AIXM/UML/XML/GML Workshop
ICAO SAM Region

SWIM Introduction
Including Practical Steps Forward

1 October 2015

Presented By: *Dennis HART*

The coming hour…..

- SWIM – State of play

- Start SWIMming

The coming hour…..

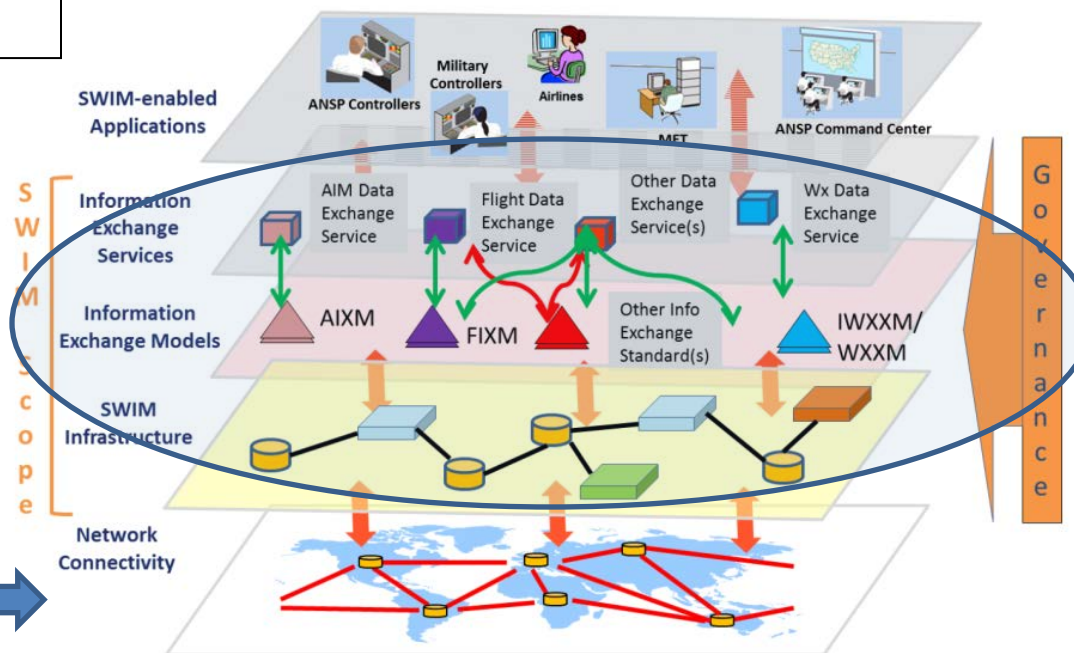- SWIM – State of play

- Start SWIMming

What is SWIM ?

Definition : SWIM consists of standards, __infrastructure__ & __governance__ enabling the management of ATM __information__ and its exchange between qualified parties via interoperable __services__."

Figure 2. SWIM Global Interoperability Framework

IP = Internet, …
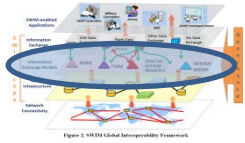
Information

AIXM
ICAO & Increasing implementations
Digital NOTAM
Lessons learned

WXXM
I(CAO)WXXM
Reality mapping
Data coming (really)

