SWIM: An ANSP Perspective

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ICAO Interregional APAC/EUR/MID Workshop on "Service improvement through integration of AIM, MET and ATM Information Services"

Agenda

- **CANSO**
- **Expected SWIM benefits**
- **The scope of SWIM**
- **General difficulties of implementing SWIM**
- **Global SWIM implementation examples**
- **SWIM Use Case: Digital Integrated Briefing concept**
  - **Reality check**
  - **Issues related to technology**
  - **Issues related to the briefing process**
- **Outlook**
- **Recommendations**

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Vision

➤ To be the recognized leader in transforming global air traffic management (ATM) performance

Membership

➤ 88 **Full Members** (ANSPs) representing 85% of the world traffic

➤ 80 **Associated Members** (Organisations that supply goods and services to the air traffic management industry, as well as academic institutions and aircraft operators)

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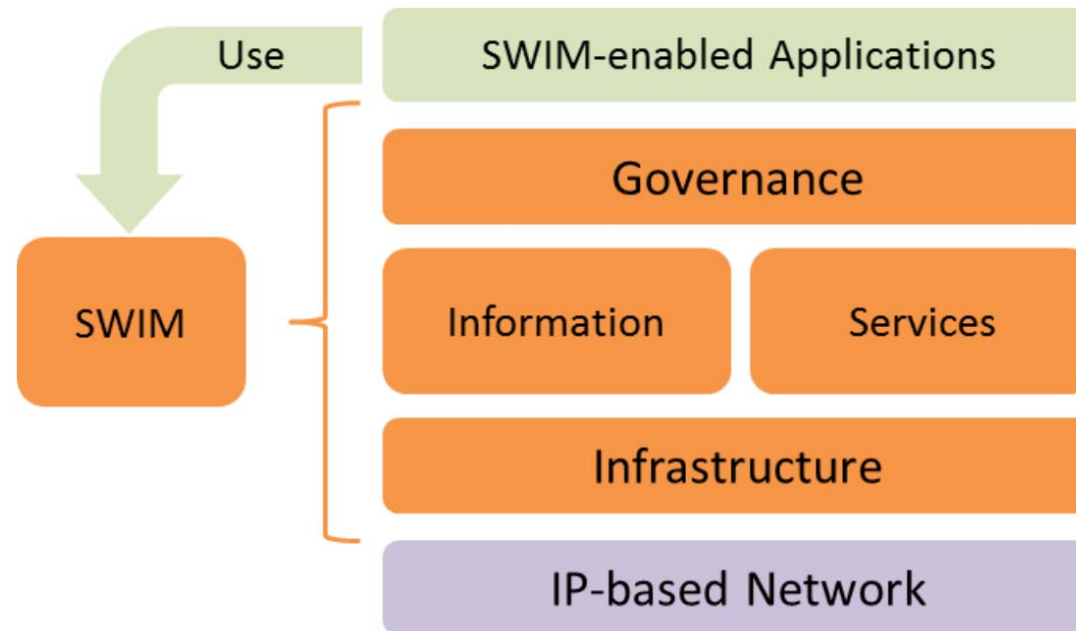GLOBAL ATM PERFORMANCE

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SWIM: expected benefits

➤ Supports data exchanges within the ATM community

➤ Technology projects can be implemented faster and cheaper by using standardized data and interfaces.

➤ Transition efforts are significantly reduced since common data and interfaces are used.

➤ It becomes easier to pool resources and optimize operational processes across boundaries (e.g. Arrival Management).

➤ Standardized data and interfaces lead to modular system architectures that are based on components, which leads to increased competition and lower costs.

➤ **SWIM is no end in itself, but an enabler for safer, higher capacity, and more cost-effective operations.**

SWIM = digital ATM data are globally available

The scope of SWIM

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Global SWIM examples

- The European Network Manager has deployed several operational SWIM services, e.g.:
  - flight plan preparation, flight plan management, flight data retrieval, departure planning information (DPI)
  - AIP source data, e-AMI (electronic airspace management information), FUA (flexible use of airspace)
  - regulation list, ATFCM situation, traffic counts, ATFCM tactical updates, regulation proposal management
- The European initial SWIM deployment by other stakeholders including ANSPs based on EC IR 716/2014 is beginning
- Heathrow - Cross Border Arrival Management (XMAN) (SWIM-WS)

ANSPs are fully committed to implementing SWIM but...

What makes implementing SWIM so difficult?

