



WORKING PAPER

ASSEMBLY — 41ST SESSION

EXECUTIVE COMMITTEE

Agenda Item 23: Innovation in Aviation

**REPORT ON THE IMPLEMENTATION OF ASSEMBLY RESOLUTION A40-27
INNOVATION IN AVIATION**

(Presented by the Council of ICAO)

EXECUTIVE SUMMARY

This working paper provides an overview of the implementation of Resolution A40-27 - *Innovation in Aviation* and highlights new initiatives, which will span across the 2023-2025 triennium.

Action: The Assembly is invited to:

- a) note the work undertaken since the 40th Session of the Assembly;
- b) endorse the priorities of ICAO on the promotion of innovation in aviation in support of the ICAO Strategic Objectives and of the ICAO Member States;
- c) encourage Member States to consider their involvement in the priorities outlined in paragraph 4 of the working paper and in any future activity resulting from the deliberations of the ICAO Governing Body; and
- d) recognize the relevance and the importance of innovation in working methods, systems and technology to facilitate the implementation of Resolution A40-27 and support the resilience of the aviation system.

<i>Strategic Objectives:</i>	This working paper relates to all Strategic Objectives, Supporting Strategies and Transformational Objective of the ICAO Business Plan 2023-2025.
<i>Financial implications:</i>	The ICAO activities referred to in this paper are expected to be undertaken within the resources available in the 2023-2025 Regular Budget and/or from extra-budgetary contributions as guided by the ICAO Business Plan 2023-2025.
<i>References:</i>	Assembly Resolution A40-27 - <i>Innovation in Aviation</i> ICAO Business Plan 2023-2025 ICAO Secretariat Innovation Strategy

1. INTRODUCTION

1.1 As the United Nations (UN) specialized agency responsible for standard-setting, monitoring and oversight, implementation support, and training for international civil aviation, the International Civil Aviation Organization (ICAO) has a key role to play, as aviation works to address the current and future challenges and opportunities of innovation, including facilitating new entrants to the civil aviation community. The adoption of Resolution A40-27-*Innovation in Aviation* at the 40th Session of the Assembly has accelerated ICAO's support to its 193 Member States in being able to respond to innovations, thereby supporting the ICAO Vision on achieving the sustainable growth of global civil aviation, improving aviation safety, efficiency, and security. Overall, the continued implementation of A40-27 supports ICAO's No Country Left Behind initiative through a more efficient approach for a resilient civil aviation and advances the achievement of the 17 UN Sustainable Development Goals (SDGs).

2. THE FOUR DIMENSIONS OF INNOVATION

2.1 Under the guidance of the Council, ICAO has identified four dimensions of innovation, which structure and rationalize the implementation of Resolution A40-27, as follows:

2.1.1 Interactions with innovators (Resolution A40-27 operative clauses 1, 4 and 5). This dimension pertains to interactions with diverse stakeholders: industry, research entities, States agencies but also to sharing the lessons learned from civil aviation authorities with experience in facilitating new entrants and facilitating the uptake of innovation in international civil aviation;

2.1.2 Incorporating innovation in ICAO's global standards in a timely fashion in order to keep up with the pace of innovation and to accompany their timely integration into operations (Resolution A40-27 operative clauses 2 and 3). This includes exploring options to bring new standards into ICAO for consideration and accelerated adoption. This dimension considers the potential involvement of external parties in some aspects of the standard development process;

2.1.3 Review of ICAO standard-making procedures (Resolution A40-27 operative clauses 2 and 3). A crucial component of implementing innovation within the work of the ICAO Strategic Objectives is to optimize the longstanding internal processes and procedures of the Organization. It includes the continuing evolution of the Air Navigation Commission procedures, the working methods of ICAO's panels and other expert groups, and the Standards and Recommended Practices (SARPs)-related deliberative processes of the Council and the relevant Committees; and

2.1.4 Organization of the ICAO Secretariat to open up to technologies and adapt its internal processes (Resolution A40-27 operative clauses 2, 3 and 4).

