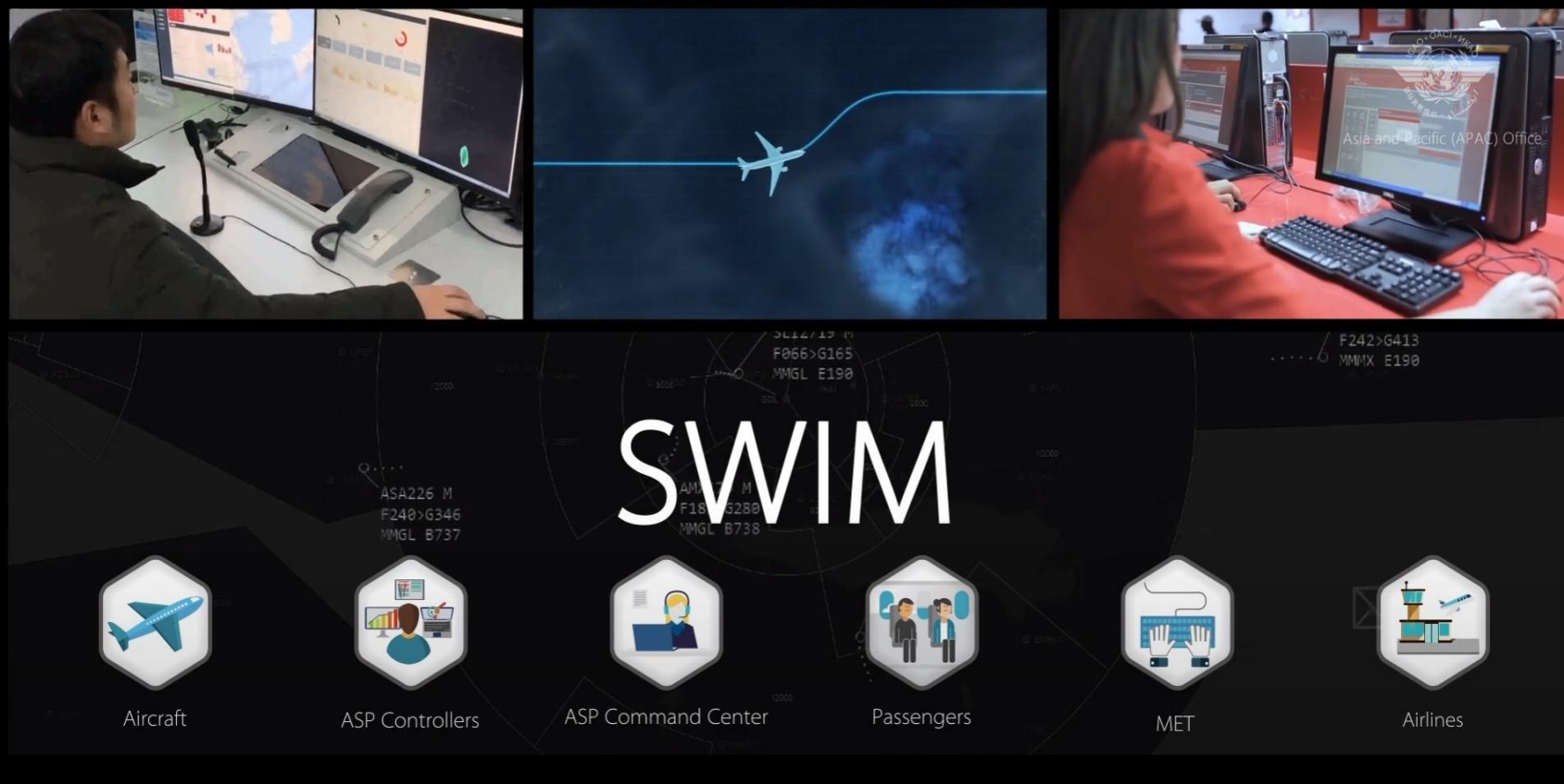
