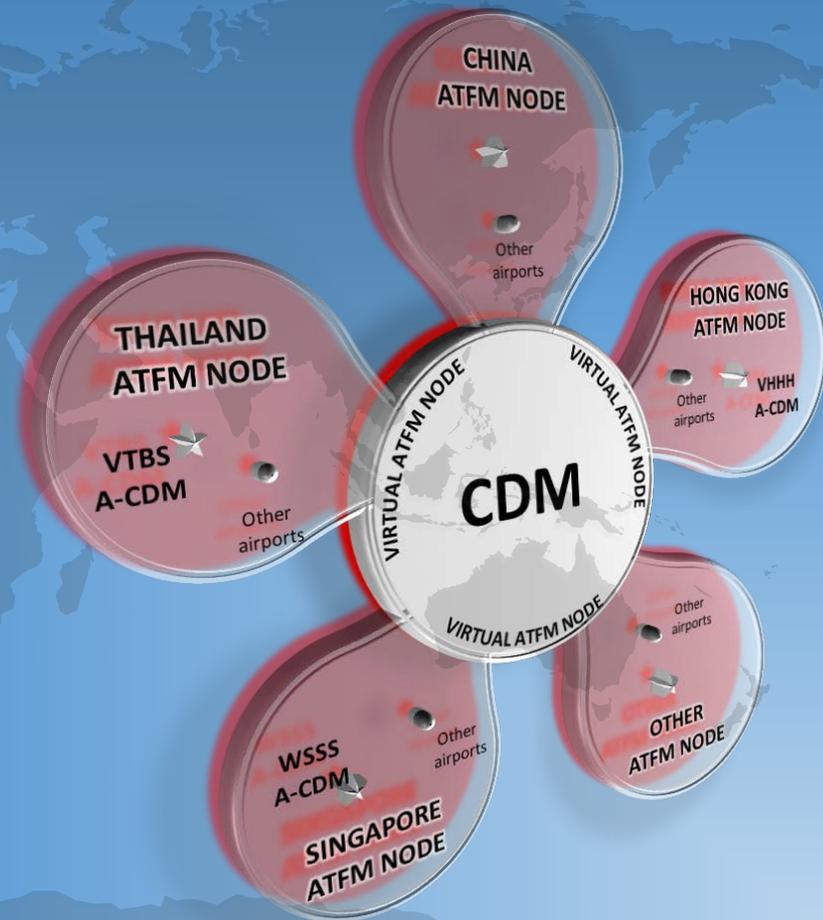
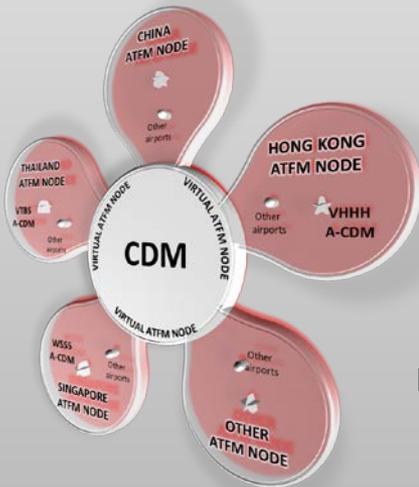


# *Distributed Multi-Nodal ATFM Project Overview & Progress*



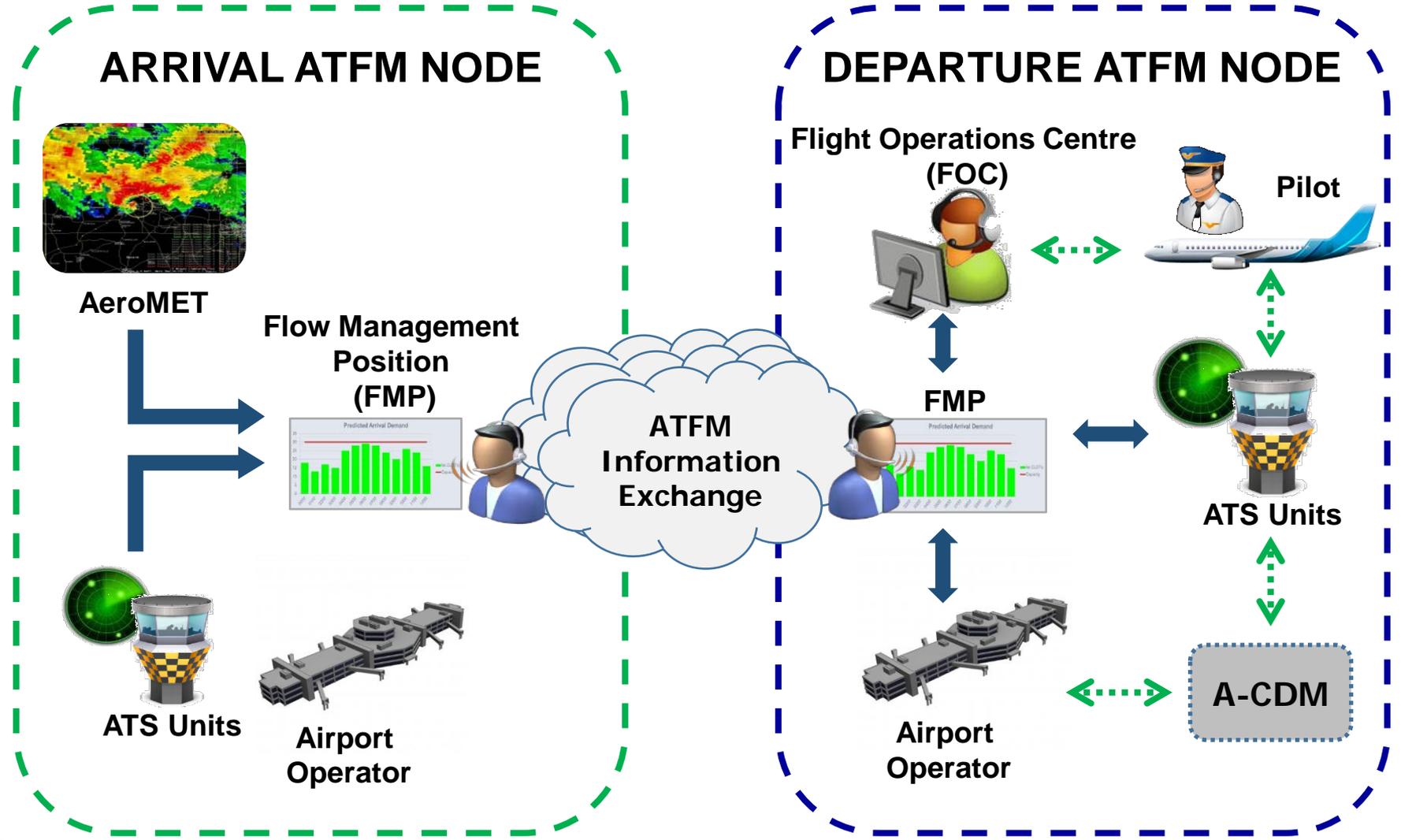
ICAO MID ATFM/TF/1 &  
ICAO World Cup 2022 TF/1  
23 – 27 Sep 2018

