INTERNATIONAL CIVIL AVIATION ORGANIZATION
ASIA AND PACIFIC OFFICE

REPORT OF

ASIA PACIFIC REGIONAL ATM AUTOMATION SYSTEM SYMPOSIUM (APAC RATMS)

22 – 23 November 2018
(Nanjing China)

The views expressed in this Report should be taken as those of the Symposium and not the Organization.

Approved by the Symposium
and published by the ICAO Asia and Pacific Office, Bangkok

HISTORY OF THE SYMPOSIUM **Page**

LIST OF ATTACHMENTS

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1. Introduction

1.1 The ICAO Asia Pacific Regional ATM Automation System Symposium (APAC RATMS) was held in Nanjing, China, from 22 to 23 November 2018. The Symposium was hosted by the Air Traffic Management Bureau (ATMB) of Civil Aviation Administration of China (CAAC).

2. Opening of the Symposium

2.1 The symposium was opened by Mr. Li Qi Guo, Deputy Director-General of CAAC ATMB. In his opening address, Mr. Li expressed his pleasure in hosting the APAC RATMS and extended warm welcome to all participants to Nanjing. He also thanked the ICAO APAC Office for timely organizing the symposium for the Region which is important for enhancing flight safety and efficiency of air traffic management. He wished the participants to have a pleasant and enjoyable stay in Nanjing.

2.2 On behalf of ICAO Regional Director, Mr. Luo Yi, Regional Officer CNS expressed appreciation to CAAC ATMB for hosting the symposium. Mr. Luo highlighted that ATM automation system is a highly complicated and integrated tool crucial in achieving seamless ATM and enhancing efficiency and capacity of air navigation services to cope with the ever-increasing air traffic. The symposium would provide the participants with an overview of the latest developments and best industry practices, and would promote initiatives and proactive activities leading to improvements with concrete methods and procedures to benefit the air transportation community.

2.3 In his opening remarks, Mr. Wu Chi-kwong, Richard, Assistant Director-General of Civil Aviation of the Hong Kong Civil Aviation Department (HKCAD) and Chairman of CNS Subgroup of APANPIRG emphasized the need for proactive efforts for this region in organizing forums on subject of ATM automation system in order to share operational and technical experience, and shaping the future development roadmap and performance-based guidance for the ATM automation system. He recalled the directives of DGCA Conf/54 and relevant outcome of discussions from CNS SG/21 meeting. He added that this symposium, being the first of its kind in the APAC Region, is a well-time forum organized in response to relevant action items as well as to address the recent and forthcoming challenges of this region. He also expressed the need to continuously enhance the robustness of ATM systems infrastructure and services to meet operational requirements of the anticipated growth in air traffic in this region, as well as to adopt a harmonized and coordinated approach to tackle the interoperability issues. Mr. Wu expressed his pleasure in seeing a very wide cross-section participation from ANSPs, aviation regulatory authorities, international organizations and aviation service providers at the symposium. He wished for a successful and productive symposium.

3. Attendance

3.1 The Meeting was attended by 96 participants from 13 States/Administrations (Bangladesh, China, Hong Kong China, Macao China, India, Indonesia, Lao PDR, Malaysia, Mongolia, Philippines, Singapore, Thailand and U.S.A) and 2 International Organizations (IATA and ICCAIA). The symposium was also attended by a number of technology/solution providers (CDATC, Chinney, Boeing China, EasySky, Indra, LES, SAAB, SunCreate, TEDC, Thales, etc.). A list of participants is at **Attachment 1.**

4. Facilitator, Moderators and Secretariat

4.1 The symposium dealt with six agenda items conducted in seven sessions. The programme for the symposium is at **Attachment 2**. The symposium was facilitated by Mr. Li Wen Xin, Regional Officer ATFM/CDM, ICAO Regional Sub Office (RSO). Each session was facilitated by a moderator. The list of moderators is shown below. Mr. Luo Yi, Regional Officer CNS, ICAO APAC Regional Office, with support from HKCAD, acted as Secretary for the symposium.

Agenda Item	Session	Moderators
1	Overall System Planning and Design	Mr. Richard Wu (HKCAD)
2	System Acceptance Tests and Certification Process	Ms. Xie Yu Lan (CAAC ATMB)
3	HMI Adaptation, Real-time Flight Data/Status Synchronization and Major Operational Enhancements	Mr. David Leow (CAAS)
4	Future Enabling ASBU Functional Modules for ICAO GANP 4.1 Integration with ATFM and CDM Capability 4.2 Enhanced Surveillance and A-SMGCS Technology	Ms. Xie Yu Lan (CAAC ATMB)
	4.3 Integrated, Digital and Remote Tower Technology	Mr. Richard Wu (HKCAD)
5	System Interoperability Issues between ATM Automation Systems	Ms. Xie Yu Lan (CAAC ATMB)
6	Cyber Threats and Mitigation Measures for ATM Automation Systems	Mr. Richard Wu (HKCAD)

5. Organization, working arrangements and language

5.1 The symposium met as a single body. The working language was English including all documentation and this Report.

6. Summary of Presentations

6.1 35 presentations in total were made under the six agenda items. The presentations in PDF format are available on the following ICAO webpage:
https://www.icao.int/APAC/Meetings/Pages/2018-ATM-ASS.aspx

6.2 A brief summary for each of the presentations is given at **Attachment 3**. When time allowed, questions and answers (Q & A) were facilitated by moderator concerned.

7. Outcomes and Conclusions

7.1 The Regional ATM Automation System Symposium is the first of this kind in the APAC Region. The symposium recognized usefulness and importance in organizing the first forum to discuss, facilitate and exchange best industry practice/experience among States/Administrations with a view to keeping abreast of the latest developments in ATM automation systems and associated technologies to cope with forthcoming development and implementation of ICAO GANP/ASBU and APAC Seamless ATM Plan. The deliberations, lessons learned and outcomes could facilitate States/Administrations on improving planning, implementation and transition to new air navigation systems and on-going system operations and maintenance.

7.2 The symposium shared experience on the main aspects of the implementation of large-scale ATM automation system. It is recognized the need to adopt a phased approach with detailed procedures, and involve all the stakeholders, especially the end-user, establish clear common understanding of each step, refer to the examples of lessons learned in previous system deployment, early involvement of relevant subject matter experts and their experience from previous system deployment, in assisting future deployments and smooth transition.

7.3 The symposium elicited constructive deliberations and recommended provision of the main and fallback ATM automation systems with same functions, capability and capacity but in separated systems in order to enhance robustness and continuity in provision of safe, efficient and orderly ATM services. In the APAC Region with high growth in air traffic, disruption to air traffic is not an option. As a best industry practice, the main and fallback systems with compatible data synchronisation scheme should be able to switch their main and fallback roles seamlessly once required and regularly for use by ATC controllers and air traffic engineers. To further enhance resilience and mitigate risks for users handling high air traffic demands, the main system and fallback system from different manufacturers could be a way forward in future ATM development. As such, the symposium considered that baseline and optional requirements on ATM automation system and the associated data synchronization scheme should be defined.