FIXM
V3 / CCB
Towards implementation – V4

AIRM

Usage starting

What about me ?
AIDX, AMDB, Asterix, ED133, …

SWIM Pioneer
Network Manager B2B Services

EUROCONTROL

sesar factsheet
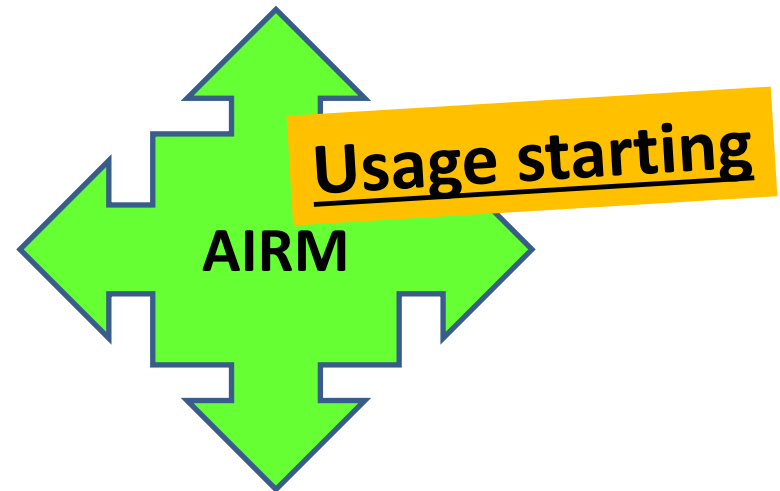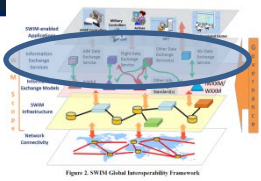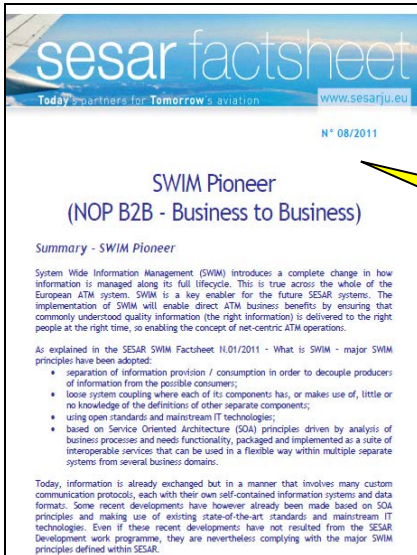Today's partners for Tomorrow's aviation · www.sesarju.eu

N° 08/2011

SWIM Pioneer
(NOP B2B - Business to Business)

Summary - SWIM Pioneer

System Wide Information Management (SWIM) introduces a complete change in how information is managed along its full lifecycle. This is true across the whole of the European ATM system. SWIM is a key enabler for the future SESAR systems. The implementation of SWIM will enable direct ATM business benefits by ensuring that commonly understood quality information (the right information) is delivered to the right people at the right time, so enabling the concept of net-centric ATM operations.

As explained in the SESAR SWIM Factsheet N.01/2011 - What is SWIM - major SWIM principles have been adopted:
- separation of information provision / consumption in order to decouple producers of information from the possible consumers;
- loose system coupling where each of its components has, or makes use of, little or no knowledge of the definitions of other separate components;
- using open standards and mainstream IT technologies;
- based on Service Oriented Architecture (SOA) principles driven by analysis of business processes and needs functionality, packaged and implemented as a suite of interoperable services that can be used in a flexible way within multiple separate systems from several business domains.

Today, information is already exchanged but in a manner that involves many custom communication protocols, each with their own self-contained information systems and data formats. Some recent developments have however already been made based on SOA principles and making use of existing state-of-the-art standards and mainstream IT technologies. Even if these recent developments have not resulted from the SESAR Development work programme, they are nevertheless complying with the major SWIM principles defined within SESAR.
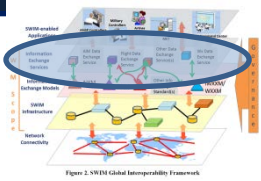
Services:
- Airspace Management
- Aeronautical Info
- Flight Plan Services

Similar trends FAA & elsewhere

Legend:
- b2b_ops_military
- b2b_ops_lara
- b2b_ops_ground_handling
- b2b_ops_fpval
- b2b_ops_european_commission
- b2b_ops_ao_flight_filing
- b2b_ops_ao
- b2b_ops_ansp
- b2b_ops_amc
- b2b_ops_airport

(Chart axis: 2009, 2010, 2011, 2012, 2013, 2014; values 0–250)

Requests per Day

(Chart axis: June, July, August, September, October, November, December; values 0–700000)
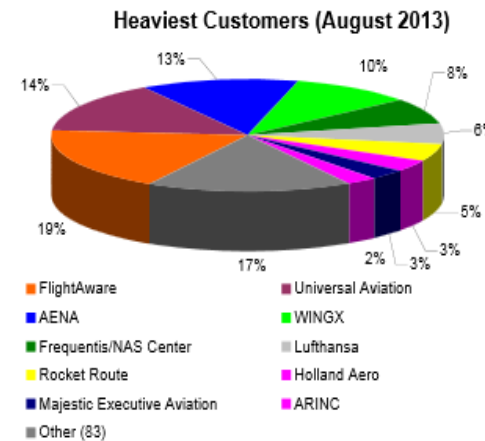
Services

- Examples: Aeronautical, MET, Flight, …

- More and more being **Developed & Deployed**

- Towards a true **business transformation** !

