Minimum SWIM Capabilities To Support FF-ICE Implementation AEROTHAI's Perspective

ICAO APAC SWIM Seminar

19 May 2025, Bangkok, Thailand

Topics

> AEROTHAI's SWIM and FF-ICE Journey

> Architecture

> SWIM Capabilities

> Lessons Learned

AEROTHAI's SWIM and FF-ICE Journey

2014 - 2016

Mini Global I & II

2017 - 2019

SWIM in ASEAN Demonstration

2020 - 2023

Multi-Regional TBO Demonstration

2023 - 2028

APAC TBO Pathfinder Project

AEROTHAI's SWIM and FF-ICE Journey

2014 - 2016 | 2017 - 2019 | 2020 - 2023 | 2024 - 2028

Mini Global I & II

- Mini Global I & II Demonstration participation to gain firsthand experience on implementing SWIM

- Capabilities building, based on scenarios of interest, to exchange information in standardized information exchange models

AEROTHAI's SWIM and FF-ICE Journey

2014 - 2016 | **2017 - 2019** | 2020 - 2023 | 2024 - 2028

SWIM in ASEAN Demonstration

- Co-host SWIM in ASEAN Demonstration with CAAS
- Global Enterprise Messaging Service (GEMS) network
- FIXM 4.1 APAC Extension, to support Distributed Multi-Nodal ATFM Operational Concept

AEROTHAI's SWIM and FF-ICE Journey

2014 - 2016 | 2017 - 2019 | **2020 - 2023** | 2024 - 2028

Multi-Regional TBO Demonstration

> Technical trial, lab demonstration, live-flight demonstration of TBO enablers, including, *inter alia,* SWIM, FF-ICE, Connected Aircraft

> FIXM v4.2 APAC Extension

FF-ICE/R1 Technical Trial with CAAS

> All 6 FF-ICE/R1 services

AEROTHAI's SWIM and FF-ICE Journey

2014 - 2016 | 2017 - 2019 | 2020 - 2023 | 2024 - 2028

APAC TBO Pathfinder Project (2024 - 2025)

- To develop and demonstrate TBO capabilities, focusing on regional TBO scenarios
- FF-ICE/R1 Technical Trial and lab demonstration
- Preparation for FF-ICE/R2 Tabletop Exercises (TTX to be conducted in 2026)

