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Agenda Item 5: ATM Systems (Modernisation, Seamless ATM, CNS, ATFM)

FROM NEW ATM AUTOMATION SYSTEM LESSONS LEARNED

(Presented by Thailand)

SUMMARY

This paper presents a summary of lessons learned from implementation of new ATM Automation System nationwide in Thailand, which completed transition in Q1 2020.

1. INTRODUCTION

1.1 Thailand initiated the Thailand Modernization CNS/ATM System (TMCS) project to replace previously aging CNS/ATM systems to enhance ATS efficiency, enhance ATM operations flexibility and increase ATS capacity to match forecast traffic growth in the Bangkok FIR, while maintaining high level of safety.

1.2 The TMCS project scope includes replacement of ATM automation support system nationwide (one area control center, seven (7) approach control units and thirty-six (36) aerodrome control units) along with associated supporting CNS systems. Transition towards full use of the new ATM automation system completed successfully with regulatory approval in Q1 2020.

1.3 It is envisaged that lessons learned from the large-scale implementation of new ATM automation system should be benefit other States / Administration planning to implement new ATM automation system.

2. DISCUSSION

2.1 Lesson learned from implementation of the new ATM automation can be grouped into the following categories.

Terms of Reference (TOR) Development

2.2 As far as practicable, TOR development should be a collaborative process that considers requirements from ATM automation system users including ATCOs and ATSEPs.

2.3 It should also be recognized that the TOR released may not necessarily match proposal from vendors. As such, individuals related to various parts of the project need to understand difference between the TOR and the vendor proposal.

2.4 System design review step should be specified in the TOR with sufficient time and resources allocated to ensure that overall system design is reviewed along with all planned functionality.

2.5 In order to support safety case development and further liaison with ANS regulators, it is highly recommended that the TOR specify that vendors provide appropriate support for safety case development and appropriate support documentation.

2.6 The TOR should specify system warranty duration that suitably aligns with expected system life cycle. As ATM automation implementation projects are often delayed, there could be a situation where warranty of a delivered ATM automation system may expire even ahead of completed transition.

ATM Service Architecture – System Data Set Management

2.7 Structured data set management team should be setup to manage overall system configuration, ensuring proper configuration alignment of various system components, while ensuring that the overall system functions as expected.

2.8 Data set management team should comprise members with operations and engineering background to ensure that ATM operational concept / procedure and be properly supported by proper system data set / configuration.

ATM Service Architecture – ATS Interfacility Data Communication (AIDC)

2.9 When implementing AIDC to facilitate automated transfer of control to neighboring ATS unit, starting with minimum message set specified in ICAO APAC Seamless ANS Plan should help minimize problems. After the initial message set is successfully implemented, expansion of message set may be carried out to incrementally add features.

2.10 It should be recognized that AIDC implementation would not fully replace traditional transfer of control. There may be cases where traditional transfer of controls may still be required. Nevertheless, AIDC implementation helps automate typical transfer of control, thus increasing ATS capacity and enabling reduced spacing parameter at FIR boundary.

2.11 Manpower planning within the context of ATM system transition activities should also consider difference in AIDC operations prior to and after transition. During transition activities, short-term extra manpower may be required in relation to AIDC operations.

ATM Service Architecture – Centralized Flight Data Management Operations

2.12 The presence of a centralized national FPL and ATS message management function helped in ensuring that FPL and ATS messages routed into ATM automation systems are not duplicated and can be properly processed.

ATM Service Architecture – ATFM Operations

2.13 In the event where ATM automation system transition is expected when traffic demand saturates available ATS capacity, presence of ATFM operations were instrumental in regulating traffic demand to ease the transition.

2.14 Prior to transition activities, transition capacity of expected constrained ATM resources (airports and airspace sectors) should be declared to ensure ATFM service can regulate traffic demand during transition. When determining capacity of constrained ATM resources, ATCOs involved in providing ATS for the constrained resources should be properly consulted. In the event that airspace congestion is expected during transition, real-time simulation of expected air traffic should be conducted to validate system transition capacity planned.

2.15 It should be expected that after ATCOs are more comfortable using the new ATM automation system, post-transition capacity should be assessed to reduce ATFM delay and impact on the overall ATM network.

2.16 ATFM coordination with neighboring / affected ATFM service providers during the ATM automation system transition generally involves request of exemption from unnecessary ATFM measures.

2.17 Meanwhile, ATFM measure selected to regulate traffic demand during transition activities should consider workload of other ATFM service providers, ATS units, aircraft operators and the overall ATM community in facilitating compliance. It was found that Ground Delay Program (GDP) was associated with lower workload than less precise ATFM measures such as Miles-in-Trail, Minutes-in-Trail and Minimum Departure Interval.

Planning of Operations Room and Support Facilities

2.18 While this aspect could be easily overlooked, operations room and console sizing should be carefully planned, along with other support facilities to ensure smooth transition. Overlooking this aspect of transition planning could result in unforeseen project delays or significant impact on ATCOs / ATSEPs psychological decision-making process when filling their readiness survey results.

Procurement Process

2.19 It should be considered that “normal” procurement process may not be optimal for typically large ATM automation system projects.

