



WORKING PAPER

THIRTEENTH AIR NAVIGATION CONFERENCE

Montréal, Canada, 9 to 19 October 2018

COMMITTEE A

Agenda Item 3: Enhancing the global air navigation system

3.1: System-wide information management (SWIM)

HARMONIZING SWIM

(Presented by Australia and New Zealand)

EXECUTIVE SUMMARY

System- wide information management (SWIM) aims at integrating the air traffic management (ATM) network in the information sense, not only in the system sense, and thereby provides one of the foundational enablers for the future air navigation system. This paper presents some of the significant challenges faced by the aviation community in achieving and maintaining a globally harmonized SWIM. It asks the Conference to support a correspondingly strong stewardship role for ICAO and urges States to participate pro-actively in coordination and cooperation with ICAO.

Action: The Conference is invited to agree to the recommendation in paragraph 3.

1. INTRODUCTION

1.1 According to the Manual on System- Wide Information Management Concept (Doc 10039), “SWIM consists of standards, infrastructure and governance enabling the management of air traffic management (ATM) related information and its exchange between qualified parties via interoperable services.” The SWIM concept promotes information-based ATM integration and supports a secure information management architecture – ultimately improving aviation safety through greater situational awareness and better informed decision-making by flight crew and aerodrome operators.

1.2 As attested by the following extracts, a globally harmonized SWIM is a prerequisite for the delivery of operational benefits from the seamless system envisaged by the *Global Air Traffic Management Operational Concept*, (GATMOC, Doc 9854). SWIM is an integral part of the *Global Air Navigation Plan* (GANP, Doc 9750), with aviation system block upgrades (ASBU) modules serving the interoperable systems and data implementation path:

- a) “The ATM community will depend on information management, shared on a system-wide basis, to make informed collaborative decisions for best business and operational outcomes...” (GATMOC, p.2-16, 2.9.5)
- b) “System-wide information management.... aims at integrating the ATM network in the information sense.... This fundamental change of paradigm forms the basis for the migration... to the many-to-many information distribution model of the future, that

is, many geographically dispersed sources collaboratively updating the same piece of information, with many geographically dispersed destinations needing to maintain situational awareness with regard to changes in that piece of information. (GATMOC, p.I-13, 11.2)

- c) “B3-NOPS - Traffic complexity management: Introduction of complexity management to address events and phenomena that affect traffic flows due to physical limitations, economic reasons or particular events and conditions by exploiting the more accurate and rich information environment of a SWIM-based ATM.” (GANP 2016-2030 (Fifth Edition), p.41. ICAO Doc 9750)

2. DISCUSSION

2.1 SWIM is technically and operationally attainable and the aviation community should focus on its governance and standardization to achieve the vision of updating the present-day messaging system with a modern information management system to ensure the secure, reliable and robust exchange of information.

2.2 Achieving and maintaining a globally harmonized SWIM generates significant challenges for ICAO and the States that, if successfully resolved, can deliver fundamental efficiencies and reduce costs, in a continuing safety-focussed aviation environment. These challenges include vital interoperability considerations that may affect States’ adoption and implementation efforts, such as the following:

- Information Exchange Models (IXM) do not guarantee system interoperability and ‘translators’ may proliferate unnecessarily. The orderly, harmonized evolution of IXMs (cores and their possible extensions) needs to be ensured. The responsibility of the various groups managing the IXMs (e.g. Configuration Control Boards) should include facilitating seamless exchange of information not just within but also across different information domains (e.g., FIXM, iWXXM and AIXM – Flight, ICAO meteorological, and aeronautical IXMs respectively).
- *Rights of access to SWIM*: who can be a consumer and who is a producer of information? How are both identified and authenticated and by whom?
- What type of aviation information will be allowed to be published as an information service under SWIM, under what conditions and for what purposes?
- *SWIM registries*: Who creates and maintains them? How do registries help enforce SWIM-related policies (registry as an important governance tool)? Should national registries be harmonized to form part of a federated architecture?
- *SWIM compliance*: What is and what isn’t SWIM compliance? Who defines compliance? ICAO? Who validates compliance; the Member State? What mechanism is used to control publication, the registry?
- *Information services*: Will there be an agreed list of common information services categorized according to a specific information domain? How does the consumer readily find and connect to any one of such information services?
- Some States have invested heavily in ATS Message Handling System (AMHS) and are planning to leverage that infrastructure to develop SWIM-like services (e.g.