AEROTHAI's SWIM and FF-ICE Implementation Plan

2025

Update FF-ICE/R1 services prototype

2026

Operational SWIM

2027

Operational FF-ICE/R1

- Filing service
- Flight data request service

2028

Operational FF-ICE/R1

- Notification service
- Trial service

2029

Operational FF-ICE/R1

- Planning service
- Data Publication service

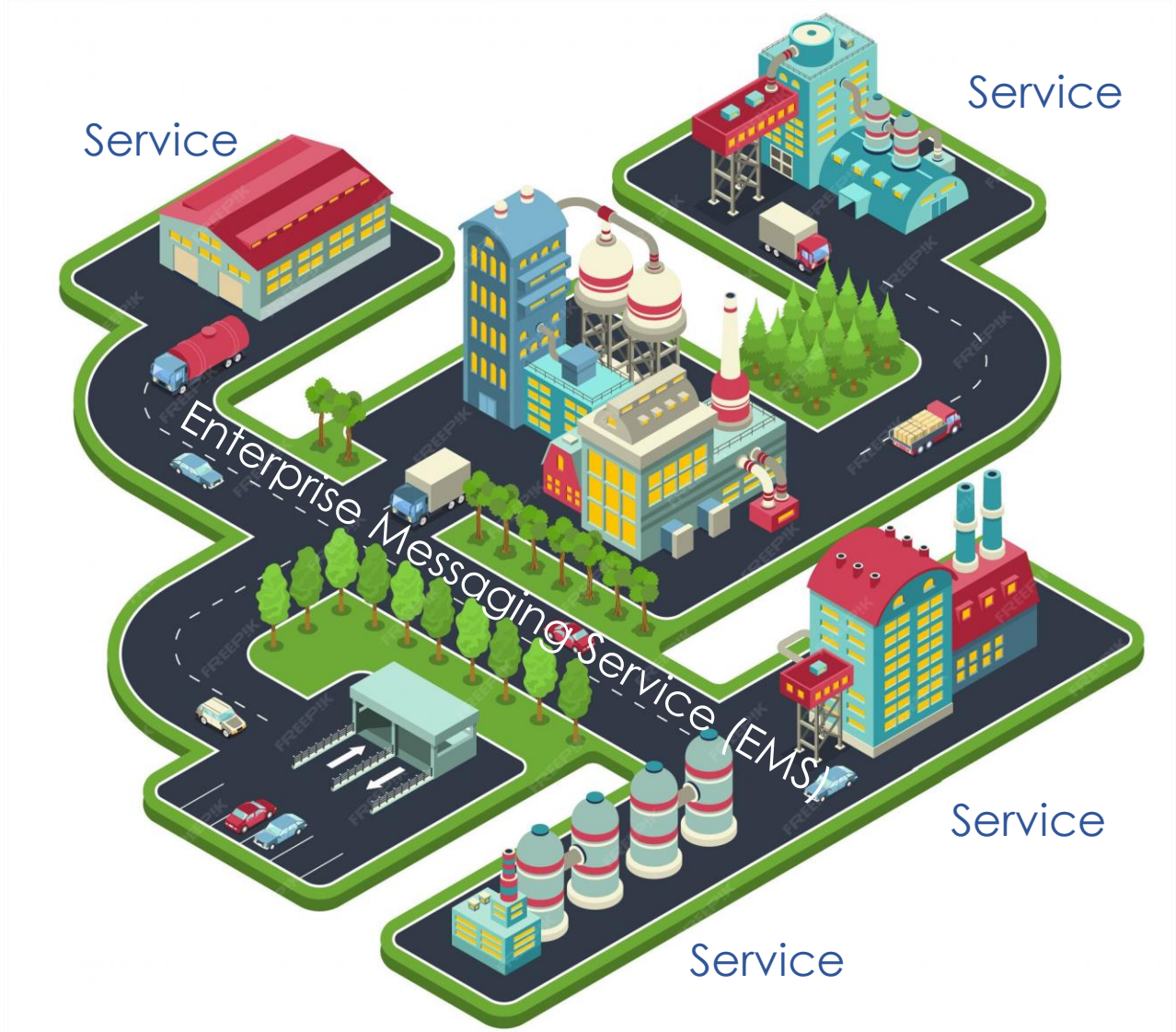
Flight and Flow – Information for a Collaborative Environment (FF-ICE) is a concept enabling dynamic flight and flow information management through information services in a SWIM environment

[complied with service-oriented architecture (SOA) principles]

SWIM information services, apart from flight and flow, e.g. aeronautical information services, MET information services, also help support FF-ICE operations

SWIM Technical Infrastructure (SWIM TI) is required for FF-ICE implementation

A paradigm shift for information exchange in ATM



Enterprise Messaging Service (EMS), the key component in SWIM TI, is the communication backbone for SWIM information services