3. IMPLEMENTATION OF RESOLUTION A40-27 - INNOVATION IN AVIATION

3.1 Interactions with Innovators

3.1.1 In response to Resolution A40-27 paragraph 5, the Council established the ICAO Industry Consultative Forum (ICF) during the 221st Session of the Council (C-DEC 221/9 refers). This Forum was established to formalize a high-level dialogue between the members of the Council and the industry, at the Chief Executive Officer (CEO) level, in order to generate strategic recommendations for consideration by the Council on the future needs and priorities of the industry. Two meetings of the ICF were held, on 29

and 30 June 2021 and on 21 March 2022 respectively. Appendix A provides information on the key conclusions of the meetings.

3.1.2 Actively monitoring and assessing the impact of innovations in technology, systems and processes are essential pre-requisites for ICAO to effectively support States in establishing appropriate international guidance. In many areas, ICAO has collaborated with innovators and research agencies through its activities in each Strategic Objective. To further progress innovation across the entire organization, ICAO has continued to develop relationships with key innovation in the aviation sector. As an example, ICAO signed a Memorandum of Understanding (MoU) with the International Forum for Aviation Research (IFAR) on 5 April 2022. Under this collaborative agreement, ICAO will benefit from independent assessment of upcoming innovations, and guidance on the aviation research agenda.

3.1.3 A series of opportunities for direct engagement between ICAO and innovators, under the Strategic Objectives, are described in Appendix B and these continue to bring the latest innovations into the Organization. Efforts are under way to promote these opportunities in a well-coordinated and structured manner.

3.1.4 The ICAO 2022 Innovation Fair, which under the theme of *Innovation and Resilience*, aims to explore how innovation has increased the resilience of the aviation sector and how it can help the aviation sector absorb and adjust to future crises. A series of regional events are also being organized to provide regional perspectives on this theme, leading up to the 2022 Innovation Fair.

3.2 **Incorporating innovation in ICAO’s global standards in a timely fashion**

3.2.1 Mechanisms have been developed to facilitate the understanding of the impacts of technological and process innovations on the work programme of ICAO. Appendix B provides a number of examples of processes that facilitate the consideration of innovations in the work of ICAO, such as the Trust Framework Study Group integrated in the Air Navigation Commission (ANC)’s panel structure (secure exchange of digital information), the New Technologies Working Group (Facilitation), and the ICAO Stocktaking Process (environmental protection). Of note is the adoption of the Global Air Navigation Plan (GANP, Doc 9750) as a high-level strategic document aimed at identifying and integrating innovations that will improve the capacity, efficiency, predictability, flexibility of the international aviation system, while ensuring interoperability of systems and harmonization of procedures.

3.2.2 The Air Navigation Commission (ANC) Talks¹ also provide an opportunity for innovators to discuss new technologies and services entering the global marketplace. Synergies are increasingly being sought between ICAO decision-making bodies and the recent incorporation of the ANC talks in the ICAO calendar of events is contributing to multiplying opportunities for relevant information to flow through the organization.

3.3 **Review of ICAO Standard-making procedures**

3.3.1 The call for new methods to profoundly accelerate the ICAO standard-making process has led to a pilot project consisting of a “direct submission process”.

3.3.2 In addition, the working methods of the ANC and its panels support the consideration of innovation in the context of standards-making, through the establishment of a prioritization process.

¹ <https://www.icao.tv/search?q=ANC+Talks>

3.3.3 A Small Group on Innovation was formed with the participation of Members of the Council and Members of the Air Navigation Commission in order to progress on the implementation of Assembly Resolution A40-27.

