Establishing SWIM – A Key Enabler for FF-ICE

SWIM TF 10 Seminar
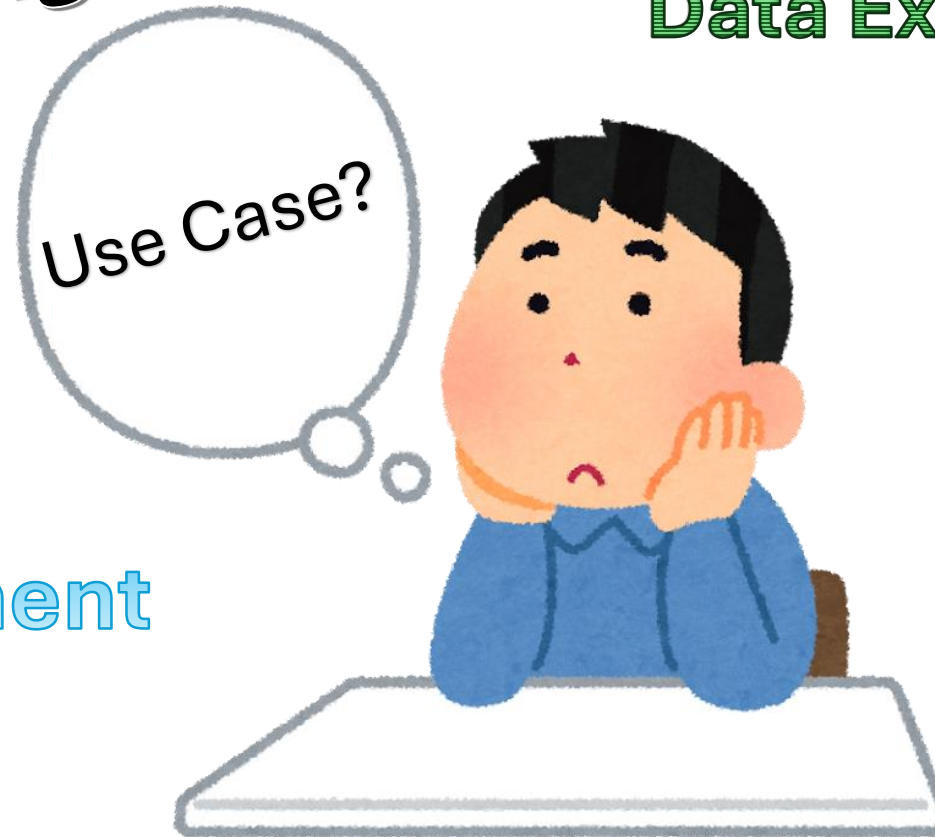
How to SWIM?

Start Small

- Identify the following:
  - Single use case
  - Data Sets that are needed to fulfil use case
  - Sources of Data

- Learn about SWIM:
  - ICAO APAC SWIM Task Force Seminars Materials
  - ICAO Guidance Materials
    - ICAO Doc 10039 – SWIM Concept Manual
    - ICAO Doc 10203 – SWIM Implementation Guidance
  - APAC Partners

Start Small

- Develop Solution:
  - Simulated Data Sources
  - Simulated Network
  - Simulated / Recorded Data Sets
  - Explore technologies
    - Message Broker
    - Message Protocols
    - Information Services Provisioning

- Deploy Prototype:
  - Initial SWIM Network
  - Initial set of Information Services
    - Data Provisioning
    - Data Consumption

Start Small

- Further Understanding:
  - Participate in APAC SWIM Task Force meetings.
  - Take part in trials with other APAC partners.
  - Develop additional use cases for further development and deployment of SWIM.