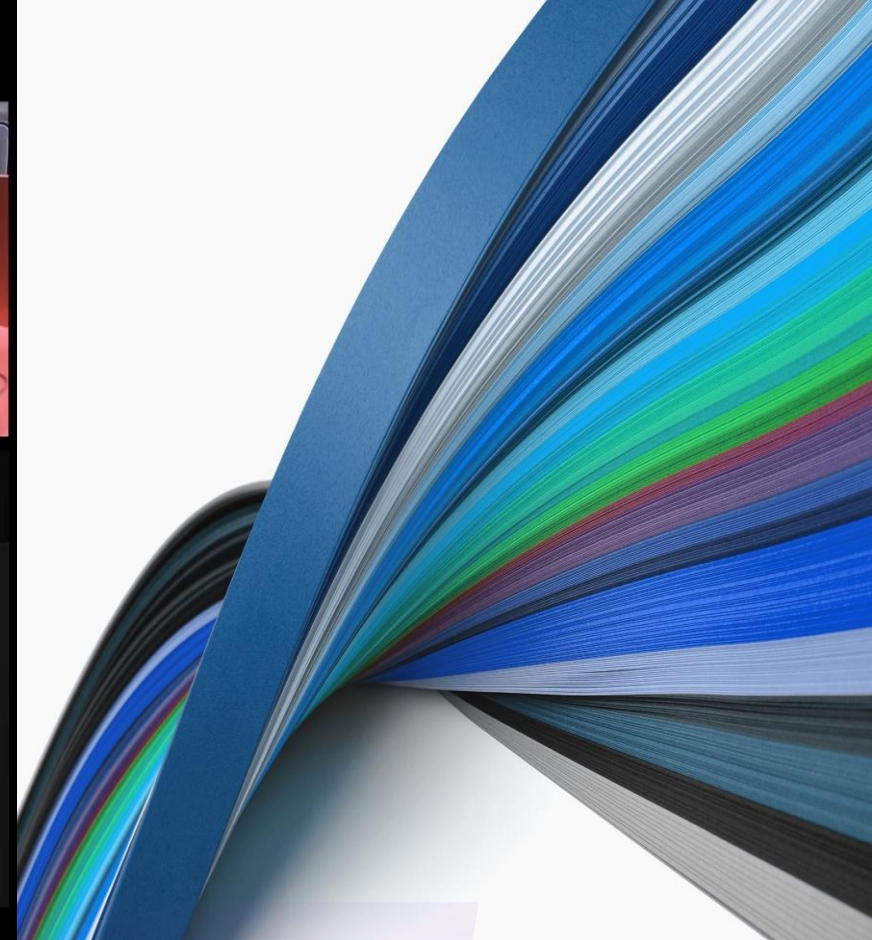