3.4 **Organization of the ICAO Secretariat to open up to technologies and adapt its internal processes**

3.4.1 Under the leadership of the Secretary General, a Secretariat Strategy on Innovation was developed by a collaborative group of ICAO Secretariat Focal Points on Innovation, nominated by their respective Bureaus and Offices. Additional efforts are required to mainstream innovation, to enhance an organization-wide culture of innovation through the realization of synergies on innovation between and across Bureaus, foster support on innovation between Bureaus, share information on innovation, and as such contribute to a vibrant innovation ecosystem in line with the organization's mandate, and consistent with the Transformational Objective included in the ICAO Business Plan for 2023-2025.

4. **PRIORITIES DURING THE 2023-2025 TRIENNIUM**

4.1 The priorities identified in this section are reflected in the ICAO Business Plan for 2023-2025. They are expected to be undertaken within the resources available in the 2023-2025 Regular Budget and/or from extra-budgetary contributions.

4.2 **Interactions with Innovators**

4.2.1 The main interaction with innovators will continue to be through the events and mechanisms identified in Appendix B, and this will be progressed throughout the next triennium. ICAO Members States are encouraged to support ICAO identifying innovators in order to facilitate their participation in the work of the Organization, at the strategic and technical levels. In addition, communications and outreach activities will be scaled up as appropriate and supported by the ICAO innovation webpage as a gateway². This will complement the innovation trackers developed in the context of the work on the Strategic Objectives (e.g. Global Coalition for Sustainable Aviation).

4.2.2 Following-up on the signing of the MoU between ICAO and IFAR, a scientific assessment on Urban Air Mobility (UAM) will deliver results for consideration by ICAO. The results of this assessment will supplement the information available to ICAO as it works on the subject.

4.3 **Incorporating innovation in ICAO's global standards in a timely fashion**

4.3.1 Under the guidance of the Council, a comprehensive technology roadmap, which builds upon and is consistent with ICAO's existing work, including the GANP, will be developed. It will include contributions from the research community, including academia and the industry and will allow to actively monitor and assess the impact of innovations in technology, systems and processes. The roadmap will identify mature innovations that should be considered for inclusion in ICAO's standards, as well as a timeframe for their expected deployment. The roadmap would be dynamic and rolling, taking into account the necessary refinement of the processes and resources in ICAO. This would contribute to prioritizing ICAO's standards-making activities to better accommodate innovations deemed critical to global air transport.

² <https://www.icao.int/innovation/Pages/default.aspx>

4.4 **Review of ICAO Standard-making procedures**

4.4.1 The lessons learned and recommendations from the pilot project on “Direct Submission” (paragraph 3.3.1 refers) will be consolidated at the end of 2022. On this basis, a framework for direct submission, including the technical areas and the selection process for which direct submission could be further elaborated and lessons learned, will be shared across ICAO. ICAO will continue to collect information from Member States on their challenges related to the implementation of ICAO SARPs. Last but not least, initiatives have been introduced to further enhance ICAO’s ability to identify opportunities to improve the efficiency and effectiveness of the SARPs development process.

4.5 **Independent evaluation of ICAO on innovation and actionable recommendations**

4.5.1 Responding to Resolution A40-27 operative clause 2 and following guidance from the Council, ICAO has initiated discussions with the United Nations System Staff College (UNSSC) to perform an independent assessment of ICAO on innovation, with the view to identifying existing gaps in the way it addresses innovation. The UNSSC was selected by the United Nations as the custodian of the UN Innovation Toolkit, and has been engaging across the UN System to build capacity on innovation and to mainstream innovation throughout the UN System. The independent assessment will lead to actionable recommendations in 2023, in line with the four dimensions of innovation presented in this paper.

4.5.2 In particular, attracting and retaining competent personnel with demonstrated ability to steer and accompany the culture change needed at ICAO should be a core element of the revised ICAO Human Resources Strategy.

