

The background of the slide is a photograph of the Jewel Changi Airport control tower in Singapore. The tower is illuminated with blue lights, and its top is lit with a warm yellow light. The sky is a vibrant mix of orange, red, and purple, suggesting a sunset or sunrise. The tower is positioned on the left side of the frame, and the text is overlaid on the right side. There are also some abstract geometric shapes in the background, including a large white star-like shape on the left.

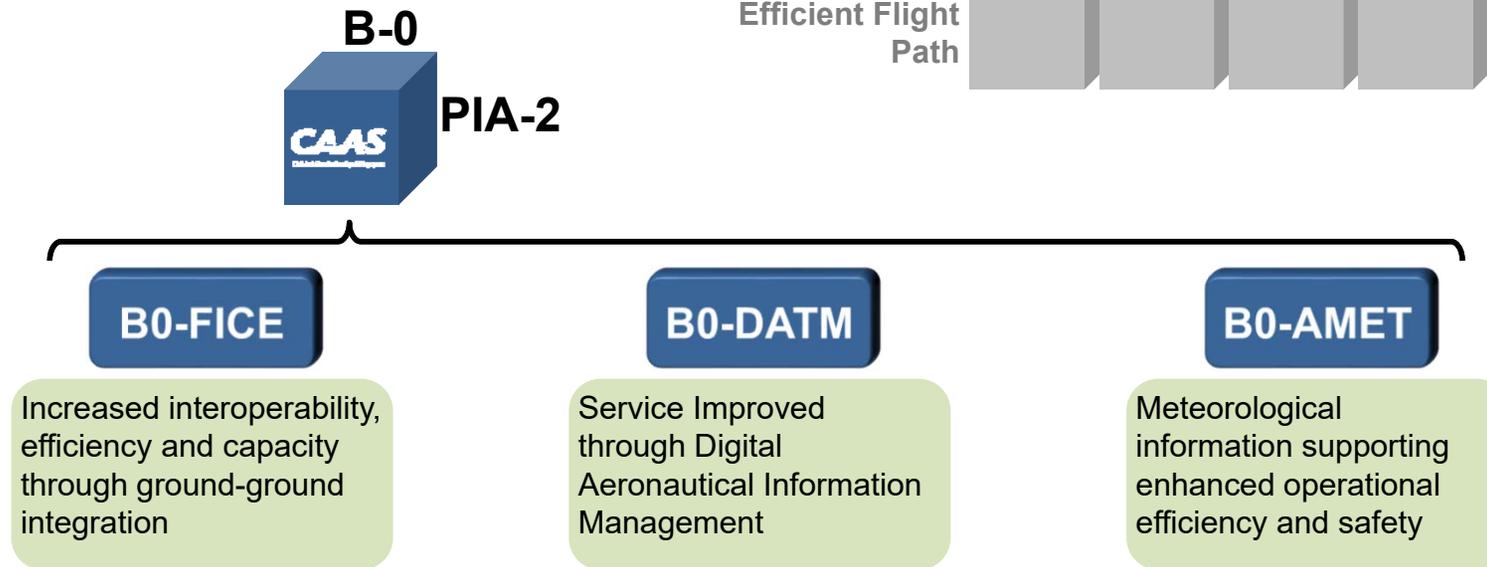
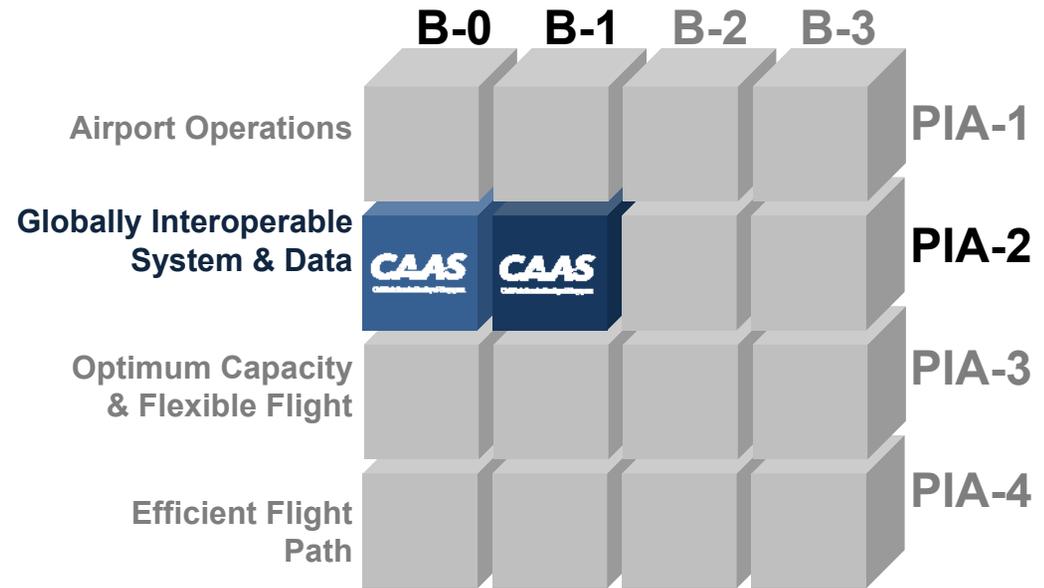
Singapore's Journey to Implement ASBU B-0 & B-1 Modules in PIA-2