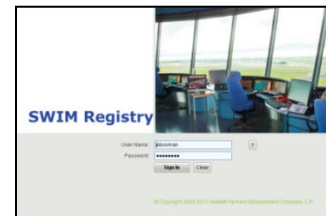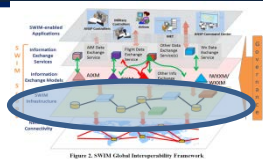## 1. NB OF B2B WEB SERVICES CUSTOMERS

Other, 3
Handling, 27   Internal, 5   Airport, 7
ANSP, 19
AO, 61
CFSP, 36

5. B2B WEB SERVICES - LOAD PER CUSTOMER (OPS & PRE-OPS)

Heaviest Customers (August 2013)

13%   10%   8%
14%   6%
19%   5%
17%   2%   3%   3%

- FlightAware
- AENA
- Frequentis/NAS Center
- Rocket Route
- Majestic Executive Aviation
- Other (83)
- Universal Aviation
- WINGX
- Lufthansa
- Holland Aero
- ARINC

- Discovery through so called **Registry**

  http://eur-registry.swim.aero

SWIM Registry

Technical Infrastructure

- IT is found to be **mature**

IT in ATM

- Mostly an issue of **agreeing** on used (open) standards

- Through so called **Technical Profiles** (Yellow / Blue / ...)

E.g. Yellow = SOAP1.1/1.2, WSDL1.1/*2.0*, WSI1.2/*2.0*, *WS-Security1.1*, TLS1.0/*1.1/1.2*, PKI x.509v3, *XML-Encryption, XML-Signature*, ECRYPT II, XML 1.0/1.1, XML-Schema, *WFS/WMS/...*, HTTP/1.1, HTTP-GET/*POST*, *MTOM*, ... (Red is core, *rest* is optional for Provider)

Pub/Sub : AMQP1.0
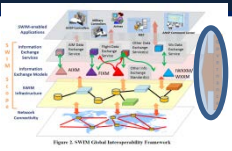
Governance

Initial SWIM (iSWIM)

EU initiative to move towards **SESAR Deployment Carrot/Stick** approach

What are the SWIM Standards ?

Foundation
- Essential Requirements
- Controlled Vocabulary
- Examples
  - Need for semantic interoperability
  - Based on Open Standards
  - Interoperable Services

Guidance
- AIRM
- AIRM Rulebook
- Service Rulebook
- Technical Infrastructure profiles
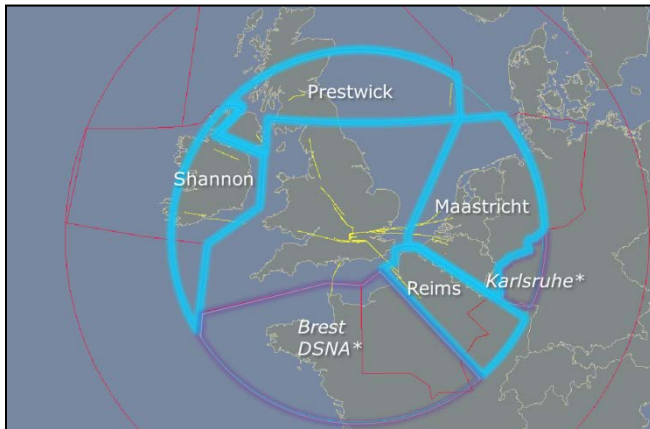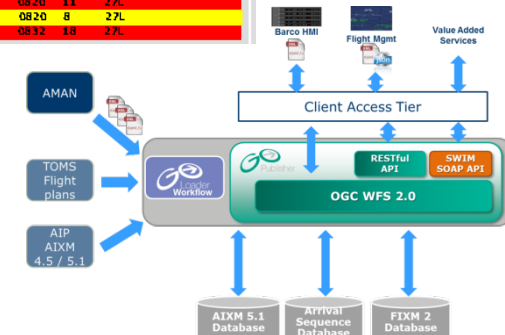- Compliance Framework

SWIM Registry

Performance Based Approach
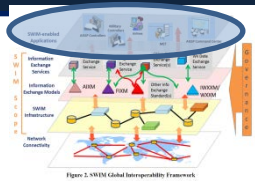
Enabled applications

- Extended Arrival Sequence Service

- Benefits (/year!)
  - 33.5 M€ fuel saving
  - 32.000 ton of CO_2 reduction

The coming hour…..