7.4 The symposium recognized a need for States/Administrations to take stock of fallback systems available for all of their ATM automation systems and for the ICAO to conduct a survey on States regarding their provisions of main and fallback ATM automation systems, their functionality/capability/capacity, and any future resilience improvement plan.

7.5 The symposium also shared the best industry practice in proactive system maintenance arrangement, which is crucial to maintaining smooth operation of large-scale, complex and highly integrated ATM automation system. This includes, for example, regularly monitoring and conducting trend analysis on system health status and various system resources, and proactively restarting servers/workstations on regular basis and in an orderly and timely manner as part of the housekeeping so as to keep the system in optimal running conditions.

7.6 The symposium has addressed the Action Item 54/13 of 54th DGCA Conference on ATM automation system:

> Noting the need for a risk-based approach throughout system development, testing/acceptance, system and operations transition, handling of teething issues of its safety-critical ATM AUTOMATION SYSTEM with good lessons learned, the Conference supported the initiative of States towards formation of an international Users' Group for ATM AUTOMATION SYSTEM to share operational and technical experience, and map out the future system development roadmap, which could be beneficial for the APAC Region in respect of development of the global roadmap and performance-based requirements of the ATM AUTOMATION SYSTEM.

7.7 The symposium has also addressed the action items arising from 21st meeting of the CNS Sub-group of APANPIRG, which called on organising workshops/symposia with experts from ANSPs, airports and regulators, etc., with the objectives to discuss and address issues on ATM automation system on the following aspects:

- systems planning and design;
- HMI adaptation, data synchronization and operational enhancements;
- ICAO roadmap in GANP / ASBU;
- systems interoperability;
- acceptance and certification;
- cybersecurity

7.8 The symposium noted that Space-based ADS-B would become operational in early 2019 providing quality ATC surveillance data as a service across the globe, which provides ATC radar like service to supplement terrestrial-based surveillance and to enhance resilience of existing surveillance systems for integration into ATM automation system, independent of weather and natural disasters. In addition, Space-based ADS-B could also support utilization of surveillance data outside individual FIRs. States/Administrations could consider its potential applications in surveillance as well as in long range flow management.

7.9 The symposium noted the recent development on digital tower and remote tower technologies and the challenges to ensure a harmonized approach due to the variety of operational requirements, and importance in striking a right balance between specification-based and performance-based approach to ensure innovation would not be stifled.

7.10 The symposium echoed the continued growth in cyber security threats, both from inside and outside of an ANSP. The ICAO Doc 9985 ATM Security Manual is relevant. Proactive steps should be taken, including risk mitigation during system planning and design stage; physical, system and human provisions; establishment of governance bodies; provision of cyber security incident escalation and business continuity processes; promotion/education; regular inspections and audits; etc. It is a good practice to consider conducting cyber security audit to the ATM system and operations by a third party.

7.11 The outcomes of this symposium could trigger forthcoming formulation of best industry practice and guidelines for reference by Member States/Administrations. Given the fruitful outcomes from the symposium, it is recommended that further workshops/symposia would be organized in regular or irregular basis to benefit the ATM automation system development and implementation. The symposium also suggested States/Administrations to consider establishment of a regional working group/task force under the ICAO CNS Sub-group of APANPIRG to deal with matters covered in paragraph 7.7 above and arisen from this symposium in regard to ATM automation systems. The symposium agreed to formulate an action item for the 23rd meeting of CNS Sub-group in 2019 to review and consider whether such regional working group/task force is needed and the terms of reference in the light of the required impetus on ATM automation systems in the region and in supporting the implementation ASBU in the ICAO GANP (version 2019) and APAC regional priorities.

8. Notes of Appreciation

8.1 On behalf of the ICAO and participants of the symposium, Mr. Luo Yi, ICAO Regional Officer CNS, ICAO APAC Regional Office, expressed appreciation and gratitude again at the closing session to the ATMB for hosting the very successful symposium, the hospitality and excellent arrangements made for the symposium, which is the first ICAO's symposium of such kind organized in the APAC Region. Mr Luo thanked LES Information Technology for supporting the event with excellent arrangement for an informative technical visit and conference facilities provided. Mr. Luo also thanked Hong Kong CAD for their support and assistance in conducting the symposium.

8.2 Mr. Wu Chi-Kwong, Richard, Assistant Director-General of Civil Aviation of the HKCAD and Chairman CNS Subgroup of APANPIRG made closing remarks. He thanked the ICAO, facilitators, speakers, moderators, the supporting team from the host as well as participants for their contributions and active participation. Moreover, he was impressed by the converging views from the deliberations which would form a strong basis to take the matter forward.

8.3 In closing speech, Ms. Xie Yu Lan, Chief Engineer, North China Regional Air Traffic Management Bureau, CAAC expressed appreciation for an opportunity hosting this symposium in Nanjing wished all participants a safe trip back home.

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ICAO ASIA/PACIFIC REGIONAL ATM AUTOMATION SYSTEM SYMPOSIUM

(Nanjing, China, 22 – 23 November 2018)

Attachment 1

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ICAO ASIA/PACIFIC REGIONAL ATM AUTOMATION SYSTEM SYMPOSIUM

Nanjing, China, 22-23 November 2018

DAY 1 – 22November 2018 (Thursday)	
08:30 – 09:00	Registration
Opening Session	
09:00 – 09:20	**Facilitator: Mr. Li Wen Xin;** *Regional Officer ATM (ATFM-CDM), International Civil Aviation Organization* **Opening Remarks** • Mr. Li Qi Guo; *Deputy Director-General, Air Traffic Management Bureau, CAAC* • Mr. Luo Yi; *Regional Officer CNS, International Civil Aviation Organization* • Mr. Richard Wu JP; *Assistant Director-General, Hong Kong Civil Aviation Department, Chairperson of CNS SG of APANPIRG*
09:20 – 09:30	• Introduction of participants • Group photo
09:30 – 10:00	*Refreshment Break*
Agenda Item 1	
10:00 – 11:30	**Overall System Planning and Design** **Moderator: Mr. Richard Wu JP;** *Assistant Director-General, Hong Kong Civil Aviation Department, Chairperson of CNS Sub-Group* • SP101 – The Role and Scope of ATM Automation System By Mr. Luo Yi; *Regional Officer CNS; International Civil Aviation Organization* • SP102 – ATM Automation System Outline in China By Mr. Li Xin; *Deputy Director, Technical Centre of Air Traffic Management Bureau, CAAC* • SP103 – Standard Terminal Automation Replacement System (STARS) Implementation and Lessons Learned By Mr. Braks Etta; *Senior Air Traffic Representative, Asia Pacific Air Traffic Organization, System Operations, Federal Aviation Administration* • SP 104 – Enhanced Robustness for Provision of ATM Service By Mr. Vincent Wong; *Senior Electronics Engineer, Hong Kong Civil Aviation Department*

	• SP105 – Overall System Design and Implementation of Main/Backup ATM Automation System By Mr. Wang Xiao Wei; *Engineer, Air Traffic Management Bureau, CAAC* Question and Answer
11:30 – 12:30	*Refreshment Break*

DAY 1 – 22 November 2018 (Thursday) cont.