Scope

- Introduction
- Strategy for Implementation of ASBU
- AIDC Implementation Plan (B0-FICE)
- AIM-SG (B0-DATM)
- Aeronautical Meteorology (B0-AMET)
- Next Steps for B1-SWIM
 - Mini-Global
 - Multi-Nodal ATFM
 - ASEAN SWIM
- Conclusion

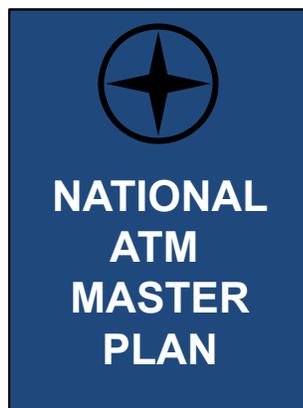
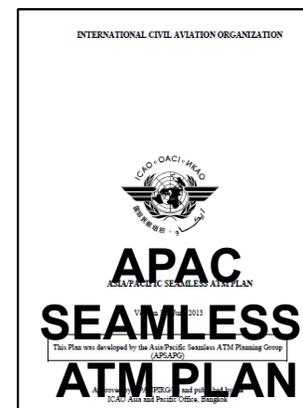
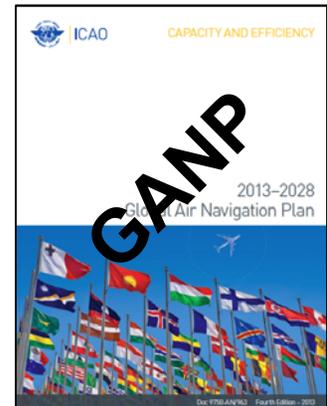
Introduction

- Focus on progress for B-0 in PIA-2
- Challenges to implementation
- Next steps for B-1

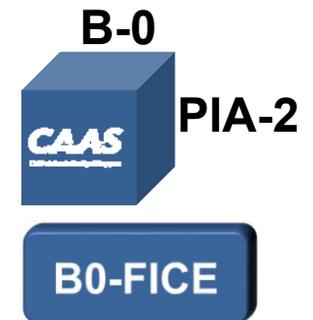


Strategy for Implementation of ASBU

- Develop national ATM masterplan based on
 - Global & Regional strategic documents
 - Implementation guidance documents
 - Other sub-regional planning documents
- Supervisory oversight at organizational level to monitor progress and provide strategic direction



AIDC Implementation in Singapore



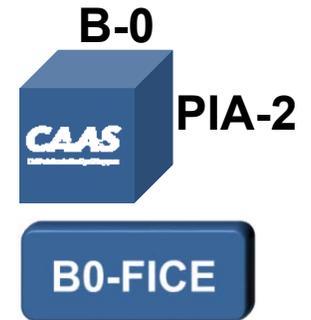
- Third Generation of Singapore ATM System (LORADS-III) introduced AIDC capabilities
 - Version 1 implemented with upgrading to Version 3 in 2016
 - AIDC messages transmitted over AFTN network
 - Phase implementation approach with adjacent ACCs



6 Contiguous boundaries with Area Control Centres

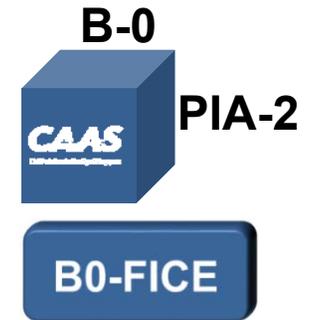
- Bangkok
- Ho Chi Minh
- Jakarta
- Kuala Lumpur
- Kota Kinabalu
- Manila

AIDC Benefits & Issues



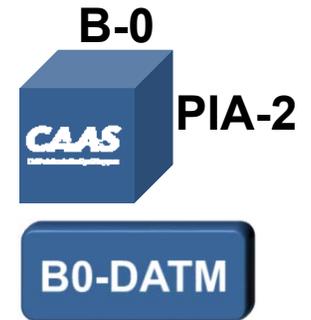
- Benefits
 - Automated transfers reduces controller workload
 - Large Height Deviation (LHD) issues mitigated
 - Weaving of the coordination process into AIDC workflow enhanced the work processes via integrated JHMI display
- Issues observed
 - CRC errors
 - Invalid message referencing
 - ATMS behaviour
 - ICAO DEP messages check
 - Network
 - AFTN message re-routing causing AIDC message timeout
 - Failed ICAO FPL message reception leading to incomplete EST

