System Wide Information Management (SWIM)

PENS Symposium
Brussels, 17 October 2012

Today's partners for Tomorrows aviation
THIS PRESENTATION IS ABOUT

- Introduction
- Principles & Definition
- Governance
- Logical models
- Technical infrastructure
- Open issues
The need for sharing ATM information ...

Sharing Information
a Key enabler for planning – executing - analysis
The way to share ATM information ...

- Systems interoperability
- Common data definition
- common interfaces
- Integrating aircraft, regional systems, local systems, military systems

Data Exchanged:
- Surveillance data
- Flight data
- Aeronautical data
- Meteo data
- ATFCM scenario data
- Demand & Capacity data

Systems implementation
- Flight data
- Surveillance data
- Aeronautical data
- Meteo data
- ATFCM scenario data
- Demand & Capacity data
PRINCIPLES & DEFINITION
Principles

Information sharing
  ➢ Multiple stakeholders

Service orientation
  ➢ separate concerns, flexibility

Federation
  ➢ Ownership of information

Open standards
  ➢ Semantic & Technical interoperability

Information and service life cycle governance
  ➢ Controlled evolution, trust
SWIM Concept

SWIM consists of **standards, infrastructure and governance** enabling the management of **ATM information** and its exchange between **qualified parties** via **interoperable services**.

---

**Qualified parties**

- ATM information
- Service consumer(s)

**Qualified party**

- ATM information
- Service(s)

**SWIM Infrastructure**

**Network infrastructure**

**Standards**
SWIM Concept

SWIM consists of standards, infrastructure and governance enabling the management of ATM information and its exchange between qualified parties via interoperable services.
GOVERNANCE
Governance - overview

Information Framework

Service Framework

Compliance Framework

Institutional Arrangements

regulatory functions
- design-time
- runtime
- general oversight

operational functions
- registration
- certification
- security
- supervision
- oversight
Governance

- Information Management functions are being identified from the SWIM Concept of Operations that was produced end of 2011.
- Proposals are being formulated for how governance may be organised in real life in the future.
  - Note: Implementing governance is part of the deployment activities and hence outside the scope of the current work.
- Governance aspects are set-up and evaluated inside the programme.
  - CCBs for AIRM and ISRM.
  - Preparation of a registry capability to support design time governance.
  - SWIM compliance framework being defined and foreseen to be applied as well.
Qualified parties

• Need to identify what it takes to become a qualified party in SWIM.
  • Link to SWIM governance and compliance framework
    • Infrastructure
    • Services
    • Information lifecycle
    • .....
LOGICAL MODELS

AIRM & ISRM
Reference models
ATM Information Reference Model (AIRM)

Semantic interoperability within ATM
- *The same name means the same thing in all parts of the system.*
- *Seamlessly combine and process information from more than one provider.*

Consistent information and data modeling
- *Minimize redundancies by spotting overlaps within data models*
- *Reuse existing model constructs*
- *Reduces effort to creating and maintaining information and data models*

ATM information standards on European and global level
ATM Information Reference Model (AIRM)

Logical model (consolidated)

Physical models (domain specific)

**AIXM - Aeronautical Information Exchange Model**
[www.aixm.aero](http://www.aixm.aero)

**WXXM – Weather Information Exchange Model**
[www.wxxm.aero](http://www.wxxm.aero)

**FIXM - Flight Information Exchange Model**
[www.fixm.aero](http://www.fixm.aero)
Information Service Reference Model (ISRM)

Operational context
  • Processes, Scenario’s, Actors, Information Flows

Information Exchange Requirements
  • Issuer, Addressee, Information Element, QoS

Service allocation and development
  • Allocation to SWIM infrastructure
  • Allocation to legacy system
Working Method on Services

Needs/Requirements
- Business modelling
- Operational modelling

Solution outline
- Service identification

Solution design
- Service design

Development
- Service allocation
- Interface definition
- Service development

Implementation
- System architecture
- System design
- Prototype development

Deployment
- Industrialisation
Interoperable services

- **Information Service Reference Model (ISRM) is under development**
  - Logical service definitions
  - Physical service implementation possible on SWIM infrastructure that supports the service’s functional and non-functional requirements.

- **Iteration/evolution in 6 month intervals.**
  - Iteration 0.5 planned for end of September
  - From 6 services in iteration 0.4 to ~12 in iteration 0.5

- **Actual (model compliant) prototype implementation is (to be) done by SESAR technical projects.**
TECHNICAL INFRASTRUCTURE
A net centric approach
Connecting multiple stakeholders
Interoperability between legacy systems

SWIM as a means to create interoperability between legacy systems (APP)

(Enabling the gradual transition towards services)
Different needs require different solutions

Grouping of needs leads to SWIM profiles

Profile 1
Profile 2
Profile 3
<table>
<thead>
<tr>
<th>Capability</th>
<th>ATC to ATC</th>
<th>B2B CFMU NOP</th>
<th>B2B EAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Messaging</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Security</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Logging &amp; Tracing</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Supervision</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Remote</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>HiPidd</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Interface Layer</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Message Protocol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Message Exchange Pattern</td>
<td>Request/Reply Request/Reply Request/Reply Publish/Subscribe Publish/Subscribe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology Standards</td>
<td>WS, DDS</td>
<td>WS</td>
<td>WS, WS-N</td>
</tr>
<tr>
<td>Network</td>
<td>PENS &amp; National</td>
<td>Internet</td>
<td>Internet</td>
</tr>
</tbody>
</table>
Ongoing PENS – SJU coordination

Led by Bolek Gasztych (ECTL) since 24 May 2012

Objective I: Short term validation requirements
Objective II: Align SWIM design and network requirements

- Identify network configuration options (e.g. multicast)
- Identify applicable SWIM profile requirements
- Define the optimal network configuration in support of SESAR requirements for future deployment of SWIM.

Note
Deployment of solutions is out of the SJU scope. Decisions on a deployment management body are pending.
Air/Ground SWIM
Still cracking the tough nuts…

Interoperable, Affordable, ….
Summary

• We agree on the basic SWIM concept ✓
• Step 1 infrastructure profiles evolving to Step2 profiles ✓
• We have some initial infrastructure prototypes ✓
  • Evolution required.
• Baseline AIRM available ✓
  • Evolution required.
  • Need to assure full use.
• Services being defined, subject to operational requirements. ✓
• Governance aspects need elaboration.
  • Registry service being set-up for the programme.
• Air ground SWIM in early development

AIM/SWIM team #3 – SESAR SWIM presentation
THANK YOU