



WORKING PAPER

ASSEMBLY — 41ST SESSION

TECHNICAL COMMISSION

Agenda Item 31: Aviation Safety and Air Navigation Standardization

ICAO ADVANCED AIR MOBILITY ADVISORY GROUP

(Presented by the United States and co-sponsored by Japan)

EXECUTIVE SUMMARY

This paper highlights the increased international interest in advanced air mobility (AAM) and recommends that ICAO focus on a streamlined approach, efficiently utilizing the current panel structure and establish an AAM advisory group (AAM AG) to help facilitate a common vision and manage a cross-panel, coherent, and coordinated approach to support their respective work programs and activities (e.g., job cards).

Action: The Assembly is invited to:

- a) consider the broad impact of the evolving AAM ecosystem on ICAO panels and consider this industry's rapid growth;
- b) encourage ICAO to establish an AAM advisory group (AAM AG) to help institute a common vision and coordinate its activities with relevant ICAO panels having equities, which may eventually lead to amending Standards and Recommended Practices (SARPs) and guidance materials in their respective panel work; and
- c) encourage ICAO Member States to provide in-kind resources, in the form of subject matter experts, to help support the work activities of the AAM AG.

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| <i>Strategic Objectives:</i> | This working paper relates to the Safety and Air Navigation Capacity and Efficiency Strategic Objectives. |
| <i>Financial implications:</i> | The activities referred to in this paper will be undertaken subject to the resources available in the 2022-2025 Regular Programme Budget and/or from extra budgetary contributions from States and Regional Safety Oversight Organizations. |
| <i>References:</i> | AN-Conf/13-WP/61, <i>Integration of the ICAO Remotely Piloted Aircraft Systems Work Program</i> Doc 9750, <i>Global Air Navigation Plan</i> |

1. INTRODUCTION

1.1 Advanced air mobility (AAM) is a new concept in air transportation most often connected to the use of electric vertical take-off and landing (eVTOL) aircraft to move people and cargo between places not currently or easily served by existing aviation modes. AAM is not a single technology, but rather a collection of new and emerging technologies being applied to the aviation ecosystem, particularly in new aircraft types and equipage. For instance, in the case of eVTOL, the aircraft may be powered by hybrid electric systems, batteries, or potentially by hydrogen fuel cells.

1.2 AAM offers the possibility of more efficient routes through our daily lives with highly dense urban area usage frequently referred to as urban air mobility (UAM). UAM “layers on” additional operational and technical considerations such as noise reduction for the operation of AAM aircraft. The AAM ecosystem includes both in-aircraft and remotely piloted operations, as well as new methods for vehicle operational controls.

1.3 AAM is not a distant future vision. It is an oncoming business model with aircraft undergoing certification, landing sites under construction, and wide variations in technological, operational and policy solutions that need to be decided to enable the envisioned operations.

1.4 The following considerations are recognized: ICAO is resource-limited; no single ICAO Panel either serves in an integrating role or has a major share of AAM; one lead-panel coordinating across panels will present challenges; there is no current underlying assumed concept of operations to help define each panel’s approach; and, lastly, there is an immediate need for guidance given this industry’s rapid growth.

1.5 Given the above considerations, the increased international interest in AAM, and the collection of new and emerging technologies and concepts envisioned, there may be a desire to establish a new ICAO Panel tasked with AAM Standards development. Instead, the United States strongly recommends that ICAO make use of the current panel structure to establish an AAM AG. This group will help facilitate the development of a concept of operations, establishing and managing a coherent and coordinated approach with the relevant panels that would be impacted by the group’s work to support activities of existing panels.

2. DISCUSSION

2.1 AAM has started to infiltrate the Air Navigation Commission Panels in various ways. The following list provides a short overview of AAM topics and activities within ICAO:

- *Aerodrome Design and Operations Panel*. Undertakes vertiports-related work including the design, airspace, fire-fighting and airport collaborative decision making (A-CDM) requirements that combine many of the airport and heliport considerations into one set of needs and guidance.
- *Accident Investigation Panel*. Develops, adapts and maintains provisions for accidents/incidents involving new airframes, propulsion, and operations in the support of the Global Aviation Safety Plan (GASP).