AIDC Implementation Plan



- Vietnam – Ho Chi Minh ACC
 - Phase 1 implemented on 24 July 2014
 - EST, ACP, LAM, LRM messages
 - Phase 2 trials ongoing with Vietnam in June 2015
 - ABI, TOC, AOC
- Malaysia – Kuala Lumpur ACC
 - Phase 1 target November 2017
 - EST, ACP, REJ, LAM, LRM, AOC, TOC
 - Phase 2 target July 2018
 - ABI, CDN, MAC, PAC messages
- Philippines – Manila ACC
 - Ongoing technical test sessions conducted with Manila ACC's upgraded interim ATM System
 - ABI, EST, ACP, TOC, AOC, LAM, LRM

AIS-AIM Roadmap



SINGAPORE'S AIS AUTOMATION PLAN

Phase 1 (Consolidation)

- ✓ AIRAC Adherence
- ✓ Monitoring of Annex Differences
- ✓ Quality Management System (B0)
- ✓ WGS84 (B0)

✓ **Completed**
● **Completed with on-going review**
 Not completed

- P03 – AIRAC Adherence
- P04 – Monitoring of States Difference to Annex 4 and 15
- P05 – WGS84 Implementation
- P17 – Quality Management System

Phase 2 (Going Digital)

- ✓ Integrated Database (B0)
- ✓ Aerodrome Mapping (B0) Data
- ✓ eTOD (B0)
- ✓ Electronic AIP (B0)
- ✓ Data quality and integrity monitoring

- P01 – Data Quality Monitoring
- P02 – Data Integrity Monitoring
- P06 – Integrated Aeronautical Information Database
- P07 – Unique Identifier
- P08 – Aeronautical Information Conceptual Model
- P11 – Electronic AIP
- P13 – Terrain
- P14 – Obstacles
- P15 – Aerodrome Mapping

Phase 3 (Information Management)

- ✓ Aeronautical information briefing
- ✓ Training
- Agreements with data originators
- Electronic aeronautical charts
- Aeronautical data exchange (B1)
- Communication Network (B1)
- Digital NOTAM

- P09 – Aeronautical Data Exchange
- P10 – Communication Networks
- P12 – Aeronautical Information Briefing
- P16 – Training
- P18 – Agreements with data originators
- P19 – Interoperability with Meteorological Products
- P20 – Electronic Aeronautical Charts
- P14 – Digital NOTAMs

Electronic Terrain & Obstacle Data

B-0
CAAS
PIA-2
B0-DATM

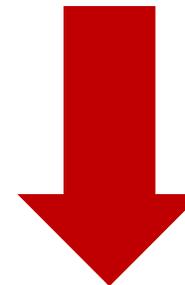


Vision and Goals

VISION
Towards a spatially enabled Singapore

GOALS
Providing a mechanism to make available the interoperable, organised and authoritative geospatial information for:

- National level decision making;
- Public security;
- Cost effective business; and
- Location awareness among citizens.

