55th CONFERENCE OF DIRECTORS GENERAL OF CIVIL AVIATION ASIA AND PACIFIC REGIONS

Denarau Island, Nadi, Fiji
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AGENDA ITEM 4: AIR NAVIGATION

NEED FOR STANDARDISATION AND GUIDANCE MATERIAL FOR DIGITAL TOWER AND REMOTE TOWER

Presented by Hong Kong, China

SUMMARY

This paper describes the recent validation trials and implementation worldwide for Remote Tower (RT) (ASBU module B1-RATS) and Digital Tower (DT) to meet individual operational needs. In the light of technology for digitisation of tower operation being ready for deployment with a view to enhancing ATS safety, service levels and efficiencies, there is an increasing need to adopt a harmonised approach with common standards and guidance materials for application of both DT and RT.

Action: The Conference is invited to note the information in this discussion paper and agree to the recommendation in paragraph 3.

NEED FOR STANDARDISATION AND GUIDANCE MATERIAL FOR DIGITAL TOWER AND REMOTE TOWER

1. INTRODUCTION

1.1 Remotely operated aerodrome control (ref. ASBU module B1-RATS) or Remote Tower (RT), which usually applies to low-traffic airports, provides safe and cost-effective air traffic services (ATS) from a remote location to one or more aerodromes where dedicated and/or local ATS are considered neither sustainable nor cost-effective. This setup can also enable its application as a contingency tower to maintain aerodrome control operation, in case the main tower has to be evacuated.

1.2 In recent years, there has been a growing trend for deployment of similar technology for RT, with enhanced features and surveillance fusion technology, at conventional towers in medium-sized and even busy airports for enhancing ATC safety and operational efficiency. Digital Tower (DT) usually refers to such application for augmenting and enhancing visual capability for controllers at conventional towers. Both DT and RT make use of high resolution surveillance cameras to capture and digitise a panoramic view of the airfield environment. Through high-speed and secured data network, the captured data are transmitted instantly to the ATC tower (for DT application) or an operational room (for RT application), where the real-time video data are displayed on wrap-around screens giving controllers an entire view of the airport. Aircraft and vehicles shown on the digitised video can be augmented with airfield maps and flight data, allowing a particular aircraft/vehicle to be identified and zoomed in based on its call-sign easily. Besides, artificial intelligence can be applied on the digitised video to provide additional safety alert functions for early detection of conflicting situation or intrusion to airfield restricted areas. These will greatly enhance ATC safety and operational efficiency in managing live aircraft and vehicle movements in medium-sized and even busy airports, especially during night time and low visibility conditions.

2. DISCUSSION

2.1 In the ICAO's State Letter ref. AN 7/63.1.1-17/23 dated 6 March 2017, an amendment to the ICAO document "Procedures for Air Navigation Services - Air Traffic Management (PANS-ATM, Doc 4444)", is proposed by adding a new paragraph 7.1.1.2.1 "Visual observation shall be achieved through direct out-of-the-window observation, or through indirect observation utilizing a visual surveillance system[1] which is specifically approved for the purpose by the appropriate ATS authority". With the proposed amendment anticipated to become applicable on 8 November 2018, the relevant technology is ready to serve as a provision of the visual surveillance system in the context of ATS. However, there remains a grey area on the required level of reliability, availability and integrity of the relevant system as a control tool for aerodrome operation, since no detailed requirements and guidelines are stipulated in Doc 4444. There is also a lack of global guidance material, such as relevant templates, on how to develop and benchmark safety case to ensure an objective assessment and approval by the appropriate ATS authority, as well as guidance for a systematic approach for planning, implementation and transition of the system into safe operation.