- *Airworthiness Panel*. Develops and adapts airworthiness and aircraft certification provisions for these new technologies via Annex 8, and new maintenance and related provisions via Annex 7 — *Aircraft Nationality and Registration Marks*.
- *Air Traffic Management (ATM) Operations Panel*. Will progress work on near-term AAM operations as they will be in the traditional air traffic service, but with business and flight characteristics that will challenge the current operations. Other near- and longer-term impact work includes airspace structures that reflect the new traffic patterns that arise from multiple vertiports in close proximity and flight characteristics including maneuvering and flight reserve differences.
- *ATM Requirements & Performance Panel*. Will develop concepts, SARPs, as well as Procedures for Air Navigation Services (PANS) and/or related guidance material supporting the longer-term concept for the AAM supplement, including variations in flight and flow information for a collaborative environment (FF-ICE), system wide information management (SWIM)-related access and trajectory-based operations (TBO).
- *Communications Panel*. Will need to progress longer-term AAM work that will require air-ground and ground-ground data applications for AAM in air traffic services, command and control links for eVTOL urban operations (uncrewed or operator-assisted), cyber-security-related provisions, potential infrastructure and aircraft, among others.
- *Flight Operations Panel*. Will adapt and maintain SARPs and guidance materials, including flight recorder-related provisions, to support accident and incident investigations for eVTOL AAM operations.
- *Frequency Spectrum Management Panel*. Will update proposals to the ICAO policy on all relevant aeronautical frequency spectrum allocations to support emerging AAM requirements to potentially include vehicle-to-vehicle coordination.
- *Instrument Flight Procedures Panel*. Develops, adapts, and maintains flight procedures SARPs and guidance material (e.g., Doc 8168, *Procedures for Air Navigation Services — Aircraft Operations*, the *Aeronautical Chart Manual* (Doc 8697), the *Required Navigation Performance Authorization Required (RNP AR) Procedure Design Manual* (Doc 9905) and *The Quality Assurance Manual for Flight Procedure Design* (Doc 9906)) leading to enhanced safety, increased terminal airspace capacity, and utilization given the rise of vertiports; improved airport/heliport/vertiports as well as increased accessibility in all weather conditions. This effort includes new instrument flight procedure (IFP) design criteria to address evolving aircraft capabilities and new operational concepts for vertiports. This also includes harmonization of charting criteria, databases, and avionics systems guidance with IFP design standards for eVTOL and vertiport operations.
- *Information Management Panel*. Defines and develops ATM information management concepts, functions, and processes required (including business model) to provide accredited, quality-assured, and timely information by AAM actors within

the air navigation system and used to support operations, including expansion of aeronautical information service to support the new operations and facilities.

- *Meteorology Panel*. This panel defines and develops concepts for delivery of aeronautical meteorological information services to support operations at lower altitudes over densely populated areas (both people and structures). It also needs to identify the scientific and/or technological capabilities necessary to fulfil these identified AAM operational requirements.
- *Navigation Systems Panel*. Will identify the performance requirements and potential alternative sources of navigation to provide operational resiliency for Global Navigation Satellite Systems that can support lower altitude operations, especially for lower visibility approach and landing operations to vertiports.
- *Personnel Training and Licensing Panel*. Will develop licensing requirements related to the use of new technologies such as electric powered aircraft or new categories of aircraft using new technologies for flying.
- *Remotely Piloted Aircraft Systems (RPAS) Panel*. Will continue to serve as the focal point and coordinator of all RPAS Panel work related to unmanned aircraft systems (UAS), including remotely piloted AAM, as well as provide support for future AAM operations, aiming to ensure global interoperability and harmonization.
- *Separation and Airspace Safety Panel*. Develops SARPs, PANS, and/or related guidance material supporting separation minima, focusing on any AAM airspace structures and capacity demands in those structures considering the availability to the vehicles and their respective operators in real-time.
- *Surveillance Panel*. Adapts, develops, and maintains guidance materials for airborne and ground-based aeronautical surveillance system needs, including AAM aircraft, airborne collision avoidance systems (ACAS) approach operations, vehicle-to-vehicle surveillance, and separation applications.
- *Safety Management and the Dangerous Goods Panels*. Continue to support their missions which applies equally to AAM.

2.2 Given the potential impact on the panels' work listed above and this industry's rapid growth, the United States encourages the establishment of an AAM AG to serve in an integrating role, coordinating across impacted panels. The AAM AG would develop a common vision to help define each impacted panel's approach and eventual need to amend SARPs and guidance materials.

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