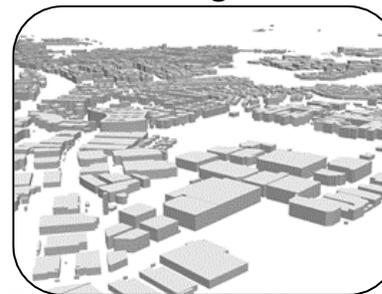


ICAO Annex 15

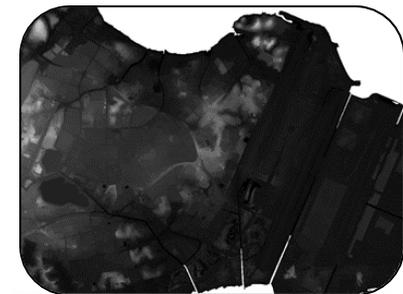
High Resolution Map



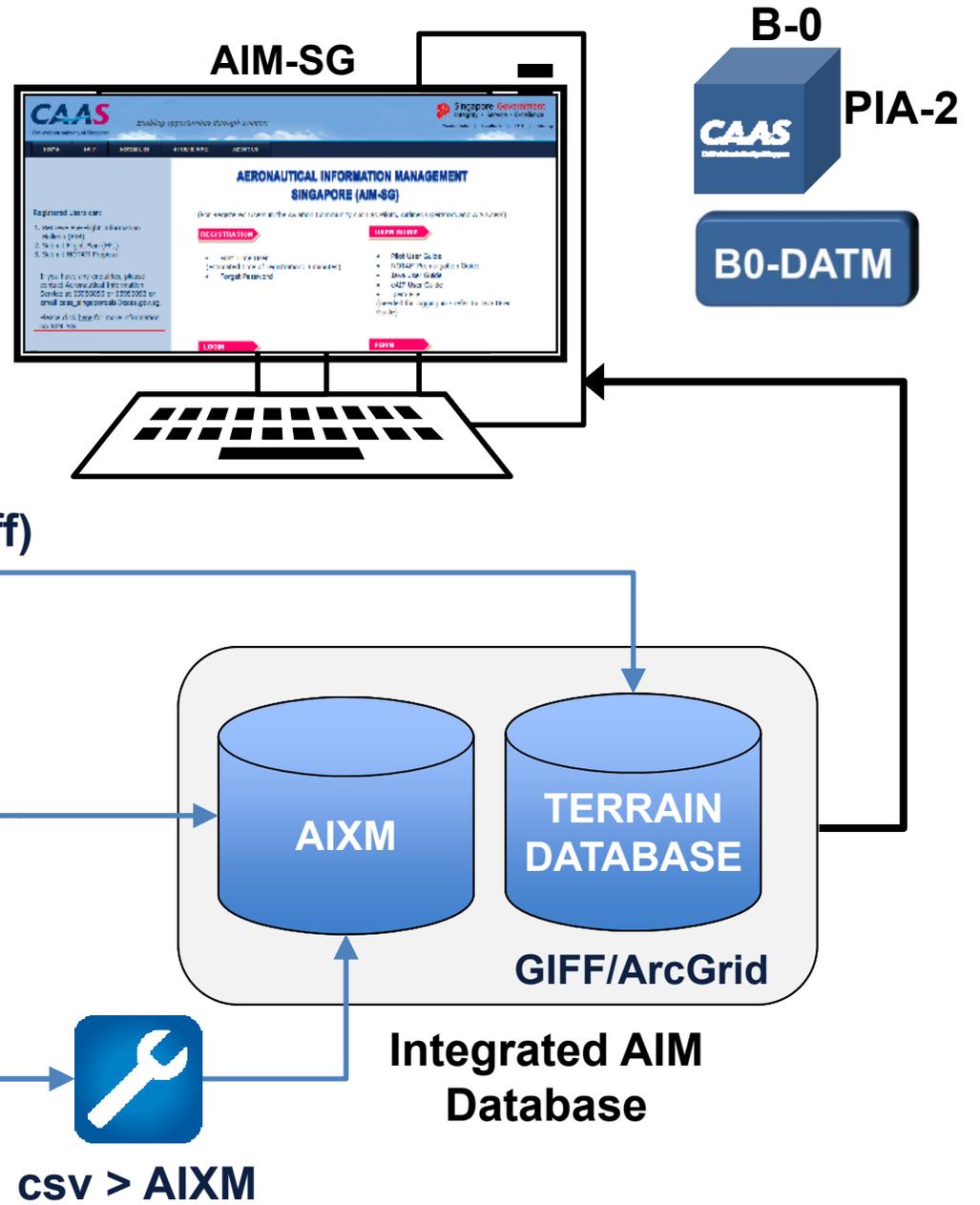
3D Building Model



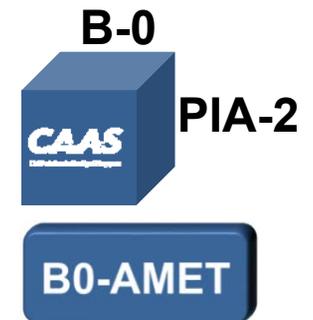
Digital Terrain Model



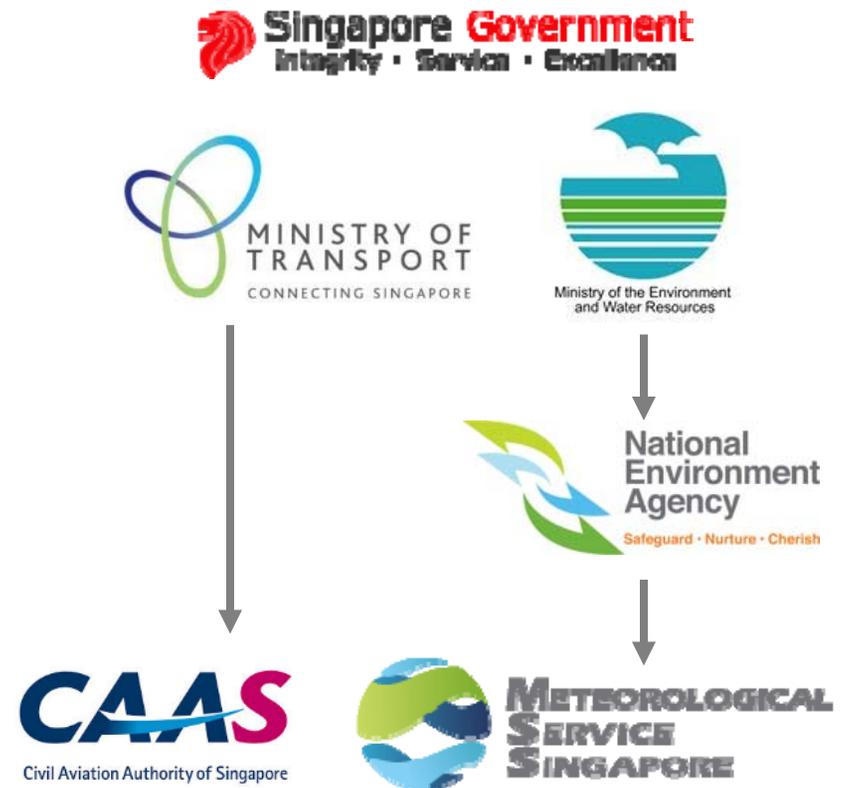
AIM-SG



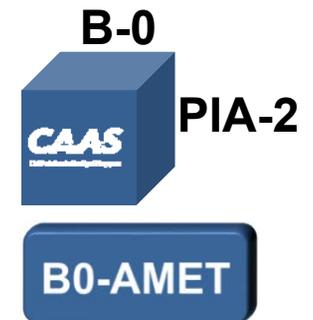
