International Civil Aviation Organization

WORKING PAPER

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ASSEMBLY — 40TH SESSION

EXECUTIVE COMMITTEE

Agenda Item 26: Other high-level policy issues to be considered by the Executive Committee

INNOVATION IN AVIATION

(Presented by the Council of ICAO)

EXECUTIVE SUMMARY

New technologies and concepts of operation are rapidly becoming available across the aviation industry sector. These innovations carry significant potential in improving aviation safety, security, sustainability, accessibility and affordability across the globe. They can also lead to more efficient and streamlined aviation regulatory processes. It is therefore vital that the global international civil aviation sector take timely action to monitor and evaluate these developments in order for them to deliver on their potential benefits, and for ICAO to do so in a manner that leaves no country behind from the start.

Action: The Assembly is invited to adopt the Assembly Resolution proposed in the Appendix to this paper.

Strategic Objectives:	This working paper relates to all Strategic Objectives.
Financial implications:	The activities referred to in this paper will be subject to the resources available in the 2020-2022 Regular Programme Budget and/or from extra budgetary contributions.
References:	C-DEC 215/7 Doc 10115, *Report of the Thirteenth Air Navigation Conference*, Corrigenda Nos. 1 and 2, and Supplement No. 1 Doc 10075, *Assembly Resolutions in Force (as of 6 October 2016)*

1. BACKGROUND

1.1 During the past five years, there has been a significant increase in the pace of development and application of new technologies and concepts of operation within the aviation sector. Milestones that have been reached during this period include:

a) the circumnavigation of the globe by a solar aeroplane and progress on hybrid/electric technologies for aviation;

b) increase in the use of sustainable aviation fuels;

c) the successful suborbital flight carrying a "test participant";

d) multiple successful tests of flying taxis with people on board;

e) the deployment of unmanned aircraft systems (UAS) traffic management systems; and

f) the provision of regular communication services from platforms on high-altitude balloons.

1.2 There has also been increased use of machine learning, artificial intelligence and blockchain in applications developed for aviation.

1.3 In many instances, these developments are improving aviation safety, security, sustainability, accessibility and affordability. Some of these advancements also introduce new challenges, such as the increasing dependence on information and communications technology. It should also be noted that Member States across the globe lead these innovations. Innovation is being developed and applied across the globe.

1.4 It is important for Member States that have relevant regulatory experiences to share them with the wider aviation community in order for all members of the aviation system to realize the potential benefits that these innovations can bring. Relevant experiences include new procedures and regulatory processes related to the administration of civil aviation.

2. INFORMATION TECHNOLOGY-RELATED INNOVATIONS

2.1 The ICAO Blockchain Aviation Summit and Exhibition (Abu Dhabi, 2019) demonstrated the importance of aviation innovations emerging from the broader information technology sector.

2.2 Speakers agreed that in a world of data, the following three technologies will be core for the coming years:

a) **Digital Objects (DO)** – In the era of "Internet of Things", all connected objects need to be properly identified and their data secured.

b) **Blockchain** – Data, when stored and modified by multiple parties, must be irrefutably true and retraceable historically, and such history must be immutable to permit trust between all users.

c) **Artificial Intelligence** – Data has become increasingly accessible but due to its extensive size and growing complexity, humans will be unable to fully harness its power for decision making unless data is processed, analysed and understood through artificial intelligence.

2.3 The above-mentioned technologies are interdependent as is their development. The International Telecommunication Union (ITU) of the United Nations has established focus groups to study these technologies.

3. ICAO AS A GLOBAL FORUM FOR INNOVATION

3.1 Several Member States brought innovations, and their oversight thereof, to the attention of the aviation community through ICAO fora including the Second ICAO Conference on Aviation and Alternative Fuels (CAAF/2, 2017), the Thirteenth Air Navigation Conference (AN-Conf/13, 2018), the Second High-level Conference on Aviation Security (HLCAS/2, 2018), the series of Global Aviation Security Symposia that began in 2017, the Remotely Piloted Aircraft Systems (RPAS) and Drone Enable Symposia, and various events on environmental protection as well as the ICAO Blockchain Aviation Summit and Exhibition. Innovation has indeed become a very common theme for all ICAO events.

3.2 Consequently, the technical work in many of these areas has already been initiated through established processes and ICAO expert groups and is included in the Work Programme of the Organization.

