ICAO Seminar on ATM Automation System
27 October 2020

Enhanced Robustness for Provision of ATM Service

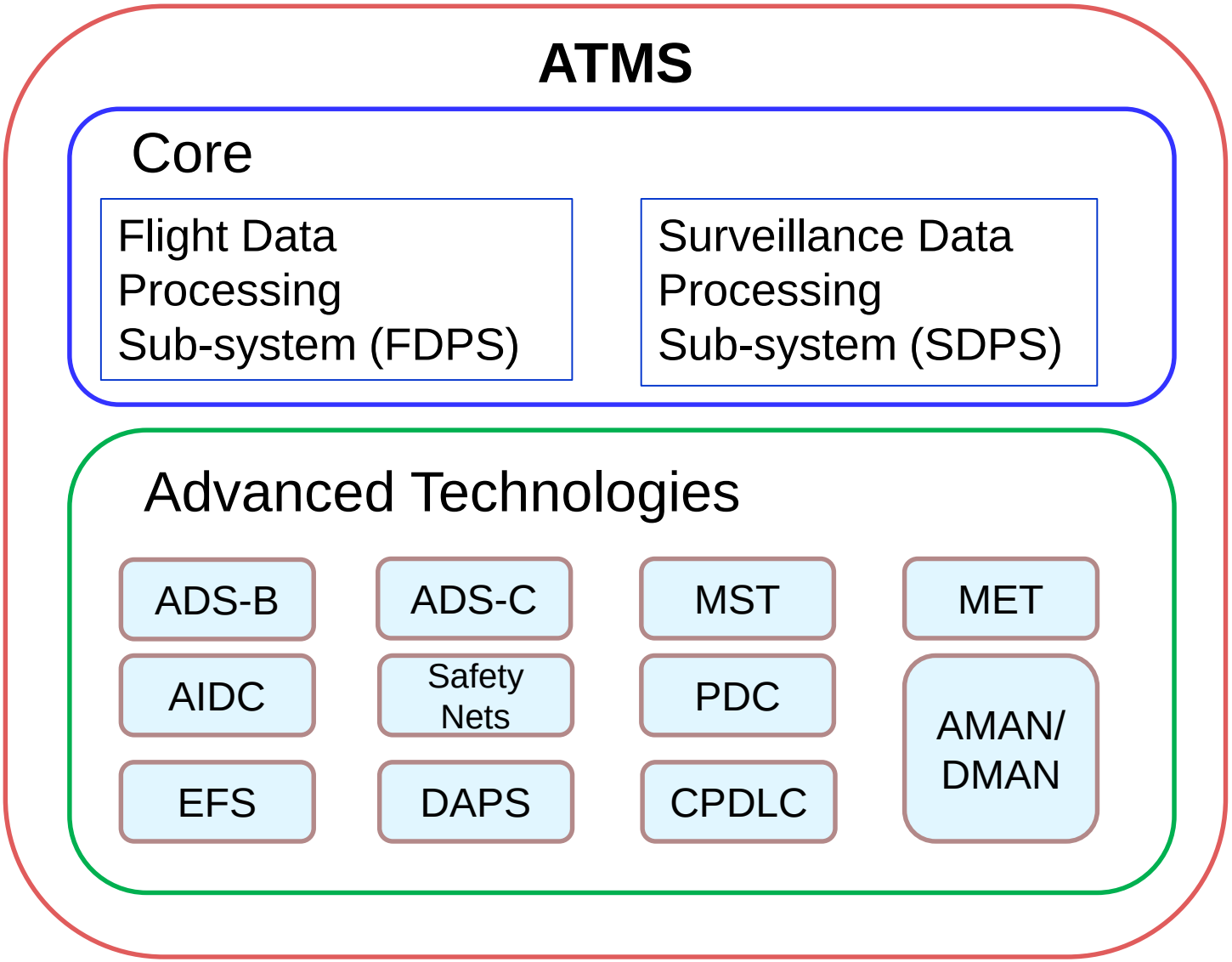
Presented by Hong Kong, China

Air Traffic Management System

- Hong Kong China commissioned Air Traffic Management System (ATMS) in November 2016
- A Risk-based Approach has been adopted:

- In full compliance with
  - Global Air Navigation Plan (GANP)
  - Aviation System Block Upgrades (ASBU)
  - Latest international safety, technical and ATC operation standards

ATMS with High-level of Integration



ATMS in Hong Kong

- ATMS is equipped with the latest aviation technologies:-
  - Enhanced surveillance capability and flight plan handling capacity
  - Advanced automatic safety-net features
  - Precise flight trajectory prediction functions
  - Multi-surveillance tracker for various surveillance technologies
  - Graphical overlay of MET information

- Providing safe, reliable and orderly air traffic services, be it during peak air traffic flow during Christmas, New Year, Easter holidays and under severe weather conditions

Main and Backup ATC Centre/Tower

Main Operation Centre/Tower

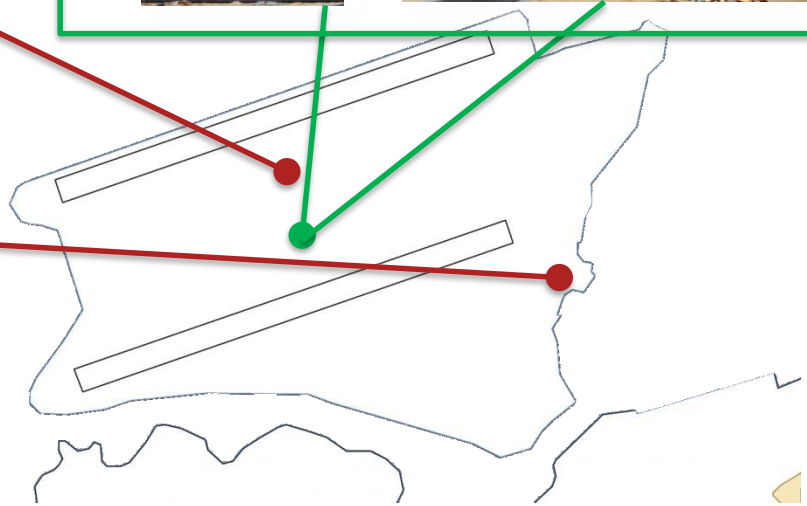
North Tower (N-TWR)

East ATC Centre (E-ATCC)

Backup Operation Centre/Tower

South Tower (S-TWR)

West ATC Centre (W-ATCC)