Agenda Item2

12:30 – 14:30	**System Acceptance Tests and Certification Process** **Moderator: Ms. Xie Yu Lan;** *Chief Engineer, North China Regional Air Traffic Management Bureau, CAAC* • SP201 – CNS Equipment Certification and Localization Process in China By Mr. Zhang De ; *Regulator of CNS Division， Air Traffic Regulation Office, CAAC* • SP202 – Sharing of experience and lessons learned from operational transition to ATM System in Singapore By Mr. Kwek Chin Lin; *Chief ATC Specialist, Civil Aviation Authority of Singapore* • SP203 – Software Management for ATM Automation System By Mr. Ren Sen; *Director, Test Evaluation Department of Technical Centre of Air Traffic Management Bureau, CAAC* Mr. Guo Wei; *Engineer, Technical Centre of Air Traffic Management Bureau, CAAC* • SP204 – Thailand ATM automation system – Architecture and Acceptance Process By Mr. Pattharasit Phankrawee; *Air Traffic Engineering Manager, Aeronautical Radio of Thailand Limited* • SP205 – Implementation of ATM Automation Systems in Indonesia By Mr. Herdianto; *ATS System Specialist, AirNav Indonesia* • SP206 – Transition of Shanghai ATM Automation System By Ms. Chen Wen Xiu; *Deputy Director, Technical Support Centre of East China Regional Air Traffic Management Bureau, CAAC* Question and Answer

14:30 – 14:50	*Refreshment Break*

DAY 1 – 22 November 2018 (Thursday) cont.	
Agenda Item 3	
14 :50 – 16:45	**HMI Adaptation, Real-time Flight Data/Status Synchronization and Major Operational Enhancements** **Moderator: Mr. David Leow;** *Head (Air Traffic Management Systems Engineering Development), Aeronautical Telecommunications and Engineering Division, Civil Aviation Authority of Singapore (CAAS)* • SP301 – Data Exchange Technology of ATM Automation System By Ms. Zhu Xiu Ying; Senior R&D Engineer, *Chengdu Civil Aviation Air Traffic Control Science & Technology Co., Ltd* • SP302 – "Fitness" – Analysis of Main Functions for ATM Automation System By Mr. Wang Yu; Senior Engineer, *Air Traffic Management Bureau, CAAC* • SP303 – Enhancing Air Navigation Safety and Efficiency in Hong Kong FIR Through Implementation of ADS-B By Mr. Charles Leung; *Senior Electronics Engineer, Hong Kong Civil Aviation Department* • SP304 – Major Operational Enhancement in ATM Automation System By Mr. Puneet Gupta; *Joint General Manager (ATM), Airports Authority of India* • SP305 – The Value and Importance of the Real-time Data Output from ATM Automation System By Mr. Zhang Ti; *Manager, ATFM Liaison, Safety and Flight Operations, IATA* • SP306 – Data Collection and Distribution of ATM Automation System By Mr. Wang Xin Rong; *Engineer, Air Traffic Management Bureau, CAAC* Question and Answer
16:45– 18:30	Technical Visit to Nanjing LES Information Technology Company Limited
End of Day 1	

DAY 2 – 23 November 2018 (Friday)	
Agenda Item 4	
09:00 – 11:00	**Future Enabling ASBU Functional Modules for ICAO GANP** **Moderator: Ms. Xie Yu Lan;** *Chief Engineer, North China Regional Air Traffic Management Bureau, CAAC* **4.1 Integration with ATFM and CDM Capability** • SP401 – Flow Management in APAC region By Mr. Li Wen Xin; *Regional Officer ATM (ATFM-CDM), International Civil Aviation Organization* • SP402 – Imminent changes of ATM Automation System based on 4D & TBO By Mr. Zhang Han Wen; Senior Software Engineer,*LES Information Technology, China* • SP403 – Thailand ATM automation System – External System Integration By Mr. Chanyut Phrukkumwong; *Air Traffic Engineering Manager, Aeronautical Radio of Thailand Limited* • SP404 – Application of Space-based ADS-B to ATM and ATFM By Mr. Greg Dunstone; *Engineer, ICCAIA* • SP405 – Air Traffic Flow Sequencer in China (AMAN,DMAN,XMAN) By Mr. Arthur; *ATC Systems Architect & Design Authority,Thales Australia* **4.2 Enhanced Surveillance and A-SMGCS Technology** • SP406 – A-SMGCS: New Developments and Functionality By Mr. Dick Langejan; *Sales Director ATM, SAAB* Question and Answer
11:00 – 11:20	*Refreshment Break*

DAY 2 – 23 November 2018 (Friday)	
Agenda Item 4 cont.	
11:20 – 12:40	**Future Enabling ASBU Functional Modules for ICAO GANP** **Moderator: Mr. Richard Wu JP;** *Assistant Director-General, Hong Kong Civil Aviation Department, Chairperson of CNS Sub-Group* **4.3 Integrated, Digital and Remote Tower Technology** • SP407 – Integrated Tower System By Wan Yuan; Vice General Manager of ATC Division, *Anhui Sun Create Electronics Co., Ltd* • SP408 – Need For Standardisation and Guidance Material for Digital Tower and Remote Tower By Mr. Charles Leung; *Senior Electronics Engineer, Hong Kong Civil Aviation Department* • SP409 – Indra Integrated Tower System BY Mr. Zhang Chi; Technical Manager, *INDRA BEIJING* • SP410 – Digital Tower : Experience In Sweden By Mr. Dick Langejan; *Sales Director ATM, SAAB* Question and Answer
12:40 – 13:40	*Refreshment Break*

DAY 2 – 23 November 2018 (Friday) cont.	
Agenda Item 5	
13:40 – 15:30	**System Interoperability Issues between ATM Automation Systems** **Moderator: Ms. Xie Yu Lan,** *Chief Engineer, North China Regional Air Traffic Management Bureau, CAAC* • SP501 – The AIDC Deployment and Implementation in China By Mr. Zhang Wei; *Engineer, Air Traffic Management Bureau, CAAC* • SP502 – Data Integration in Tower By Mr. Chen Xiao Yu; *Engineer, Air Traffic Management Bureau, CAAC* • SP503 – System Interoperability of ATM Automation System By Mr. R.R. Bassi; *General Manager (CNS), Airports Authority of India* • SP504 – Centralized Flight Plan Progress in China. By Mr. Xiao Ao; *Engineer, Air Traffic Management Bureau, CAAC* • SP505 – ATC System Interoperability / SWIM IOP R&D Activity in China By Mr. Li Fei; Technical Director, Beijing EasySky Technology Ltd. Question and Answer
15:30 – 15:50	*Refreshment Break*