# *Introduction*

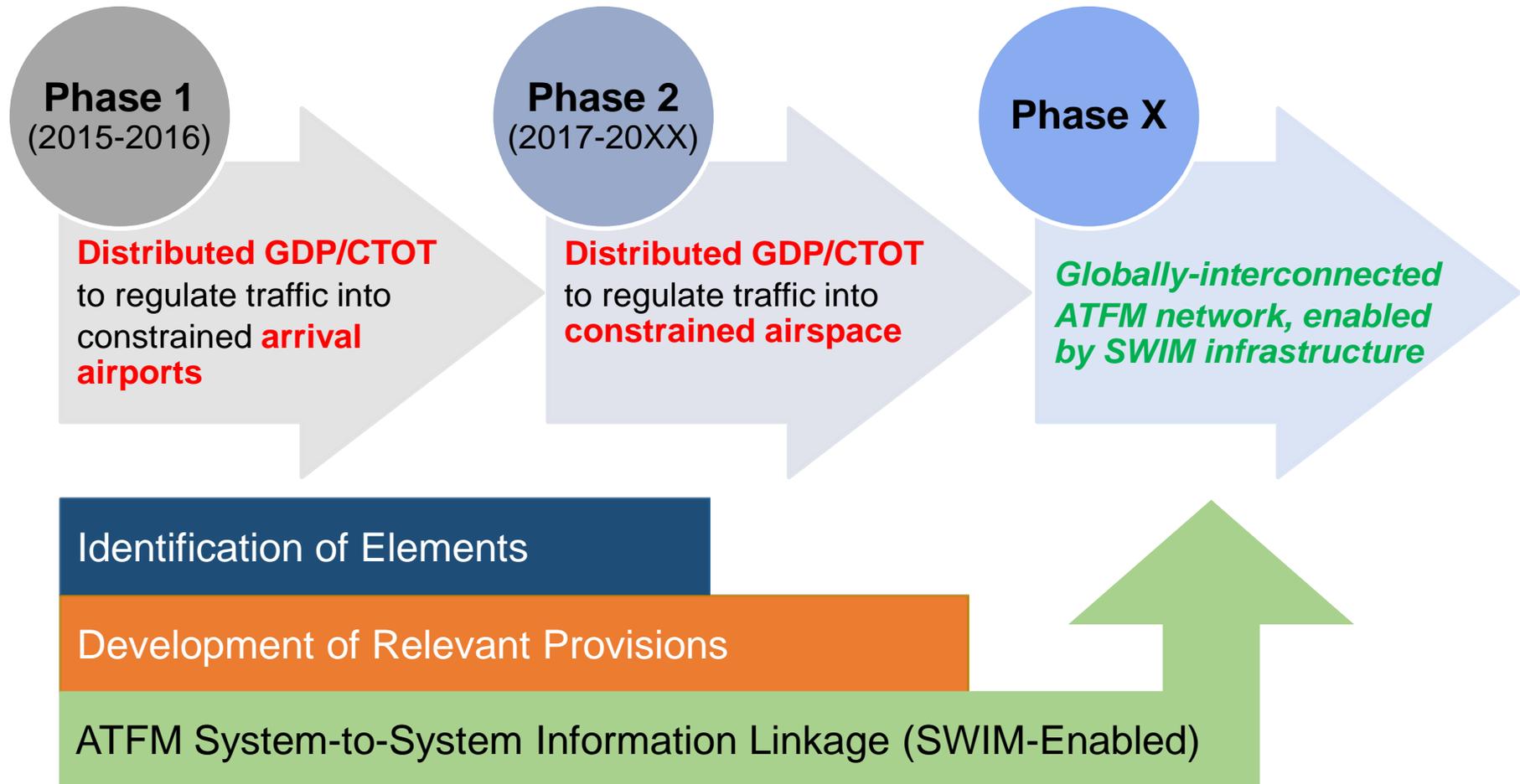


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# What We Are Trying To Do: *Operational Environment*



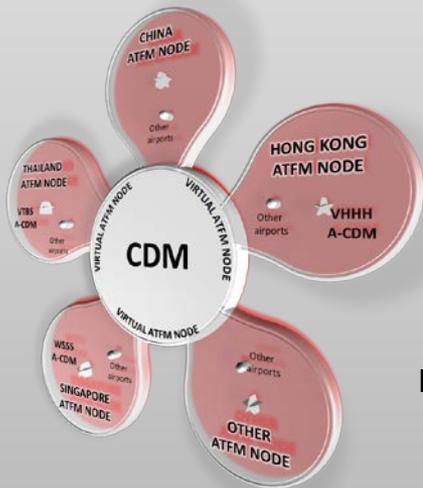
# How We Approach The Project: *Multi-Phase Work*