System Architecture

System 1

System 2

Ultimate Fallback System

Development System

Evaluation & **Training**

Simulator

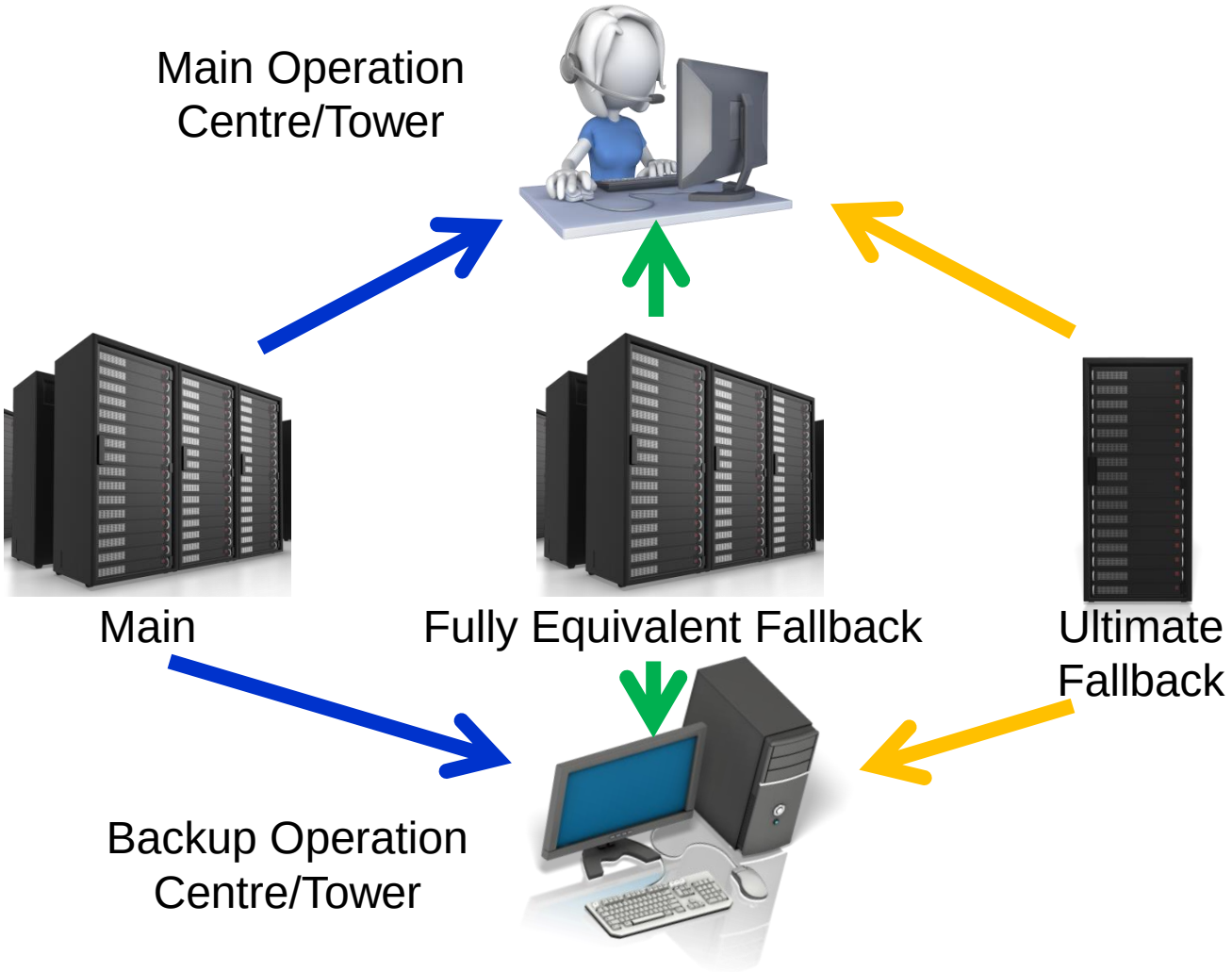
Evaluation & **Training**

CBT

Training

Multiple Layers of System Resilience

- ATMS has multiple layers of fallback



Operation & Maintenance

- Demanding on system resources for large-scale, complex, comprehensive and highly integrated ATM system

- Comprehensive and proactive system maintenance is crucial in maintaining smooth operation.
  - Proactive system housekeeping procedure as per the industry best practice
    - Monitor system healthiness and system resources
    - Proactive reboot/restart/housekeeping of server/workstations on regular basis to keep the system in optimal running conditions
  - the Main and Fallback systems with compatible data sync. Should switch their main and fallback roles for online alternatively on regular basis
  - Training and re-fresher training on system switchover procedure (ATC operation and Maintenance personnel)

Key Factors and Way Forward of Fallback System

Key Factors

- Fallback system should be a separated system

- Fallback system should be available at all times
  - To immediate takes up Main system role for uninterrupted operation

- Main system and Fallback system should be compatible with each other in data synchronisation

Key Factors and Way Forward of Fallback System

Way Forward

To further enhance resilience and mitigate risks for users handling high air traffic demands :-

- Fallback system from different manufacturers with full functions as Main system :-
  - Same functionality, capability and capacity as Main system with seamless switchover time
  - Same automatic safety-net features and performance
  - Data synchronisation compatibility
  - Same multi-surveillance tracker performance

ATMS in Asia Pacific Regions

- ATMS in Asia Pacific Regions
  - Served by more than **10 major** ATMS suppliers