Image credit: freepik.com

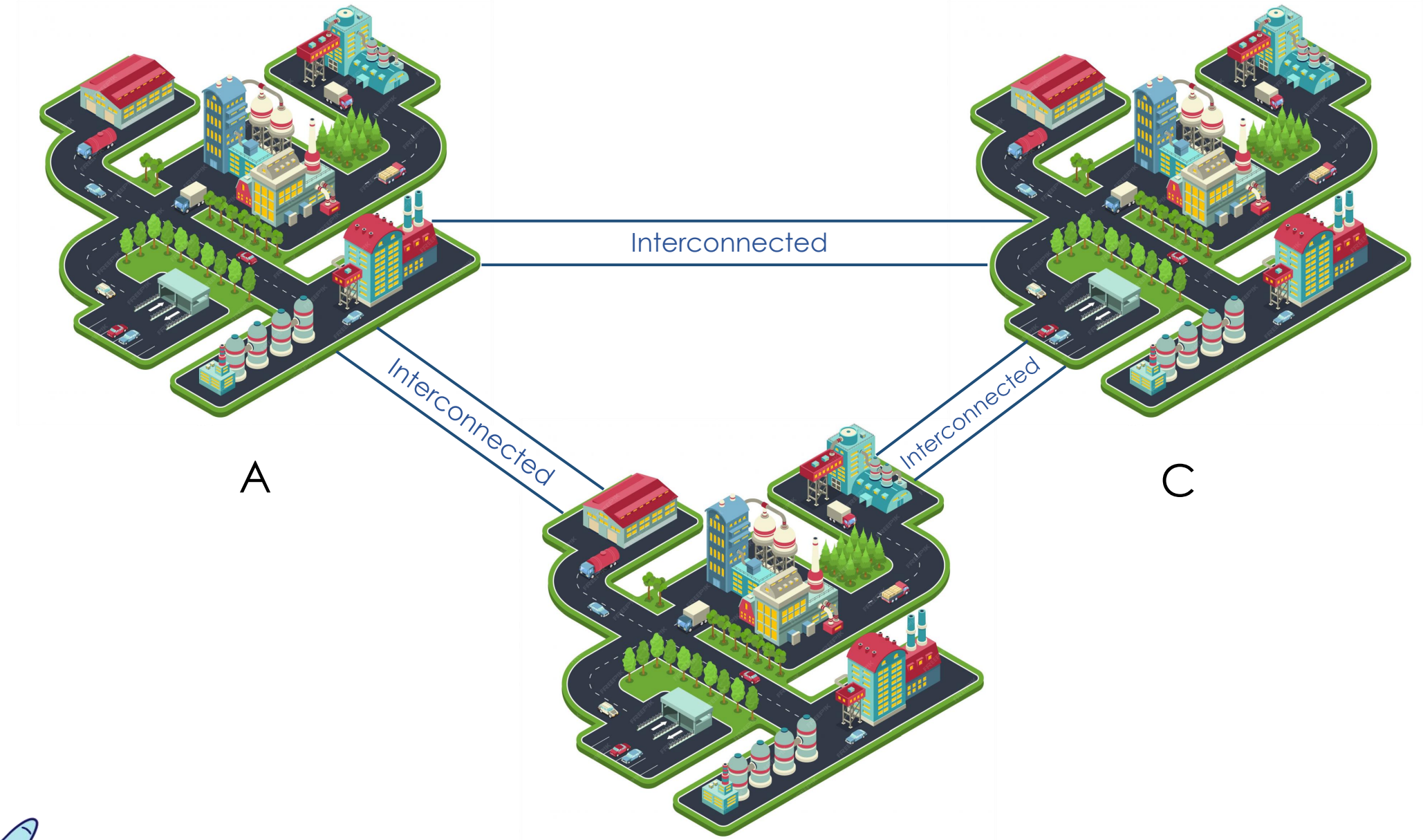
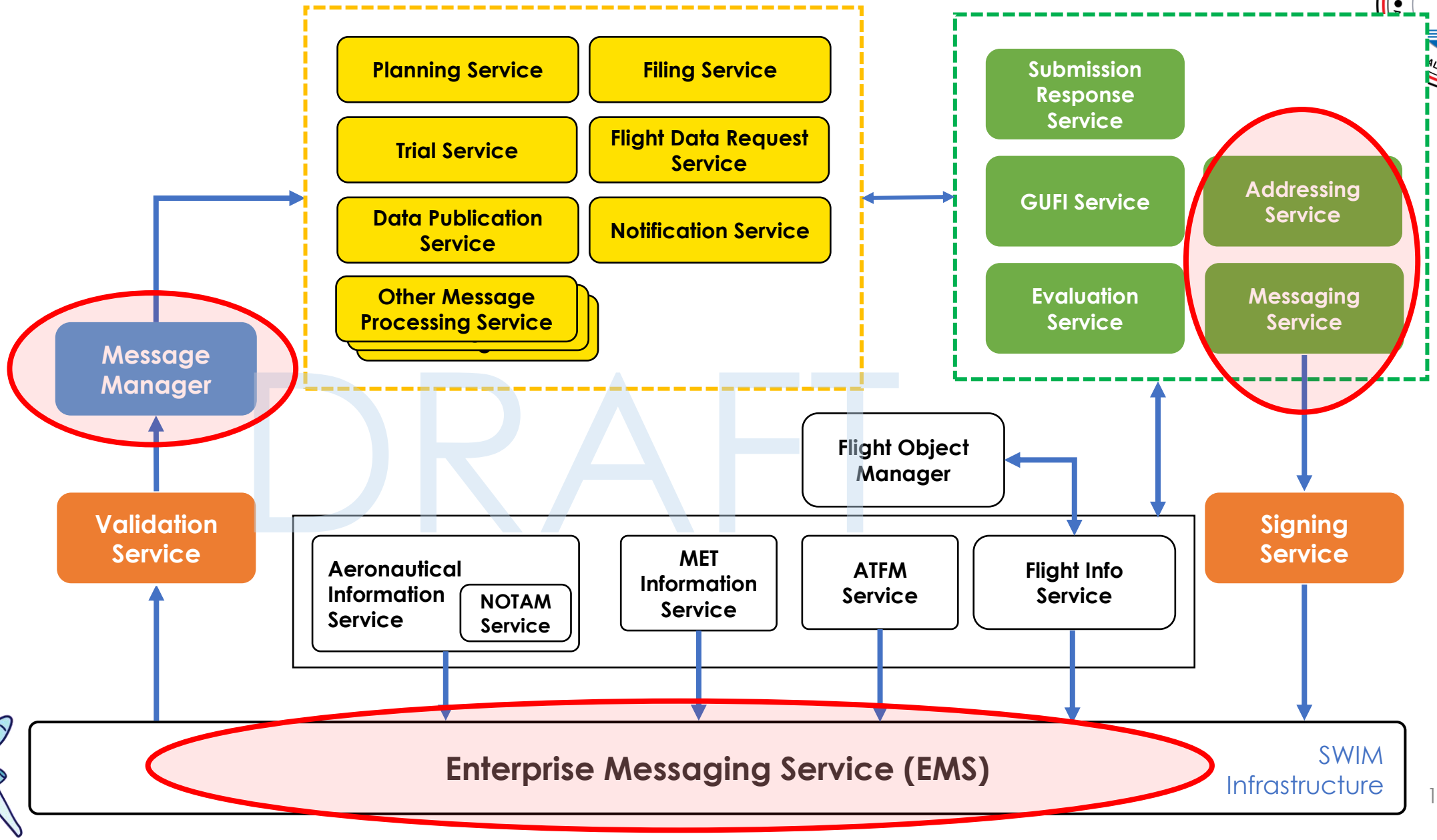