DAY 2 – 23 November 2018 (Friday) cont.	
Agenda Item 6	
15:50 – 17:00	**Cyber Threats and Mitigation Measures for ATM Automation Systems** **Moderator: Mr. Richard Wu JP;** *Assistant Director-General, Hong Kong Civil Aviation Department, Chairperson of CNS Sub-Group* • SP601 – Cyber Security risks and control of ATM Automation System Regarding Interconnection Environment By Mr. Gong Xin Yu; *Engineer, Air Traffic Management Bureau, CAAC* • SP602 – Aircraft Address Issue By Mr. Zhang Shuo; *Engineer, Air Traffic Management Bureau, CAAC* • SP603 – Risk-Based Assessment and Enhancement on Management of Cyber Security Threats for ATM Automation System By Mr. He Liang; *Engineer, LES Information Technology* Question and Answer
Closing Session	
17:00 – 17:45	**Facilitator: Mr. Li Wen Xin;** *Regional Officer ATM (ATFM-CDM), International Civil Aviation Organization* **Review Outcomes from Symposium and Closing Remarks** • Mr. Luo Yi; *Regional Officer CNS, International Civil Aviation Organization* **Closing Speech** • Mr. Richard Wu JP; *Assistant Director-General, Hong Kong Civil Aviation Department, Chairperson of CNS SG of APANPIRG* • By Ms. Xie Yu Lan; *Chief Engineer, North China Regional Air Traffic Management Bureau, CAAC*
End of Symposium	

Brief Summary of Presentations at ICAO Asia/Pacific Regional ATM Automation System Symposium 22-23 November 2018

Agenda Item 1: Overall System Planning and Design

SP101 – The Role and Scope of ATM Automation System,

By Mr. Luo Yi; Regional Officer CNS; International Civil Aviation Organization

This presenetation covered three major areas, ATMS and ATM Automation, ICAO provisions and transition to future. It firstly recalled the background of automation implementation and evolution since 1960's, then discussed the operational, technical requirements, challenges and efforts in planning and implementation, the expanding and blurred boundary of automaiton functionalities. It also mentioned the possibility for automation of tomorrow to a state when controller's intervention is exception.

It outlined ICAO provisions relevant to automation implementation, and indications for automation system included in APAC regional ANP and Seamless ATM Plan.

It also recommended for Member States to proactively participate in and contribute to ICAO meetings and symposiums, striving for early improvement in operational safety, efficiency, capacity and environmental protection.

SP102 – ATM Automation System Outline in China,

By Mr. Li Xin; Deputy Director, Technical Centre of Air Traffic Management Bureau, CAAC

China provided a briefing on the outline of China ATM Automation system development status and characteristic as well as the challenges and problems,including:

- Characteristics
  - Support for rapid and tremendous growth of air traffic of China
  - Need to synchronize with on-going development and modification of ATC control area, ATC centres and operational requirements
- Deployment Status
  - Various ATM Automation systems in China from a multitude of vendors
- Challenges
  - Capacity growth
  - New technologies
  - Other challengessuch as integratability and security requirements
- Problems
  - Type diversity of different ATM automation systems, system scale, configurations and age of ATM Automation system leading to problems in different aspects, such as information and data exchange; overall system operation and maintenance efficiency

The presentation provided some short term and long term recommendations to address those challenges and problems, including:

- Short Term
  - Enhance software version and requirement management
  - Realize data synchronization between main and backup system
  - Limit upgrade and modification to adopt new functional requirements
- Long Term
  - Adopt top-down approach to develop and deploy next generation ATM Automation system uniformly

SP103 – Standard Terminal Automation Replacement System (STARS) Implementation and Lessons Learned,

By Mr. Braks Etta; Senior Air Traffic Representative, Asia Pacific Air Traffic Organization, System Operations, Federal Aviation Administration

FAA provided a briefing on the STARS Implementation and lessons learned. Examples of lessons learned includes:

- Program Planning
  - Include early end-software evaluations
  - Establish collaborative relationships with labor unions/associations early in the planning phases of the program
  - Have scheduled meetings with stakeholders to discuss possible implementation changes
- Deployment (Site planning)
  - Hold an initial site survey with stakeholders before meeting with the vendor
  - Keep proper documentation of alternatives to inform future design changes
  - Develop disciplined process for deciding when to update baseline design
  - Assess risk when deciding whether to use legacy material or upgrade infrastructure
  - Sites have different culture and coordination practices from each other
- Deployment (logistics)
  - End of life considerations
  - How many parts to buy and when
- Training
  - Ensure that air traffic personnel are trained and prepared to use the system as well as training for on-site maintenance personnel, responsible for support and certification of the system for operational use
  - Provide a concise introduction to the system and various resources to be used while learning the system
  - Documentation and supporting rationale should be provided for all key program decisions

SP 104 – Enhanced Robustness for Provision of ATM Service,

By Mr. Vincent Wong; Senior Electronics Engineer, Hong Kong Civil Aviation Department

In November 2016, Hong Kong China commissioned its new ATM Automation system which has successfully demonstrated its performance in coping with the challenges of peak traffic demands during the holiday and adverse weather seasons. A risk-based approach has been adopted throughout ATM Automation system development, testing/acceptance, system and operations transition, handling of teething issues with good lessons learned. The new system is equipped with multiple layers of system resilience with a Main system and a fully equivalent Fallback system, which enhanced the robustness for provision of ATM services. Hong Kong China also shares the key factors and way forward in future ATM Automation system development with enhanced robustness design. In line with the ICAO APAC Seamless ATM Plan, it is a best practice to have both the Main and Fallback ATM Automation system to have the same functionality, capability and capacity with seamless switchover time, as is the case at Hong Kong China.

Since the Air Navigation Conference held in 2012, ICAO has been developing a global roadmap and performance-based requirements for ATMS under its Global Air Navigation Plan (GANP), with a view to harmonizing functions and operations for interoperable, consistent and predictable ATM service across States and regions. This presentation also shares the experience from Hong Kong China in promoting workshops/user groups for subject matter experts and ATM Automation system suppliers to share their best practice and experience in project management and implementation, past and forthcoming system enhancements, system operations and maintenance.