- SWIM – State of play

- Start SWIMming

Help !
My boss asks me to <u>do/be</u> SWIM

A 'How-To-Get-Started' checklist

✓ Do you have some/all data in Digital Format (AIXM4.5/5.1, ...) ?

✓ Are you able to provide this as a web-service ?

✓ Using technos such as SOAP, HTTP, TLS ?

✓ Over (secured/open) Internet ?

Then you are SWIM(ming) !

Jumpstart
A free SWIM Concept Demonstrator

- **NOT for Operational Use**

- Open source -C#/.NET

- Available upon signing license agreement ☺

- Tested with data sources from around the globe
  - Incl AIM, MET, Flight, Surveillance, ICAO, ...

- Supported (Open) Standards
  - WFS, WMS, WS-N, WSDL, SOAP, REST, HTTP, TLS, PKI, AMQP, XML, JXSD, SON
  - AIXM 5.1 (incl Dig NOTAM), iWXXM, FIXM v2/v3, (NM B2B), ..

- Includes Jumpstart (Cloud-based) Services
  - (Basic) AIXM4.5 → AIXM5.1
  - METAR/TAF → iWXXM
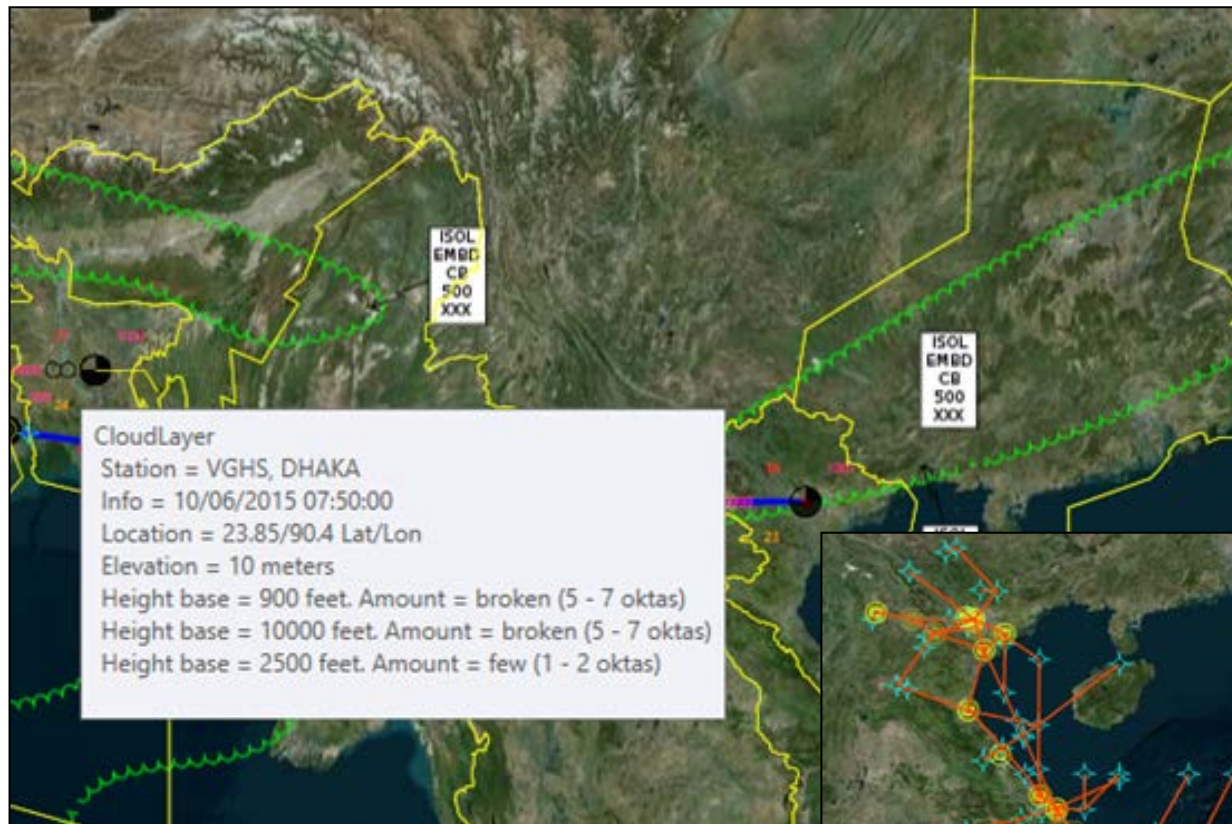 - Flightplan2012 → FIXMv2/v3
  - Federated PKI
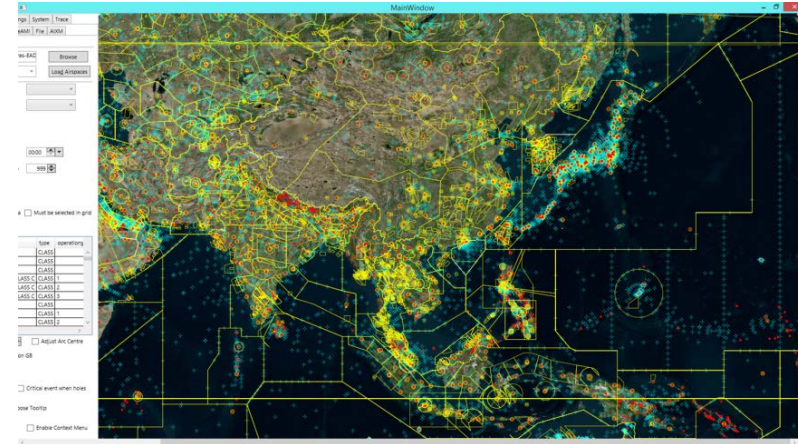
Vietnam example - I
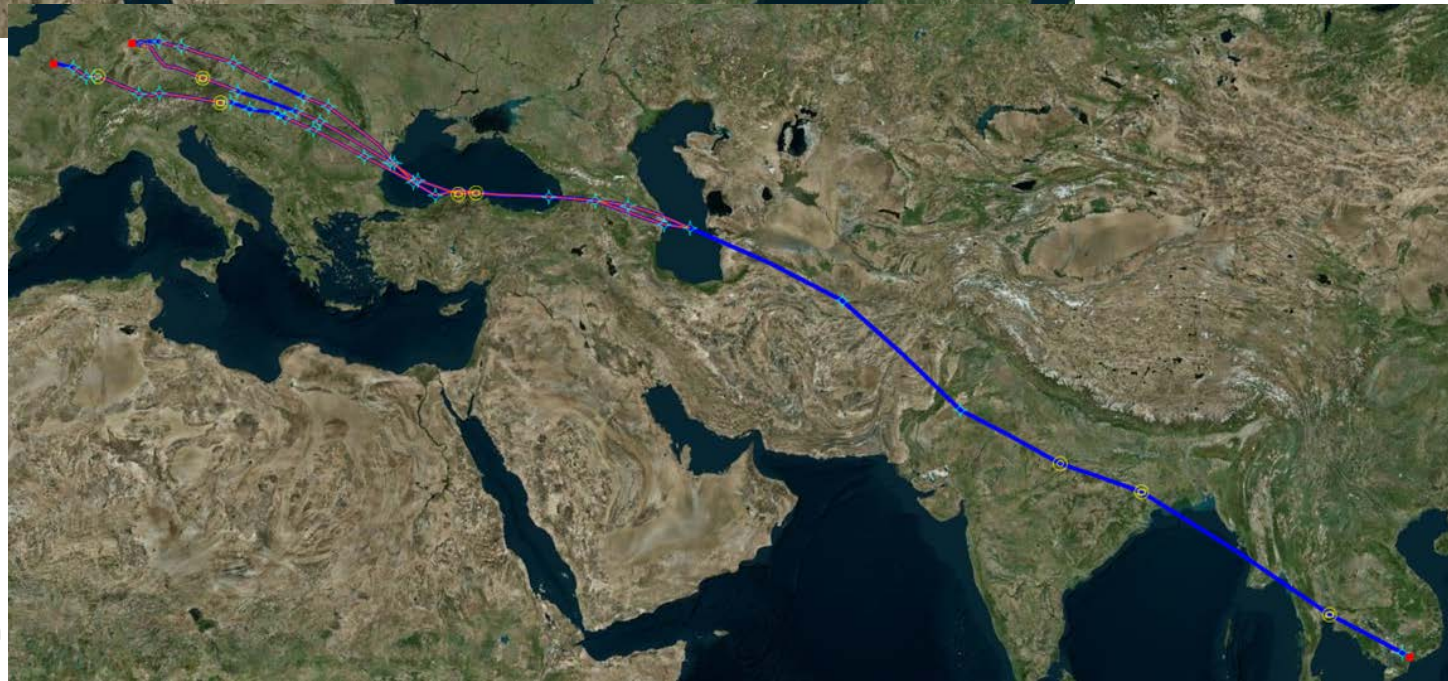
HVN Flights Europe – Hanoi
10th June 2015