MET-ATM Collaboration in Singapore



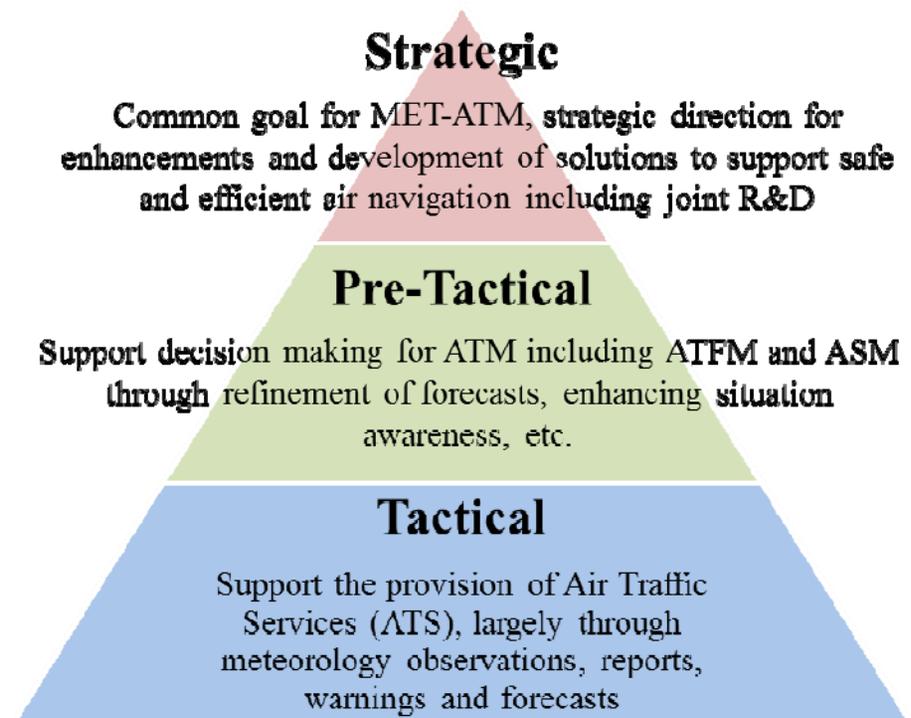
- CAAS; a statutory board under the Ministry of Transport
 - Provides air navigation services including Air Traffic Management over the Singapore Flight Information Region
- MSS; a division of the National Environment Agency under the Ministry of the Environment and Water Resources



