On ‘interoperability’ and ‘seamless’ within the context of SWIM

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• Doc. 9854, Global ATM Operational Concept
  – Information management will achieve a seamless transfer of relevant information…
  – ICAO is the only international organization in a position to effectively coordinate global ATM implementation activities leading to the realization of a seamless global ATM system.

• Doc. 10039, Manual on SWIM Concept
  – SWIM consists of standards, infrastructure and governance enabling the management of ATM information and its exchange between qualified parties via interoperable services.
Doc.9882, Manual on ATM System Requirements

- The requirements of **seamlessness** and **interoperability** dictate that systems — whether proprietary or not — conform to openly available standards regarding the format and character of transmitted or transferred information. It is intended that there will be development of fully **interoperable** information systems capable of **seamless** information transfer throughout the ATM system.

- To meet the expectations for the ATM system regarding information services, the ATM shall:
  - **support a reduction in transactional friction for transmission of information across systems.**
ATMCP-WG/WHL/10-WP/257, The Use of the Terms “Interoperability” and “Seamlessness”, 03/02/2006

- **Interoperability** within the ATM system is the ability to transfer information or effect functionality across any discontinuity, in order to enable operations.

- **Seamless** within the ATM system is the property that allows a transition across any discontinuity, which from the perspective of the transiting agent does not require a considered action to facilitate the transition.
Successful operations require reliable information.
The information in the Global ATM operations environment
Information relevant to global ATM operations
System Wide Information Management to provide the information in support of global ATM operations
Currently, the problem is the existences of various initiatives around the world began developing SWIM systems based on their respective and particular national or regional requirements.
Fulfilling the promise of SWIM enabling seamless information transfer.
On the notion of “interoperability”

• The question is:
• So, how to achieve interoperability?
• Simply put, interoperability means for heterogeneous systems to interoperate, that is, to work together.
An analogy to illustrate interoperability and seamless

- Electrical system in different States:
  - System A: 230 Volts
  - System B: 110 Volts
- The frequent world traveller, always, carries an adapter to use his/her electrical equipment.
- “Interoperability” means having to change to a different plug configuration and/or converter.
- No external adapter is needed for seamlessness.
Defining a standard SWIM Solution?

Standard Information eXchange Models

Technical Infrastructure

Information Management (key information domains)
AIRM – for semantic interoperability across XMs

- Aeronautical Information
  - AIXM
  - Annex 15, PANS-ATM Doc.8126

- Meteorological Information
  - IWXXM
  - Annex 2, PANS-MET

- Flight & Flow Information
  - FDXM
  - PANS-ATM Doc.9965

- Surveillance Information
  - Annex 20, Vol. IV

- Other Information...

Information Services

- Annex 15, PANS-ATM (Chapters dedicated to SWIM)

Technical Infrastructure

- Annex 10, Vol. III

COMM including Network Security
Defining a standard SWIM Solution?

Fully compliant Standard SWIM Solution should probably be made up of three key elements, namely:

- A standardized SWIM technical infrastructure,
- SWIM information services,
- SWIM registry to permit discoverability of the SWIM information services that are being provided.
The standard SWIM Solution decomposed into its three key elements, SWIM Technical Infrastructure, SWIM Information Services and SWIM Registry.
Global SWIM implementation:
Combining Uniformity with (interoperable) Variability to enable seamless information exchange in support of ATM operations.
Summary

• Interoperability and Seamlessness are key notions of the GATMOC
• Definitions for Interoperability and Seamless (WP/257) are still valid
• Discontinuities in the global system introduce transactional friction
• Interoperability always comes at a price
• To deliver on promise of seamless, global SWIM should act as “single system”
• Seamlessness requires uniformity
• Uniformity is not singleness
• Need to define a standard(ized) SWIM solution; key SWIM components
  – SWIM technical infrastructure,
  – Basic set of SWIM information services, and
  – SWIM registry
• Specificity versus Flexibility
• Objective of interoperability is to eliminate or, at least, minimize transactional friction
• Premise that uniformity leads to flexibility is counterintuitive