➤ Some industries and applications have successfully established global, seamless data exchanges, some examples:

- Banking (e.g. ISO/TC 68, ISO/IEC JTC 1)
- Maritime industry (e.g. IHO, IEC/TC 80)
- Machine Readable Travel Documents (e.g. ICAO, ISO/IEC JTC1)
- Space data systems (e.g. CCSDS, ISO TC20/SC13)

➤ Mandatory processes to achieve congruent and coherent standards and validate their implementation are applied in these areas.

➤ We will look at the maritime industry in more detail later.

PASSPORT
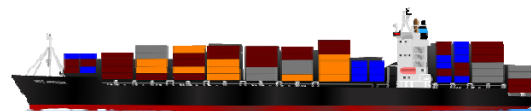
Let's look at some of the difficulties in implementing one particular use-case of SWIM in more detail:

Digital Integrated Briefing

Why should we look at Digital Integrated Briefing?

- A reality check to see if the objectives of SWIM are being met is a prudent thing to do.
- Aeronautical information stakeholders are early adopters of SWIM technology and can provide some valuable lessons learned.
- A good case study for this reality check is Digital Integrated Briefing since it encompasses more than one information domain and has global relevance.
- Digital Integrated Briefing is a SESAR Solution with a clearly defined new operational concept that depends on the successful implementation of SWIM.

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Concept: digital integrated briefing

Key changes:

➤ generation of the briefing products from digital aeronautical data (in particular from Digital NOTAM) instead of providing a list of NOTAM messages;

➤ extensive graphical presentation of the information that affects elements that are usually displayed on aeronautical charts (taxiway/runway/apron closures, navaids unserviceable, temporary obstacles, airspace restrictions, etc.)

➤ use of normal sentence case for the textual/tabular part of the briefing

➤ joint presentation of the aeronautical and MET events that may have a combined effect on a flight's trajectory (such as airspace restrictions and significant weather)

➤ the possibility for interactive briefing, thus allowing the pilot/dispatcher to highlight/prioritize information that is more relevant for each individual flight.

➤ The Digital Integrated Briefing will be used both on the ground (FOC/WOC, pre-flight briefing rooms and ARO offices) and in the cockpit, in all phases of flight.

Global Framework

Doc 10039 AN/511

MANUAL ON SYSTEM WIDE INFORMATION MANAGEMENT (SWIM) CONCEPT

Definition "SWIM consists of standards, infrastructure & governance enabling the management of ATM information and its exchange between qualified parties via interoperable services."
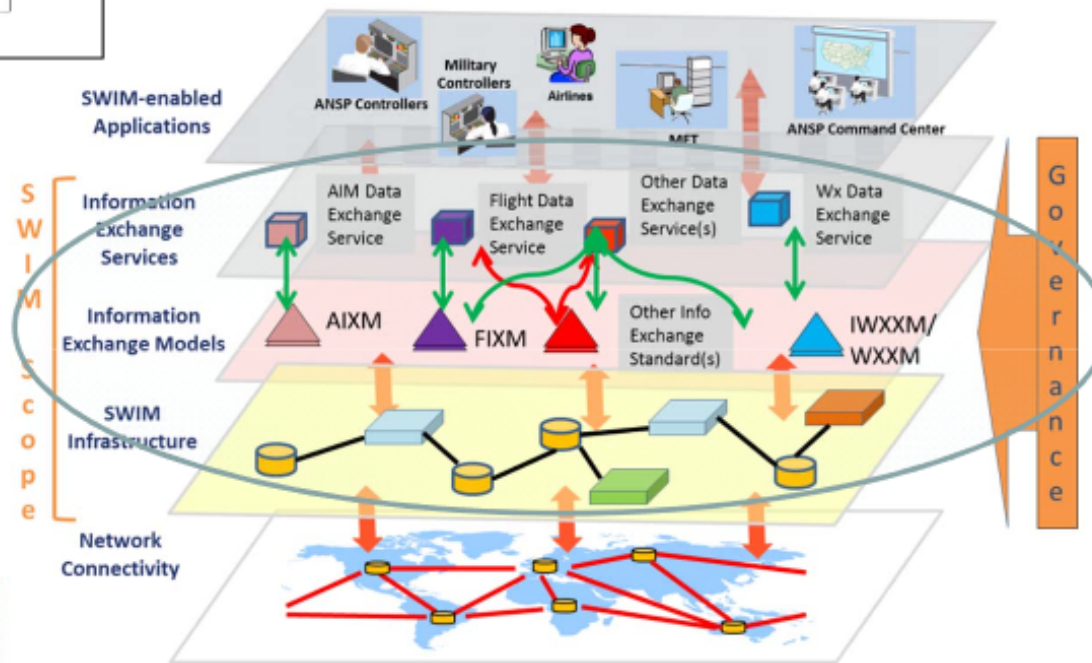
Figure 2. SWIM Global Interoperability Framework

Reality check for aeronautical data

Upstream → Downstream → 28-day AIRAC cycle

Mostly proprietary data formats

Upstream boxes:
- Airports
- CNS infrastructure
- Procedure design
- ATS
- Others

→ AIS organization → Aeronautical database AIP NOTAMs PIBs etc.