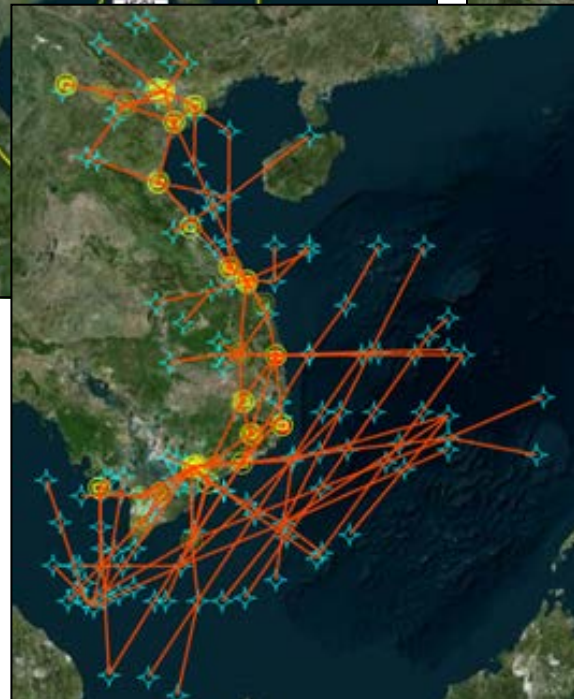HVN Flights Europe – Ho Chin Minh
10th June 2015