# *Phase 1*

## *Airport ATFM Programs*



**DISTRIBUTED MULTI-NODAL AIR TRAFFIC FLOW MANAGEMENT**

# Phase 1 Key Objective & Work Plan

**Distributed GDP**  
for  
Constrained / Congested **Arrival Airports**

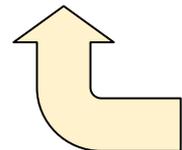
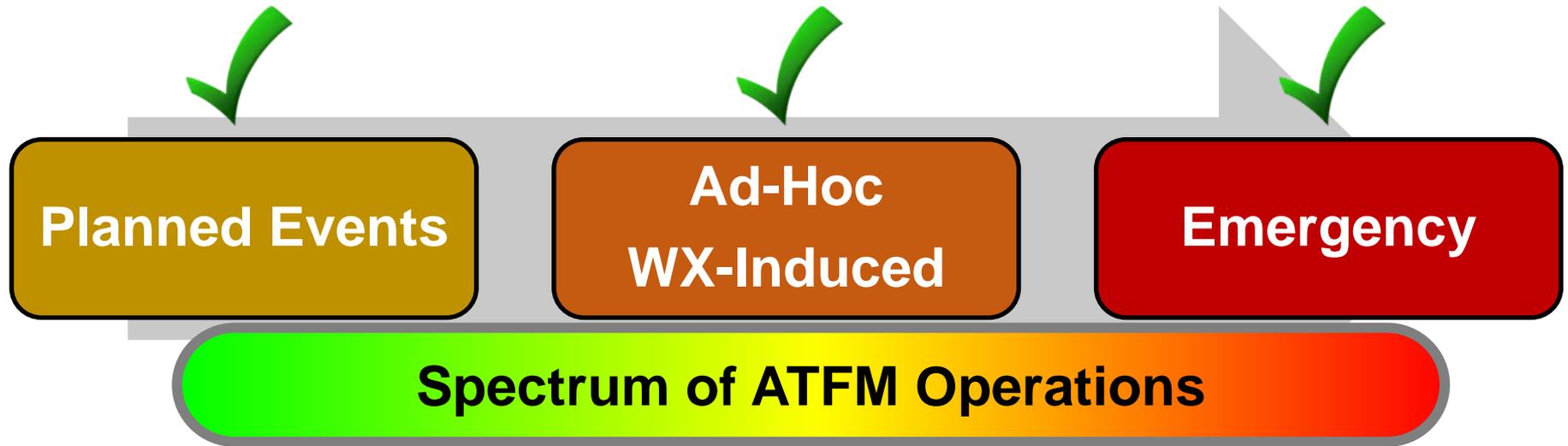
Phase 1 Stage 1	Phase 1 Stage 2	Phase 1 Stage 3
<i>Communication Linkage and Information Exchange Protocol Design</i>	<i>Procedure Development and Demonstration Flights</i>	<i>Progressive implementation effort</i>
ATFM System-to-System Information Linkage		
Stakeholder Engagement		



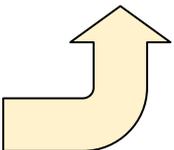
**DISTRIBUTED MULTI-NODAL ATFM NETWORK**



# Key Achievements

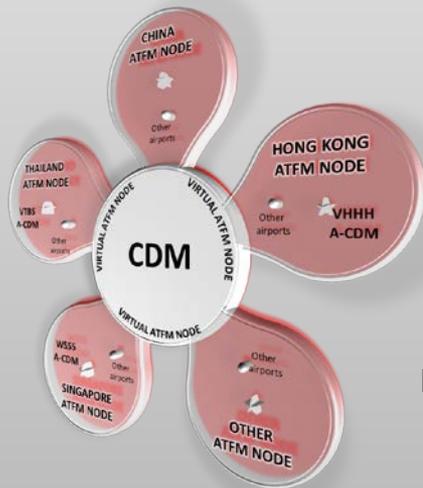


**Validated procedures** for distributed GDP  
**Proven benefits** for constrained airports  
**Increased awareness** for cross-border ATFM  
**Contribution** to APAC States' ATFM readiness



# *Phase 2*

## *Airspace ATFM Programs*



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# Phase 2 Key Objective & Work Plan

**Distributed GDP** (+other measures)  
for  
Constrained / Congested **Airspace Volume**

Phase 2 Stage 1	Phase 2 Stage 2	Phase 2 Stage 3
<i>Airspace Demand-Capacity Assessment Capability</i>	<i>Procedure Development for Single-Constraint DCB</i>	<i>Procedure Development for Multi-Constraint DCB</i>
ATFM System-to-System Information Linkage		
Stakeholder Engagement		

**For recent ATFM programs, refer to <http://tinyurl.com/multi-nodal-16>**



# ATFM System Readiness Status for Phase 2

## GDP System Status

ATFMU	Resource	Status	CTOT Delivery Method
Bangkok (AEROTHAI)	Airport	✓ Operational	✓ E-Mail, Web, AFTN
	Airspace	✓ Waypoint: Operational  ❑ Sector: In Dev	✓ E-Mail, Web, AFTN
Hong Kong (HKCAD)	Airport	❑ In Development	❑ AFTN: Q3 2019 ✓ E-Mail, Web
	Airspace	❑ In Development	❑ AFTN: Q3 2019 ✓ E-Mail, Web



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# ATFM System Readiness Status for Phase 2

## GDP System Status

ATFMU	Resource	Status	CTOT Delivery Method
Sanya (CAAC ATMB)	Airport	✓ Operational	<input checked="" type="checkbox"/> AFTN <input type="checkbox"/> E-Mail, Web (available)
	Airspace	✓ Waypoint: Operational ✓ Sector volume: operational	<input checked="" type="checkbox"/> AFTN <input type="checkbox"/> E-Mail, Web (available)
Singapore (CAAS)	Airport	✓ Operational	<input checked="" type="checkbox"/> E-Mail, Web <input type="checkbox"/> AFTN: 2019
	Airspace	✓ Operational	<input checked="" type="checkbox"/> E-Mail, Web <input type="checkbox"/> AFTN: 2019



