THE SESAR CONCEPT AND SWIM

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SESAR Joint Undertaking
SESAR Priority Strategic Business Needs

- Moving from airspace to 4D trajectory management
- Traffic synchronisation
- Network collaborative management and DCB
- Airport integration and throughput
- Conflict management and automation

System wide information management
System Wide Information Management

- Information is at the heart of ATM
- Develop the concept of ‘System-Wide Information Management’
- Moving ATM from System-Centric to Information-Centric operations
- Establish the ‘intranet’ for aviation
- Access to the right information at the right time by all ATM stakeholders in support of the decision making process.

**Definition**: SWIM consists of standards, infrastructure & governance enabling the management of ATM information and its exchange between qualified parties via interoperable services.”
SWIM Global Interoperability Framework
WHAT IS SWIM?

Michel Procoudine
SESAR Programme Technical Director
Thales
SWIM consists of standards, infrastructure and governance enabling the management of ATM information and its exchange between qualified parties via interoperable services.

**DEFINITION:**
Ref: SESAR SWIM CONOPS, adopted in ICAO SWIM Concept material

SWIM consists of standards, infrastructure and governance enabling the management of ATM information and its exchange between qualified parties via interoperable services.
The way to share ATM information using SWIM ...

- Sharing information via Providing / Consuming service(s)
  - Information Services Reference Model (ISRM)
- Common data definition
  - ATM Information Reference Model (AIRM)
- SWIM Technical infrastructure

Interoperability through standards
SWIM Building Blocks

ATM Service

SWIM Technical Infrastructure
- Service discovery
  - Registry
  - Provider
  - Consumer
- Security
- Logging
- Tracing
- Recording
- Data validation

SWIM Governance

Information Integration
- Directory
- Service discovery
- Information discovery

Network and communication
- G-G Communication
- A-G Communication

Information Assurance
- Authorize
- Authenticate

SWIM governance

FROM INNOVATION TO SOLUTION
- Standard Service Oriented Architecture (SOA) technologies
- Associated SOA products
  - Enterprise Service bus, Security solutions, supervision products, Data distribution solutions (DDS), etc ...
- Developed software to complement and interconnect products
- Relying on IP-based communication network services
- One size does not fit all > technical profiles (stacks of technology)
  - Yellow profile: non critical information (AIM, Weather, ...)
  - Blue profile: critical information (Flight Object)
  - Purple profile: to accommodate air-ground exchanges
Example: Flight Object Interoperability

Sharing of consistent flight data between all stakeholders (Civil ATC, Military ATC, Flow Management Systems, Airport Operators, Aircraft Operators and Aircraft Systems)
Coordination of changes to that flight data even between systems that are not yet operationally responsible for the flight
SWIM Infrastructure – Flight Object IOP example

- Interconnection of 3 ACCs for exchange of Flight Objects
- Promising results
- Significant progress towards global information exchange

Validation exercise run in the scope of SESAR in November 2013
Global Cooperation & Interoperability

Need to work out the ICAO Global Interoperability Framework (GIF)

Aeronautical databases (WG44/SC217)
Flight Data Interoperability (WG59)
Aeronautical Information and Meteorological Management (WG76/SC206)
Standards for Air Traffic Data Communication Services (WG78/SC214)

Open Geospatial Consortium testbeds
Aviation Domain Working Group

ARINC 816 – Airports Database
ARINC 424A – Navigation Database
ISO 27000 – Information Security Mgt

RTCA
ARINC
ISO
OGC

NextGen
EU/FAA Coordination

• ATM Requirements and Performance Panel
• Aeronautical Information Services to Aeronautical Information Management Study Group
• Aerodrome Meteorological Observation and Forecast Study Group / Information Management Panel

ARINC
AIRM
Aeronautical Information eXchange Model
Weather eXchange Model
Flight Information eXchange Model
Registry

FROM INNOVATION TO SOLUTION
SWIM SERVICE MODELS

Georg Trausmuth
Head of Corporate Research

Frequentis

FROM INNOVATION TO SOLUTION
Outline

• Experience report on providing an AIM service on the SWIM platform
  – Integrated Digital Briefing Service

• Service Development Steps
  – Data Models
  – Service Models
  – Implementation