# PROOF-OF-CONCEPT BASED PROJECT



| S                     | W           | I                                              | M                                         |
|-----------------------|-------------|------------------------------------------------|-------------------------------------------|
| Y<br>S<br>T<br>E<br>M | I<br>D<br>E | N<br>F<br>O<br>R<br>M<br>A<br>T<br>I<br>O<br>N | A<br>N<br>A<br>G<br>E<br>M<br>E<br>N<br>T |



SWIM : Proof-of-Concept Project in India



Accomplishments and Experience



Jitendra Kumar Shukla



Airports Authority of India



March 19, 2024



# Contents

01

Planned Milestones

02

Capabilities

03

Infrastructure, Other Details

04

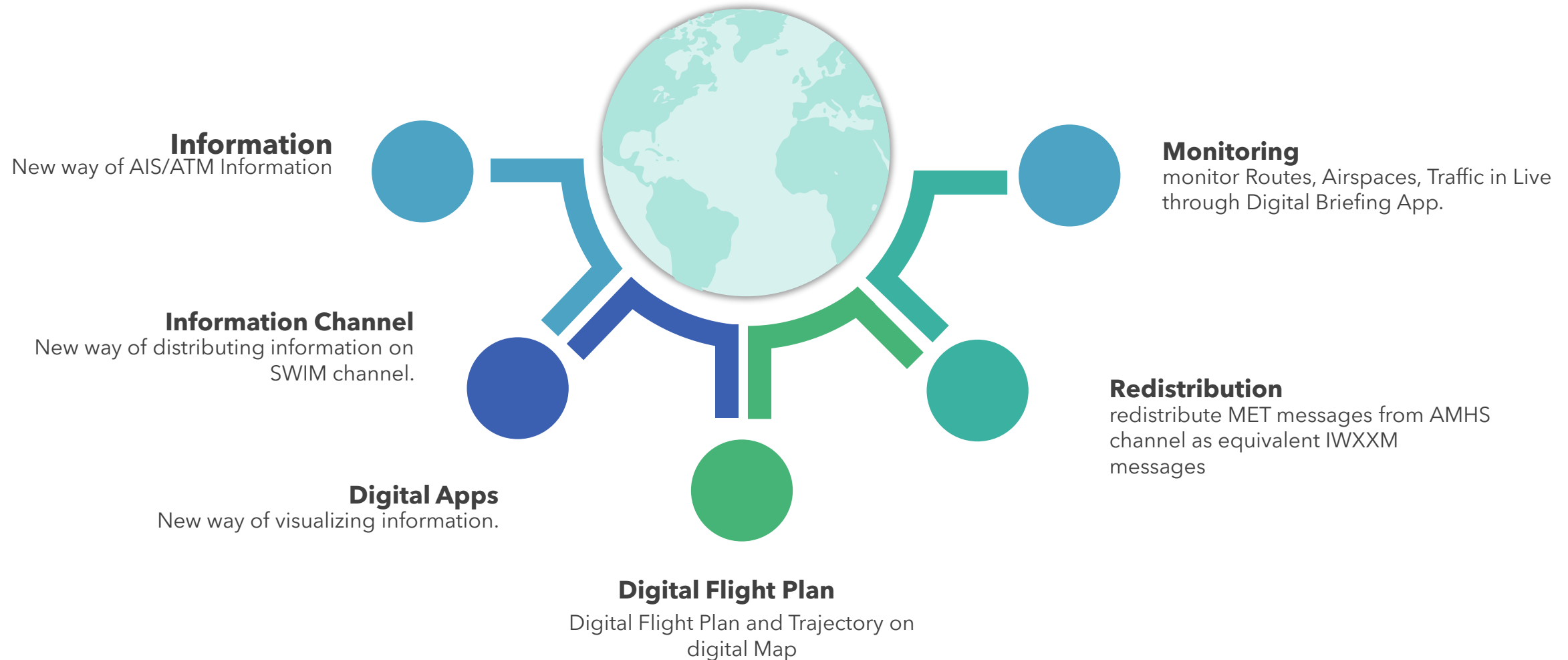
Challenges faced and lessons learned

# Milestones

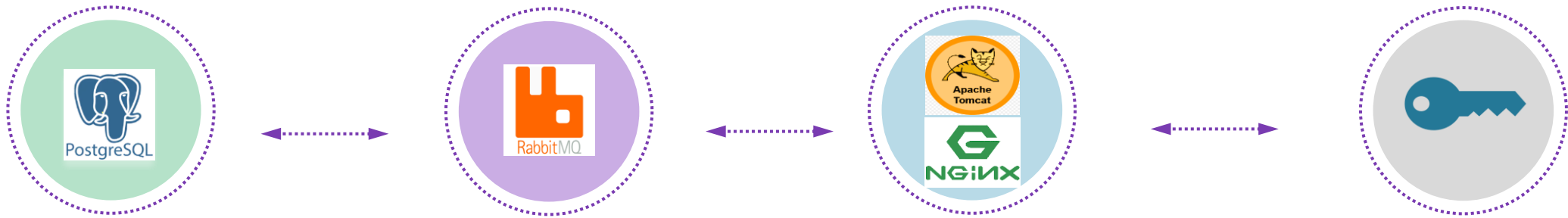
## PLANNED MILESTONES

- 01** Blueprint
- 02** Technical Infrastructure
- 03** Core Engine, Transformations, Digi Apps
- 04** Integrations, Services