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# Forward Airspace ATFM Implementation Plan

## ATS Route MINIT Conversion

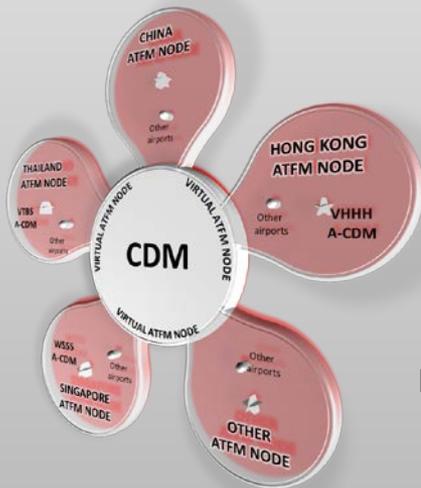
Route	Lead ATFMU	Status
A1	Sanya ATFMU	✓ Ongoing
A202	Sanya ATFMU	✓ Ongoing
A581	Bangkok ATFMU	✓ Ongoing
M771	Singapore ATFMU	✓ Ongoing
<b>DOTMI – A470</b>	Hong Kong ATFMU	❑ Expected: Oct/Nov '18



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# *Key Revisions to Common Operating Procedure*



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# Key Areas of COP Revisions

## Routine CDM Conference

- ✓ Scope of Attendance
  - ATFMUs (+team)
- ✓ Timing
  - Weekly, Thursdays 0800z
- ✓ Topic
  - Outlook of ATM resource issue and possible ATFM programs
- ✓ Commencement
  - Start with Level-3 ANSPs, expand subsequently
  - Start date: **Thursday 20 Sep 2018**



# Key Areas of COP Revisions

## Resolution of Conflicting ATFM Measures

- ✓ Requirement:
  - 1 flight should be subjected to only 1 ATFM measure (1 CTOT)
- ✓ Possible Issue:
  - Conflicting CTOTs given by  $>1$  ATFM nodes
- ✓ Solution
  - Insofar as possible, **conduct CDM conference to resolve** by comparing ATFM delay
  - If CDM conference not possible
    - Departure ATFMU note the conflict and request appropriate exemption



# Key Areas of COP Revisions

## Standard Phrases for CDM Actions

- ✓ Issue:
  - Difficulty in CDM communication between ATFMUs and stakeholders, *sans phraseologies*
- ✓ **Solution:**
  - **Communication guideline**
  - **Sample list of phrases for basic coordination**
- ✓ *To be provided as an Annex to COP*



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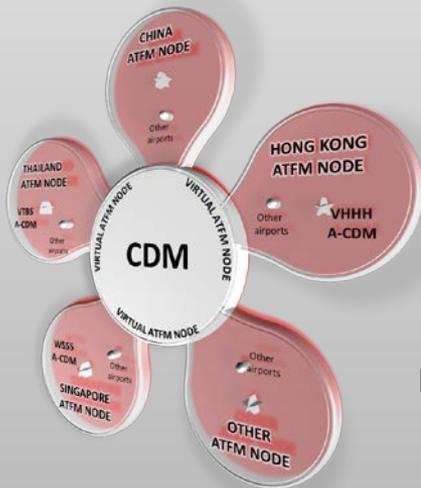
# Key Areas of COP Revisions

## Revised Requirement for Participation Levels

Tiered Participation	Expected Capabilities
Level 3	<ul style="list-style-type: none"><li>• Capable to generate, deliver <b>and</b> receive <b>CTOT</b>.</li><li>• <b>Able to comply with CTOT from all Level 3 ATFM node</b></li></ul>
Level 2	<ul style="list-style-type: none"><li>• Capable to receive and comply with CTOT <b>from all Level 3 ATFM node</b></li></ul>
Level 1	<ul style="list-style-type: none"><li>• Observe and participate in the Trial Progress</li></ul>



# *Key Challenges to the Project*



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# Key Problem Areas from Post-Ops Analysis

## CTOT Compliance

- Lack of compliance remains an issue

## Adherence to Procedure

- Respect of lead time requirement for CTOT revision

## Overall / System Delay for Compliant Flights

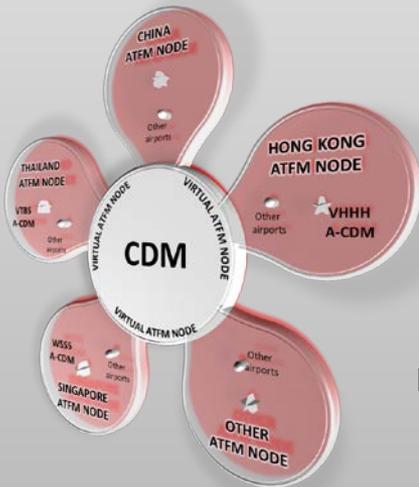
- The struggle with adverse effect from non-compliance flights

## Conflicting ATFM Measures

- Occurrences of “double penalties” due to concurrent ATFM measures and restrictions