4.6 **The importance of ICAO Member States**

4.6.1 As per the Assembly Resolution A40-27, ICAO Member States have a crucial role in sharing their experience with other Member States, through ICAO, on the development and implementation of new regulatory methods to better evaluate and assess the applications of innovations. ICAO will continue to create outreach opportunities to allow for this exchange of experience, supporting the current wide-ranging initiatives under each Strategic Objective. In addition, by the means of a State Letter, ICAO Member States will be encouraged to identify innovators in their respective States, in order to facilitate their participation in relevant upcoming events organized by ICAO.

5. **CONCLUSION**

5.1 ICAO remains committed to work across the aviation and innovation ecosystem to accelerate a culture of innovation and to facilitate the uptake of technologies and processes through timely standard setting, with respect for transparency and accountability, following the processes of due diligence in order to prevent conflicts of interest and comply with good governance principles. The result will foster the achievement of the SDGs at the national, regional and global levels.

APPENDIX A

RESULTS OF THE ICAO INDUSTRY CONSULTATIVE FORUM

1. Responding to Assembly Resolution A40-27 – *Innovation in Aviation*, operative clause 5 “Directs the Council to urgently consider the establishment of a high-level body with the industry to regularly provide strategic advice to the Council concerning innovation in aviation”, the Council endorsed the establishment of the ICAO Industry Consultative Forum (ICF) (C-DEC 221/9 refers).
2. The inaugural meeting of the ICF took place on 29 and 30 June 2021³. It was designed as a horizon-scanning exercise that would support the identification of the most significant and transformative challenges faced by the industry in the years to come, in relation to innovation. In addition, the ICF meeting aimed to prompt comments from the industry on possible enhancements by ICAO on its approach to innovation, as well as on its engagement with the industry.
3. Three main themes stood out from the meeting, namely: a) the COVID-19 recovery as the most pressing challenge; b) environmental sustainability, in particular climate change, as an existential threat for the aviation sector; and c) the increased digitization of the sector and the inherent cyber-security threat. In addition, the wider topic of air traffic management was at the core of many interventions, either from the perspective of its modernization, or from the expected increased interactions with urban air mobility solutions and space operations. Also, underlying the discussions on COVID-19 response and possible impacts of climate change, an urgent call for a more resilient aviation sector was made.
4. On the issue of ensuring the relevance of ICAO in a fast-evolving environment, the industry called for performance-based Standards and Recommended Practices (SARPs), which would not fix a technological solution but leave room for further innovation. Prescriptive Standards would be developed only when appropriate. The role of ICAO was deemed essential in examining and validating pilot projects, which could then be codified by ICAO and shared throughout the sector to deploy rapid benefits. The approach of “direct submissions” was also welcomed.
5. The speakers underlined the need to take into account the consistent requests for more continuous dialogue between ICAO and the industry, including new stakeholders, not necessarily related to aviation. The Council Aviation Recovery Taskforce (CART) was quoted as an example of excellent cooperation and expeditious work and requests were made to establish the CART as a model to be replicated in case of other global crises affecting the aviation sector.
6. The second meeting of the ICF was held on 21 March 2022 and was dedicated to Sustainable Aviation Fuels (SAFs) and Lower Carbon Aviation Fuels (LCAFs), recognizing their key role in the sector’s emissions reductions efforts. Speakers shared key lessons learned from SAF/LCAF developments, which would be crucial for its effective scale-up and expectations regarding the evolution of SAF/LCAF moving forward.
7. The meeting recognized that ICAO could drive the development of SAF/LCAF and their use by international aviation through the coordination of roadmaps, milestones and policies. In addition, adopting an all-inclusive, technology agnostic approach, and promoting an agenda that balances

³ The four sessions of the inaugural meeting are available on ICAO TV www.icao.tv

SAF/LCAF affordability and access were also noted as important factors in providing certainty and decisive signals to consumers and suppliers, thus enabling a stable long term business strategy for SAF/LCAF development and deployment.

8. In setting out an ICAO strategic vision and policy approach for SAF/LCAF, industry viewed that avoiding market distortions and an unlevelled playing field, as well as harmonized policies were crucial. Support for technical coordination especially in the certification of new SAF pathways, and harmonization of SAF sustainability criteria, will allow the sector to take into account the development of synthetic fuels, and growing options beyond drop-in fuels.

