



WORKING PAPER

FOURTEENTH AIR NAVIGATION CONFERENCE

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Agenda Item 2: Timely and safe use of new technologies

2.2: Addressing safety risks related to evolving aviation technologies

METHODOLOGIES AND APPROACHES TO MANAGING INTERACTING AVIATION RISKS

(Presented by Hungary on behalf of the European Union¹ and its Member States, and the other Member States of the European Civil Aviation Conference², by the European Organisation for the Safety of Air Navigation (EUROCONTROL), Canada and the United States)

EXECUTIVE SUMMARY

This paper outlines the need to explore methodologies and approaches for managing interacting aviation risks. Within the aviation system, organizations and individuals manage many different types of risks simultaneously. These risks include, but are not limited to aviation safety, security, health, cybersecurity and environment. It should be a priority to ensure that States and service providers have sound information and guidance on how to recognize, evaluate and manage these interactions in dealing with current and future threats and hazards. This should be ensured via established methodologies and approaches in a manner that respects the nature, sensitivity, protection levels, and specificities of the different risks in the different areas concerned. To that end, a holistic approach to various risks is needed to ensure that all interacting risks are managed in a coordinated manner.

Action: The Conference is invited to agree to the recommendations in paragraph 4.

1. INTRODUCTION

1.1 Civil aviation organizations face a variety of risks. As aviation continues to evolve, with global focuses on areas such as environment and emerging technologies, it is important that risk management continues to maintain the safety and security of operations. Furthermore, uncontrolled risk transfer from one area to another must be avoided and mitigations in one area used, where appropriate, for the benefit of others, so that effectiveness of risk management is improved. Hence it is important to ensure that “traditional” risks and the potential impacts from or on other areas are considered, as part of risk management. Therefore, a cross-cutting approach to managing risks including safety, security, cybersecurity, facilitation, environmental, economic, artificial intelligence and human resources should be considered.

1.2 Traditionally risk management in aviation is characterized by an approach where the risks impacting in one area (whether it be safety, security, environmental etc.) are assessed and managed according to the methods used within that particular area. However, following technology advancements, rapid changes in the civil aviation environment and the multitude of factors and different actors, the

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importance of identification and management of interacting risks across multiple areas has been recognized as an issue that must be taken seriously to reduce the collective risk. While there are good reasons to apply different approaches, for instance to safety and security risks, where the latter is driven by vulnerability and threat and the former is focused on the impact and likelihood of hazards, a downside of this approach is that the efficient mitigation and management of interacting risks may be compromised.

1.3 As ICAO and States focus attention onto new and emerging areas (e.g. new technologies and environment), they should also recognize the importance of promoting understandings, approaches, and methodologies for identifying, managing and mitigating interacting aviation risks. The ICAO Trust Framework Panel (TFP) has developed guidance material documenting a method for the assessment of interacting safety and information security risks. This method was also adopted and further explained in the developing guidance of the Cybersecurity Panel (CYSECP). The ICAO Air Navigation Bureau's Secretariat Study Group on Integrated Risk Management is a welcome start to this work and may take advantage of the TFP/CYSECP work. This paper promotes the need for a global approach towards handling interacting risks and proposes that ICAO prioritizes the work related to interacting risks within its work programme and its global plans³.

2. DISCUSSION

2.1 This paper identifies three levels at which interacting risks and their mitigation could occur:

2.1.1 Cases where measures taken for the management of risks in one area have a clear impact on managing risks in another area. Examples:

a) in the security-safety interface:

- i) use of lockable cockpit doors – a long-standing example where there is a clear trade-off between impacts that has become settled over time;
- ii) banning of laptops in the cabin and storing them in the hold – the speed of response necessarily led to arguments that the safety impacts had not been sufficiently considered in the security risk assessment;
- iii) drones flying in the vicinity of an airport – the deployment of measures to protect the airport can negatively impact aviation safety systems at that airport (e.g., communications, navigation, and surveillance (CNS) equipment). Whilst this mitigates security risks, there may be negative safety effects; and

b) health and facilitation - to control the spread of biological threats, the experience of the COVID-19 pandemic showed the need for health measures to be supported by policy/regulation to counter the effects on other areas in a strategic and collaborative approach.

2.1.2 Cases where risks interactions could occur in areas where the normal distinctions between them is less clear from the point of view of risk management. Examples:

- a) Safety-cybersecurity – a cyberattack against an airline may compromise or make unavailable data on crews' duty and rest time or aircraft utilization data, with safety impact. If the airline continues operations on the basis of corrupted or unavailable data,

³ Principles for the governance of the ICAO global plans, presented by Hungary on behalf of the European Union, ECAC and EUROCONTROL

safety margins might be eroded or compliance with regulatory limits (rest-duty periods, life limited parts) is not ensured.