# *Technical Work Toward ATFM-on-SWIM*



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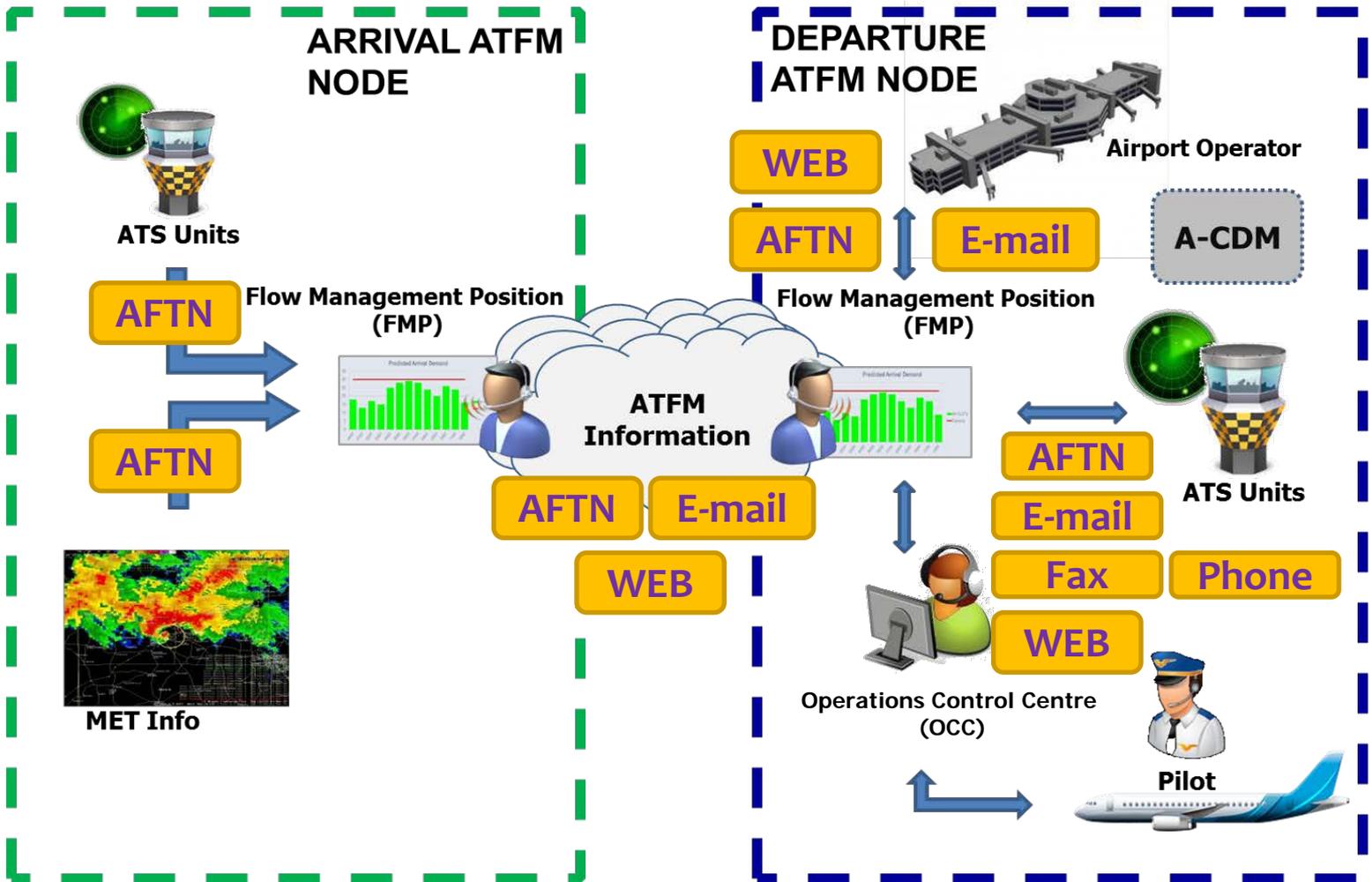
# Multi-Nodal ATFM Communication Today