SP105 – Overall System Design and Implementation of Main/Backup ATM Automation System,

By Mr. Wang Xiao Wei; Engineer, Air Traffic Management Bureau, CAAC

China provided a briefing on overall design and implementation of real-time synchronization operation between main/standby ATM automation system. In China, two systems with similar HMIs are working as main/backup systems on the same site to ensure safety and reliability of ATC services. ATMB of CAAC has released the technical standard for data synchronization and exchange. Synchronization operation between automation systems has been realized at 16 ATC centers so far and will cover a total of 47 ATC centers by 2023. To cope with the discrepancy of the main/backup systems, three features including the HMI operations-based core content, the focusing on the results pattern and the mapping function are introduced in the synchronization design. The synchronization of system tracks/flight data/environment data and the design of corresponding system working mode has significantly simplified the switchover process and minimized the risk for controllers to restore their situational awareness in the event of unexpected system outage. Relevant operational issues and mitigation measures are mentioned in the presentation in preventing simultaneous system failure of both the Main and Fallback system and preventing system parameters in-consistency.

The presentaton also recommends that the ICAO APAC office should organize further research on data synchronization, and provide relevant guidance material to promote and standardize data synchronization in the area. With the experience in the past years, China is willing to contribute.

Agenda Item 2: System Acceptance Tests and Certification Process

SP201 – CNS Equipment Certification and Localization Process in China,

By Mr. Zhang De ; Regulator of CNS Division, Air Traffic Regulation Office, CAAC

China shared its CNS equipment certification system which was started in year 2002. Technical standards for CNS/ATM systems are set in accordance with relevant ICAO document, taking into account local conditions in China. EUROCAE and RTCA standards are also considered as reference. Taking ATC automation system as an example, CAAC has established 3 technical standards successively since 2010, as well as a specific test requirement for ATC automation system FAT, SAT and certification test. The procedures for CNS Equipment certification in China are as follows:

- System design review;
- Factory checking;
- Quality Control System Evaluation;
- System Factory Testing;
- Onsite Stability and Reliability Testing; and
- Pre-operation Testing.

China also introduced the localization process of it's domestic CNS industry including the ATC automation system.

SP202 – Sharing of experience and lessons learned from operational transition to ATM System in Singapore,

By Mr. Kwek Chin Lin; Chief ATC Specialist, Civil Aviation Authority of Singapore

Singapore briefed Symposium on the transition to their new ATM system (LORADS III), which had been putted into operations since October 2013. The project was a major undertaking due to the complex architecture for redundancy requirements and customized user requirements. A brief overview of the LORADS III system was presented to set the stage and it covered the key components and the main features of the new ATM system. This was followed by detailed coverage of the training and transition process including shadow operations, cut-over planning/contingencies, regulatory approval and ended with a summary of some of the lessons learnt for this project.

SP203 – Software Management for ATM Automation System,

By Mr. Ren Sen; Director, Test Evaluation Department of Technical Centre of Air Traffic Management Bureau, CAAC

By Mr. Guo Wei; Engineer, Technical Centre of Air Traffic Management Bureau, CAAC

China briefed the software management for ATM Automation system in CAAC in the following areas:

- Current situation of software management
  - 80 sets of ATM automation system in 44 sites in China regional and branch ATMBs.
  - ATM automation systems were supplied by domestic and international manufacturers with different software versions for operation. Totally,there are 9 manufactures (5 domestic and 4 overseas) with approximately 29 software versions in use.
- Software version management and service architecture
  - A management platform was developed for interconnecting the whole system
  - Dynamic version tracking and sharing information of all sites
- Software management platform and management procedure
- Software testing process

The presentation introduces the test phases and products of the ATC Test and Verification Laboratory.

SP204 – Thailand ATM automation system – Architecture and Acceptance Process,

By Mr. Pattharasit Phankrawee; Air Traffic Engineering Manager, Aeronautical Radio of Thailand Limited

Due to the high growth of the air traffic in BKK FIR, AEROTHAI hads foreseen that the current ATM system could not support the dramatic increase of the air traffic. AEROTHAI then decided to implement the new ATM automation system called Thailand Modernization CNS ATM System (TMCS). This presentation shows the TMCS architecture, level of redundancy, acceptance test and current status of the system.

SP205 – Implementation of ATM Automation Systems in Indonesia,

By Mr. Herdianto; ATS System Specialist, AirNav Indonesia

Indonesia gave a presentation which highlighted the current features and achievement of their ATM Automation system. It briefed Symposium on the Indonesia Modernization of Air Navigation Services (IMANS) Program with an aim to achieve the highest level of aviation safety, increase system capacity, and enhance operational efficiency. One of the strategies was implementing advanced ATM and ATFM systems and supporting infrastructure.

SP206 – Transition of Shanghai ATM Automation System,

By Ms. Chen Wen Xiu; Deputy Director, Technical Support Centre of East China Regional Air Traffic Management Bureau, CAAC

This presentation introduces some of the challenges, difficulty, complexity and experience in the online transition of ATM automation system of Shanghai ACC, which is the busiest area control center in China.

There were 12 partitions in Shanghai ATM automation system located in 5 different sites. The transition of Shanghai ATM Automation system included the implementation of a totally new software baseline on a system with some new hardware and some old hardware. The transition needed to be done in the same place on operational environment over one night. At the same time more than 10 related systems and departments were involved in the transition, which made the transition more difficult and risky.

On 2 June 2015, the transition was completed on the operational system successfully without interrupting the normal operation. Detailed procedures were made to ensure every step was correct, standard phrases were defined to let all related parties have clear understanding of each step, which was proven to be efficient. All procedures were optimized to save the transition time. The experience introduced is proven to be effective and will be helpful to similar large scale ATM automation system transition.

Agenda Item 3: HMI Adaptation, Real-time Flight Data/Status Synchronization and Major Operational Enhancements

SP301 – Data Exchange Technology of ATM Automation System,

By Ms. Zhu Xiu Ying; Senior R&D Engineer, Chengdu Civil Aviation Air Traffic Control Science & Technology Co., Ltd

This presentation describes data exchange solutions among systems in air traffic management, including the transfer standards, protocols, etc. Also it describes details of data types that need to be transferred between ATC automation system and other systemsas well as how the data is transferred with some applications included in the presentation.

SP302 – "Fitness" – Analysis of Main Functions for ATM Automation System,

By Mr. Wang Yu; Senior Engineer, Air Traffic Management Bureau, CAAC

The presentation mainly introduces the functional evolution of China's ATM automation system, definition and analysis of core functions of ATC automation system, and some suggestions. ATC automation system has developed greatly in past two decades in China. System complexity, high business cost and extensive deployment time are three main problems encountered by ATMB.

By using CAAC definition of core function of ATC system, the analysis shows that more than three quarters of demands are related to core functions in NESACC (Northern, Eastern and Southern Area Control Centres) program, but for other sites the ratio is relatively lower, and some requirements have weak relations with ATC service. Also, the module failures statistics shows the software modules that are frequently modified have more failures.

It puts forward two suggestions, one is to carry out software requirement engineering to evaluate requirements, and the other is to migrate non-core functions to external systems. CAAC ATMB migrated some non-core functions from ATC system, such as ADS-B pre-processing, FPL editing and distribution and etc. CAAC ATMB is preparing some trails on centralized allocation of SSR code. At the end, the presentation concludes that the system ATC system should keep "fitness" for safe and reliable operation.

