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AGENDA ITEM 3: AVIATIONS SAFETY

**NEW ZEALAND'S APPROACH TO THE INTEGRATION OF
UNMANNED AIRCRAFT**

Presented by New Zealand

SUMMARY

The challenges and opportunities presented by the integration of unmanned aircraft (UA) are not unique to New Zealand. To varying degrees, these will be common to all States and will manifest in ways that challenge traditional aviation systems and approaches to safety oversight. While New Zealand currently has a relatively enabling regulatory framework for UA, challenges remain to achieve full integration of UA. Using CAANZ's ongoing work with Zephyr Airworks' Cora UA as a case study, this paper outlines some of those challenges, the opportunities integration can provide, and how New Zealand is taking a government-wide approach to considering UA integration.

NEW ZEALAND'S APPROACH TO THE INTEGRATION OF UNMANNED AIRCRAFT

1. INTRODUCTION

1.1 In recent years, New Zealand has worked to position itself as a leader in the testing and trialing of safe unmanned aircraft (UA) operations by leveraging a robust regulatory system, relatively uncongested airspace, and collaboration between government agencies. This was highlighted in March 2018, when Zephyr Airworks LCC (Zephyr) announced that it was basing its long-term development and testing of its self-piloting air taxi, Cora, in New Zealand following a global search for locations.¹

1.2 Key to that decision was a performance-based Civil Aviation Rule created in 2015 that allows any UA operation to occur if the operator can mitigate their operation's associated risks. The aim of that rule and other updates was to better manage immediate safety risks of a growing number of UA operations in New Zealand. It recognised that UA are fast developing, had an increasingly wide range of applications, and that no prescriptive rule could anticipate all future operational requirements. It also allowed greater research, development, and commercial application of rapidly advancing technologies not yet realised at the time, such as Cora.

1.3 While New Zealand currently has a relatively enabling regulatory framework for UA testing and trialing, challenges remain to achieve full UA integration. This paper outlines some of those challenges, the opportunities integration can provide, and how New Zealand is taking a government-wide approach to considering UA integration.

2. DISCUSSION

2.1 Like in many States, UA use in New Zealand is rapidly growing. Research shows that approximately 281,000 New Zealanders (out of 4.6 million) own or fly a UA, with the majority of being recreational operators.² It also showed that eight percent of New Zealanders aged 18 or older, and up to 11 percent of households use UA, while international tourists brought approximately 200,000 UA with them to New Zealand in the past year. While New Zealand has had UA rules since the mid-1990s, the 2015 changes essentially created a three-tiered framework:

- **Civil Aviation Rule Part 101** captures low-risk UA operations. No approval is needed if the operation complies with Part 101, e.g. only flies during the day, stays below 400 feet, keeps visual contact with the UA, the UA weights under 25kilograms, does not over people or property without consent, and no 'unshielded' flight within 4kilometers of an aerodrome'³;
- **Civil Aviation Rule Part 102** is risk-based certification framework that accommodates riskier operations or those beyond the limits of Part 101. Operators submit a plan to the Civil Aviation Authority of New Zealand (CAANZ) for approval that shows how they will safely operate; and
- **A tailored approach to certification** for more complex UA, CAANZ uses Part 102 as a baseline for operational certification. This is effectively equivalent to the U.S. Federal Aviation Regulation

¹ Zephyr is the New Zealand operator of Kitty Hawk, a California-based company working to have a fleet of unmanned personal air taxis that carry goods or up to two people. Once Zephyr finalize Cora's design, it will undertake further testing to prove that it is safe for passenger carrying operations. See more: <https://cora.aero/>.

² Colmar Brunton Research, *RPAS Use in New Zealand*, August 2017: <https://www.caa.govt.nz/assets/legacy/Surveys/2017-RPAS-users-report.pdf>.

³ A shielded operation must be within 100 feet of, and below the top of, a natural or physical object e.g. below the height of a building, or in a forested area below the height of the trees. Provided a shielded operation is outside an aerodrome boundary and in airspace physically separated by a barrier capable of stopping a UA, shielded operations can occur within four kilometers of an aerodrome without air traffic control authorization. Operators can conduct shielded operations at night.

(FAR 21.17(b)), just on a larger scale.⁴ This allows CAANZ to levy initial airworthiness requirements and other relevant rules or requirements dependent on the nature of the operation and degree of risk presented. This is how New Zealand is enabling Cora.

2.2 When applying existing requirements to a Part 102 UA operation, CAANZ must think beyond traditional concepts like hire or reward and typical certification methods. Where there is uncertainty when tailoring requirements under Part 102, CAANZ relies on the intent of a rule. Where possible, CAANZ uses the Joint Authorities for Rulemaking on Unmanned Systems (JARUS) Specific Operations Risk Assessment (SORA) to assess the risk of a proposed operation. In the absence of established standards and guidance, the SORA provides a more nuanced risk assessment.

2.3 Part 102's flexibility is the key factor allowing CAANZ to engage with Zephyr free from the restrictions of the traditional aviation rule suite. CAANZ has engaged with Zephyr for eighteen months, with a focus on achievable steps as Zephyr works to realise its long-term vision of commercial passenger carrying operations. Zephyr has gained airworthiness approval from CAANZ for an experimental UA (Cora) to conduct research and development flight testing. CAANZ is also agreeing a certification plan.

2.4 Despite good progress, a number of issues still need addressing in New Zealand, including finding suitable solutions to Detect and Avoid (DaA) that enable safe Beyond Visual Line of Sight (BVLOS) operations that support Annex 2 *Rules of the Air*, Avoidance of Collision. These issues are not unique to any UA operator and reflect the global challenge facing UA integration and the pressure rapid technological change puts on a system designed for traditional aircraft.