Regulator Relationship Management

2.20 Regulator involvement should start early since planning of the new ATM automation system. Adherence to Safety Management System process is expected to form significant part of the regulatory approval process. ANSPs are expected to notify the ATM system changes to the regulator along with implementation plan. ANS regulators should be continually briefed on planning of the new ATM automation system as well as implementation progress. Close coordination and precise communication between ANS regulator and ANSP are essential for smooth transition. It is recommended that communications be routed through designated Points of Contacts to ensure continuity of communication.

2.21 Complete set of documentation must be organized and stored for the purpose of regulatory audit and approvals.

Vendor Relationship Management

2.22 There should be team-based structure setup to provide the vendor with effectively detailed problem / bug report along with associated tracking, while also ensuring that problem reports of similar nature are not duplicated. This should help these problems are fixed effectively in a timely manner.

2.23 Vendor personnel presence during critical transition phases should be considered to ensure smooth transition activities.

ATM System Transition Planning

2.24 ATM system transition planning should be well-documented to minimize all form of risks and optimize resource allocation during the critical period where more resource may be required. Transition planning should be conducted in consultation with operations, engineering, training and support facilities teams, while trying to maintain simple transition phases along with associated entry/exit criteria.

2.25 ATM system transition is generally divided into the following typical phases:

a) Shadowing: use of the legacy ATM automation system as main system for providing ATS in parallel with active use of the new ATM automation system

- i) Planning of this transition phase should focus on quality, not quantity of time spent with the new ATM automation system e.g. choose busy traffic periods and timing of shadowing period close to ghosting as much as practicable
- ii) It should be noted that shadowing ATS provided using the legacy ATM automation system would not provide ATCOs with the full sense of actual workload when using the new ATM automation system as though process in issuing ATC clearances and instructions may not be fully reflected.

b) Ghosting: use the new ATM automation system as main system for providing ATS with manpower provided for the legacy ATM automation system as backup measures (if the new ATM automation not used continuously, there may be an Operational Trial sub-phase)

c) Post-Cutover: full use of the new ATM automation system with small or no standby manpower for the legacy ATM automation system

2.26 Readiness surveys are recommended to be used to evaluate ATCO readiness to transition ATM automation system especially in later phases of transition when coverage of ATCO target group is essential. These surveys should be carefully developed considering survey length. It is also generally useful to include open-ended questions to solicit feedback where appropriate. In addition, prior to releasing the survey, they should be tested. Caution is highly advised when these surveys are used as entry/exit criteria between transition phases especially in response scales to certain questions.

ATM System Transition Planning – Communications

2.27 Throughout all phases of transition, communication strategy needs to be carefully developed and executed. Communications to ATCOs and engineering personnel should start from roadmap of the new ATM automation system, while providing progress updates as well as encouragement and support throughout various transition phases.

2.28 During transition process, social media / instant messaging groups may prove to be useful means of quick and effective means of communications. Less “formal” setting of social media / instant messaging groups may also help ATCOs and relevant staff to be reasonably relaxed and provide more direct feedbacks.

ATM System Transition Planning – Project Management Office (PMO)

2.29 Especially in the case of large-scale ATM automation system transition, a Project Management Office (PMO), should be setup comprising representatives with ATM operations, engineering, legal and procurement teams. The PMO should organize routine meetings with relevant units to follow-up implementation and transition progress, chaired by senior management with sufficient decision-making authority.

2.30 The PMO should also be able to communicate with representatives from ATS units planning ATM systems transitions. These ATS unit Points of Contacts (POCs), should be properly trained and equipped with at least the following knowledge:

- a) Understanding of current and new ATM automation support system;
- b) Understanding of new ATM automation support system TOR (especially in relation to the ATS unit concerned);
- c) Understanding of vendor proposal and difference from system TOR; and
- d) Understanding of system design

2.31 These ATS unit POCs should be supported by a Support Team to ensure proper communication with PMO and ensuring that problems / bugs are reported to vendor for correction.

2.32 Organization structure of ATS unit POCs and support team should be further considered. There might be benefits in temporarily transferring ATS unit POCs and support team into a common management structure, while they are still stationed at various ATS units.

2.33 Manpower of all units involved in the transition activity should be carefully planned as some critical periods may require extra manpower. Duration of transition periods need to be balanced with key personnel fatigue and staff confidence in the process.

Operational Procedures Development and Training

2.34 Operational procedures on using new ATM automation system should be collaboratively developed in consultation with ATCO users. Timing and manpower should be accordingly budgeted. In cases where operational procedures may counterintuitively require more workload from ATCOs, suitable explanation should be prepared and communicated to ATCOs to manage expectations and support.

2.35 Availability of a Contingency / Training ATM automation support system proved to be very useful for developing / testing operational procedures, training appropriate personnel and evaluating capacities in real-time simulations.

2.36 Sufficient time should be allocated for ATCOs training. It is suggested that ATCOs training be performed in batches mixing ATCO age groups, so that younger ATCOs potentially picking up new systems faster can provide support to elder ATCOs, while elder ATCOs may be able to impart their experience / techniques in managing busy traffic and apply knowledge from old ATM automation system in the context of new ATM automation system.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information contained in this paper;
- b) contact Thailand for further detailed information if required; and
- c) discuss any relevant matters as appropriate.

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