APPENDIX B

ICAO'S ENGAGEMENT WITH INNOVATORS: INITIATIVES FOR A STRUCTURED AND PREDICTABLE OUTREACH

ICAO has designed a number of activities to enhance its interface with innovators, as per the expectations set in Assembly Resolution A40-27 - *Innovation in Aviation*. These initiatives form a comprehensive, coordinated and predictable framework to facilitate the engagement of innovators with ICAO and with its Member States. They constitute real platforms to hold a global dialogue on innovation and aviation at ICAO.

a) Across all Strategic Objectives

- *ICAO Industry Consultative Forum*: it formalizes a high-level dialogue between the Council and the industry and generate strategic insights on the priorities and needs of the industry.
- *Innovation Fair*: it provides a unique opportunity for ICAO to showcase its expertise and capability to be the international forum of choice during which the state of the art in innovation and aviation is being discussed.
- *Innovation workshops*: they aim to support Member States understand the impact of innovations on all aspects of international civil aviation and create an environment prone to innovation. They also aim to support the private sector understand better the role of ICAO;
- *Innovation webinars*: they showcase innovations in aviation that have the potential to help progress the ICAO Strategic Objectives, deliver on the United Nations Sustainable Development Goals and enable the resilience and recovery of the aviation system. They help viewers understand the opportunities and challenges related to new technologies.

b) Specific to the ICAO Strategic Objectives:

Aviation Safety and Air Navigation Efficiency and Capacity

- *The Trust Framework Study Group*, integrated in the ANC's panel structure, was created at the request of the 13th Air Navigation Conference and draws extensively on industry representatives with information technology background to ensure that necessary cyber safety and resilience are addressed proactively.
- ICAO has developed and enhanced a number of web-based platforms to provide and share information on a broad range of subjects related to innovation in aviation (e.g. UAS Toolkit⁴).
- The organization of symposia for States and industry to share best practices and be kept informed of relevant developments (e.g. *DRONE ENABLE Symposia*).
- The creation of expert groups to look into emerging issues and innovations at an earlier technological readiness level. Thus, their impact on international aviation operations and their disruptive potential can be better understood before they are integrated in the more traditional technical work of ICAO (e.g. *Space Learning Group*).

⁴ <https://www.icao.int/safety/UA/UASToolkit/Pages/default.aspx>

- *The ANC Talks*: As it creates opportunities to engage with aviation industry and stakeholders, ICAO has been organizing ANC Talks. The collaborative approach of ANC Talks is aimed at staying connected on important matters that are happening today around the world.

Aviation Security and Facilitation

- The *Working Group on Innovation in Aviation Security* of the Aviation Security Panel (AVSECP) monitors and analyzes the impacts of technological and procedural innovations to efficiently mitigate new and evolving threats.
- The annual *Global AVSEC Symposium* gathers key stakeholders from States, industry, manufacturers and academia, in order to, among other objectives, raise the sector's awareness on the latest developments and trends which are shaping the future of aviation security. This is complemented when feasible with an exhibition area, which is an opportunity for attendees to understand better the technologies and techniques entering the market and their impact on our activities. Such direct exposure to the industry feeds strategic considerations.
- The *New Technologies Working Group* (NTWG) explores innovative topics, mostly in relation to passenger identification, automated border control, biometrics and digital travel documents. Member States' experts and industry representatives develop guidance documents or propose the development of SARPs, which are subsequently considered by the Facilitation Panel.
- The *Traveller Identification Programme* (TRIP) Symposium creates the optimal platform for a fruitful exchange of views between States, industry, manufacturers and academia in the area of facilitation. The exhibition area is of prime importance, as it offers a unique opportunity to navigate the innovations and technological developments displayed by manufacturers, which in turn can inform the work of ICAO and strategic decision-making.
- The *Secretariat Study Group on Cybersecurity* (SSGC) was established following Assembly Resolution A39-19 in order to ensure a cross-cutting approach to cybersecurity and cyber resilience across civil aviation domains in a harmonized and holistic manner. It has since been replaced by a Cybersecurity Panel, which has started its work in May 2022.

