59th CONFERENCE OF DIRECTORS GENERAL OF CIVIL AVIATION ASIA AND PACIFIC REGIONS

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AGENDA ITEM 4: AIR NAVIGATION

COLLABORATIVE INNOVATION TO MODERNISING AIR TRAFFIC MANAGEMENT IN THE ASIA-PACIFIC REGION

Presented by Singapore

SUMMARY

The paper outlines the imperative to keep air traffic capacity and efficiency ahead of projected traffic growth in the Asia-Pacific (APAC) region. Innovation and collaboration between air navigation service providers (ANSPs) and stakeholders are key to identifying solutions and experimentation in air traffic operations that benefit the APAC region as a whole.

Singapore has set up the International Centre for Aviation Innovation (ICAI) to foster innovation collaboration through research and development (R&D) across key aviation domains, including in airport operations and air traffic management (ATM).

The Conference is invited to:

a) Note that innovation is key to unlocking air traffic capacity and efficiency, and that a collaborative approach between ANSPs and stakeholders would facilitate the joint identification of ATM solutions that could benefit the APAC region as a whole;

b) Note the setting up of ICAI in Singapore and its collaborative R&D approach, partnerships, types of projects which could be undertaken, and;

c) Discuss issues and potential areas of interest on collaborative innovation in ATM.

COLLABORATIVE INNOVATION TO MODERNISING AIR TRAFFIC MANAGEMENT IN THE ASIA-PACIFIC REGION

1. INTRODUCTION

1.1 Around the world, air travel is recovering well from the COVID-19 pandemic as air travel demands return, with the Asia-Pacific (APAC) region at the forefront of growth. This economic growth boosts business travel and tourism, leading to significant growth potential for the aviation sector. APAC currently has seven of the top ten busiest international airline routes within the region[1].

1.2 To meet projected increase in demand for air travel, policy makers should look holistically at expanding infrastructure capacity and enhancing operational efficiency, particularly in domains of airports and air navigation services. Economic and growth opportunities would suffer if airport and ATM capacity do not keep pace with traffic growth, resulting in congestions / inefficiencies and associated safety and sustainability concerns.

1.3 Innovation is key to unlocking untapped efficiency and capacity. Leveraging on technologies such as digitalisation, automation, big data, artificial intelligence and robotics, it is possible to transform the travel experience, introduce new products and services, lower cost, overcome manpower, land and airspace constraints and achieve sustainability goals.

1.4 Given the dynamic and transboundary nature of air traffic operations, it is necessary for ANSPs to take a collaborative approach towards identifying and experimenting with solutions to improve capacity and efficiency of air traffic flow from end to end. A collaborative approach between ANSPs, airport operators, airlines and other stakeholders could take into account diverse operational needs and address different readiness levels, with the aim of developing solutions that benefit the region as a whole.

1.5 Recognising the need for innovation and collaboration, Singapore set up the International Centre for Aviation Innovation (ICAI) in January 2024. Its areas of focus are: (i) next generation air navigation services, (ii) unmanned systems and advanced air mobility, (iii) automated & smart airport and (iv) sustainable air hub. ICAI's approach is collaborating with international partners to develop aviation solutions for the APAC region.

2. DISCUSSION

2.1 It is imperative that regional ANSPs and stakeholders work together on common technological or operational solutions that benefit air traffic operations across the region. ICAI can play a role to spearhead cross-border research and development (R&D) collaboration to advance aviation technologies and seamless ATM in the region. ICAI takes on a collaborative approach in seeking tailored solutions for the APAC region. It leverages cross-domain expertise and, through engagement with multiple private and public partners, pursues technological solutions designed for wide adoption in an integrated manner.

2.2 ICAI fosters partnerships among governments, industry and research institutes to co-drive development, deployment and adoption. With support from the Civil Aviation Authority of Singapore (CAAS), ICAI is equipped with robust R&D capabilities built over the past decade, through the establishment of four aviation research institutes at local universities (ATMRI, ASI)[2] and with

[1] Source: Busiest International Airline Route – Top 10 Global International Flight Routes, which are (1) HKG-TPE, (2) KUL-SIN, (3) ICN-NRT, (4) ICN-KIX, (5) CAI-JED, (6) DXB-RUH, (7) JFK-LHR, (8) BKK-HKG, (9) BKK-SIN & (10) NRT-TPE. (OAG, September 2024)

[2] CAAS has established aviation research institutes at local universities namely (i) Air Traffic Management Research Institute (ATMRI) at Nanyang Technological University, is Singapore's first institute dedicated to ATM R&D, founded in 2013 and (ii) Aviation Studies Institute (ASI) at Singapore University of Technology and Design, established in 2019.

leading international organisations (MAPS, AIRLAB)[3]. To accelerate the translation of R&D into technology solution, ICAI leverages the unique capabilities of relevant research institutes, and involves industry partners and operational users early in the R&D process. It considers an approach in strategically mapping out product development lifecycle with the delivery of relevant functional end-product in mind.

2.3 ICAI's preferred modus operandi is to set up individual bi- or multilateral projects focussing on specific technologies or operational procedures, and to demonstrate these technologies in an operational environment, with live traffic. It is expected to be the most pragmatic way to inform, train and commit the operational community to the implementation of new tools. Types of projects which could be undertaken include time-based flow management, collaborative regional ATFM, enhanced collaborative decision making (CDM), regional airspace simulations and system-wide information management (SWIM)-based flight and flow information for a collaborative environment (FF-ICE). Building on these regional collaboration projects, there could be new and common tools that could be developed and deployed to enhance ATM and other aviation operations.

2.4 CAAS and ICAI have announced plans to set up an International Aviation Lab (IAL) in Singapore within the next two years. This unique initiative aims to group various international aviation stakeholders including aircraft manufacturers to co-develop innovative airport automation solutions. Similarly, CAAS and ICAI are launching an ambitious programme aimed at better forecasting convective weather in order to reduce safety risks and increase efficiency.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to:

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b) Note the setting up of ICAI in Singapore and its collaborative R&D approach, partnerships, types of projects which could be undertaken, and;

c) Discuss issues and potential areas of interest on collaborative innovation in ATM.

— END —

[3] Through joint collaborations, CAAS has established aviation institutes in collaboration with international organisations to set up (i) MITRE Asia Pacific Singapore (MAPS), MITRE's first R&D entity outside United States, established in 2015 and (ii) AIRLAB, between Thales and CAAS, established in 2019.