- b) Conflict zones and remotely piloted aircraft systems (RPAS) – where traditional boundaries are not so clear, and could lead to refined approaches to risk management.

2.1.3 Cases where measures in one area help to mitigate risks in another area and may be used to their best effect to reduce costs and resolve gaps.

- a) Examples of already existing positive interactions are:

- i) protection of the airside (fencing and patrolling) – the airside needs to be protected against unauthorized access (terrorists, criminals, activists) but also against animals or other unintentional intrusions;
- ii) access control – restricting access from the security perspective to what is necessary and job-related may contribute to safety as it limits access of staff to certain areas (e.g., hold baggage make-up area or cargo warehouses); and
- iii) aircraft design – safety features and the need for frequent and detailed safety checks may deter or contain the consequences of malicious attacks.

- b) Further opportunities may be examined:

- i) use of security patrols might contribute to the identification of gaps in the fence or debris left on the apron;
- ii) screening of cabin baggage, hold baggage and cargo – the existing screening technologies and processes may, and sometimes already are, contributing to safety, such as the detection of undeclared dangerous goods, which are much more frequent than explosives, without compromising the security outcome; and
- iii) security verification of documents and visual inspection of shipments upon acceptance (for signs of interference, leaks) could be synchronized, where possible, with safety related objectives to ensure that no undeclared dangerous goods are transported.

2.2 Following analysis of the identified levels of interaction of aviation risks presented above, the underlying problem is to understand and determine how action in one area could exacerbate a related risk in another, potentially with serious consequences. Therefore, it is necessary to establish a process to ensure that the management of risks relating to one area minimises possible impacts to other areas.

2.3 A second aspect is the complexity of the risk relations that may require a more mature approach to risk management in areas such as cybersecurity to ensure that multifaceted risks are managed so that an adequate level of safety and security is maintained. A data driven approach relying on reported occurrences will certainly support a better understanding of these interacting risks.

2.4 As noted above, there are several examples which have already come to fruition. Nevertheless, ICAO work on interacting risks should take a forward view towards what aviation could look like in the future and constantly observe how new airspace entrants (e.g. drones and eVTOL) or future connected aircraft, are driving the evolution in this field. As work towards a global approach to handling interacting risks develops, data and information driven approaches should be pursued by considering frameworks which describe how to gather data and intelligence to include areas other than safety. As the

aviation system continues to evolve, we may well see actors, who are either not directly involved or do not exist, and therefore a methodology to capture them at the earliest opportunity is extremely important.

2.5 Finally, whilst methodologies and frameworks would support a global approach to handling interacting risks, work to develop these should also be cognizant of potential cultural differences across areas and of the need to promote cross-fertilisation. This since its benefits will only take us as far as if these are not fully accepted and understood.

3. **METHODOLOGIES**

3.1 When exploring methodologies, there should be an open dialogue between different aviation risk areas, such as safety, environment, security, health etc. Moreover, it should be clear that aviation safety margins cannot be reduced under a certain level, for example due to mitigation actions of environmental risks. Equally, risks in other areas should not fall below an acceptable level of mitigation. So, when assessing interacting risks, all risks across areas should be taken into further consideration. There are already different risk assessment and management methods which allow the assessment from different aspects. In choosing them, due consideration shall be given to the following enablers:

- a) *Collaboration*: by taking a holistic approach to risk assessment, stakeholders can develop risk management strategies that address interacting risks coming from different areas.
- b) *Technology*: the increasing availability of technological solutions may lead to potentially conflicting outcomes that need to be properly addressed through a refined approach to the management of interacting risks and their consequences.
- c) *Data*: the availability of data gathered through different components of the aviation systems will support a holistic understanding of interacting risks in the different areas. The consequent decision-making will also be driven by the available data and by their understanding.

4. **CONCLUSION**

4.1 By considering the information above, the Conference is invited to agree to the following recommendations:

- a) recommend ICAO to continue its work, including through the work of the ICAO Integrated Risk Management Study Group (IRM SG), the TFP and CYSECP, to develop its approach and working methods in order to allow for more interactions between the ways different risks in the different areas are addressed and managed;
- b) encourage ICAO to prioritize the work and propose a global approach towards handling interacting risks;
- c) develop risk assessment methodologies taking into account interactions between the various types of risks identified; and
- d) ask ICAO to analyse and develop an interacting aviation risks portfolio.