



**WORKING PAPER**

**ASSEMBLY — 41ST SESSION**

**TECHNICAL COMMISSION**

**Agenda Item 31: Aviation Safety and Air Navigation Standardization**

**CHALLENGES IN SAFETY APPROVALS FOR HUMANITARIAN BVLOS OPERATIONS**

(Presented by Singapore, the United Kingdom, the Flight Safety Foundation and the World Food Programme)

**EXECUTIVE SUMMARY**

This paper presents a summary of the initial feedback collected from operators to understand challenges regarding humanitarian beyond visual line of sight (BVLOS) unmanned aircraft systems (UAS) operations and to support the development of timely and repeatable processes and tools for their effective enablement.

**Action:** The Assembly is invited to:

- a) note the UAS survey being progressed by the Flight Safety Foundation (FSF) and the benefits of input by UAS operators worldwide; and
- b) encourage ICAO to work with States and international organizations, including FSF, to further develop tools and guidance in support of regulators, regarding BVLOS UAS humanitarian operations.

<i>Strategic Objectives:</i>	This working paper relates to the Safety Strategic Objective.
<i>Financial implications:</i>	This paper has no significant financial implications
<i>References:</i>	HLCC 2021-WP/122, <i>Enabling Innovative Delivery of Pandemic Medical Services and Other Humanitarian Missions</i> HLCC 2021-WP/222, <i>Opportunities and Challenges in Delivering Humanitarian and Medical Services using Unmanned Aircraft Systems</i> Current challenges in the safety approval process survey: <a href="https://www.surveymonkey.com/r/5GGWWTW">https://www.surveymonkey.com/r/5GGWWTW</a>

## 1. INTRODUCTION

1.1 Unmanned aircraft systems (UAS) provide unique, effective ways to respond to humanitarian needs, from urgent disaster responses to delivering life-saving materials, such as medical supplies, vaccines or food aid. Using UAS can reduce the cost of operations, put fewer people at risk of harm, and can often improve efficiency of response efforts. Enabling UAS operators to conduct beyond visual line-of-sight (BVLOS) flights allows for further reach, providing more aid to those in need in case of natural disasters, aiding those in conflict zones, or offering long-term community support. For example, medical institutions have partnered with drone operators to distribute COVID-19 vaccines in places like Ghana and Malawi. National medical supply networks, like that of Rwanda's blood delivery network, are supported in part by BVLOS UAS operations. The World Food Programme (WFP) has demonstrated the benefits of UAS operations in responding after natural disasters and in rapid-onset emergency response. Wide-area efforts like these are aided by BVLOS operations when locating people in need of critical aid and to deliver much-needed medical supplies.

1.2 Safety approval processes for these types of operations are often time-consuming and can be challenging for both the regulator and the operators applying to conduct them, especially when time is of the essence. Key factors in approving a BVLOS operation include 1) the ability of the regulator to assess whether risks to people and structures under the flight path have been mitigated sufficiently; and 2) whether there is an unacceptable collision risk with crewed aircraft that may be in the airspace. Recognizing that various initiatives were underway to make progress in harmonizing the safety approach, including the development of the Joint Authorities for Rulemaking of Unmanned Systems (JARUS) guidelines on Specific Operations Risk Assessment (SORA), Flight Safety Foundation (FSF) undertook to coalesce the global safety community among its members to consider the emerging best practices and coalesce around support for enabling humanitarian operations.

1.3 The Foundation created a survey and publicized it, via various online social media platforms and at several conferences, seeking input from operators regarding their current challenges in the safety approval process. (The survey is still accepting inputs —see Reference above.) The following discussion presents the trends from responses received to date and is meant to open dialogue between regulators and operators.

## 2. DISCUSSION

2.1 Several themes have emerged from the initial responses to FSF's Humanitarian BVLOS Operator Needs survey. In most cases, these themes are consistent across all UAS operations in all geographical areas, regardless of where the operators originate or even their mission. In some cases, these challenges result in some operators abandoning approval requests or ceasing operations all together. The themes from the survey responses are summarized below.

2.2 *Complicated and unclear processes.* Survey respondents indicated confusion regarding applicable regulations for a given operation, and lack of clarity on the primary authorities involved in approvals. Operators noted that rules were not written clearly and unambiguously. In some cases, it proved challenging to access the latest information because websites or contact details were not working or it was not clear who was the designated authority for UAS operations.

2.3 *Lengthy times to process.* Humanitarian responses are often time-sensitive, and operators often have felt the regulator's safety approval processes could not match the time sensitivity. Operators

also had little insight into the status of approval processes and could wait for months without feedback or insight into the status of their applications. This challenge extends beyond humanitarian UAS operations and is at least partially attributable to a lack of resources and dedicated staff for UAS among civil aviation authorities (CAAs), and the need to involve other external agencies such as security services in some countries.