Image credit: freepik.com

AEROTHAI's Internal Processes / Services



SWIM Capabilities

Functional

Messaging

Security
- Authentication
- Authorization

Management
- Monitoring

Non-Functional

Performance

Security
(Non-functional)

Images credit: Flaticon.com

Functional Capabilities

Messaging (Information Exchange)

This capability allows SWIM service providers and consumers to exchange information

> Message Distribution
- Queues
- Topics

> Message Exchange Pattern
- Publish/Subscribe
- Request/Reply

Functional Capabilities

Security

This capability enables trusted information exchange

at a minimum

> Authentication – Identity verification

> Authorization – Permission associated with identity

> Identity Management

> Cryptography – Encryption / Decryption

Functional Capabilities

Technical Infrastructure Management

This capability ensures reliability and performance of information exchange

> Resource / Service Monitoring and Alerting

> High Availability – Redundancy, Failover, Load-Balancing

> Time Synchronization

Non-Functional Capabilities

Quality aspects of SWIM services
such as performance, security

- Availability
- Recoverability
- Latency
- Throughput
- Confidentiality
- Integrity

Lessons Learned (Technical)

- Routing management could easily become a challenge with growing number of queues/topics, so we need some solutions or tools
- Queues/Topics naming convention or standardization would be helpful for implementation
- Agreed upon message headers are crucial for efficient message routing and messaging policy

Lessons Learned (Technical)

- FF-ICE/R1 message template
- Some FIXM data attributes are interpreted differently among stakeholders
- *Information Service Definition (ISD)* is a key to support harmonized implementation of information services, including FF-ICE services, at global and regional levels

Lessons Learned (General)

- Start small with a simple use case, identify the required information and the flow of it, then develop information services and infrastructure to support the specified use case

- Participating in technical trials and demos greatly build understanding, leading to improvement of systems development

The most difficult part is to simply start

THANK YOU