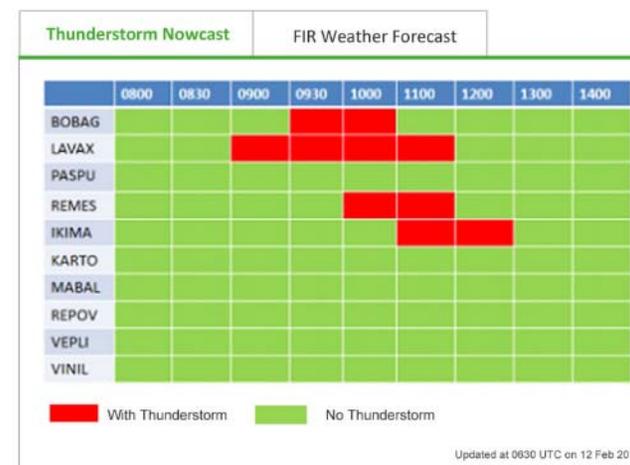
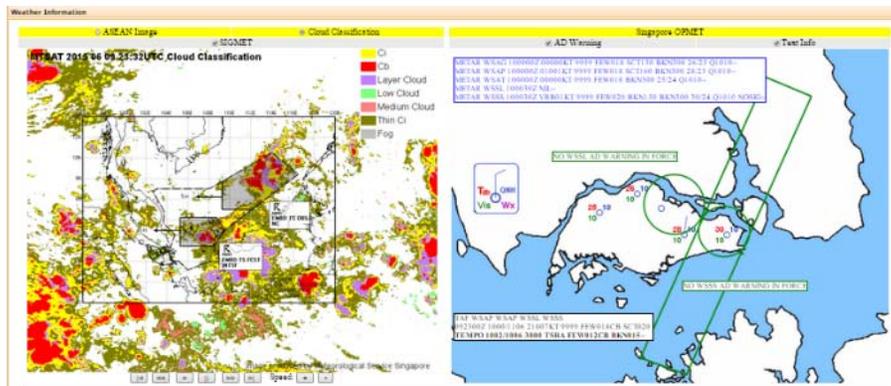
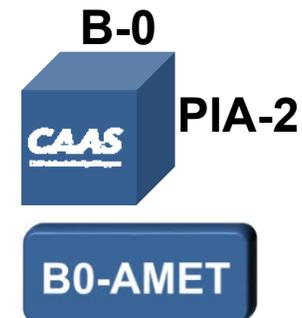
MET-ATM Collaboration Framework



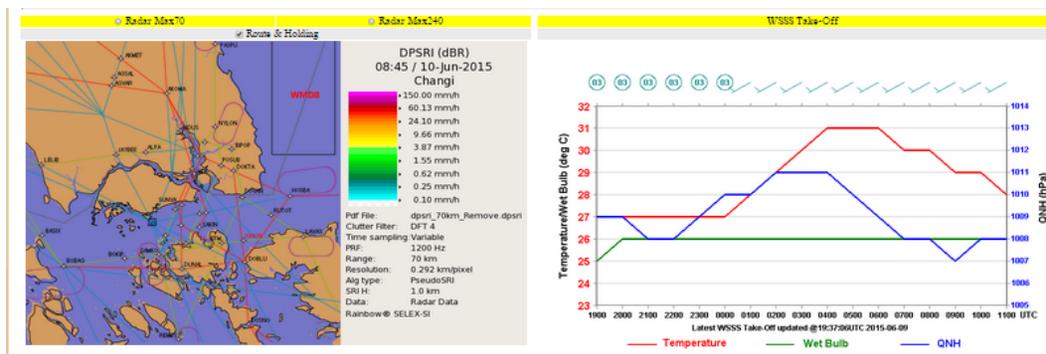
- Joint development of enhancement roadmap to support ASBU implementation
- Knowledge-sharing through regular dialogues and meetings
- Establish service level agreement for provision of MET services