Vietnam example - II

+ Meteo and Airspace data
10th June 2015

+ Airspaces type (FIR + D, P, R, TMA)
10th June 2015

Vietnam AIXM 4.5 -> 5.1

CloudLayer
Station = VGHS, DHAKA
Info = 10/06/2015 07:50:00
Location = 23.85/90.4 Lat/Lon
Elevation = 10 meters
Height base = 900 feet. Amount = broken (5 - 7 oktas)
Height base = 10000 feet. Amount = broken (5 - 7 oktas)
Height base = 2500 feet. Amount = few (1 - 2 oktas)
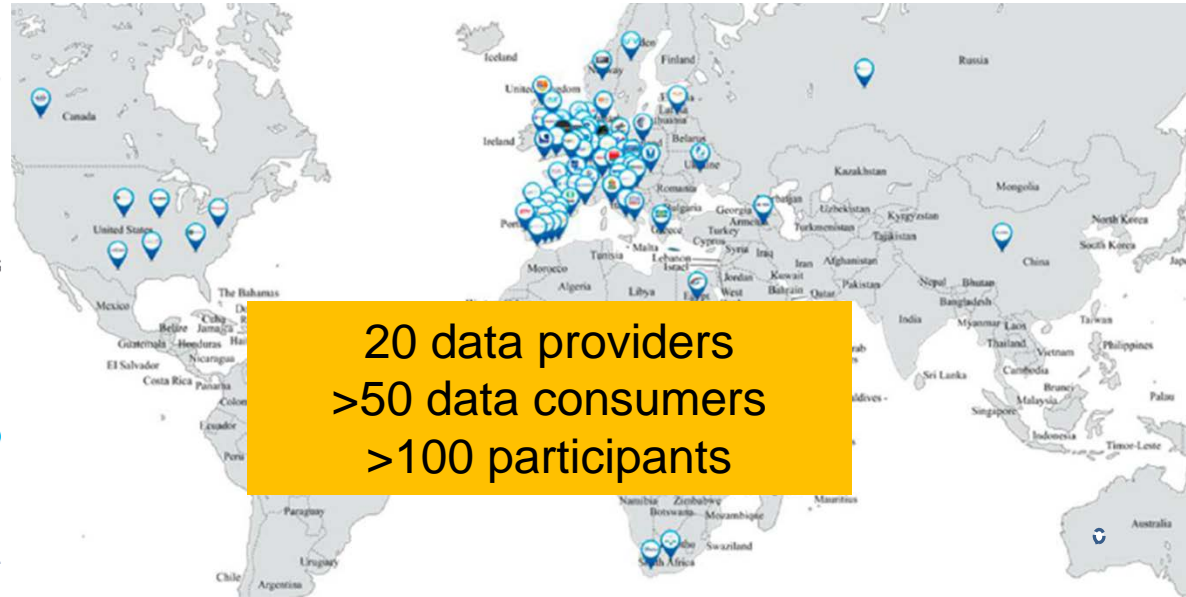
SESAR SWIM Masterclass

A **global SWIM Sandbox**
During 6 months 'play' together in a Non-Operational environment
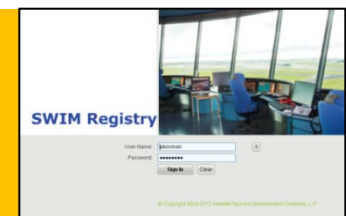providing/consuming SWIM Services
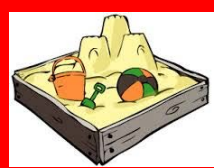
2014 Participants

20 data providers
>50 data consumers
>100 participants

- Aeronautical, Meteorological, Flight, Environmental, Surveillance, Aircraft, … services
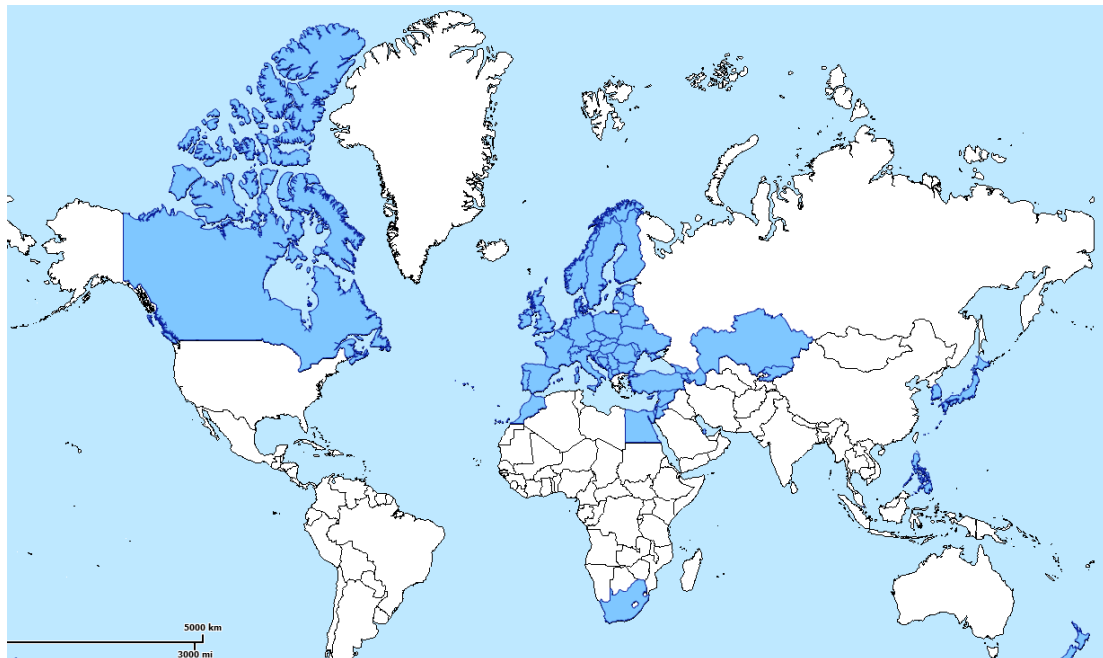 - All in registry

SWIM Registry

Local or Central ?