2.4 *Means for demonstrating airworthiness.* In the absence of clear testing standards for air or flight worthiness, most small and light UAS remain uncertified with a lack of proven technical maturity for certain functions. The data associated with the manufacturer's airframe and capability testing may not be available to an operator or the approval authority as data sharing and collaboration remain an ongoing challenge, in part owing to commercial interests. Further, uncertainties regarding population density under the planned route of flight make it difficult for operators and regulators to assess whether ground risks have been adequately mitigated, preventing many from receiving permits, particularly for BVLOS operations.

2.5 *Lack of sufficiently trained regulator resources.* Many CAAs have limited resources and do not have sufficient staff trained for, and dedicated to, UAS regulations and operational approvals. This training is essential to effectively and confidently assess safety risks to other aircraft or to people and ground structures associated with a proposed operation. Although tools to help guide risk assessments exist, these tools may not be in use by, or may be unknown to, some authorities. Note that currently there is significant diversity in the methods used by CAAs to assess compliance; there is no single standardized risk assessment format or tool that is accepted across all regulators.

2.6 *Incompatibility with commercial transport regulatory approaches.* The survey respondents also relayed that regulators sometimes mis-applied commercial transport processes and expectations to UAS approvals and that often, CAA staff may not have familiarity with the unique scales of risk and the applicable mitigations of UAS operations. The suite of procedures associated with conventional air traffic management (ATM) approvals and risk management does not easily translate to UAS aircraft that are orders of magnitude smaller, do not carry human life on board and are capable of operating outside controlled aerodromes and airspace. Humanitarian operations, in particular, require an evaluation of the larger risk picture and consideration of a potential temporary risk rebalancing to reap rewards such as lives saved and other societal benefits that may outweigh the higher risk of conducting operations. Yet at the same time, it is crucial to assure conventional aviation operators that UAS will be operated in a non-disruptive way that does not add risk to their operations.

2.7 *Lack of harmonized regulations complicate efficiency and training.* Operators reported that there is still significant variation in regulatory frameworks for small UAS operations, resulting in training challenges for operators as well as regulators. While ICAO Standards and Recommended Practices (SARPs) cover cross-border operations and those involving larger remotely piloted aircraft systems (RPAS) operating in airspace that often includes traditional crewed aircraft, there are no SARPs that address smaller UAS in low-level airspace. The result is a global patchwork where regulators may create their own set of regulations or adapt regulations from different sources such as the European Union Aviation Safety Agency (EASA) or the ICAO UAS model regulations. Many regulators do not have any standard approaches to guide staff in assessing applications for approval. Although the ICAO UAS model regulations are a step to address this gap, it does not comprehensively address BVLOS operations.

2.8 *Lack of common situational awareness and deconfliction capabilities to mitigate air risk.* Operations may also be limited by the lack of unmanned traffic management (UTM) capabilities for strategic deconfliction of UAS with other traffic. Small and light UAS are often not equipped with any

cooperative surveillance that provides the ability for crewed aircraft or air navigation service providers (ANSPs) to track their positions. Capabilities that allow small and light UAS to detect and avoid traditional crewed aircraft are maturing, but are not yet widely in use.

2.9 It is important no country be left behind in the benefits that UAS can uniquely enable. As BVLOS UAS operations become more prevalent to address urgent and ongoing humanitarian needs, operators and regulators will benefit from increasing consistency in the tools and regulations that can assess safety hazards and determine whether planned mitigations achieve an acceptable level of risk.

2.10 In the interest of providing harmonized guidance for operators, FSF's ARPAC Advisory Committee is working with the aviation community to develop guidance material and a BVLOS remote operations toolkit (BROT), focused on addressing needs for humanitarian operations in remote locations and those with limited resources and connectivity. The toolkit will provide guidance to operators for use in cases such as mapping/surveying and small package delivery of essential medical supplies.

2.11 Additional training and tools for regulators also are needed. As an interim step, CAAs may consider partnerships with mature operators to better understand challenges and streamline approval and safety risk management processes. The Foundation will also be seeking more information from CAA perspectives regarding challenges when working with new entrants and approvals for UAS BVLOS operations.

### 3. CONCLUSION

3.1 Humanitarian UAS operators have expressed various challenges, including prolonged timelines hindering timely humanitarian response, when seeking approval for BVLOS operations. Many of these challenges are persistent and yet to be addressed. Equally, CAAs face significant hurdles to establishing sufficient confidence when handling these UAS/remotely piloted aircraft (RPA) BVLOS approval requests. To address operator and regulator needs for timely assessment of proposed BVLOS operations, it is necessary to have a clear understanding of the challenges both operators and regulators may have in assessing safety hazards and whether intended mitigations achieve an acceptable level of risk.

3.2 The Foundation is seeking support from ICAO to gather additional input from both operators and CAAs to help develop guidance material that facilitates BVLOS operations. In particular, gathering case studies of UAS requests, aircraft that have been used, approval and safety risk management processes, designated and involved authorities, and other information, can help coalesce findings into effective recommendations and guidance material, as was done with line-of-sight operations culminating in the UAS model regulations.

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