• Specific characteristics

• Lessons learned
Digital Briefing Service

Digital Briefing Service Orchestration

- Aeronautical Feature Service
- Flight Data Exchange Service
- Weather Data Exchange Service

provides

uses

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Building Blocks

- SWIM-enabled Applications
- Information Exchange Services
- Information Exchange Models
- SWIM Infrastructure
- Network Connectivity

Service relevant Building Blocks

Governance

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Data Model

The Data Model developed by SESAR is called the ATM Information Reference Model (AIRM) – it consists e.g. of:

- Aeronautical Information Exchange Model (AIXM)
- Surface Data and Aerodrome Map Database (AMDB)
- using the Weather Information Exchange Model (WXXM)
- using the Flight Information Exchange Model (FIXM)

AIRM models foresee regional extensions
Specific Aspects of the Solution

• Focus on Security because services from different providers are orchestrated to work together
  – Backend services from EAD, Eurocontrol Network Management System and different weather providers are connected

• Experimental work is ongoing to also uplink briefing information to the cockpit via air-ground data link
Lessons Learned

• Governance and Security are key for a service oriented system (e.g. Service Catalogue & Registry)

• International cooperation helps to shape solutions for the whole domain (beyond regional solutions)

• Technology changes are less complex than organisational surroundings

• Technology deployed is proven in use in other fields and ready for Air Traffic Management
FROM INNOVATION TO SOLUTION

SESAR SWIM OUTREACH

Dirk Janssens
Project Manager

Eurocontrol
**Objectives**
- Passing R&D knowledge to Implementers and Operators
- Stimulate the transition to SWIM deployment

**How?**
- Mixture of SESAR SWIM Master Class and Demonstrations
- Going truly global
- Involving end-users
- 2014/2015/2016
SWIM Demonstrations in the SESAR lifecycle

- Innovative R&D
- Applied R&D
- SWIM Demonstrations
- SWIM Master classes
- Global SWIM Demonstrations
- Industrialisation
- Deployment
- iSWIM deployment

SESAR JU Work Programme
SESAR SWIM Master Class

A global SWIM Sandbox
During 6 months ‘play’ together in a Non-Operational environment
providing/consuming SWIM Services

2014
In progress
100 participants
Even more non-European

Aeronautical, Meteorological, Flight, Environmental, Surveillance, Aircraft, … services
All in registry
Key element: the Registry

Discover Service → Database → Publish Service

Provide Service ← Database ← Consume Service

Consumer

Provider

SWIM

Governance
Information
Services
Infrastructure
SWIM Artefacts in the Registry

- Policies
- Stakeholders (roles and responsibilities)
- Compliance Assessment Results

Governance

Information
- Consolidated and structured source of reference
- Accessible for all qualified ATM stakeholders
- Improved visibility on standards and services
- Support for collaborative evolution

Services

Infrastructure
- Infrastructure Profiles
- Infrastructure Protocols
Global SWIM Demonstrations

Long haul information need

- Create a 'global sandbox' environment that:
  - It is available where possible throughout the demonstration projects duration
  - It allows different choices to be tried
  - It facilitates connecting parties with joint interests, yet decouples them where necessary.
- Bi-/Multilateral demonstration scenarios
- Publication of service information in a (federated) registry.
- Minimal schedule constraints between parties

SESAR FOCUS

Static and dynamic information between **regional information providers** and **global information consumers**, i.e. airlines conducting long haul flights through different ICAO regions, with a particular focus on the domains of **meteorological**, **aeronautical** and **network management**.
A sneak preview on upcoming opportunities

- "SWIM Global Demonstrations" is a common and global workspace for SWIM where the ATM community can find/share/coordinate information about SWIM demonstrations of a global interest, aiming at the deployment of SWIM.

- www.swim.aero
Conclusions

• **SWIM** is now **becoming a reality**

• **Information Management**, Data/Information models, Registry, ...
  – New concept for ATM (but not new in other industry domains!!)
  – Service Orientated Architecture (SOA) approach

• In terms of **SWIM Implementation**
  – Unlock the data
  – Data exchange models (XMs) are safe investments
  – Be SOA - Publish / Consume services

• Lets go for a **truly global SWIM** ...

• **More information on SWIM & how to participate?**
  – Visit us at the stand of SESAR Joint Undertaking
  – www.sesarju.eu/swim
  – www.sesarju.eu/masterclass
  – www.swim.aero