# Capabilities



# Technical Infrastructure



## D atabase

Database Engine - Core infrastructure to store SWIM Information

## M essaging

Messaging Service - Core infrastructure to exchange SWIM messages

## W eb server

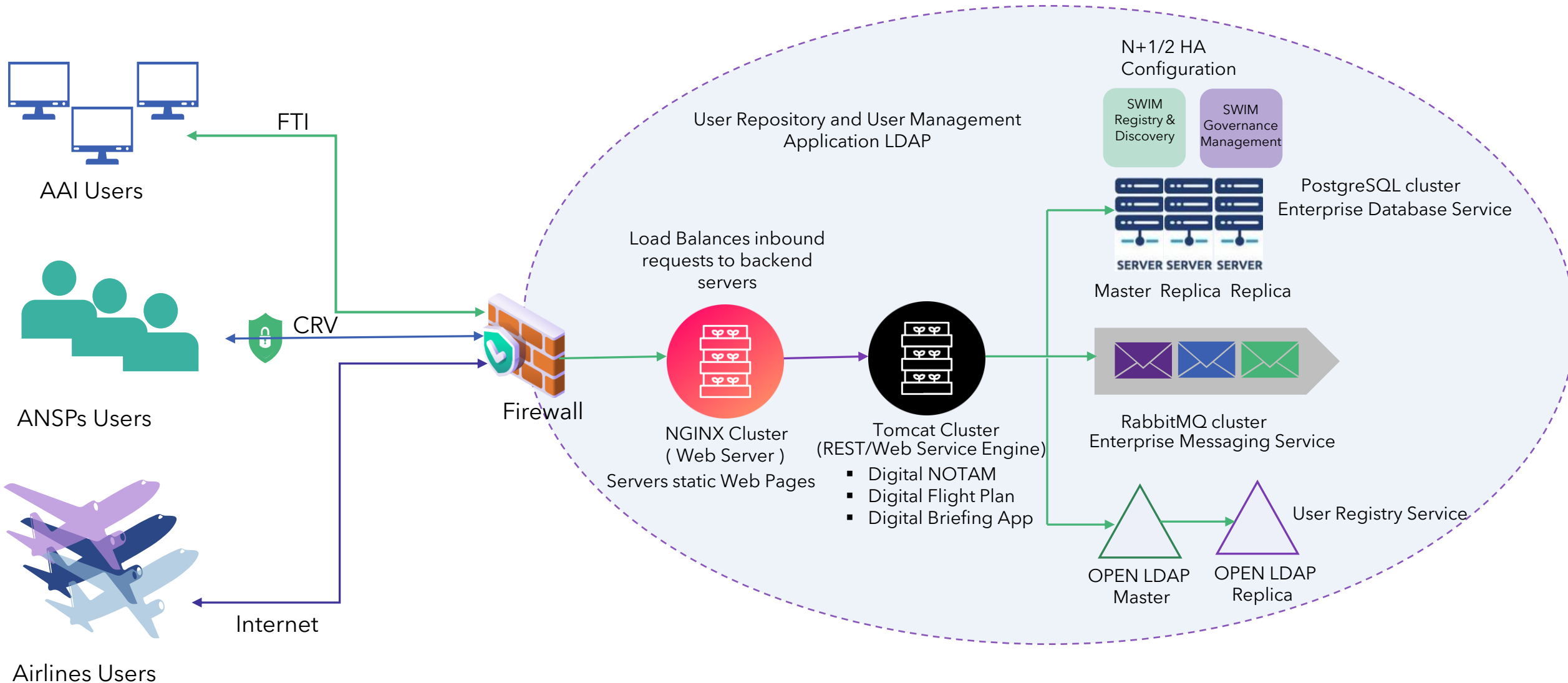
Application Server - Core infrastructure to host SWIM Services

Web Server - Core infrastructure to serve SWIM Applications

## P KI Service

PKI Service - To establish TRUST between SWIM stakeholders

# SWIM SYSTEM TECHNICAL INFRASTRUCTURE



# Exchange Models & Database

## **AIXM v5.1.1**

Engine that processes, validates, and stores AIXM XML messages in AIXM DB



## **AIXM/DNOTAM Database**

Schema for storing AIXM/DNOTAM information in relational format with GIS support.

## **FIXM v4.2**

Engine that processes, validates and stores FIXM XML Messages in FIXM DB



## **FPL Database**

Schema for storing FIXM elements in a relational format.

