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COMMITTEE A

Agenda Item 3: Enhancing the global air navigation system
3.1: System-wide information management (SWIM)

APPROPRIATELY SCALED SWIM SOLUTIONS FOR SMALLER NATIONS – NEW ZEALAND CASE STUDY

(Presented by New Zealand, Civil Aviation Authority)

EXECUTIVE SUMMARY

This paper presents New Zealand as a case study for system-wide information management (SWIM). States such as New Zealand, need SWIM solutions that are tailored, proportionate and sufficient to respond to their operational and economic needs.

As New Zealand's traffic volumes rise and new aviation system entrants emerge, SWIM will contribute to mitigation of these issues. However, New Zealand also perceives that any SWIM solution needs to be of appropriate scale, cost and effectiveness for the value of benefits that can be obtained, and anticipates that this will be true for many States of comparable size and traffic volumes.

A SWIM service will be most effective if it enables applications developers to use mainstream technologies and data exchange standards. Harmonised international standards would help clarify and accelerate progress. The development of new unmanned aircraft systems (UAS) traffic management (UTM) technologies and the confluence of new air traffic management (ATM) and surveillance systems at the end of 2021, gives New Zealand a window to evaluate emerging SWIM concepts and solutions and to allow time for technology enablers to mature.

Action: The Conference is invited to agree to the recommendation in paragraph 3.5.

1. INTRODUCTION

1.1 The aviation system block upgrades (ASBUs) provide high-level objectives for system-wide information management (SWIM). SWIM enables timely, user-friendly information to support good decision making by pilots, air traffic control (ATC), aerodrome operations, airline operations etc. SWIM enables the smooth exchange of operationally useful data to create value. On its own, exchanging data

delivers no tangible benefit. The benefit comes when operators use the information to address problems and realise benefits.

1.2 However, although data formatting standards exist, an agreed approach, standards, terminology, or specifications for an internationally interoperable SWIM system have not yet emerged. This scenario may limit SWIM benefits; however, it also provides an opportunity for innovation.

1.3 This paper provides a case study outlining where New Zealand lies on the spectrum of SWIM capability. Some States/regions have adopted complex solutions based on operational needs. It postulates that New Zealand and comparable States have less complex needs and could adopt simpler solutions.

2. DISCUSSION

2.1 In New Zealand SWIM is part of the National Airspace and Air Navigation Plan being implemented as the New Southern Sky (NSS) programme. NSS started in mid-2014 and spans a decade. NSS is a benefits driven programme. New Zealand expects SWIM to deliver tangible benefits.

2.2 For many ICAO States, implementing SWIM would support solutions to flow management problems. However, New Zealand does not have flow management issues to the same extent. This is due to the development level of the New Zealand ATM system, and the relatively lower traffic density away from the main terminal areas[1]. New Zealand implemented ATM flow management capabilities in the mid-2000s that largely eliminated jet aircraft holding and allowed for predicted traffic increases.

2.3 The New Zealand ATM system substantially meets the SWIM-enabled network optimisation in ICAO ASBU Block 2. Moreover, New Zealand has already adopted the AIXM 5.1 aeronautical data standard and is using this to share data between systems and develop new generation aeronautical charts and digital services.

2.4 States such as New Zealand need solutions that are fit for purpose and tailored to their operational and economic needs. This is particularly pertinent given that new entrants to New Zealand airspace include not only remotely piloted aircraft systems (RPAS) but also high altitude balloons, commercial space rockets, and ‘flying cars’.

2.5 For New Zealand, the obvious place to look first for SWIM benefits is from trans-Tasman traffic: the busiest set of international air routes in this part of the globe. Using a typical trans-Tasman flight as an analysis model, an investment logic mapping exercise was conducted, focusing on problem definition.

2.6 This work identified four major problems that SWIM implementation has the potential to help address and suggested that the impact of information management issues were evident beyond the trans-Tasman scenario. The four problems are:

[1] Prior to introducing collaborative flow management, New Zealand had classical levels of congestion, similar to many mid-sized European airports. New Zealand is more or less directly comparable to a mid-sized European country, and experiences similar challenges, apart from high density airspace.

a) access to shared airspace is becoming more difficult for all system participants, resulting in frustration and potentially avoidable costs[2]. This is likely to become more acute as the number and type of new system entrants increases;

b) fixed allocation of airspace and constrained resources (e.g. approaches to and availability/access to apron space at Queenstown airport), resulting in some airborne holding for trans-Tasman traffic;

c) information is not readily available; there is too much information, it's not coded simply or presented smartly. This results in poor quality information, information overload, increased costs, delays, inefficiency, and potential safety impacts; and

d) aviation has traditionally evolved slowly. Rapid technology change requires a collaborative approach involving all stakeholders to ensure regulatory enablers are harmonised with infrastructure and equipment investments (the aim of NSS).

2.7 While these problems have been identified, the 'whole of system' multi-interdependency nature of aviation means that SWIM would only be part of the solution. SWIM-enabled solutions for States with similar characteristics might include:

a) employing mainstream technology that is faster, cheaper, and tailored to the user;

b) enabling the flexible use of airspace through real-time information sharing;

c) overheads and investment minimal to deliver system and benefits;

d) enhanced decision making by ATC and flight crew through easily accessible, timely and user friendly information feeds; and

e) interoperability achieved by basic performance standards provided by ICAO, ensuring that systems have standards for communications security, the definition of the data content, and access control to obtain data.

2.8 The SWIM concept that New Zealand ultimately adopts will need to cater for new entities in our airspace as well as conventional aircraft. UTM systems may have SWIM characteristics at their core. New Zealand is introducing a new ATM system (Skyline X) in support of its new automatic dependent surveillance — broadcast (ADS-B)-based surveillance system. Both are planned to be fully functional across all controlled airspace by the end of 2021.

2.9 Given this timeline, it makes sense for New Zealand to assess the utility of new mainstream technologies to support the SWIM concept. At the same time, trans-Tasman trials of existing SWIM technology could be explored to validate the potential benefits of SWIM.

3. CONCLUSION

3.1 As New Zealand's traffic volumes rise and new aviation system entrants emerge, access to shared airspace is becoming more difficult for all participants creating frustration, costs and loss of

[2] The trans-Tasman analysis cited particularly acute issues around the busy Queenstown (ZQN) basin area, but the problem is manifesting itself across New Zealand.

amenity; inflexible allocation of airspace and constrained resources give rise to delays, particularly for trans-Tasman traffic; information delivery remains suboptimal; and the pace of improvement is slow.

3.2 The benefits of SWIM will contribute to the mitigation of these issues. However, New Zealand and comparable States require SWIM to be fit for purpose and tailored to their operational and economic needs.

3.3 A SWIM service will be most effective if it enables applications developers to use mainstream technologies and data exchange standards.

3.4 ICAO has a role in setting the basic performance Standards for international interoperability, ensuring that systems have acceptable standards for communications security, the definition of the data content, and access control for obtaining and updating data.

3.5 The Conference is invited to agree to the following recommendations:

Recommendation 3.1/XX – Promote and support the use of flexible, scalable system-wide information management (SWIM) solutions

That the Conference;

a) request ICAO to commit to the development and promulgation of minimum essential standards for international interoperability, with the aim of ensuring that systems have acceptable performance standards for communications security, definition of data content, access control and obtaining and updating data; and

b) encourage member States to share information and observations regarding SWIM development and implementation.

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