Next Generation of Aviation Professionals (NGAP) framework beyond traditional operational trades to include the regulatory and oversight workforce. By building proactive technical competencies and practical oversight capabilities for emerging technologies, States can eliminate costly administrative bottlenecks, ensure robust safety enforcement while driving sustainable market development.

1.2 Emerging aviation technologies, including Advanced Air Mobility (AAM), Unmanned Aircraft Systems (UAS), artificial intelligence (AI), automation and other digital technologies, is transforming aviation operations, business models and market structures. These developments are introducing new operational concepts, new market participants and new functions across the aviation ecosystem, while also changing the roles, competencies and skills required of aviation personnel.

1.3 These technologies require States to consider how existing regulatory frameworks may need to evolve to accommodate new technologies, operational concepts and business models. At the same time, the workforce supporting the aviation system must also be prepared for these changes. Personnel may require new or complementary competencies to operate, regulate, oversee, assess, train and support emerging aviation activities.

1.4 The ICAO Policy on Innovation emphasizes that regulatory frameworks must be adaptive, responsive, and forward-looking to ensure that innovation is facilitated rather than hindered. Concurrently, the NGAP initiative highlights the necessity of anticipating future human capital and competency requirements.

1.5 While these two initiatives have often progressed on their own tracks, their practical implementation is inherently interdependent. Regulatory frameworks cannot enable innovation if the personnel responsible for evaluating and approving new technologies lack the required technical

2. BRIDGING INNOVATION AND HUMAN CAPITAL

2.1 Expanding the NGAP Scope to Include Regulators

2.1.1 Historically, global aviation workforce development under NGAP focused primarily on operational disciplines such as pilots, air traffic controllers, and maintenance engineers. The rapid emergence of non-traditional technologies requires expanding this focus to the regulatory and oversight workforce.

2.1.2 Equipping regulatory personnel with practical technical competency prevents costly administrative bottlenecks such as prolonged approval timelines for vertiports, commercial drone operations, and digital flight systems that stall private investment and delay market entry. When regulatory officers possess a clear understanding of emerging operational concepts, they are better equipped to establish proportional, risk-based economic oversight that safeguards safety while enabling market growth without creating prohibitive barriers to entry.

2.2 Operationalizing the ICAO Policy on Innovation

2.2.1 The ICAO Policy on Innovation calls for a level playing field and fair opportunities for all States to deploy innovative technologies. Achieving this vision requires equipping regulatory authorities with continuous, modern learning mechanisms that evolve alongside technological disruption.

3. PRACTICAL APPROACHES AND LESSONS LEARNED

3.1 Adapting Regulatory Workforce Training to Fast-Moving Tech

3.1.1 Civil aviation authorities should modernize their internal training programs, particularly given the limited availability of specialized training courses and qualification frameworks for rapidly advancing technologies. Training programs must prioritize demonstrated task mastery, allowing authorities to assess personnel through practical duties such as reviewing operational risk assessments and automated systems. Emphasizing modular learning enables authorities to update targeted skill sets as technologies mature without overhauling broader institutional staffing structures.

3.1.2 To build in-house technical capability for UAS, Thailand has utilized its UAS Regulatory Sandbox as a controlled operational learning environment for regulatory personnel. Rather than relying solely on classroom instruction, inspectors and authorization officers have participated directly in sandbox trials to evaluate operational risk assessments, command-and-control links, and beyond visual line-of-sight (BVLOS) flight profiles. These field exercises enabled technical officers to develop and demonstrate their competencies under controlled, real-world conditions by assessing airworthiness-related matters, pilot competence, and safety mitigations, thereby strengthening the institutional expertise required to process commercial authorizations effectively.

3.2 Cross-Sectoral Inter-Agency Training

3.2.1 The implementation of Thailand's UAS Regulatory Sandbox has also demonstrated that UAS and AAM operations intersect directly with telecommunications, radio frequency spectrum, digital technology, and national development agencies. Civil aviation authorities should therefore institutionalize joint training mechanisms and establish appropriate coordination with relevant national bodies to pool technical expertise and harmonize cross-sectoral oversight.

4. CONCLUSION

4.1 The sustainable growth of emerging aviation technologies relies on developing regulatory frameworks and institutional workforce capabilities together. Publishing modern policies without trained personnel to review, approve, and oversee operations creates administrative bottlenecks that stall investment and delay market entry.

4.2 As demonstrated by Thailand's UAS Regulatory Sandbox experience, utilizing live testbeds for hands-on workforce training and coordinating with non-aviation authorities enables civil aviation bodies to maintain institutional agility. Proactive investment in regulatory personnel ensures that oversight upholds the highest safety standards while actively accelerating the sustainable economic growth of emerging aviation markets.

5. **ACTION**

5.1 The Conference is invited to:

- a) urge Member States to develop regulatory workforce strategies and training curricula in parallel with the drafting of policies and regulations for emerging aviation technologies, ensuring that civil aviation personnel possess the necessary technical and analytical capabilities; and
- b) request ICAO to link the *ICAO Policy on Innovation* with the *NGAP Strategy* by developing specialized training toolkits, regulatory competency guidelines, and knowledge-sharing platforms under the *No Country Left Behind* (NCLB) strategic goal.

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