## **IWXXM v3.0**

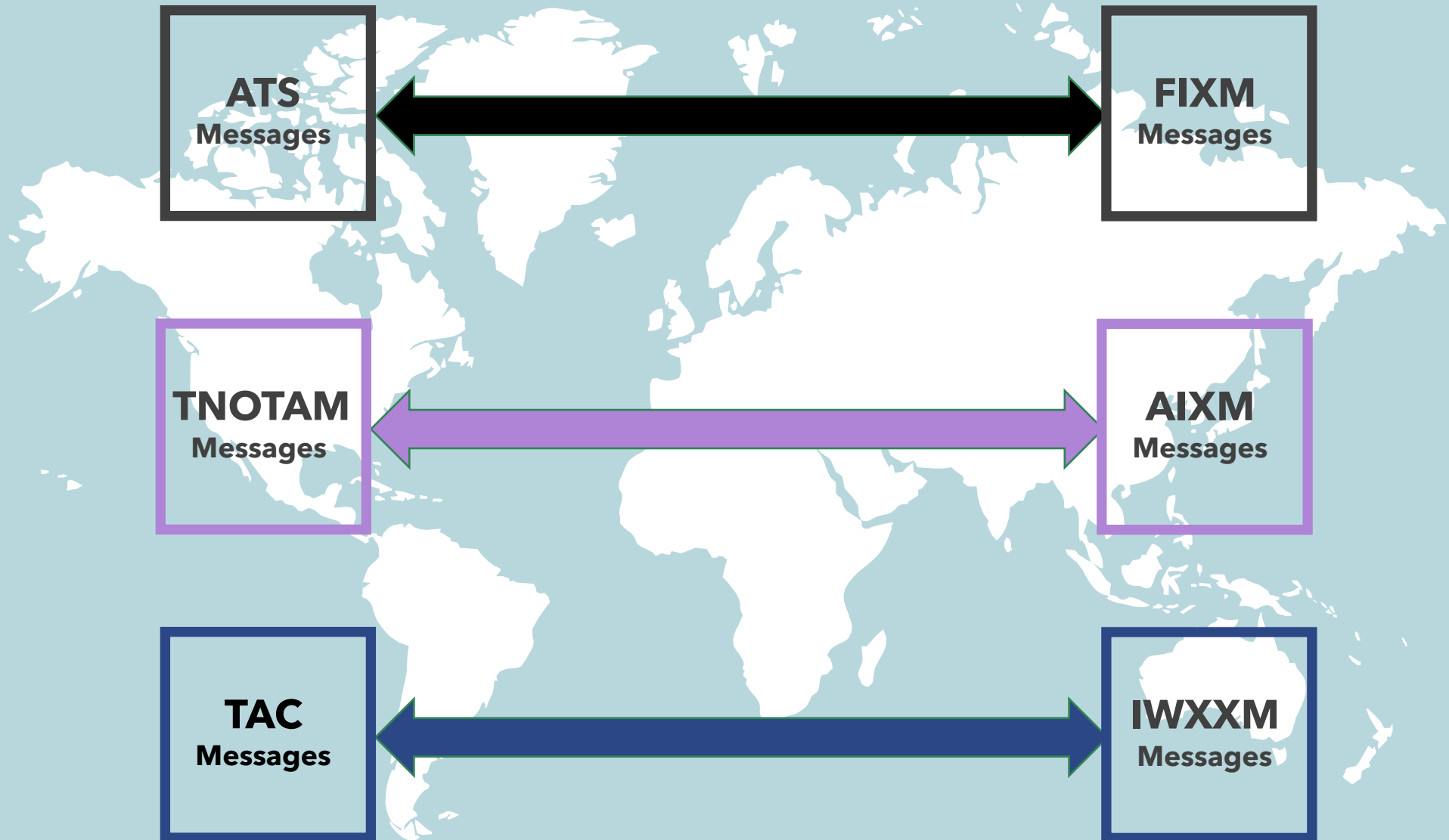
Engine that processes, validates, and stores iWXXM messages in iWXXM DB.