SP303 – Enhancing Air Navigation Safety and Efficiency in Hong Kong FIR Through Implementation of ADS-B,

By Mr. Charles Leung; Senior Electronics Engineer, Hong Kong Civil Aviation Department

This presentation shares Hong Kong China's experience in enhancing air navigation safety and efficiency in Hong Kong Flight Information Region (HKFIR). This has been achieved by a phased approach for gradual implementation of ADS-B within HKFIR to ensure safe and smooth integration of ADS-B into Air Traffic Management System (ATMS) supported by a risk-based and evident-based safety assessment process in meeting the operational needs and combating limitations of traditional radar technology.

SP304 – Major Operational Enhancement in ATM Automation System,

By Mr. Puneet Gupta; Joint General Manager (ATM), Airports Authority of India

With the evolvement of ATM Automation system capabilities, the complexity behind the HMI Adaptation has also multiplied. Human Machine Interface is the face of the Automation System. What lies behind is secondary. Suitable configuration of the complex automation features and system parameters ensures smooth blend-in of the system with the local regulations and environment. This requires in-depth knowledge of operating procedures, controller's behaviors and the prevailing regulations. Without such provisions, even sophisticated and feature ridden automation system are likely to fail its objectives. The key objective to be borne in mind while configuring the HMI adaptation in Indian Environment and the challenges faced are discussed in the presentation.

Most of the ATM automation systems are connected to a network of systems all working in unison. Multiple users work on different phases of the same information based on their roles and responsibilities. Information status change needs to be displayed to all users simultaneously to keep them updated. For Eg an Approach Controller should be aware as soon the aircraft has landed. An update of SSR code or level change needs to be updated to all concerned users. An update of Flight estimate should be available to all Enroute controllers and so on. In Aviation, real data sync means Safety and Efficiency. Therefore, all automation systems and their connectivity strive to achieve the same.

All ATM Automation system have their limitation. To cater to some operational requirements, additional enhancements are required. In India, additional systems are maintained to cater to local procedures such as security clearance etc. These systems run parallel with shared information. There are additional systems such as CATFM, AFTN Network, DCL, ACDM, AMAN/DMAN which are later integrated as and when the requirement arises. The integration of these systems with core Automation system is equally important and requires similar efforts as in case of HMI adaptation.

SP305 – The Value and Importance of the Real-time Data Output from ATM Automation System,

By Mr. Zhang Ti; Manager, ATFM Liaison, Safety and Flight Operations, IATA

IATA gave a presentation outlining the below content:

1) the content from ICAO9854 regarding the seven operational concepts of the ATM, including ATMSDM/AUO/CM/TS/AO/DCB/AOM to show the importance of the ATM real-time data output;
2) suggest implementing the ATM real-time data output including flight plan data, CDM data and airspace data, meanwhile introduce some actual cases of the IATA China liaison desk dealt in the daily operation to emphasis the importance of the ATM real-time data output;
3) introduce the relevant content of NARAHG/7 meeting regarding the seamless/cross border operation;
4) fully understood the aim of the ATM real-time data output is hard to achieve and willing to assist ICAO and CAAC in the future from the IATA side, and also thanked for the long-time efforts of ICAO and CAAC.

SP306 – Data Collection and Distribution of ATM Automation System,

By Mr. Wang Xin Rong; Engineer, Air Traffic Management Bureau, CAAC

China indicated that many departments and systems need the data from automation system to improve their business. So automation system have to be accommodatediverse requirements.

On the other hand, automation system only have limited interfaces. How to assign these interfaces to multiple clients is a complex and difficult problem that must be solved.

In the aspect of data reuse, these real data of automation system is valuable for further data mining.

The presentation introduces a data collection and distribution system developed in Shanghai, which can collect system tracks, flight plans, alerts information, sectors assignment information and system logs from main/backup automation system, and stored all the data in RAID separately by their types. After that, such data is extracted according to clients' requirements and then distribute to them.

The system will be expanded to become a data center of ATM automation system and supply unified interface for data output. For Controllers, the system could give some suggestions about optimizing the design of routes and sectors according to the historical flight data. And for maintenance department, the system could supply system health report according to system logs and give some suggestions about system maintenance and future project plan.

Agenda Item 4: Future Enabling ASBU Functional Modules for ICAO GANP

4.1 Integration with ATFM and CDM Capability

SP401 – Flow Management in APAC region,

By Mr. Li Wen Xin; Regional Officer ATM (ATFM-CDM), International Civil Aviation Organization

ATFM/CDM is one of the priorities in APAC ATM development, as stipulated in the APAC Seamless ATM Plan. ICAO has developed APAC Framework for Collaborative ATFM and the APAC ATFM Operational Concept as guidance materials to ensure the interoperability of the ATFM/CDM in the region

Two sub regional ATFM projects are undergoing. The Distributed Multi-Nodal ATFM Operational Trial Project, engaged by 11 ANSPs and 35+ airports, and the Northeast Asia Regional ATFM Harmonization Group Project jointly implemented by China, Japan and ROK.

The ATFM harmonization is one of the major tasks in ICAO APAC RSO, which organizes the ATFM Information Requirement Small Working Group meetings to facilitate the operational and technical discussions for identifying the necessitate data elements in cross-border ATFM information exchange, and to develop the ATFM harmonization plans.

Regional ATFM development is an ongoing process, with certain number of items deemed to require further research and development, including the ATFM system-to-system interface control document, the FIXM extension, the interoperability of ATFM, AMAN/DMAN and A-CDM system, network level CDM process and the Collaborative Trajectory Options.

SP402 – Imminent changes of ATM Automation System based on 4D & TBO,

By Zhang Han Wen; Senior Software Engineer, LES Information Technology, China

This presentation introduces the concept of Trajectory based Operation (TBO), which combines advanced Flight Management Systems (FMS) with ground automation systems to manage aircraft position and timing. With latest and enabling surveillance and air-ground communication technologies such as Mode-S radar, ADS-B/C, CPDLC and exchange of flight data, CDM, MET information, etc., there are benefits of:

- Improved accuracy in 4-D positional tracking and prediction;
- Enhanced performance in safety nets;
- Enhanced Separation control, increased airspace capacity;
- Enhanced accuracy in AMAN and ETA; and
- Reduced ATC workload;

which would contribute to greater safety in air traffic, efficiency in airspace utilization, airflow traffic flow control and efficiency in operation on ground and in air.

This paper also provides a block diagram of such a TBO-capable ATM automation system with auxiliary systems incorporating the above-mentioned technologies for the Symposium's reference.