MET Info

ADP

Flight Info

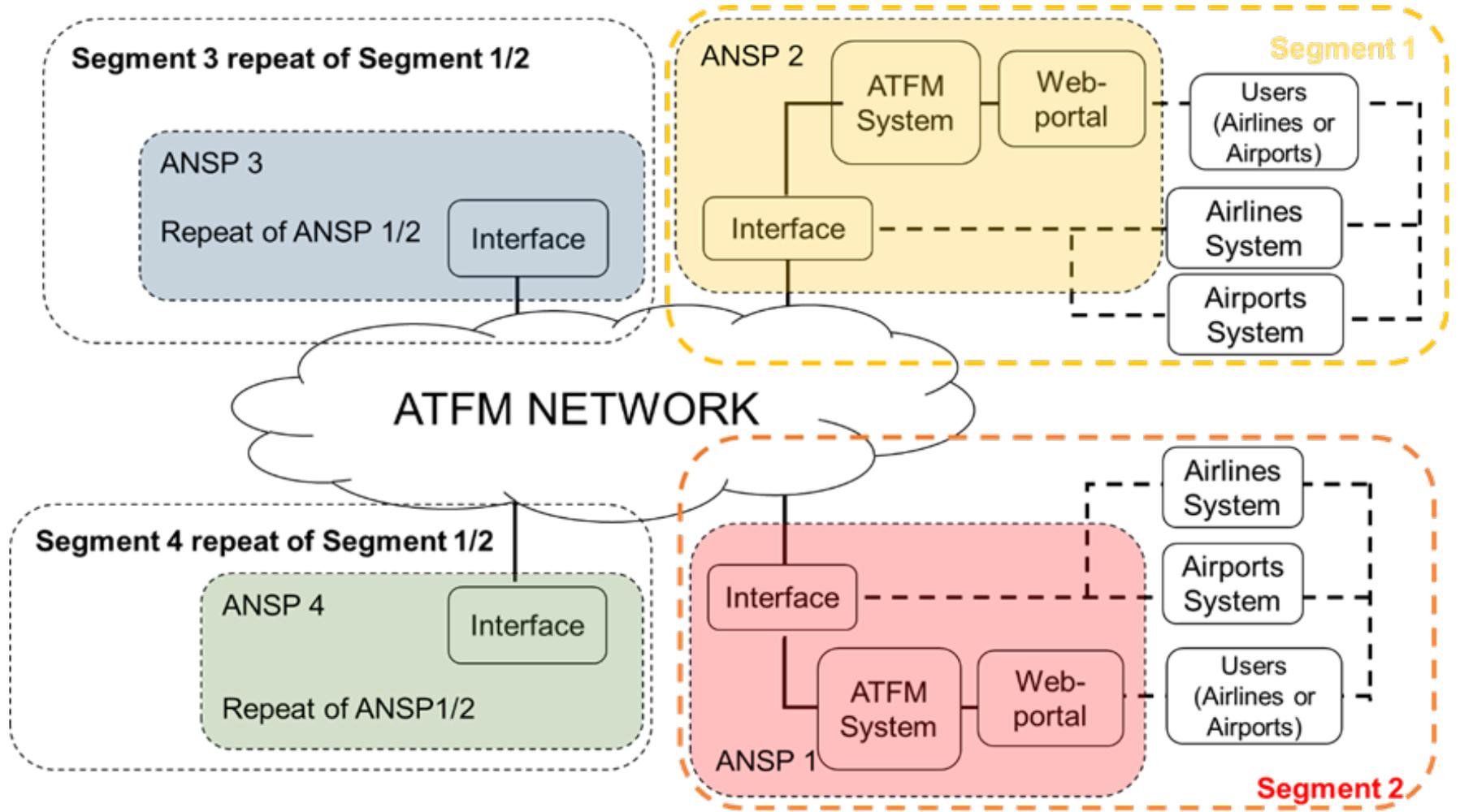
ATFM Measure



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# Multi-Nodal ATFM Communication **Tomorrow**



# Technical Subgroup Main Tasks

## Identify NEEDS

- ✓ Required data elements
- ✓ Operational scenarios

- ✓ Demand Monitoring
- ✓ GDP Activation – Congested Airport
- ✓ CTOT Management
- GDP Activation – Congested Airspace

## Develop Infrastructure

- ✓ Map with FIXM provisions (v4.1)
- ✓ Initial FIXM extension (CTOT, CLDT)
- Connection, system, operational tests

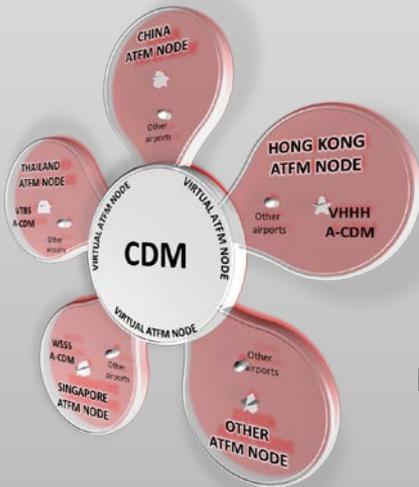
## Influence Provisions

- Coordinate with APAC SWIM TF
- Engage FIXM CCB
- Drive suitable provisions



# *Technical Work*

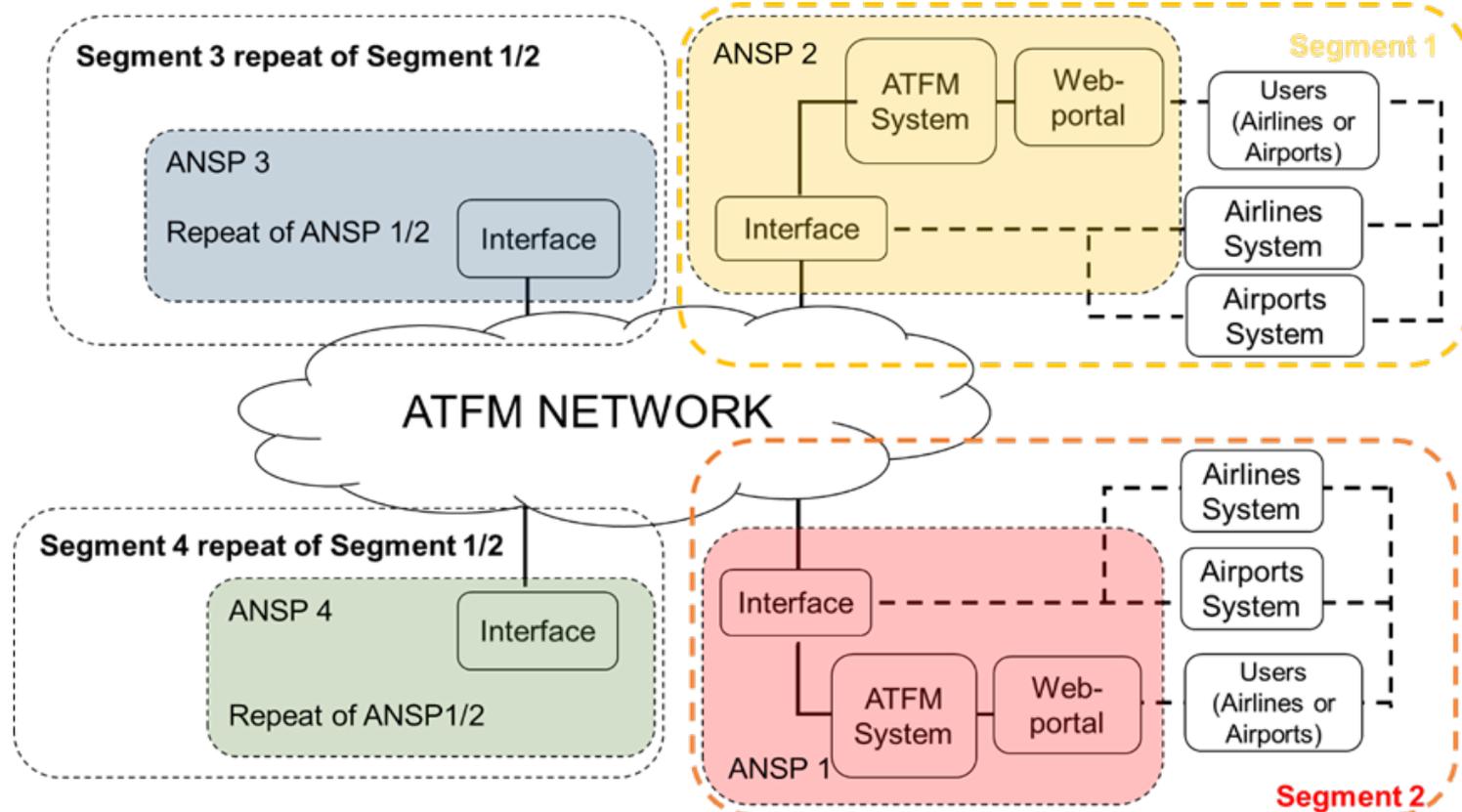
## *Technical Subgroup Work Plan*



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# Multi-Nodal ATFM Communication **Tomorrow**

