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WORKING PAPER

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COMMITTEE B

Agenda Item 8: Emerging safety issues
8.1: Measures to proactively address emerging issues;
8.2: Emerging safety issues

EMERGING ISSUES

(Presented by Austria on behalf of the European Union and its Member States[1], the other Member States of the European Civil Aviation Conference[2]; and by EUROCONTROL)

EXECUTIVE SUMMARY

The aviation system is always being confronted with new technologies, products, operations and new business models. This paper presents the need for ICAO and the international aviation community to co-operate and manage in a pro-active manner emerging issues in aviation to ensure the deployment of innovative solutions contributing to a safer and better performing aviation system. ICAO is invited to further develop the management of emerging issues and risks by establishing mechanisms that ensure that new technologies, products, operations and business models are addressed in a timely and inclusive manner.

Action: The Conference is invited to agree to the recommendations in paragraph 3.

1. INTRODUCTION

1.1 The aviation system is always being confronted with new technologies, products, operations and business models, and has developed its own strategies and mechanisms to cope with them. Introducing technical enhancements, addressing human and organisational factors, and moving to safety risk management and a total system approach in safety allowed aviation to develop over time, making it the safest mode of transport. ICAO is playing a fundamental role in assuring a globally safe aviation system through global provisions (i.e. SARPS and other ICAO guidance material).

[1] Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

[2] Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Georgia, Iceland, Republic of Moldova, Monaco, Montenegro, Norway, San Marino, Serbia, Switzerland, The former Yugoslav Republic of Macedonia, Turkey and Ukraine.

1.2 The aviation system today is challenged with rapid developments in new technologies, products, operations and business models. Significant technological (e.g. space, augmented reality, virtualisation), environmental (e.g. new propulsion systems, climate change impacts), economic (e.g. new players and new types of air (hybrid) vehicles) and societal (e.g. urbanisation, digitalisation, passenger's expectations, traffic growth) transformations are to be expected in the coming years. At present, their impact on aviation safety and how to address these issues within the current aviation safety framework and with the existing tools is difficult to assess. The current Standards and Recommended Practices (SARPs) development process and updates to their provisions are time consuming and lacking a holistic synchronised development by ICAO panels. The current ICAO instruments are not sufficiently adapted to respond to this dynamically changing environment and to ensure and enhance a safe and efficient aviation system.

1.3 Evidence shows that after the introduction of a disruptive change to the aviation system, for example glass cockpits, and despite significant safety and performance demonstrations, such changes have resulted in an increasing number of occurrences during an early stage, followed by a rapid and steady decrease of occurrences. In cases where several significant changes are to be introduced in parallel within the aviation system, the safety impact will require very careful consideration and review. Furthermore the successive and very rapid introduction of innovations coupled with their unknown interdependencies may no longer allow the system to maintain the high level of safety as expected.

2. COMMON APPROACH TO EMERGING ISSUES

2.1 The safety approach used so far was developed within a specific aviation environment. However, today's aviation system must be considered in a broader context of a connected world with open architectures and within new and rapidly changing environments. These environments could consist of the application of low cost off the shelves solutions (e.g. use of smartphones), complex systems of systems with potentially short life cycles (e.g. navigational applications) or further developing themselves (e.g. artificial intelligence), new technologies (e.g. augmented reality, virtualisation, electric propulsion) or new business models. They combine practices and ideas which could potentially disrupt today's aviation system.

2.2 To address this new challenging environment and to enable the quick uptake of innovative solutions (technical and operational) and new business models, whilst ensuring an even safer and more performing aviation system meeting the general public expectation, a number of preparatory actions should be taken by States and regional organisations. For example, States and regions could prepare by fostering safety research notably in the areas of human and organisational factors, safety intelligence tools, operational safety improvement methods, adapted certification methods, as well as new integrated safety and security approaches. International co-operation on safety research and application through the cooperation of Regional Safety Oversight Organisations (RSOO) serves the aviation community in a structured way.

2.3 However, States are more frequently facing situations where innovation seems ready for deployment or has even been introduced by industry in the absence of a clear regulatory framework, and based on limited understanding of safety impacts. One example is the integration of drones in controlled and uncontrolled airspace, where technologies develop at a fast pace, while at the same time there is a need for the appropriate approach to ensure safe operations.[3]

2.4 States and regions are currently facing the same or similar challenges in all parts of the world. There is a need to understand new technologies and concepts of operation, their possible impact,

[3] Refer also to AN-Conf/13-WP/41

and the potential interactions within the aviation system. Based on input provided by States and regional organisations, ICAO may consider ensuring a monitoring function, to collect intelligence and to identify emerging issues and to carry out a preliminary assessment of any potential safety impacts. There is a balance to be established with respect to the application of safety requirements to avoid unnecessary burden for industry while maintaining and improving aviation safety. There may be new safety risks that emerge and that need to be analysed and addressed. Expertise beyond the aviation domain becomes essential notably with the increased use of digital technologies.