Economic Development

- The *ICAO World Aviation Forum* was convened for the first time in November 2015 in support of the No Country Left Behind (NCLB) campaign and with a clear objective to enhance partnership and financing opportunities required to accelerate the implementation of international civil aviation global standards and policies, plans and programmes, leading to improvement of their air connectivity and access to the global aviation system. Within the same objective, IWAF/5 aimed to support Member States in addressing innovation in aviation. As such, IWAF's purpose and role within aviation's development coincide with innovation due to the nature of subject matters being discussed.
- The Statistics Division is a platform to gain consensus and formulate recommendations to guide the development in aviation data and analysis to meet the evolving needs of Member States and in tandem with the technological advancement. The Eleventh Meeting of the Division (STA/11), held in April 2022, discussed a broad range of issues including big data analytics and collaborative projects with the United Nations (UN) and other international organizations in the area of advanced data analytics.
- ICAO has partnered with Member States and UN/international organizations to develop enhanced business intelligence tools, including the *Tableau Business Intelligence (BI) to monitor State of Industry and COVID-19 related impacts*.

- The Air Transport Regulation Panel (ATRP) is a forum to undertake tasks related to the liberalization of air transport and related economic regulatory matters. In light of innovative advancements in aviation, the Panel has been tasked with considering economic regulation of international operations of unmanned aircraft (UA).
- In the context of air cargo, ICAO has been working with partners and international organizations to advance the digitalization of air cargo through, among others, the development of new guidance on digital technical specification.

Environmental Protection

- Since the 1970s, ICAO has been reviewing innovations in fuel efficiency, noise and local air quality in the context of the work of the Council's Committee on Aviation and Environmental Protection (CAEP). Experts nominated by ICAO Member States and approved by Council make recommendations to the Council, including on amendments to ICAO's Environmental Standards contained in Annex 16. These recommendations are forged by consensus and benefit from the contribution of the industry and Non-Governmental Organizations (NGOs), through the participation of ICAO's Observers in the process.
- The attainment of environmentally responsible and sustainable aviation requires a holistic approach to innovation, including a consideration of its environmental footprint. Regarding climate change issues, such consideration has been enabled in the context of the "ICAO Stocktaking process" through the contribution of worldwide experts on sustainable aviation fuels, aircraft technologies, and operational improvements. The Stocktaking Seminars⁵ also supported the work on the feasibility of a long-term goal for international aviation CO2 reductions. This format allows ICAO to reach out to those who understand and drive innovations in aviation and secure their contribution to our work.
- Other events, such as the *ICAO CORSIA Forum*⁶, the *Green Airport Seminars*⁷ or the *Aviation Green Recovery Seminars*⁸ multiply the opportunities to reach out to stakeholders that promote new approaches or solutions to mitigate aviation's environmental impact.
- In the context of its Global Coalition for Sustainable Aviation, ICAO has set up tracker tools⁹ to facilitate access to information on innovations that can generate in-sector CO2 emissions reductions. The tracker tools are organized in four main streams: Technology, Operations, Sustainable Aviation Fuels, and net zero initiative.

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⁵ <https://www.icao.tv/stocktaking>

⁶ <https://www.icao.int/Meetings/CORSIA-Forum/Pages/default.aspx>

⁷ <https://www.icao.int/Meetings/greenairports2021/Pages/default.aspx>

⁸ <https://www.icao.int/Meetings/GreenRecoverySeminar/Pages/default.aspx>

⁹ <https://www.icao.int/environmental-protection/SAC/Pages/GCSA%20main%20page.aspx>