- Loose system coupling
- Use of open standards
- Use of interoperable services

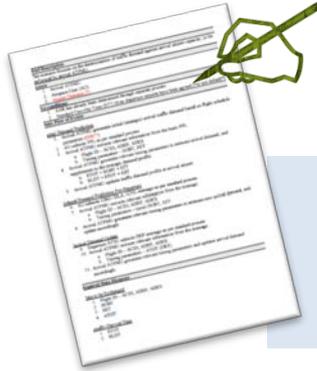


System-to-system connection designed based on SOA with the use of XML-based information exchange model



# Collaboration

- ICAO APAC SWIM TF
- ICAO APAC ATFM/IR/SWG
- Multi-Nodal Technical Subgroup

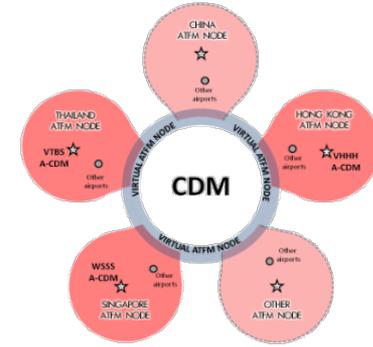


Operational Scenarios  
(Operational Requirements)

Why / When / How ?

Required Data Elements

CTOT, CLDT, etc. not included in FIXM4.0 and FIXM 4.1 Core



Mapping to FIXM

ATFM Sys-Sys Connection

Develop FIXM Extension

ATFM Sys-Sys ICD

DRAFT

System Test



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## Operational Scenarios (Operational Requirements)

- Demand-Capacity Monitoring
- GDP Activation
- CTOT Management

## Required Data Elements

## Mapping to FIXM

## Develop FIXM Extension

- Finalized service description – Data elements to be exchanged between ATFM units
- Developed FIXM v4.0 Extension for CTOT and CLDT
- **With FIXM v.4.1 released in Dec 2017, new FIXM v4.1 was developed in Feb 2018 and validated in Apr 2018**

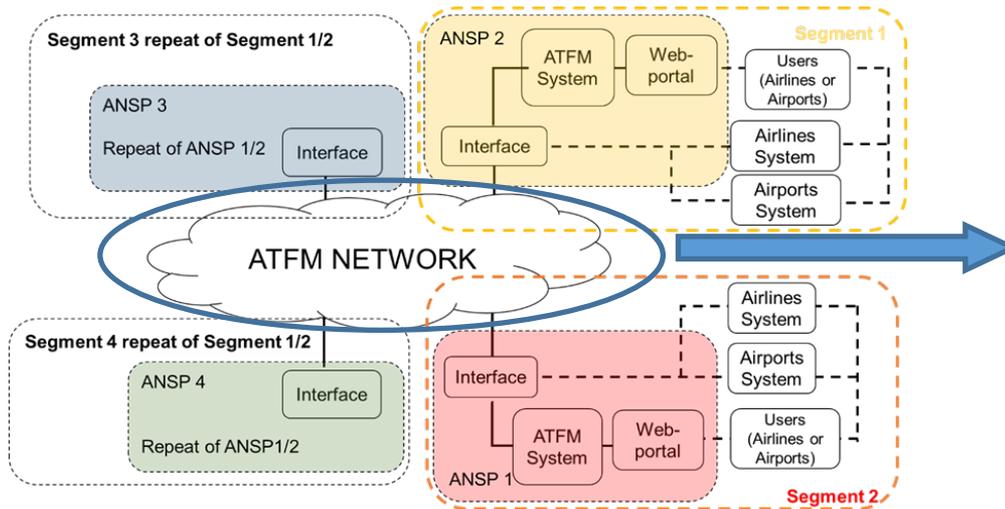
## System Test

- Conducted system test between AEROTHAI and CAAS at the end of August 2017, using FIXM 4.0 with Extension
  - Flight Creation
  - Flight Update
  - CTOT Distribution
  - CTOT Cancellation



# ICD Update

- Detailed interface requirements



## Assumptions

- ATFM-to-ATFM system interconnection through EMS using **AMQP v1.0**

- I. Detailed service specification
- II. Readiness of FIXM v4.1 Extension
- III. Security requirements (done by EMS)