Gradually Expand

- Identify
  - Additional Use Cases
  - Additional Data Sets
  - Additional Data Source

- Operationalise SWIM System
  - Cybersecurity Considerations
  - Extend Reach of Network
  - Maintenance considerations
  - Governance considerations

Gradually Expand

- Involve other stakeholders:
  - ATC Operations Users
  - Flight Planners
  - Aeronautical Information Services
  - Meteorological Services
  - Airport Operators
  - Airline Operators

- Work and learn with others:
  - ICAO APAC SWIM Task Force
  - ICAO APAC SWIM Implementation Pioneer group

SWIM Implementation: CAAS's Journey Thus Far

CAAS Civil Aviation Authority of Singapore

	2013 - 2019	2020-2022	2022 - 2026	Beyond 2026
Activity	**Fact-Finding and Prototyping**	**Project Planning and Procurement**	**Project Implementation**	**Integration with Next Generation Systems and Expansion**
Stakeholders	CAAS • Engineers • Data Analysts External Stakeholders • Other ANSPs	CAAS • Engineers • Operations	CAAS • Engineers • Operations External Stakeholders • Metrological Services • Airlines • Airport • Other ANSPs	CAAS • Engineers • Operations • ATM Planners • Flight Planning Specialists System Vendors External Stakeholders
Objectives	• Explore Operational Feasibility & Functionality • Knowledge Development & Feedback • Gather requirements	• Confirm requirements • Confirm procurement approach	• 3 Phase Development • Extension of reach of SWIM Network • Completion of deployment Q4 2026	• Cloud Expansion • Integration with new systems • Extension of reach to Seletar Airport and Changi Airport Terminal 5

How about FF-ICE?

CAAS started small with a different team

- Learnt about FF-ICE:
  - Table-top Exercises internally and externally

- Develop Solution
  - Worked with MITRE Asia Pacific Singapore(MAPS) to develop FF-ICE solution
  - Developed prototype to further understanding of FF-ICE and to enable participation in trials and demonstrations

CAAS started small

- Work and Learn with others
  - APAC FF-ICE Ad-hoc Group
  - TBO Pathfinder Program

- Operationalise FF-ICE
  - Technology Transfer from MAPS to CAAS for further prototype development
  - Generate requirements for FF-ICE system from prototype

FF-ICE/R1 Implementation: CAAS's Journey Thus Far
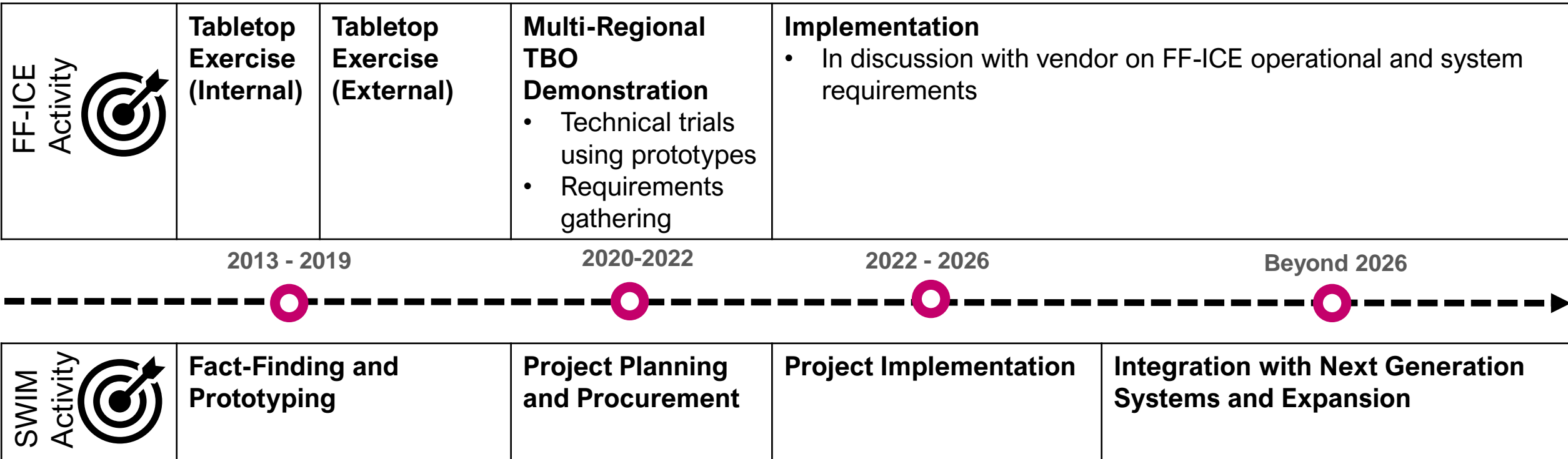
	2018	2019	2020 - 2022	Beyond 2022
Activity	**Tabletop Exercise (Internal)**	**Tabletop Exercise (External)**	**Multi-Regional TBO Demonstration** • Technical trials using prototypes • Requirements gathering	**Implementation** • In discussion with vendor on FF-ICE operational and system requirements
Stakeholders	CAAS • ATM Planners • Flight planning specialists	CAAS AEROTHAI Singapore Airlines Thai Airways	CAAS **Prototype Development:** MITRE ASIA PACIFIC **Demo Partners:** AEROTHAI FAA JCAB NAVCANADA	CAAS • ATM Planners • Flight Planning Specialist • Engineers System Vendors