3.3 Some specific outcomes related to these events include:

a) AN-Conf/13 recommendations under Agenda Item 5 “Emerging Issues”;

b) CAAF/2 Declaration on the 2050 ICAO Vision for Sustainable Aviation Fuels;

c) HLCAS/2 conclusions under Agenda Item 3 “Global Aviation Security Plan (GASeP);

d) establishment of a multidisciplinary group to develop a trust framework for a digitally connected aviation ecosystem;

e) agreements with international organizations not traditionally part of the aviation community but now producing technology and providing innovative services to the aviation industry;

f) ICAO Blockchain Aviation Summit and Exhibition;

g) establishment of an Aviation Security Panel Working Group on Innovation in Aviation Security;

h) creation of a multidisciplinary Secretariat study group to coordinate ICAO’s efforts to address all cybersecurity-related issues; and

i) establishment of an annual AVSEC Industry Engagement Day, focused on discussions between policymakers, decision makers, industry, academics and

manufacturers, to identify current and future innovations in aviation security technology and processes.

3.4 While the technical aspects of individual innovations are included in the Work Programme, it is important to note that, due to the pace and nature of many of the innovations, regulatory bodies at the national, regional and global level must, themselves, evolve and indeed innovate.

4. COUNCIL ACTIVITIES RELATED TO INNOVATION

4.1 The Council recognized the emergence of innovation in aviation under the general theme of the future of aviation during its 2018 Council Off-site Strategy Meeting (COSM2018) (C-DEC 215/7 refers), as well as the 2019 Council Off-site Strategy Meeting (COSM2019). Moreover, based on the outcome of those deliberations, the theme for the upcoming fifth ICAO World Aviation Forum (IWAF/5) focuses on innovation and an innovation fair will be held prior to the 40th Session of the General Assembly[1].

5. CONCLUSION

5.1 Given that the growth of innovation in aviation is expected to increase, it is important for the global aviation community to develop new regulatory policies in order to evaluate innovations in a timely manner. These policies should not be technology specific but rather should provide a high-level framework though which innovations can be assessed and, where relevant, be brought under global polices and standards. The technology-specific elements will, of course, continue to be reviewed under the existing expert groups.

5.2 To that end, it is important for the Assembly to recognize the need for, and endorse the development of, such a framework.

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[1] At the time of writing, the Global Aviation Security Symposium 2019 (AVSEC2019), IWAF/5 and the Innovation Fair had not yet taken place. A40 will, however, be apprised of any relevant information stemming from these events when this working paper is introduced formally to the Assembly.

APPENDIX

DRAFT RESOLUTION FOR ADOPTION BY THE 40TH SESSION OF THE ASSEMBLY

Resolution A40-xx: Innovation in aviation

Whereas Article 44 of the *Convention on International Civil Aviation* states that among the aims and objectives of ICAO are development of the principles and techniques of international air navigation and fostering of the planning and development of international air transport so as to meet the needs of the people of the world for safe, regular and economical air transport;

Whereas Article 37 of the Convention stipulates that ICAO shall adopt and amend from time to time, as may be necessary, international standards and recommended practices and procedures dealing with […] and such other matters concerned with the safety, regularity, and efficiency of air navigation as may from time to time appear appropriate;

Whereas several ICAO Conferences have recognized the real and potential benefits and challenges that innovation can bring to the safety, efficiency, security, facilitation and to the economic and environmental sustainability of air transport and that Member States should be provided the opportunity to realize these benefits in a manner that leaves no country behind;

Recognizing that ICAO provisions apply to all civil airspace users, and the absence of normative activity at the global level may hamper the realization of innovative technological solutions and prevent the materialization of their benefits in aviation; and to that end ICAO can benefit from continued interaction with industry to identify the latest technological developments and their timely integration;

Recognizing that the nature and pace of innovations require regulators at the national, regional and global level avail themselves of new methodologies that facilitate the timely evaluation and assessment of technological developments;

The Assembly:

1. *Urges* all Member States that have experience in facilitating the introduction of innovation in civil aviation, and that have evolved their regulatory methods to better evaluate and assess the application of such innovations, to share their experience with other States through ICAO;

2. *Directs* the Council to assess the need, as well as the resources required, to evolve the processes of the Organization, in order to keep pace with innovations that affect the sustainable development of civil aviation;

3. *Directs* the Council on the basis of the conclusions arising from the assessment to be undertaken pursuant to operative clause 2, to develop, if considered appropriate and necessary, high-level polices to address the findings of the aforementioned assessment and subsequently provide a framework that will help ensure the timely development of global polices and standards that support the continuing improvement of safety, efficiency, security, facilitation, economic and environmental performance; and

4. *Directs* the Council to instruct the Secretary General to further liaise with States, governmental and non-governmental organizations, the private sector, academia and the relevant United Nations system entities in order to establish an inclusive dialogue at strategic level that will encourage further collaboration and sharing of experience in relation to innovation.

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