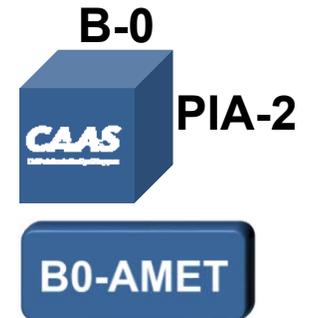
MET Support for ATM Operations



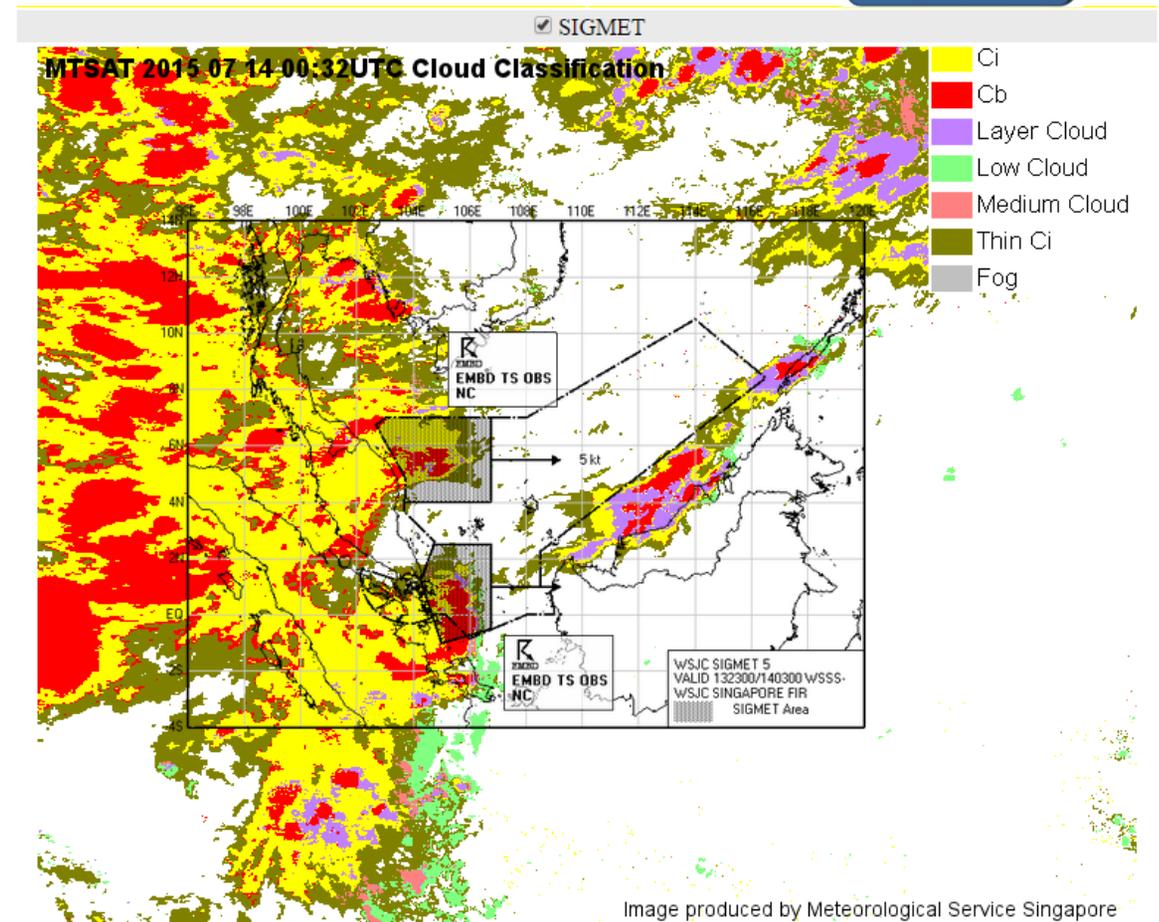
- Regular MET teleconference briefing to air traffic controllers
- Augmented with the visuals from the MSS' web portal
- Improve ATC situational awareness and operational planning
- Provide a feedback platform to MSS to further enhance their product