Within Sep 2018



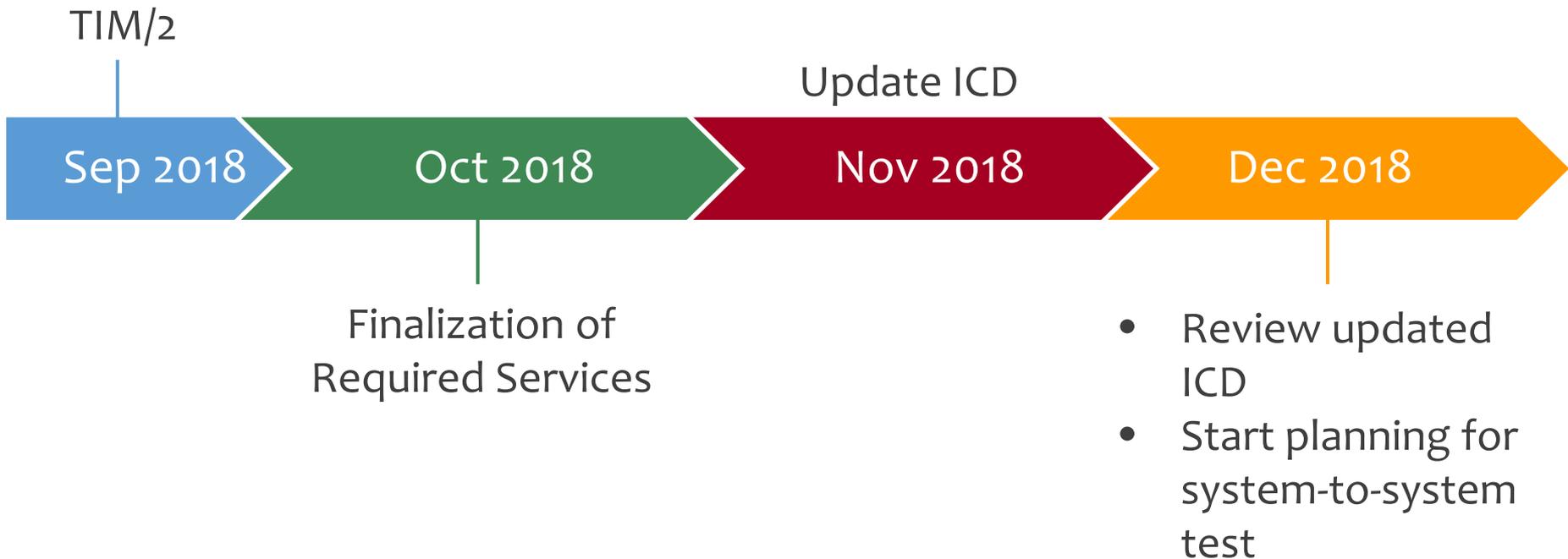
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# ICD Update

- Detailed interface requirements

*Synchronize with the SWIM in ASEAN Demonstration project timeline*



# ATFM-on-SWIM Forward Plan

ATFM-related  
services  
development based  
on operational  
scenarios

**SWIM in ASEAN  
Demonstration**

2018

June 2019

Dec 2020

Key considerations

- Network connection: CRV
- ICD amendment to include ADP service



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# In the Meantime...

...we use **Slot Allocation Message (SAM)**...

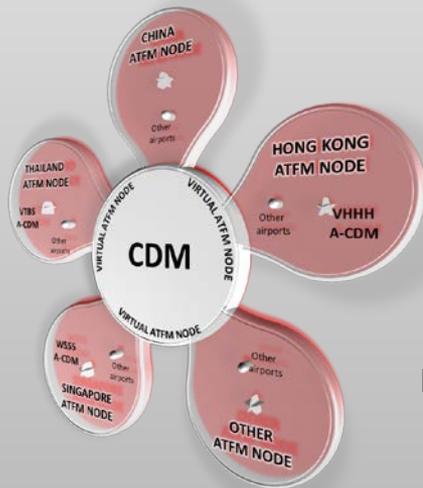
ANSP	SAM distribution
CATS	✓
CAAC ATMB	✓
HK CAD	Q3/2019
CAAS	Q3/2019
AEROTHAI	✓



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# ***ASEAN ATFM Implementation Support Group***



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# ASEAN ATFM Implementation Support Team

## Core Idea:

- ASEAN ATM Master Plan
  - ASEAN Members supporting ATFM as Level-2 by 2018
- Support group to aid AMS in ATFM implementation
  - Workshop series
  - Guided / specific operational trials

## Proposed Strategy:

- Singapore (CAAS) & Thailand (AEROTHAI) to lead
- Kick-off meeting: 24 August 2018, Bangkok
  - **Develop a roadmap for *harmonized* ATFM implementation among ASEAN Members**



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## Summary

# ASEAN ATFM Implementation Support Team Kick-Off Meeting





# Updated AMS ATFM Implementation Status

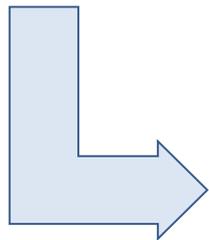
## + (Informal) Update during ASEAN ATFM Support / 1

AMS	Phase I 1 Jan 2018 to 31 Dec 2020			Phase II 1 Jan 2018 to 31 Dec 2022		
	Expected Starting Date	Expected Completion Date	Progress (ASEAN ATFM/1)	Expected Starting Date	Expected Completion Date	Progress (ASEAN ATFM/1)
BRUNEI	To be provided	To be provided		To be provided	To be provided	
CAMBODIA	Started	31-Dec-17	100%	Started	31-Dec-20	Completed
INDONESIA	26-Jun-16	31-Dec-17	100%	26-Jun-16	31-Dec-18	Expect completion 31 Dec 2019
LAO PDR	28-Dec-18	31-Dec-20	30%	31-Dec-20	30-Dec-22	None
MALAYSIA	Started	Completed	100%	01-Dec-19	3rd Quarter 2020	
MYANMAR	Started	31-Dec-19	Completed	Started	31-Dec-20	
PHILIPPINES	02-Apr-18	01-Nov-18		01-Nov-18	01-Nov-19	
SINGAPORE	Started	01-Apr-17	100%	Started	01-Sep-18	Completed 30 Sep 2017?
THAILAND	Started	31-May-17	100%	Started	30-Sep-17	100%
VIETNAM	Started	31-Dec-18	80%	Started	31-Dec-20	



## ATFM Implementation Support Wish List

- Prioritized Elements - Phase I
  1. ATFM operations training
  2. Regulatory framework development
- Prioritizes Elements - Phase II
  1. ATM resource capacity assessment



**Input into EU ARISE Plus workshops**



## Workshop # 1: ASEAN ATM Master Plan

*“Introduction to ATM Master Plan and Key Initiatives”*

- Date 10 – 12 September 2018
- Host Civil Aviation Authority of Thailand (CAAT)
- Venue Pathumwan Princess Hotel, Bangkok

## Workshop # 3: Implementation of ATFM

*“To assist implementation of ATFM in ASEAN”*

- Date 24 – 26 September 2018
- Host AirNav Indonesia
- Venue AirNav Indonesia HQ, Tangerang City

# Thank You!