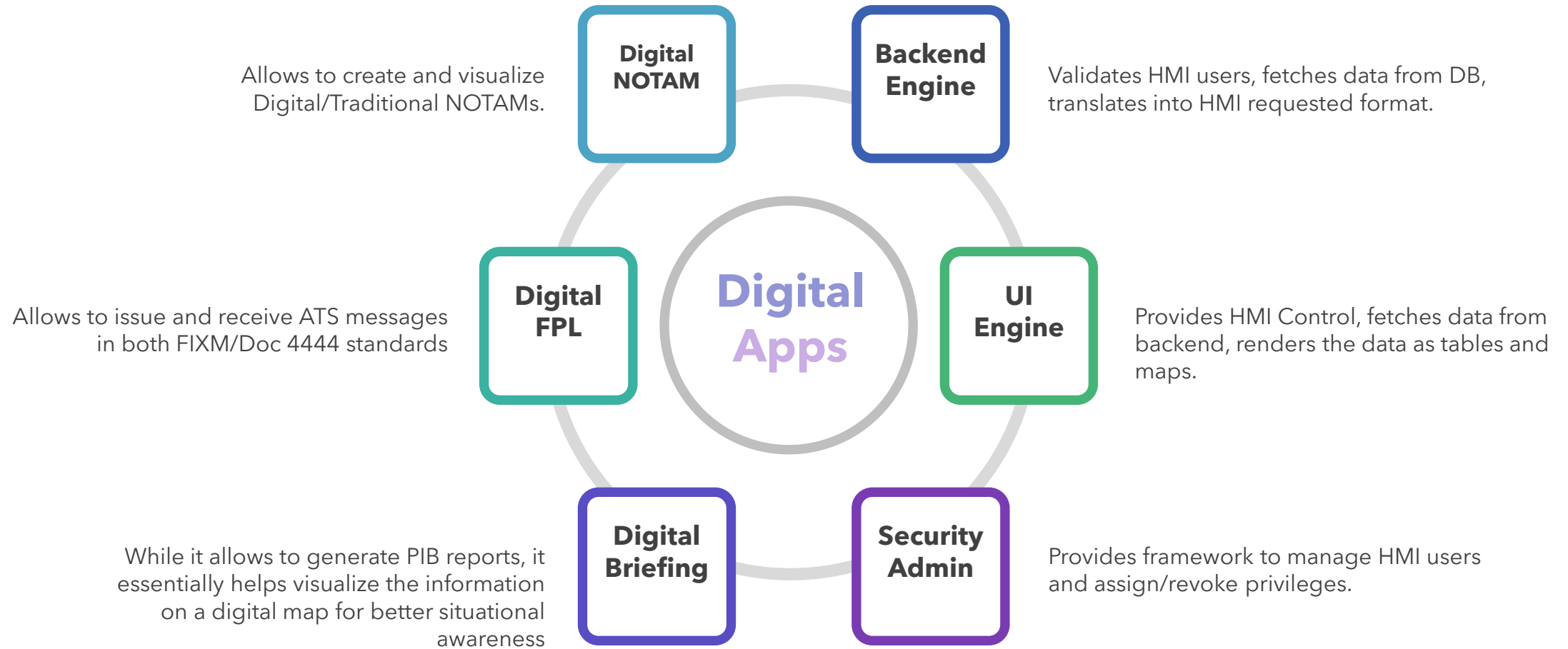
## **iWXXM DB**

Schema for storing iWXXM information in relational format with GIS support.

# Transformation Capabilities



# HMI Capabilities



# INTERFACING & VALIDATION

## Objective



- ❖ To verify POC SWIM system interoperability with Aero Thai SWIM Systems.
- ❖ To exchange and validate the SWIM messages between 2 ANSPs.

## Prerequisites



- ❖ Network Connectivity - VPN/Internet
- ❖ Agreement on Technical Interface - Publish / Subscribe
- ❖ Agreement on System Protocol - AMQP v1.0
- ❖ Agreement on Message Types and Sub Types - AIXM, FIXM, IWXXM.
- ❖ Agreement on Integration Metadata