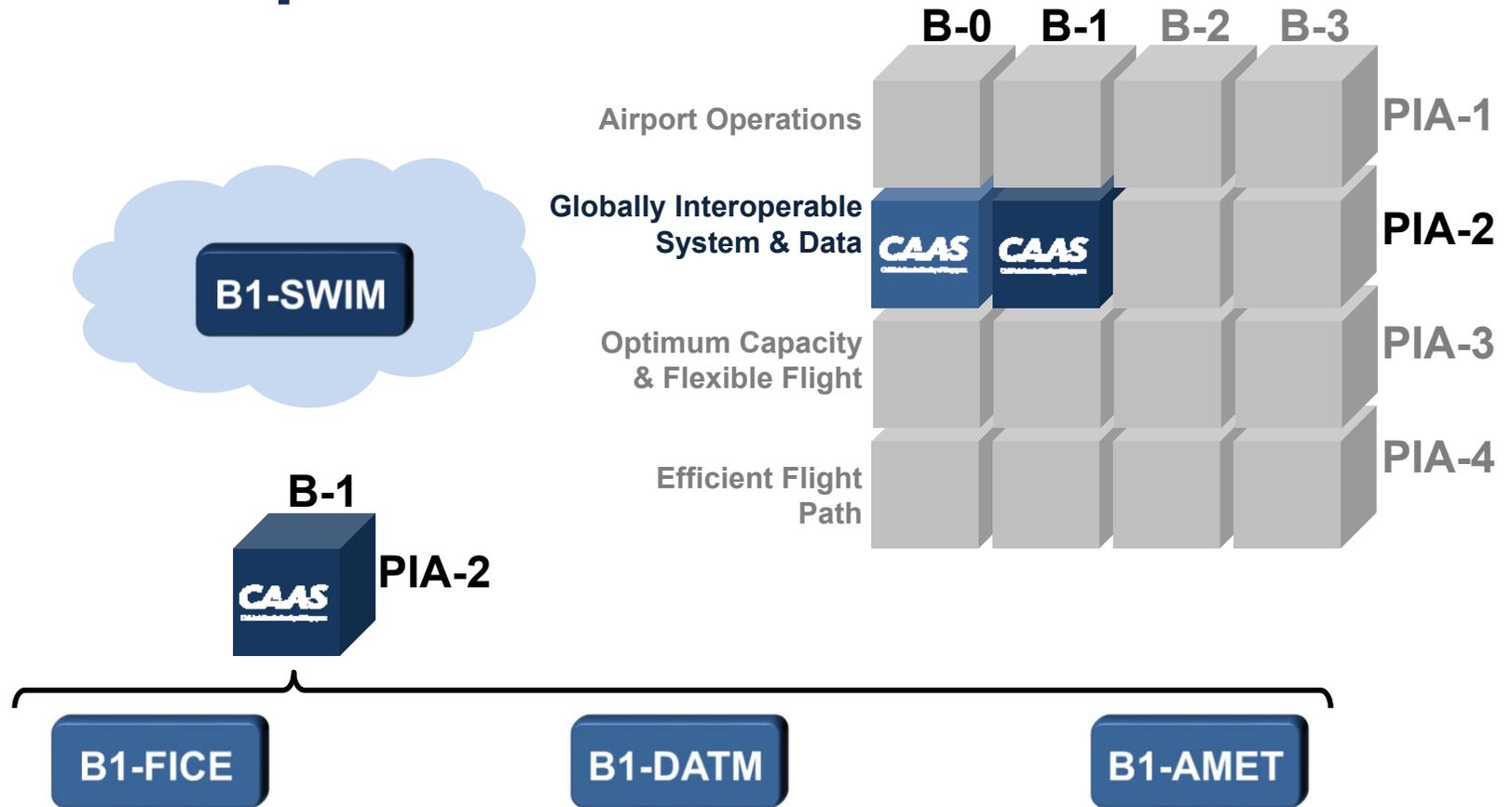
MET-MET Collaboration to Enhance ATM



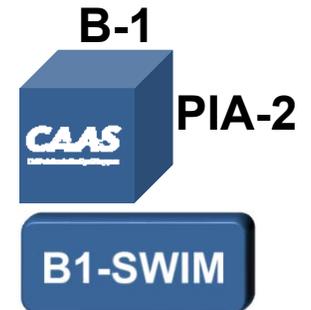
- Information integration not only between ANSPs but also between MET providers
- Harmonisation of cross-border SIGMET
- Enhancement for aviation community



Next Steps for B-1

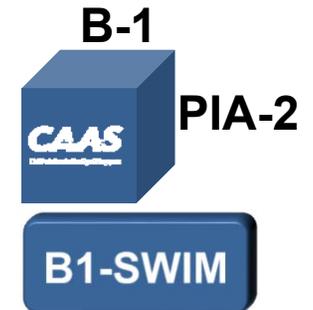


SWIM in Singapore



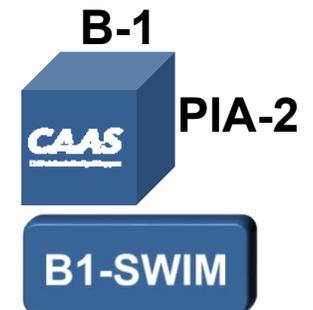
- CAAS is looking to SWIM to provide an information rich environment
 - Support Distributed Multi-nodal ATFM Network
 - Increase situational awareness
 - Increase predictability
 - Data analytics
 - Support FF-ICE and TBO
- CAAS has already implemented a small scale SWIM
 - For the purpose of data analytics
 - Focused on collecting ground tracks from the A-SMGCS and ADS-B
 - No registry as yet due to the small number of services offered.

Singapore's Participation in Mini-Global



- Mini-Global Program is a US-FAA led series of SWIM demonstration
 - A series of 2 demonstrations, Mini-Global I and Mini-Global II
- Singapore participated in both demonstrations
- Mini-Global I
 - Demonstrated the technical feasibility of SWIM
 - Showed how SWIM could be implemented
 - Introduced us to the FIXM, AIXM and WXXM data models
- Mini-Global II
 - Focused on exploring operational scenarios using SWIM
 - How the availability of data can help improve operations
 - Architecture included multiple Enterprise Messaging Service (EMS) providers.

SWIM in ASEAN Demonstration



- Demonstration planning and execution jointly led by CAAS and AEROTHAI with support from the US-FAA and IATA

GOALS

- Lay down fundamental building blocks to pave way for regional SWIM implementation
- Promote cross-border information exchange and demonstrate the value of sharing information
- Facilitate the flow of ATS information from ANSPs to the users (airspace operators)
- Further develop SWIM to support ATM improvements
- Propagate ICAO Information Management Panel (IMP) vision (lessons learnt from the Demo will feed back into the IMP)

DEMONSTRATION PLAN

- Demonstration targeted for June 2019
- Tiered Level Participation
 - Observer only
 - Legacy-format data producer and consumer
 - Native SWIM format data producer and consumer
 - EMS provider and Native SWIM format data producer and consumer

Conclusion

- Development of national plan
 - Take guidance from Global and Regional plans
- Needs and dependency analysis
 - Dependency not only on other modules but also other partners to enable implementation
 - Plan according to the “technology refresh” cycle
- Determine gaps and impact
 - Engagement of partners in multiple platforms
- Implement !
 - Focus on building a strong foundation for the future



Thank you