SP403 – Thailand ATM automation System – External System Integration,

By Mr. Chanyut Phrukkumwong; Air Traffic Engineering Manager, Aeronautical Radio of Thailand Limited

Normal operation of Thailand ATM Automation system rides on the normal operation of all its interfaces with external systems. Up to 15 interfaces for current and planned operations have been defined. They are interfaces from/to communication systems, navigation systems, surveillance systems flight plan data servers, ATFM, adjacent ACC's ATM automation system via AIDC protocol, etc. Almost all of the interfaces have been tested and ready for the operation. The interface that has been planned to be available to support future ASBU is for module ACDM and the system is called iFIMS(Integrated Flight Information Management System).

SP404 – Application of Space-based ADS-B to ATM and ATFM,

By Mr. Greg Dunstone; Engineer, ICCAIA

Space based ADS-B will become operational in early 2019, providing quality ATC surveillance data as a service across the whole globe. It can be easily integrated into ATC automation systems. This data service can :

- allow ATC radar like separation standards or support the new Oceanic standards;
- provide Surveillance where there is none at present;
- backup and improve existing surveillance systems, independent of weather and natural disasters; and
- allow the avoidance of terrestrial surveillance costs.

In addition, it could support use of surveillance well outside individual FIRs to support long range flow management determination of estimates before adjacent FIR advice/coordination is received.

It is recommended that as appropriate, States to consider :

- the need to support Space based ADS-B in any ATC acquisition or upgrade;
- the potential of Space based ADS-B to provide backup surveillance and to avoid extra terrestrial surveillance costs; and
- the potential for worldwide ADEP to ADES Surveillance, to support long range flow management.

SP405 – Air Traffic Flow Sequencer in China (AMAN,DMAN,XMAN),

By Mr.Arthur Lebeau; ATC Systems Architect & Design Authority,Thales Australia

The presentation gives answers to the following questions:

- What are the objectives of an arrival manager (AMAN), a departure manager (DMAN)?
- Where are MAESTRO AMAN and DMAN being deployed in China?

and also gives the status of experimentations to address complex multi-systems collaboration to improve the efficiency of arrival management. Extending the flow sequencing support cross-borders with concepts such as the SESAR Extended AMAN (E-AMAN).

4.2 Enhanced Surveillance and A-SMGCS Technology

SP406 – A-SMGCS: New Developments and Functionality,

By Mr. Dick Langejan; Sales Director ATM, SAAB

Many A-SMGCS systems have been implemented at airports around the world based on the ICAO A-SMGCS Manual Doc 9830, EUROCONTORL Guidance Material for Level 1 and Level 2 A-SMGCS and EUROCAE MAPS for A-SMGCS, ED-87 as prepared by EUROCAE WG-41.

Earlier in 2018, EUROCONTROL has published a Specification that describes the Services (Surveillance, Airport Safety Support, Routing and Guidance) of an Advanced-Surface Movement Guidance and Control System (A-SMGCS) for the Single European Sky (SES). It provides a Specification for A-SMGCS Services to be implemented at an aerodrome. This Specification supersedes prior EUROCONTROL ASMGCS documentation that referred to Level 1 and 2 material and complements EUROCAE document ED-87 Minimum Aviation System Performance Specification (MASPS) for A-SMGCS.

SAAB is actively contributing to the development of the these new standards and specifications. The SAAB I-ATS product includes the Functionality and Services and is now being implemented in various airports around the world including Changi Airport – Singapore, Taipei Taoyuan Airport – Taipei and New Istanbul Airport – Turkey. In Europe, these new A-SMGCS Functionalities are deployed through the SESAR Pilot Common Project. SAAB is actively working with its European customers to implement these new A-SMGCS Functionalities.

4.3 Integrated, Digital and Remote Tower Technology

SP407 – Integrated Tower System,

By Wan Yuan; Vice General Manager of ATC Division, Anhui Sun Create Electronics Co., Ltd

It is presented from the following perspectives:

- Why?
  - More Information can help controllers to work better, while More Information System with more displays cannot for the attention is distracted.
- What?
  - An integrated system facing the operation flow of controllers, serves the controllers with fewer displays by classifying the data and combing the classified information.
- Difficulties: Interface Level: Non-standard of Standards.
  - Controlling Rules: More Strict than Strict.
- How?
  - Independent XIO management for different interfaces.
  - Flexible HMI to meet kinds of controlling Rules.

SP408 – Need For Standardisation and Guidance Material for Digital Tower and Remote Tower,

By Mr. Charles Leung; Senior Electronics Engineer, Hong Kong Civil Aviation Department

This presentation describes the recent validation trials and implementation worldwide for Remote Tower (RT) (ASBU module B1-RATS) and Digital Tower (DT) to meet individual ATC 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 a pressing need for all stakeholders to adopt a harmonised approach with common standards and guidance materials for application of both DT and RT for upholding safety and service levels

SP409 – Indra Integrated Tower System,

By Mr. Zhang Chi; Technical Manager, INDRA BEIJING

Historically, air traffic controllers in tower must use different systems to access different information they need, and these systems are generally isolated and not well integrated.

By introducing a new product “Indra Integrated Tower System” (iTWR), all information available in tower are integrated and processed in one system, and finally shown to controller in a unique and optimized HMI.

The iTWR system is designed and dedicated to the needs of tower control. It includes a unique situation display for both air targets and ground targets, an electronic flight strip display optimized for tower control, and auxiliary display for metrological, AIS, and other useful information. The iTWR system can process surveillance sensors of SMR, PSR, Mode-S, ADS-B and MLAT, to generate unique system track for both air and ground targets. It can interoperate with TMA automation system to share and exchange flight plans. RIMCAS, AFDAS, CATC, CMAC and other types of alerts are generated based on surveillance and flight data. Advanced taxi route planning and guidance (Follow the Green) function is also integrated when AGL interface is available.

SP410 – Digital Tower : Experience In Sweden,

By Mr. Dick Langejan; Sales Director ATM, SAAB

As the technological pillar of the Single European Sky (SES) to modernise Europe's air traffic management (ATM) system, SESAR, is developing "solutions" (i.e. deliverables including concept definitions, validation results and material supporting implementations) that are now being deployed in Europe. One example is remote tower operations (RTO), the provision of aerodrome ATS, including Air Traffic Control (ATC) and Aerodrome Flight Information Services (AFIS) based on digital ATS data, including presentation of out of the window view on screens and information sharing.

The ICAO ASBU B1-81 cover Remotely Operated Aerodrome Control with the objective to provide safe and cost-effective ATS from a remote facility to one or more aerodromes where dedicated, local ATS are no longer sustainable or cost-effective, but there is a local economic and social benefit from aviation operations.

The amendments to PANS-ATM (Doc 4444) from November 2018 now also includes the use visual surveillance for aerodrome control and makes reference to the European Aviation Safety Agency (EASA) Guidance material on the implementation of the remote tower concept.

