International Civil Aviation Organization

WORKING PAPER

A41-WP/292
TE/112
5/8/22
(Information paper)
English only

ASSEMBLY — 41ST SESSION

TECHNICAL COMMISSION

Agenda Item 31: Aviation Safety and Air Navigation Standardization

NEED FOR GUIDELINES AND REGULATORY FRAMEWORK FOR DEVELOPMENT OF URBAN AIR MOBILITY/ADVANCED AIR MOBILITY (UAM/AAM)

(Presented by Brazil)

EXECUTIVE SUMMARY

The world of aviation is constantly evolving. Currently, air mobility (urban air mobility or advanced air mobility) is on the verge of a fast-growing expansion as the major aircraft manufacturers are progressing towards and have started the certification process of various electric vertical take-off and landing (eVTOL) aircraft models. There are huge cities in different countries chosen by airlines to be the target of their initial implementation. To stay ahead of that demand, some States are working on independent projects. Considering that eVTOL implementation will be global, the lack of international guidelines and regulatory framework may cause an impact on safety, security, the environment, system reliability, and economic efficiency. While Air Mobility, as a concept, is already under development, a holistic and collaborative agreement is fundamental to ensuring global harmonization and interoperability.

Strategic Objectives:	This working paper relates to Strategic Objectives on Safety, Air Navigation Capacity and Efficiency, Economic Development of Air Transport, and Environmental Protection.
Financial implications:	The financial impacts will depend on approved decisions.
References:	Doc 4444, *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM) Doc 9613,*Performance-based Navigation (PBN) Manual* ICAO Document: Unmanned Aircraft Systems Traffic Management (UTM) – A Common Framework with Core Principles for Global Harmonization - Edition 3 ICAO Website: https://www.icao.int/safety/UA/Pages/UTM-Guidance.aspx

1. INTRODUCTION

1.1 First of all, it is necessary to clarify the terminology usage. Some countries expanded the scope of urban air mobility (UAM) and are using the term advanced air mobility (AAM). For the purpose of this document, UAM and AAM are equivalent. From now on, the term UAM/AAM will be used in the body of this document.

1.2 Several institutions are working on initiatives involving the elaboration of a concept of operations (CONOPS) and the consequent implementation of the UAM/AAM concept in urban and/or suburban airspaces aiming to integrate eVTOL aircraft. In this sense, as examples, we are aware of works in progress in Brazil, the United Kingdom, the European Union, the United States, Australia, China, and in other entities. The UAM/AAM ecosystem is multidisciplinary and involves different areas, as vertiports infrastructure, aircraft certification, pilot license, public acceptance, air traffic management, air traffic flow management, airspace design, aeronautical meteorology, aeronautical information management, communication, navigation, surveillance, and flight procedure design, among others. All this work shares a common objective: to enable the implementation of air operations with eVTOL aircraft and allow, in a safe and orderly manner, the scalability of this type of flight. Therefore, as a global demand, it is highly important to participate in this process from the beginning. The most important deliverable goal is the publication of ICAO guidelines and a regulatory framework for UAM/AAM.

2. DISCUSSION

2.1 *Necessity of global guidelines and framework*

2.1.1 There is an expectation of exponential growth in the number of air movements of eVTOL aircraft predicted for the coming years. The industry is advancing, and some have already started the certification process. In the Brazilian scenario alone, there is a forecast of approximately six hundred eVTOL aircraft orders. According to this trend, most of them are expected to fly in the main big cities such as Rio de Janeiro and Sao Paulo. The same is happening in other cities around the world. In preparation for this scenario, there are CONOPS development projects for eVTOL operations in North America, South America, Europe, Asia, and Oceania. This highlights a global demand. As a result, of this prediction of growth, it is a fact that the infrastructure, the current standard of operation, the airspace capacity and the regulations in force will not be able to absorb this growth in demand, especially in large urban centers. It will be necessary to increase airspace capacity and provide new services and technological solutions. In addition, all other areas mentioned in the previous paragraph will need to evolve.

2.1.2 Given this scenario, where manufacturing companies have already started the eVTOL certification process, the start of operations is getting closer. The provision of infrastructure is an activity that requires resources from States and/or certified private entities to provide products or services. Today, although global, these initiatives are taking place independently without ICAO provisions. Therefore, the UAM/AAM guidelines and framework should be published as happened with UTM. This is important to support the States and harmonize the main actions. The unique competent organization for doing this is ICAO. Besides that, it is also necessary to establish a new expert group.

2.2 *Necessity of a new expert group*

2.2.1 On the one hand, within this perspective of progress, much of the content developed for UTM may be incorporated into UAM/AAM development. On the other hand, it should be noted that the

UTM and UAM/AAM environments will not be identical. The types of aircraft, performances, operating characteristics, and other factors make them distinct from each other. Therefore, the publication of specific guidelines for the UAM/AAM environment is important for the implementation to occur in a harmonized and safe way. Separation criteria, operating regulations, and clear rules on airspace planning are essential to building a safe, efficient, and scalable environment for air operations including eVTOL. Today, the ICAO expert group that deals with the UTM issue is RPASP. Due to the nature of the type of operation, characteristics of the aircraft, and specificities involved, we believe the best solution is the establishment of a new expert group to meet the UAM/AAM demand. In addition, in our view, the best way of improving the concept of UAM/AAM is by asking the support of States in a collaborative approach.

2.3 *Collaborative approach*

2.3.1 Currently, States, and public and private institutions around the world are carrying out projects aimed at implementing the UAM/AAM concept. Considering the creation of this new ICAO expert group, we understand that the best way to advance this work is to gather experiences, expertise, and projects on the evolution of the UAM/AAM concept. The ICAO Council, through the ANC, could forward a State Letter requesting national information about UAM/AAM initiatives. This would be useful to support the work of the new expert group. Additionally, as part of the scope of its activities, the new expert group would need to develop technical requirements and interact with other panels in order to demand the creation of a new navigation specification (NavSpec).

2.4 *New navigation specification (NAVSPEC) for UAM/AAM*

2.4.1 Navigation specifications are published in ICAO Doc 9613. The development of a new navigation specification is done by the expert group performance-based navigation study group (PBNSG). The use of navigation specifications, for example, is related to:

a) the PANS-OPS area, regarding the provision of separation from obstacles;

b) the ATM area, regarding the separation between aircraft, according to Doc 4444; and

c) airspace design, regarding the route structure and requirements of use for each route.

2.4.2 The creation of a new navigation specification is critical to supporting the development of the UAM/AAM concept. Therefore, we recommend that the Council assigns this demand to the PBNSG.

3. CONCLUSION

3.1 UAM/AAM is growing and developing fast. Different initiatives around the world are planning to implement the use of eVTOL aircraft in a safe, organized, and efficient manner. After the certification process, the proliferation of eVTOL aircraft for commercial use is expected. As a result, there is a need for safe and efficient integration of eVTOL into existing operational airspace; and the airspace, infrastructure, and regulations will need to be ready. The implementation of the UAM/AAM concept requires a collaborative and multidisciplinary global effort led by ICAO.

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