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Committee on the Peaceful Uses of Outer Space

Report on the series of aerospace symposiums organized by the International Civil Aviation Organization and the Office for Outer Space Affairs of the Secretariat

(Montreal, Canada, 18-20 March 2015; Abu Dhabi, 15-17 March 2016; and Vienna, 29-31 August 2017)

I. Introduction

A. Background and objectives

1. Given the growing number of benefits derived from space science and technology applications, the conduct of space activities by all the main players continues to expand rapidly. Space tools are fundamental to meeting the challenges facing humanity and sustainable development, and the overarching space security environment in its broader sense caters to global governance of outer space activities. As activities in the exploration and use of space continue to increase, so too will their interaction with international aviation operations. In that context, there were outstanding prospects for strengthened involvement and exchange of experience among all relevant stakeholders, helping to ensure that the emerging and innovative field of space exploration and aerospace activities could flourish alongside the orderly development and conduct of international civil aviation.

2. The main objectives of the series of symposiums were to bring together representatives of the aviation and space communities, including the commercial and private sectors, and to explore existing regulatory mechanisms and operational practices in the fields of aviation and space transportation. The series of symposiums explored challenges and opportunities related to emerging space activities, in particular potential future space traffic management, in comparison with existing air traffic management. It also looked into the area of protection of systems, assets and infrastructures.

3. Moreover, the series of symposiums addressed several elements related to the process towards the fiftieth anniversary of the United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE+50) and beyond. The symposiums were relevant to the long-term perspective of the “Space2030” agenda, which would connect space governance with the global agendas for development. The core pillars of the “Space2030” framework — space economy, space society, space

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accessibility and space diplomacy — would define the outputs for considering space as a tool for use in sustainable development.

4. One of the fundamental strengths of the series of symposiums was the provision of a cross-sectoral platform for dialogue and the sharing of innovative approaches among the broader aerospace community, including the fields aviation, space activities, and suborbital flights. That platform ultimately gave impetus to an enhanced dialogue among all stakeholders involved.

5. The series of symposiums has made efforts to facilitate the strengthening of a dialogue between the aviation and space communities, and it was agreed that the collaboration should be seen as the first step. Moreover, it was expressed that the unique, inter-agency coordinated effort should be reflected in the second phase of cooperation and in the work of the Space Learning Group of the International Civil Aviation Organization (ICAO) and the Office for Outer Space Affairs of the Secretariat.

B. Attendance

6. Government officials, including representatives of regulatory entities of aviation and space activities, educators from national universities and research institutions and representatives of the private sector as well as associations participated in the series of symposiums as invited moderators, speakers, panellists and participants.

7. Participants from all regions were encouraged to attend the first symposium, hosted by ICAO in Montreal, Canada, in 2015; the second symposium, hosted by the Government of the United Arab Emirates in Abu Dhabi in 2016; and the third symposium, hosted by the Office for Outer Space Affairs in Vienna in 2017.

C. Programme

8. In the series of symposiums the following topics were discussed:

(a) *Uniting the aerospace community*. Under the present topic, various representatives from the areas of aviation, space and information communication technology demonstrated their efforts to promote innovation in aerospace activities. Speakers from aviation and space agencies, international organizations and private sector entities utilized the forum to exchange views and present different backgrounds on commercial space transportation;

(b) *Regulatory practices in aerospace activities*. The present topic endeavoured to foster a better understanding of legal and regulatory mechanisms in international air law and international space law. The topic addressed factors that impact aerospace operations and — in order to ensure the safe and sustainable operation of civil aviation — suborbital operations and space activities. Regulatory perspectives for promoting reliable, consistent and predictable frameworks at the national level were explored;

(c) *Integration with aviation*. Safety management and systems engineering practices are now common practice in aviation. They are useful concepts that could help integrate the operations of all aerospace vehicles within controlled airspace. Aerospace transportation providers, aerospace operators, and operators of launch sites, airports and spaceports were represented in the discussion;

(d) *Not beyond reach: access to and equity in aerospace transportation*. Like air transportation, the space sector must be inclusive and open to all. The present topic looked at the many opportunities of States and stakeholders with regard to the burgeoning industry of commercial space transportation;

(e) *Motivating the next generation*. The present topic was motivating and inspiring the youth of today and giving them confidence that a career in the

commercial space industry is not a gamble or a dream but is quickly becoming a reality;

(f) *Ground infrastructure for commercial space transportation*. The present topic addressed the minimum ground infrastructure required to accommodate commercial space transportation and emerging suborbital operations. It looked into voluntary cooperative mechanisms for the facilitation of compatibility and interoperability of spaceport infrastructure. In addition, trends in the aerospace sector were studied, including sharing experience on the protection of communication and navigation systems and critical infrastructures, in order to assess where further efforts are desired within the broader aerospace community;

(g) *Risks posed to civil aviation and suborbital operations*. The present topic outlined the risks to civil aviation and suborbital operations posed by space hazards, including space debris and space weather, and studied risk-management solutions to those problems, including the role of space situational awareness in mitigating risks to space and aviation operations;

(h) *Governmental cooperation with aerospace stakeholders*. The present topic addressed contemporary and future cooperative endeavours, including the development of ground infrastructures to accommodate commercial space transportation and emerging suborbital operations. The topic also addressed the emerging cooperation between Governments and industry, and opportunities to engage in public-private partnerships in the aerospace field;