Downstream boxes:
- Adaptation data systems → ATS systems
- LoA 1
- LoA 2 → Pilots
- Commercial data providers → Navigation Database Suppliers → Airlines
- Other airspace users
- Drones

← ICAO SARPS (and regional regulations)

AIXM
GeoTIFF
CSV
and
others

Industry standards →

ARINC 424 (FMS navigation data)
ARINC 633 (EFB briefing data)
ARINC 813 (terrain data)
ARINC 815 (obstacle data)
ARINC 816 (aerodrome mapping)
and others

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Comparison with the maritime industry

S-57 files

ENC files

ISO certification

Process Documentation Focus: process within segment

Validation

Encryption

Distribution

ISO certification

SENC certification

Type approval

Data product standards

Extendable

Data Supply Chain Certification
(Data quality, integrity, and interoperability)
Focus: data across entire supply chain
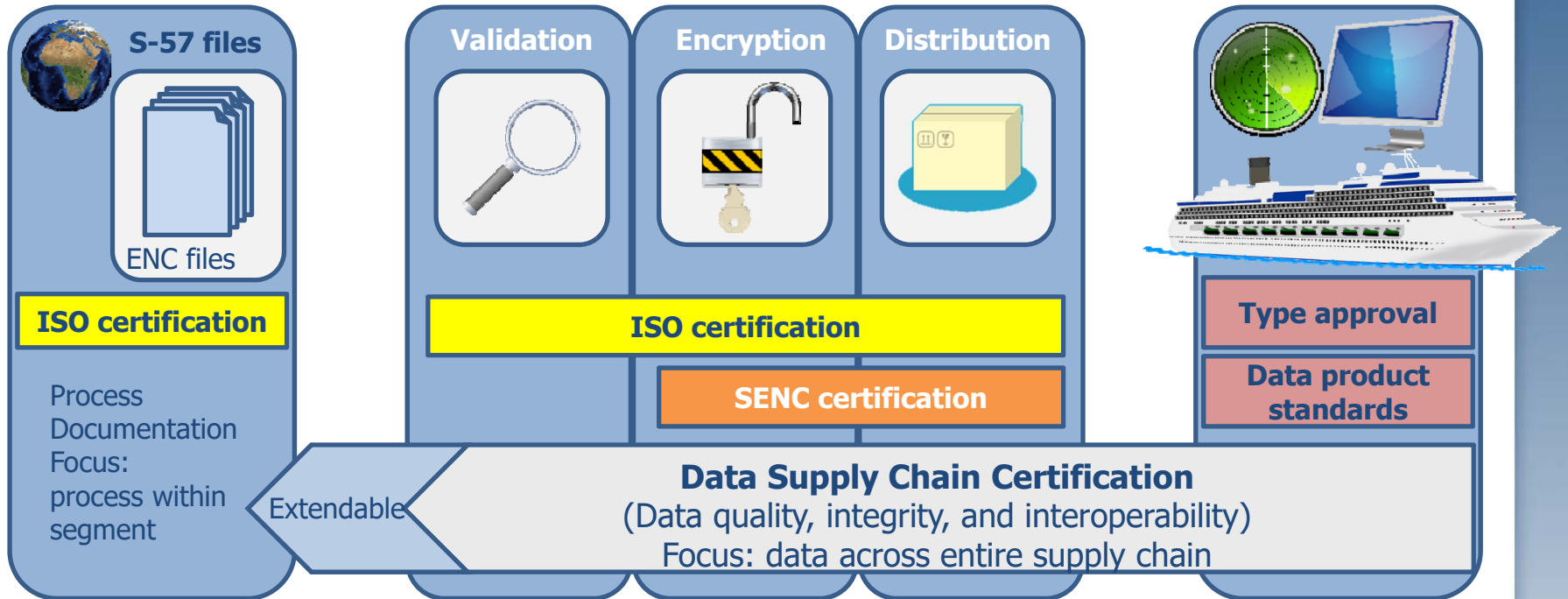
➤ No manual data conversions take place; the update cycle is flexible from one week to on-demand

➤ Systems can convert IHO S-57 data into their own system-specific formats (SENC) for processing

➤ All actors use S-57 data, S-57 data processing is inter alia certified in accordance with IEC 61174

➤ **Aviation can learn from this example.**

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A more detailed look at technology issue (I)

➤ ARINC Specification 633 is the de facto standard used in today's Electronic Flight Bags (EFBs).