# TRIAL OPERATION

Aero Thai

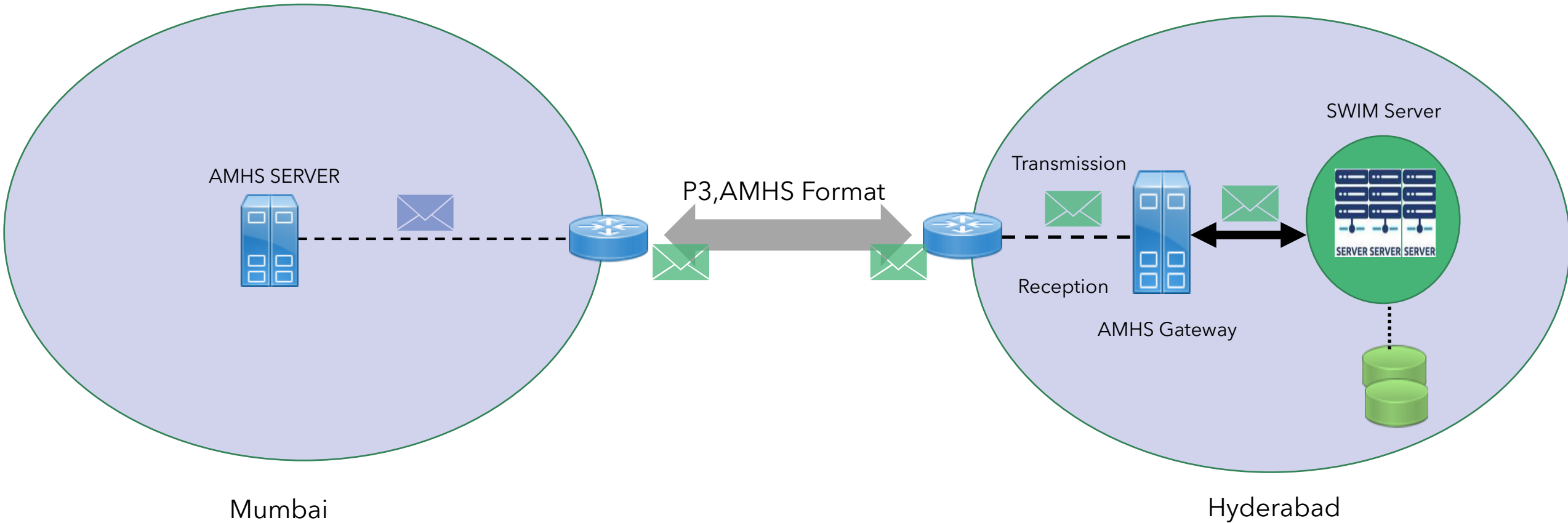
Airports  
Authority of  
India(AAI)



# INTEGRATION WITH AMHS

Non SWIM  
(AMHS) Client

SWIM  
(AAI)



# CHALLENGES ENCOUNTERED AND RESOLVED

- SWIM system supports AIXM v5.1.1 while Aero Thai supports v5.1.
- The difference was nullified by implementing an SWIM Adapter Software Module

AIXM Version  
difference



- Aero Thai use AMQP v1.0, while AAI SWIM used v0.9.1
- Upgraded EMS Server to support AMQP v1.0.
- Also upgraded the SWIM Client (Subscriber) version to AMQP v1.0

AMQP Version  
difference



- The Aero Thai team received the message body but not properties in the header. The same message when viewed through our EMS web interface, the properties were indeed present.
- Developed a AMQP Message Converter module to convert the message structure used by AAI EMS server into the one respected by Aero Thai EMS Server.
- Every message published by AAI SWIM system converted by this converter before publishing into AEROTHAI.OUT Queue

Message Header  
Properties Not Set properly



# LESSONS LEARNED FROM SWIM JOURNEY IN AAI SO FAR



Very few digital NOTAM scenarios are available as of now. Other Digital NOTAM scenarios need to be identified.



SWIM adapter is required for interfacing with other SWIM system. Difficult to manage so many adapters



The readiness of airlines to join SWIM platform and assess their infrastructure requirements for SWIM Implementation.

# LOOKING FORWARD

- The OEM has been awarded Annual maintenance support contract for SWIM Prototype system.
- Following functionalities shall be test with SWIM POC system :
  - i. Testing of GEMS & EEMS functionality with International stations through CRV Network / over IP-SEC VPN as appropriate
  - ii. Testing of ADS-B Surveillance Data sharing with Domestic station and later with International Stations
  - iii. Testing of FFICE/R1 functionalities
  - iv. Necessary coordination shall be done with concerned AAI, Non-AAI Stakeholders and adjacent ANSPs to verify , validate and test the SWIM system in the operational environment.
- Process for SOW / QR for new SWIM system has been initiated and is in progress.

Thank You