2.2 Apart from technological readiness, any implementation of DT and RT in providing ATS will have to go through the necessary robust consideration and assessments. Such processes include but not limited to a sound business case with justifiable operational benefits, and more importantly the development of a safety case, the operational procedures and training requirements, as well as the subsequent regulatory approval. Many of such considerations and assessments will have to

[1] A visual surveillance system is an electro-optical system providing an electronic visual presentation of traffic and any other information necessary to maintain situational awareness at an aerodrome and its vicinity. It will normally consist of a number of integrated elements, including sensor(s), data transmission links, data processing systems and situation displays.

make reference to or be based on standardised requirements and guidelines. The ICAO's GANP under its ASBU framework, has promulgated RT under one of its Block 1 modules, namely B1-RATS, in which States/Administrations are encouraged to consider its implementation in timeframe of 2019-2025, where there is a positive business case with operational benefits and the corresponding matching provisions are available[2]. Despite its increasing application worldwide, DT has neither been specified in the ICAO GANP nor any ASBU modules.

2.3 Nowadays, the pace for technological development in DT and RT is well ahead of the available governing standards and guidance materials. This has led to the prevailing circumstances that diversified approaches are being adopted by different States/Administrations and equipment suppliers. Despite the unavailability of such standards and guidance materials, trials/implementation of DT and RT have been intensively carried out worldwide to fit individual purpose. Examples are the CAAs/ANSPs in various regions, including Sweden, Hungary, Norway, Germany, U.K., the Netherlands, Austria, Dubai, Australia, U.S.A, New Zealand, Singapore and China (including Hong Kong China) etc. The Swedish ANSP has implemented the first remote tower in the world with operational approval from its CAA at a low-density airport for provision of ATS from a remote location.

2.4 At the Hong Kong International Airport (HKIA), both DT and RT technologies involving high resolution surveillance cameras with pan-tilt-zoom features and thermal infrared capabilities will be deployed for trial. The trial system will be integrated with the A-SMGCS, ADS-B, and flight plan data. Customised display screens showing essential flight information and panoramic view of the runways and apron areas will be installed at the aerodrome control tower and a remote site outside the airport. The objectives of the trial are to gather feedback from controllers and evaluate the technology to determine if it can: (i) enhance out-of-window view for performing day-to-day duties in managing aircraft and vehicle movements on the aerodrome, particularly under low visibility conditions; (ii) provide contingency operation from an off-tower location and (iii) improve visibility of distant areas of the airport under expansion.

2.5 Indeed, different ANSPs have provided different requirements to equipment suppliers with a view to performing trials/implementing DT and RT in accordance with their own operation needs. A harmonised approach with common standards and guidance materials for system interoperability has become increasingly important to ensure that system trials and implementation will not be fragmented with loopholes, where safety and service levels might be compromised.

2.6 With the ICAO ASBU B1-RATS module ready for deployment commencing 2019 according to the GANP, there is a need for stakeholders, including the ICAO, regulators, ATS and CNS providers, aerodrome operators and equipment suppliers etc. to work together and expedite the development of corresponding standards and guidance materials. While the said ICAO's State Letter has made reference to an EASA guidance material published in 2015, standards and guidance materials are urgently required from ICAO to govern the rapid technological development and intensive activities of trials and implementation of DT and RT worldwide.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to agree on the following recommendation:

Recommendation – Standardisation and Guidance Material for Digital Tower and Remote Tower

3.2 That the Conference :

[2] According to the ICAO ASBU Document published in July 2016, such matching provisions include, standards, avionics, infrastructure, ground automation, procedures and operational approval, which are estimated to be available in 2018.

a) note the diversified approaches currently adopted by various States/Administrations in conducting trials on or implementing DT and RT to fit their own operational needs;

b) note that a harmonised approach with common standards and guidance materials is necessary to ensure the harmonised trials and implementation of DT and RT for upholding safety and service levels;

c) urge the ICAO to consider inclusion of the application of DT into the GANP and relevant ASBU module(s), in the light of a trend for global adoption by ANSPs who found such application beneficial to their operational needs; and

d) urge the ICAO to expedite development of standards and guidance materials in conjunction with stakeholders, which shall include a template for development of safety case, as well as a systematic approach for planning, implementation and transition of DT and RT into operation to ensure that a harmonised approach is adopted.

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