(i) *Aviation and space education programme needs*. The present topic outlined the ways and means to strengthen the capacity of new stakeholders in order to enlarge the aerospace community and intensify its activities. One key objective was to study the opportunities available to relevant stakeholders with regard to the creation of the competencies necessary for the future of aerospace activities, and assess capacity-building needs;

(j) *Concepts for evolution in aerospace transportation and looking ahead*. The present topic addressed various means for stakeholder operations. It highlighted key points and summarized perspectives from aerospace transportation providers, aerospace operators, and operators of launch sites, airports and spaceports. The topic also described how suborbital operations would affect activities in airspace and outer space, addressing segregation versus integration of airspace;

(k) *Perspectives on air traffic management and future potential space traffic management*. The present topic addressed air traffic management, focusing on possible future elements of space traffic management. An important component was how suborbital operations might affect activities in airspace and in outer space. The impact of small-satellite launches and deployment and future mega-constellation projects was addressed. Perspectives of international air law and international space law in ensuring sustainability of aerospace activities were also studied.

II. Observations

9. The following observations were made at the third and final symposium:

(a) The series of aerospace symposiums brought aviation and space communities closer through a mutual understanding and recognition of common areas of interest and concern for current and future aerospace activities. The series of symposiums was unique in that government officials, including regulators in both the aviation and space sectors, and representatives of international intergovernmental and non-governmental organizations, academia, industry and the private sector, had actively participated throughout the series;

(b) The third symposium concluded the series, highlighting the interest of participating in aerospace dialogue and of maintaining a regular platform for exchanges. The secretariat of ICAO, together with the Office for Outer Space Affairs,

will undertake closer cooperation in an inter-agency effort to study the possibility of a second phase of activities building upon the achievements made so far. Further actions to increase awareness of the opportunities, prospects and challenges to the aerospace community as a whole will also be undertaken in cooperation with Member States;

(c) Aviation safety and space sustainability were among the core areas of consideration in the series of symposiums. Challenges and hazards posed by space debris and space weather to space flight and space operations, as well as to aviation, were regarded as key areas for further discussion. Other emerging challenges included, inter alia, data gathering, analysis and protection; spectrum protection and harmful interference between radiocommunication services; the protection of critical ground infrastructures; airspace management and utilization; and the protection of space systems and aviation systems. Cybersecurity poses a serious challenge that requires the sharing of experience and dialogue among the aviation, space and telecommunication sectors;

(d) It was observed that issues pertaining to effective management of safety in the transition through airspace, either to or from space, should be further discussed;

(e) The current and increasingly high demand for launching of payloads and the insufficient launching capacity to manage such a projected increase in demand were recognized;

(f) The emerging commercial space transportation sector is evolving rapidly, and the inherently different international regimes for aviation, and space flight and space activities, respectively, demand better coordination at the intergovernmental level, where the Committee on the Peaceful Uses of Outer Space, ICAO and the International Telecommunication Union will have a primary role to play. It was also recognized that the International Maritime Organization could have a role to play in determining areas of concern with respect to the launching of space vehicles from maritime areas;

(g) In view of the different international legal regimes applied for aviation and space activities, the complexity of launching activities in the broader perspective of orbital and suborbital activities needed further study, in order to eliminate legal uncertainties;

(h) National regulatory framework for licensing, authorization and supervision of orbital and suborbital activities, the application of such regulations, and the needs of the actors conducting those activities could benefit from the harmonization of certain requirements. The development of international policies and guidelines, including effective oversight of public safety, as well as due consideration for region-specific aspects, was seen as one way of assisting the further development of such requirements;

(i) National regulatory authorities are increasingly working with industry and the private sector to define the best requirements for stability, consistency and predictability in developing and applying national regulatory frameworks for commercial space transportation without hindering the growth of the sector;

(j) It was noted that the number of new actors in the space sector was increasing, and technological advancement in the space field was accelerating. It would therefore be necessary to further explore the possible future establishment of a space traffic management regime, which would need to be safely interoperable with the existing global air traffic management system and supporting infrastructure;

(k) The development of international provisions for commercial space transportation was seen as an element for further discussion. In that regard, there was a need to take into account emerging aerospace activities, including human space transportation, the different nature of orbital and suborbital environments, and the inherently different requirements under international air law and international space

law, as well as the law of the sea and maritime law, and the established mandates of the intergovernmental bodies involved;

(l) The need to clarify the scope of aerospace activities that should be studied, including elaborating problem statements, conducting a gap analysis and making the consequential determination of work programmes as necessary;

(m) Performance-based standards that consider associated risks need to be considered to allow for the flexibility of future technological development, increase predictability and transparency, enhance implementation and guarantee effective management of safety;

(n) There is a need for enhanced dialogue at the national, regional and international levels to promote economic and societal growth, protect public interests, including safety and security, and promote the interests of industry and the private sector in the emerging aerospace field;

(o) It was felt that the Space Learning Group was a productive venue for fostering dialogue between the aviation and space communities. The Space Learning Group also had an important role in bringing governmental authorities, international intergovernmental and non-governmental organizations, representatives of industry and private sector actors together in sharing experiences and raising awareness of the different realities and requirements in aviation and space activities;

(p) The future success of the aerospace sector is a shared endeavour, dependent on mutual recognition, through an open and constructive dialogue and the combined efforts of all parties concerned.