- Interoperability issues among ATMS operated by various ANSPs or by same ANSP
  - Same supplier but different implementation timeframes
  - Different suppliers adopting:
    - ✓ Proprietary Design
    - ✓ Vastly different HMI and Techniques

Global Interoperability and Harmonization

- Global interoperability and harmonization
  - Globally accepted performance-based requirements for ATMS is highly desirable

- Since AN-Conf/12 held in 2012, ICAO has been developing :
  - Global roadmap
  - Performance-based Requirements for ATMS
  - Interoperable, consistent and predictable air traffic management service across States and Regions
  - GANP, 6th Edition

- However, there was no update from AN-Conf/13 in 2018 and no relevant contents in GANP, 6th Edition in 2019

ATMS International Users Group Meeting (2017)

- Nevertheless, in supporting the ICAO initiative, Hong Kong China has spearheaded formation of an International Users Group for ATMS with a view to:
  - sharing operational and technical best practice and experience in project management and implementation,
  - past and forthcoming system enhancements, system operations and maintenance
  - enhancing users' operations and map out future system development roadmap

- Hong Kong China hosted the Autotrac III User Group (AUG) Meeting on 19 – 20 Sep 2017. Subject Matter Experts (SMEs) from Hong Kong China, Dubai, India, United States and ATMS suppliers participated the meeting.

ATMS International Users Group Meeting (2017)

Outcomes :-

- The meeting considered the AUG was an effective forum to share experiences on issues and occurrences encountered with relevant lessons learnt, as well as the enhancement and optimisation to cope with the air traffic growth, future challenges and technological advancement.
- The member considered such information should be shared in regular and timely manner.
- A discussion paper on the outcomes was presented in DGCA/54 which drew the DGCA Action Item 54/13 Paving way for Interoperability of ATMS

ICAO APAC ATM Automation System Symposium (2018)

- The Symposium was organised to address the outcome from DGCA Action Item 54/13.
- The symposium recognized usefulness and importance in organizing the forum to discuss, facilitate and exchange best industry practice/experience among States/ Administrations to keep 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 ANS 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.

ICAO APAC ATM Automation System Symposium (2018)

Outcomes :-

- triggered 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 to benefit the ATM automation system development and implementation.

- suggested States/Administrations to consider establishment of a regional task force under the ICAO CNS Sub-group to deal with regional matters in regard to ATM automation systems.

CNS SG/23 (2019)

Outcomes :-

- Endorsed **Decision CNS SG/23/13 (SURICG/4/5) - Establishment of ATM Automation System Task Force (ATMAS/TF)**
- That, the ATM Automation System Task Force (ATMAS/TF) with TOR provided in **Appendix L** to the Report be established.
- To take forward all matters arising the ATM Automaton System Symposium and to address the regional needs, such as developing regional guidance to facilitate the implementation, enhancements, operation and maintenance of ATM automation systems and services in the Region

Conclusion

The Seminar is invited to :-

1. note the comprehensive and proactive system maintenance in accordance with industry best practices is crucial in maintaining smooth operation of large-scale, complex and highly integrated ATM system.

2. note the ATM Fallback system with same functionality, capability and capacity as Main system with seamless switchover time is key factors for future ATMS development with enhanced robustness design. Fallback system from different manufacturers could be a way forward in future ATM development

Conclusion

The Seminar is invited to :-

3. share:-
   - operational and technical experience, and
   - map out the future system development roadmap, which could be beneficial for the ICAO in respect of development of the global roadmap and performance-based requirements of the ATMS

4. encourage States/Administrations to join the ATM Automation System Seminar and/or Task Force on regular basis to facilitate experience sharing for ensuring ATM system interoperability and harmonization to cope with latest development of GANP / ASBU.

5. seek support from volunteered States/Administrations in making contributions to developing guidance materials for best practices for ATM Automation Systems.

Thank you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• Airworthy • Teamwork
Committed to a Safe, Efficient and Sustainable Air Transport System