Objectives	• Explore Operational Feasibility & Functionality
	• Knowledge Development & Feedback
			• Testing of Message Exchanges
			• Understanding System Requirements & Needs
				• Target operationalizing two mandatory FF-ICE/R1 services by ~2028
				  • Filing Service
				  • Flight Data Request Service
				• Phased Approach to full FF-ICE/R1 implementation in ~2030

CAAS SWIM and FF-ICE Journey

FF-ICE Activity	**Tabletop Exercise (Internal)**	**Tabletop Exercise (External)**	**Multi-Regional TBO Demonstration** • Technical trials using prototypes • Requirements gathering	**Implementation** • In discussion with vendor on FF-ICE operational and system requirements

2013 - 2019   **2020-2022**   **2022 - 2026**   **Beyond 2026**

|				
SWIM Activity	**Fact-Finding and Prototyping**	**Project Planning and Procurement**	**Project Implementation**	**Integration with Next Generation Systems and Expansion**

Two teams dove-tailed and synchronized schedules together to enable desired outcomes

CAAS SWIM and FF-ICE Journey

- SWIM cannot be done in-silo in the long run
- By itself, it is meaningless
- It is an enabler of other use-cases such as FF-ICE
- Requires a wide range of expertise to fully utilize and maximise its value
  - Aviation Industry
    - ATC Operations
    - AIS Operators
    - Airport Operators
    - Airline Operators
  - Data Analysts
  - Engineers
    - Software Engineers
    - Network Engineers
    - Cybersecurity Engineers
  - Meteorological Services
  - Etc...
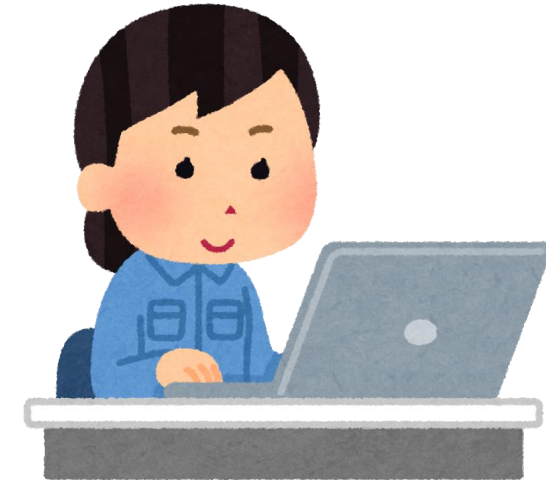
But! Start Small

- CAAS started SWIM with 2 software engineers and 1 data analyst to provide the use case

- Similarly, FF-ICE started with just 2 operations analysts

- Analyse organization's needs and individual's capabilities to better scope the work and expectations

Minimum SWIM Capability for FF-ICE

- Connectivity to Flight Planning System
  - Receive Flight Plans
  - Publish Flight Plans
- Connectivity to External World
  - Via Common aeRonautical VPN
  - Via Internet
- Cybersecurity Considerations
- Governance Considerations
  - Data Sharing Policy

Questions?