Figure 1 - Zephyr Airwork's flying taxi Cora.

3. CHALLENGES

3.1 UA integration presents States with new challenges. Future regulatory approaches will often (but not always) need to cater for the differences between UA and traditional aircraft and operations, across different types of airspace. New Zealand always intended its 2015 UA rule changes to be an interim step to manage and mitigate immediate safety risks. While flexible enough to enable the trialling and testing of UA like Cora, its case-by-case nature means it is not sustainable for UA operations like this on a wider scale.

⁴ FAR 21.17(b) allows for the establishment of a certification basis for aircraft types for which airworthiness standards have not been issued using the applicable requirements from existing airworthiness standards and any other airworthiness criteria found to be applicable to a specific type design.

3.2 Integration challenges the entire spectrum the aviation system from legislation and guidance material, to safety promotion. CAANZ experience enabling UA operations to-date has highlighted key impediments, with many being technologically-based and beyond its control. For example, while New Zealand does not prohibit BVLOS operations, no UA operator has yet proven that their BVLOS solution adequately mitigates their operation's safety risks. There is also a lack of suitable DaA systems. As with other States, New Zealand is yet to determine the standards this technology will need to meet. This poses challenges for the UA industry and whether or not their testing and trialling outcomes provide a high enough level of risk mitigation.

4. CAANZ APPROACH

4.1 Substantial growth in the number and complexity of UA operations has forced a significant shift in how CAANZ approaches its regulatory functions and the aviation system more generally. As operators present new and novel operations, the status quo's boundaries are continually tested. CAANZ must balance an approach that does not impede technological innovation while adapting how it assesses and mitigates risk to adequately ensure public safety.

4.2 Supporting that significant shift, an organisational-wide programme is underway to ensure CAANZ has the required capability, tools, and systems needed to manage risk in an increasingly risk- and performance-based system. While it encompasses all of CAANZ's business, the programme will benefit and refine the way it meets ongoing challenges presented by the growth in UA operations and integration.

4.3 At an UA-specific level, CAANZ is increasing its level of international engagement to both influence and learn from global thinking. There is greater involvement with JARUS and the work to develop the SORA and the International Civil Aviation Organization (ICAO) UAS-AG of the RPAS Panel (RPASP). Through the Asia-Pacific Bilateral Partners UA Certification Working Group, CAANZ is working to define a common approach to certification. CAANZ also hosted a six-week UA policy exchange with its Finnish counterpart *Trafi*.

5. GOVERNMENT-WIDE APPROACH

5.1 UA integration in New Zealand requires an approach that goes beyond just aviation. New UA uses is resulting in greater overlaps and links with other sectors requiring effective harmonization, interoperability, security, and safety oversight. It is also highlighting the need to consider other areas such as privacy, national security, local government, law enforcement, training, and industries. Recognising this and that CAANZ's legislative mandate is limited to aviation safety and security, New Zealand has embarked on government-wide approach to achieve UA integration.

5.2 New Zealand's Ministry of Transport is leading an inter-agency group to ensure a coordinated approach to UA regulation, enablement, and integration. This acknowledges that integration is an iterative process, requiring a shared vision that underpins any work programme. CAANZ is providing technical and analytical support to that work. Also, the Ministry is working to better understand the public acceptance of UA and how that could affect different types of operations in an integrated transport system.

5.3 The Ministry of Business, Innovation, and Employment is seeking to develop economic opportunities through research and development of new technology, including BVLOS. Also involved are New Zealand's air navigation service provider, Airways, who are trialling possible UA traffic management (UTM) solutions, and the New Zealand Police, who work closely with CAANZ on enforcement. A number of other agencies outside the traditional scope of the transport and aviation-sectors are also engaged to provide input from their particular interests.

6. OPPORTUNITIES

6.1 UA integration is providing New Zealand with a chance to reassess its current regulatory framework. Informed by stakeholder engagement, international best practice, and global developments, New Zealand recognises it needs to improve the capacity and effectiveness of its existing UA framework to meet the expected (and rapidly approaching) future state. Underpinning this work is a need to adequately manage safety risks while also retaining and enhancing New Zealand’s supportive and flexible regulatory environment for trialing and testing, and ultimately integration.

6.2 To that end, New Zealand is assessing other States’ approaches to inform possible changes, including greater alignment with the new European Union (EU) framework. The EU’s new risk-based and proportionate approach is similar to New Zealand’s framework, especially regarding categorization of operations and applying further aspects could provide for better UA integration. While this happens, New Zealand continues to engage with operators and international partners, mindful that any future framework must be flexible enough for use cases not yet imagined.

6.3 A regulatory framework enabling UA integration will transform the way goods and people move, improving a range of transport, environmental, economic, and social outcomes. Globally, there is significant investment in research and development across a range of UA applications. Concurrently, New Zealand is already enabling numerous types of operators within its existing aviation system. Examples include filming and photography, precision agriculture, infrastructure inspection, surveying, and security and monitoring. As this occurs, operators also continue to undertake testing and trialing of new and novel technologies including to others trialing UA delivery of medical supplies to remote locations.

7. ACTION BY THE CONFERENCE

7.1 The Conference is invited to:

- a) note the contents of this discussion paper, in particular the benefits of taking a holistic, government-wide approach to UA integration, regulation, and enablement;
- b) recommend that States consider a holistic approach to UA integration, regulation, and enablement; and
- c) urge ICAO and the Asia/Pacific Unmanned Aircraft Systems Task Force (APUAS/TF) to continue to share the experiences of other Member States and organizations, including JARUS and the European Aviation Safety Agency, as it develops scalable, performance-based Standards and Recommended Practices, and other guidance material for UA.