➤ The integration of AIXM/IWXXM/FIXM with ARINC 633 should be developed and validated; overall the alignment of all relevant standards must be ensured in the target system architecture.

➤ Digital NOTAM should be further matured and globally harmonized rules for its deployment developed.

➤ The implementation of Regulation 73/2010 (ADQ) and eTOD mostly failed due to technical issues. The underlying technical issues must be fixed to make available the digital baseline data required for the successful deployment of Digital NOTAM and other briefing applications.

➤ Major interoperability issues with AIXM, which the solution relies on*, must be solved.

* see ICAO Information Management Panel WG 3 paper "AIXM Interoperability Issues" and ICAO's conclusions from the AIM Global Conference in Kampala 2017, slide 18

A more detailed look at technology issues (II)

➤ The harmonization of AIXM 5.1 with ARINC Specifications 815 Obstacles, 816 Airport Mapping Databases, and 424 Navigation System Database is also in various implementation stages but not fully implemented and validated.
This harmonization is relevant for the usefulness of briefing data on the flight deck because pilots need to have full situational awareness and should no longer have to deal with majorly disparate update situations.

➤ **We must ensure that the data used are standardized in accordance with globally applicable specifications since flight briefings cover worldwide destinations.**
The standardization arrangements must be improved to address these issues. An improved global standardization framework, which ensures format compliance through tests and certifications of implementations needs to be implemented.

Issues related to the briefing process

➤ SESAR needs to develop and validate processes, which ensure that digital aeronautical data sets provided by States are congruent and coherent (the maritime world provides good examples on how to achieve this).

➤ Congruent and coherent data are required for digital processing. EAD data are only suitable for limited operational use.

➤ A globally harmonized process framework for Digital NOTAM needs to be developed. NOTAM processes today are, and will continue to be, agreed at the ICAO level because non-harmonized NOTAM operations are intrinsically unsafe.

➤ Any isolated development of legislation in Europe today runs a major risk of being made obsolete in due course through the SERA process (with obviously dire consequences for investments made through the European legal framework).

➤ A mature concept for the transition from legacy to Digital NOTAM and a concept for "mixed mode" ARO briefing operations need to be developed. Under the current regulations, any flight that also requires NOTAMs that are only partially digitalized, will likely have to fall back to the non-digital legacy environment.

What does the future look like if we change nothing?

➤ Instead of a globally harmonized information landscape, numerous islands of more or less proprietary and disparate standards will keep appearing.

What can we do to fix it?

➤ We need a global process that acts as a funnel and:

- aligns the standardization ~~activities of all stakeholders~~ in the aviation domain (including drones, commercial space transport, etc.)
- ensures that aviation leverages existing international standards to the maximum extent possible
- requires successful reference implementations to demonstrate technical maturity
- requires mandatory compliance tests in technical standards to guarantee a high level of trustworthiness
- bundles global resources

➤ Why not adopt the "Code of Good Practice for the Preparation, Adoption and Application of Standards" developed by the World Trade Organization* (WTO), which would address all these aspects? These guidelines can be adopted by any standards organization!

* These WTO standardization and certification guidelines form the basis of European standardization as per Regulation (EU) No 1025/2012 on European standardization.

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Conclusions I

➤ **The long-term benefits of SWIM** in general and of the Integrated Digital Briefing Solution in particular **are undisputed**.

➤ Digital Integrated Briefing requires the availability of an integrated data environment of quality-assured digital aeronautical data as a pre-requisite (which does not yet exist).

➤ There are a number of show-stopping issues for which production-strength solutions need to be developed.

Conclusions II

➤ In absence of a V3-validated solution for creating this data environment (both technically and procedurally) it is not possible to define a realistic deployment target for solutions built on top of such a data environment – this also applies to other SWIM-based solutions.

➤ We need to end the development and use of non-harmonized technical standards and data formats.

➤ Our target architecture should foresee the convergence of data formats and interfaces as well as technical standards for data processing with corresponding compliance tests*.

➤ We should improve our working structures to reach production-strength solutions, bundle resources globally, and harmonize our data similar to the maritime industry.

* An example for such a technical standard from the maritime industry is IEC 61174

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Questions?

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Thank you!

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