Operational Meteorological data, OPMET). This may lead to a prolonged transition period with a need to support multiple communication infrastructures (AFTN (aeronautical fixed telecommunication network)/AMHS; Internet Protocol-based). Furthermore, a prolonged transition period may delay if not jeopardize global SWIM adoption. What is to be done to build a local/national/global transition path that satisfies the need of the community – individually and generally?

- A significant number of SWIM-related efforts are and will continue taking place around the world simultaneously – including within aviation infrastructure modernisation programs that are gathering momentum. Any misalignment in the standards and governance arrangements developed for and/or used by such parallel efforts increases the risk of lack of harmonization with resultant poor operational outcomes and associated risks and costs.

2.3 Therefore, achieving and maintaining a globally harmonized SWIM requires the early resolution of vital interoperability considerations (as listed in 2.2) to create a strong foundation of ICAO provisions and guidance materials that can satisfy the needs of the aviation community and Member States, and accord with Assembly Resolution A39-22, *Formulation and implementation of Standards and Recommended Practices (SARPs) and Procedures for Air Navigation Services (PANS) and notification of differences which, inter alia:*

- a) “*Instructs* the Council to utilize, to the maximum extent appropriate and subject to the adequacy of a verification and validation process, the work of other recognized standards making organizations in the development of SARPs, PANS and ICAO technical guidance material;” (Clause 5);
- b) “*Resolves* that to the extent consistent with the requirements of safety, regularity and efficiency, SARPs specifying the provision of facilities and services shall reflect a proper balance between the operational requirements for such facilities and services and the economic implications of providing them;” (Clause 6);
- c) “*Instructs* the Council to consult Member States on proposals for the amendment of SARPs and PANS before the Council acts on them, except when the Council may deem urgent action to be necessary. Furthermore, subject to the adequacy of the verification and validation process, technical specifications may be acted upon by the Council without consultation with Member States. Such material shall however be made available to Member States upon request;” (Clause 7); and
- d) “*Reiterates* that SARPs and PANS shall be drafted in clear, simple and concise language. SARPs shall consist of broad, mature and stable provisions specifying functional and performance requirements that provide for the requisite levels of safety, regularity and efficiency.” (Clause 4).

2.4 ICAO is uniquely placed and qualified to foster consensus on common important issues affecting the aviation community and to drive the development of policy and regulatory responses that are globally cohesive and can deliver tangible implementation outcomes. Air Navigation Commission technical panels of experts (panels) remain a proven mechanism for reaching such consensus – as is the case of the Information Management Panel (IMP) dealing with SWIM. Many States do not participate in the development of provisions by panels, even if actively engaged in ICAO Planning and Implementation Regional Groups (PIRGs). It is of utmost importance to ensure a continuum between panel work and parallel PIRG activities. Therefore, given the size and complexity of the SWIM task at hand, it is also the responsibility of all States and their regulatory bodies to be actively engaged and to ensure that their activities are aligned in order for ICAO to develop suitable provisions and guidance material.

2.5 In summary: to foster the creation of a strong foundation of SWIM provisions and guidance material ICAO must play a strong stewardship role and States must participate pro-actively in coordination and cooperation with ICAO.

3. CONCLUSION

3.1 A globally harmonized SWIM is a prerequisite for the delivery of operational benefits from the seamless system envisaged by the GATMOC to be put in place through the implementation of the ASBU modules of the GANP. The achievement and maintenance of SWIM will remain challenging since it requires the early resolution of a range of vital interoperability considerations to create a solid foundation of ICAO provisions that accord with Assembly Resolution A39-22. Further momentum to deliver an effective and interoperable SWIM must be supported by ICAO playing a strong stewardship role and all States participating pro-actively in coordination and cooperation with ICAO.

3.2 The Conference is invited to agree on the following recommendation:

Recommendation 3.1/x – Harmonizing SWIM

That the Conference:

- a) request ICAO to ensure that the provisions related to system-wide information management (SWIM) include – whether directly, by reference or both – a robust regime of international standards and governance in sufficient and necessary detail that ensures:
 - 1) the full interoperability of systems and harmonization of procedures;
 - 2) the publication of provisions for information service providers/users that are essential to enable the delivery of tangible benefits in a realistic timeframe;
 - 3) the minimization of costs due to poor or lacking interoperability or harmonization; and
 - 4) integration with the cyber-resilience trust framework being developed in parallel by ICAO (AN-Conf/13 WP/27 refers);
- b) urge all States to participate pro-actively in coordination and cooperation with ICAO to foster a solid foundation of ICAO provisions and guidance material that ensure the full interoperability of systems and harmonization of procedures, and the minimization of costs due to lack of interoperability; and
- c) urge States to review their national policies to support an effective and efficient implementation of a globally harmonized SWIM for the entire ATM community.

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