EUROCAE has published the first industry standard on the technical aspects of remote aerodrome ATS, ED-240 - Minimum Aviation System Performance Specification (MASPS) for Remote Tower Optical Systems3. ED-240 includes requirements related to the optical system used in remote tower installations. EUROCAE is now working on updating ED-240 to include remote tower target tracking technologies, including assessment of the applicability of MASPS already produced for SMGCS. The updated ED-240 is planned to be published in 2018.

SAAB andSwedish ANSP LFV have actively participated in the development of remote tower operations. LFV is now providing aerodrome ATC using Saab's Digital Tower Solutions at the Airports of Örnsköldsvik (since 2015) and Sundsvall (since 2016). SAAB and LFV have created SDATS to support ANSP's with the introduction of this Digital Tower Technology and Operations. SDATS is now implementing Digital Tower Technology at various airports in Europe, including the busy London-City Airport.

Agenda Item 5: System Interoperability Issues between ATM Automation Systems

SP501 – The AIDC Deployment and Implementation in China,

By Mr. Zhang Wei; Engineer, Air Traffic Management Bureau, CAAC

This presentation providesdetailed AIDC deployment and implementation in China,in five major parts, including introduction, status quo, implementation procedures, case analysis and advanced technology. With the many merits from AIDC function over traditional telephone calls,this presentation illustrates the status quo in China with neighboring countries and domestic adjacent areas in between. Based on experience and trial, the presentation concludes several steps and procedures for implementation with great details for prerequisites. In addition the presentation also uses Beijing-Shanghai and Beijing-Ulaanbaatar AIDC for case analysis. Last, the presentation provides a few glimpses into the advanced techniques to be explored and future development trends.

SP502 – Data Integration in Tower,

By Mr. Chen Xiao Yu; Engineer, Air Traffic Management Bureau, CAAC

ATMB of CAAC focuses on the data integration in tower. It briefly introduces the current status and existing problems in tower, emphasizing the necessity of data integration. This presentation takes the Beijing Daxing International airport project as an example and provides a technical solution for data interaction between A-SMGCS and ATC system. It describes the solution at the aspects of system interface, interaction data type, implementation method and effect, and process examples. Finally, it looks ahead to application and promotion plan.

SP503 – System Interoperability of ATM Automation System,

By Mr. R.R. Bassi; General Manager (CNS), Airports Authority of India

Airports Authority of India is an ANS service Provider in India, have installed 44 ATC Automation Systems at different Airports. The ATC Automation Systems installed at various Airports in India are supplied by M/s Raytheon, M/s Selex and M/s Indra.

AAI intends to share data with different Automation Systems installed in the country with an Objective to enhancing surveillance coverage, effective co-ordination between adjacent ATC centres, to achieve seamless control on Air Traffic Operators and to bring uniformity at HMI level for better operational efficiency.

ATC Automation supplied by different vendors are developed, keeping the country specific requirement and uses different protocols, lacks similar functionalities, which result in incoherent ATC Automation systems.

As on data, operational ATC Automation systems in India is having a provision of generating CAT-62 data stream from ATC Automation System, which can be integrated with other ATC Automation system at other Airportsin India. In addition, AIDC implementation using AFTN Network between ATC Automation systems for better co-ordination and transfer & control of Air Traffic is being implemented in

India. It is realized that there are different challenges for integrating ATC Automation system of different make due to different database structure, data base synchronizations, requirement of strong Telecom infrastructure etc.

India is planning to implement PAN India Automation System to have same software baseline, HMI and CNS/ATM training. This will facilitate adding new sites seamlessly and to achieve objectives of interoperability of ATC Automation System. The different options are being considered by India for implementing PAN India Automation system is covered in the said presentation.

SP504 – Centralized Flight Plan Progress in China,

By Mr. Xiao Ao; Engineer, Air Traffic Management Bureau, CAAC

ATMB of CAAC has indicated that with the rapid development of China's civil aviation industry, the number of flight plans is increasing rapidly with the flight volume. The manual daily processing has brought heavy pressure onto the operating units around the country andis particularly prone toerrors and potential safety problems. Under this circumstance, ATMB has developed the centralized processing of flight plans, which is an important measure for the integration of aviation information. This presentation is mainly divided into three parts,i.e.Research and Development, Main Functions of the System and Application and Benefits and details the difference between the old and the new working modes, the process of reform and development, and the advantages of data for future air traffic control with centralized processing.

SP505 – ATC System Interoperability / SWIM IOP R&D Activity in China,

*By Mr. Li Fei; Technical Director, Beijing EasySky Technology Ltd***.**

The presentation discusses the operational needs that call for the Interoperability solutions between ATC systems in China, and the joint R&D activities between ATMB, Thales and Beijing EasySky Technology (BEST), aiming at improving the ATC system interoperability using the SWIM and Flight Object concept.

Agenda 6: Cyber Threats and Mitigation Measures for ATM Automation Systems

SP601 – Cyber Security risks and control of ATM Automation System Regarding Interconnection Environment,

By Mr. Gong Xin Yu; Engineer, Air Traffic Management Bureau, CAAC

The presentation indicated that interconnections and data exchange between dual automation systems and other ATM systems have been implemented in many ATC centers. While it improves the corporations between different ATM systems and increases efficiency of ATC service, it is accompanied by more potential risks and threats in the interconnection environment which is open and complicated.

China shared experiences in the risk analysis from the four aspects, which are multiple system failures caused by abnormal input data, flight plan processing failure caused by the flight data exchange messages, reduction of system performance under the heavy synchronous data processing, and cyber security in the interconnected environment. In the analysis, China shares some failure cases that happened in the different ATC centers. After analysis, prevention suggestions are given.

.**SP602 – Aircraft Address Issue,**

By Mr. Zhang Shuo; Engineer, Air Traffic Management Bureau, CAAC

This paper presents the concept, source, and benefit of aircraft address. It shows Mode S radar and ADS-B ground station implementation outline and the aircraft equipment mandatory plan in China, and concludes four kinds of failed aircraft identificationin automation system, and provides enhancement suggestion on administration and automation system.

SP603 – Risk-Based Assessment and Enhancement on Management of Cyber Security Threats for ATM Automation System,

By Mr. He Liang; Engineer, LES Information Technology

This presentation indicated that as ATM Automation System develops, more interconnected system accesses, the architectures become less isolated. Increasing connectivity, more access points with networking and increasing public demands for such, etc. raise the cyber security risks of ATM Automation System. The ICAO Doc 9985 ATM Security Manual is relevant. Proactive steps should be taken, including risk mitigation during system planning and design stage; physical, system and human provisions; establishment of governance bodies; provision of cyber security incident escalation and business continuity processes; promotion/education; regular inspections and audits; etc. It is a good practice to consider conducting cyber security audit to the ATM system and operations by a third party. This presentation briefly analyses the risks current ATM Automation System may be susceptible to, and introduces the main risk assessment method and flow via a simple case.

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