SWIM is not prescriptive

Depends on your local business case

Importance is to unlock & share your data !

EAD Participating States, more welcomed !

So what can you do ?

- Free : Follow SWIM Webinars
  - www.sesarju.eu/swim/resources

- Free : Install & Use Jumpstart
  - www.sesarju.eu/swim/resources

- Free : Participate to SWIM Masterclass (June-Dec 2015)
  - www.sesarju.eu/newsroom/events/sesar-swim-master-class-2015

- Free : Participate to SWIM Global Demos (till Q2/2016)
  - www.swim.aero

- Free : Follow IMP proceedings
  - www.icao.int/airnavigation/IMP/Pages/default.aspx
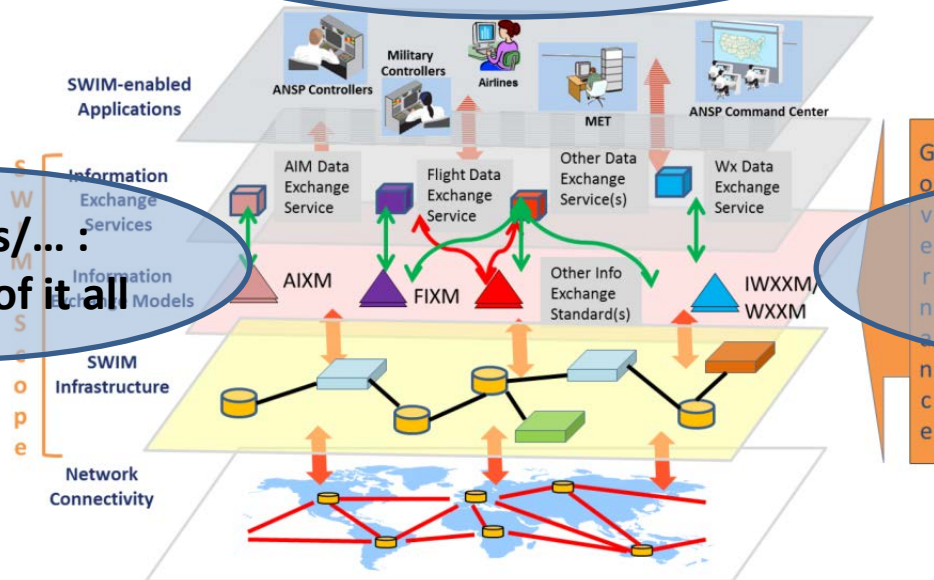
paul.bosman@eurocontrol.int
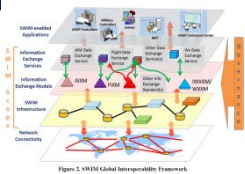
Conclusions

SWIM is a becoming a reality with impressive Benefits

AIRM/XMs/... : Foundation of it all

ICAO IM Panel ++

(Web)-Services : Booming

More global trials / demos will further de-mistify and obtain more benefits

Figure 2. SWIM Global Interoperability Framework

Questions & Contact Information

- **SESAR Joint Undertaking**
  www.sesarju.eu/swim
  Linked in http://www.linkedin.com/groups?gid=3748809&trk=hb_side_g

- **Email** swim@sesarju.eu

- **Registry**
  http://eur-registry.swim.aero

- **Data Exchange models**
  - *Aviation Information Data Exchange* **www.aidx.aero**
  - *AIXM - Aeronautical Information Exchange Model* **www.aixm.aero**
  - *WXXM – Weather Information Exchange Model* **www.wxxm.aero**
  - *FIXM - Flight Information Exchange Model* **www.fixm.aero**

- **AIRM** **http://im.eurocontrol.int/wiki/index.php/AIRM**

- **Some additional info**
  www.eurocontrol.int/im & **im.eurocontrol.int/wiki**

- **IM Panel** http://www.icao.int/airnavigation/IMP/Pages/default.aspx