2.5 Emerging issues will affect the way oversight is to be conducted. The oversight system should be geared towards a system approach, focusing on clear organisational accountabilities, responsibilities and processes that ensure a safe outcome. It should include the systematic collection and analysis of data to implement a risk- and performance-based approach, which covers both regulations and oversight. Inspector qualifications need to be enhanced to include systematic data analysis and safety assessment skills as well as technical knowledge and auditing experience.

2.6 It is equally important that ICAO ensures collaboration between all relevant stakeholders, including the industry, from the beginning. This is essential if the new entrants have not been exposed to the aviation environment before. In addition to the aviation community, such collaboration should also involve representatives of the general public, to broaden understanding and acceptance of new developments, as well as non-aviation governmental agencies in case of transversal developments. In addition, ICAO should ensure collaboration with regional organisations such as RSOOs that have resources and thus can facilitate responding to emerging issues.

2.7 Further, successful risk management should aim for overall risk reduction in the aviation system, including but not limited to finance, environment, safety and security risks. All risks need to be appropriately managed to minimise any identified adverse consequence. This would require appropriate civil and military cooperation.[4] Traditionally, aviation industry developed different management systems to address distinct characteristics of each specific risk. Thus, for example, safety management systems were designed to be able to manage safety risks. However, in some cases, the management of a domain-specific risk (e.g. security) may affect other domains in unforeseen ways (e.g. safety). Circumstances such as last-year discussion on the carriage of personal electronic devices (PEDs) in the passenger cabin have highlighted the need for performing an integrated risk management - safety vs security risks, possibly expanded to environmental and financial risks. Integrated risk management cannot replace the objectives of specific risk management systems; it is a distinct multi-objective decision-making concept to leverage and balance the conclusions of specific risk management systems and provide holistic advice to achieve overall risk reduction. However, today, there is not enough guidance for States and aviation industry on how to balance the management of distinct risks. In addition, in most cases different risks are being managed by different government agencies or organisation departments without the existence of a formal function or official channels to ensure a collaborative risk management that also take due account of civil and military dimensions .

2.8 In summary, ICAO needs to play an essential role in the development of a common approach for States to deal with emerging issues. This common approach would aim at streamlining the development of ICAO provisions to optimise operational benefits stemming from new developments, e.g. through reducing time to market of new products and services, whilst reinforcing safety and efficiency. Where challenges to existing ICAO frameworks and traditional areas of competency are identified, ICAO should develop appropriate mechanisms in order to ensure appropriate levels of agility and adaptability, influence and involvement to address emerging international aviation issues in a timely fashion. Early assessment and planning for likely challenges to the existing ICAO remit would allow the international

[4] Refer also to AN-Conf/13-WP/39

community to be proactive, rather than reactive, in responding to emerging aviation issues.[5] Examples may include the need for ICAO to consider fully the impact of future commercial space operations on traditional aviation. Whenever possible, the chosen option should be performance-based. This approach should also include the link with sister United Nations organisations on transversal issues and funding, for example the International Telecommunication Union (ITU), the World Meteorological Organisation (WMO) and the World Bank Group.

2.9 Finally, it is important to monitor the developments and to review the new mechanisms and adapt them as necessary. Predictive methods of safety data analysis can provide additional insights on the potential evolution of emerging issues. In addition, a periodic post-evaluation of the initial provisions should be performed thereafter to conclude if the established provisions eventually have achieved the objectives for which they were designed.

3. CONCLUSION

3.1 ICAO is invited further develop the management of emerging issues and risks stemming from new technologies, products, operations and business models and that they are addressed in a timely and inclusive manner.

3.2 The Conference is invited to agree on the following recommendations:

That the Conference request ICAO to:

a) systematically collect information from States and regional organisations on new concepts of operations and initial implementations to assess and monitor their global safety impact;

b) raise awareness and provide guidance to States regarding emerging risks, recommending mitigation means, and balancing the integrated management of distinct risks;

c) establish a holistic and performance-based approach process to ICAO provisions developments, in response to these emerging issues and risks including a periodic post-evaluation of the initial mitigations to assess if the established provisions achieve the objectives for which they were designed;

d) provide guidance for the implementation of risk and performance-based assessment and oversight both at State and regional level; and

e) provide a global inclusive civil-military cooperation mechanism to move from a reactive situation to a proactive and predictive holistic risk management towards emerging issues.

— END —

[5] Refer also to AN-Conf/13-WP/35 and AN-Conf/13-WP/43 highlighting the need to include emerging issues into the ICAO plans in a consistent manner.