



(Lima, Peru, from 18 to 22 September 2017)

Agenda Item 6: Planning for SWIM implementation

SWIM concepts and domains

(Presented by the Secretariat)

SUMMARY	
This working paper presents an introduction to system-wide information management (SWIM), its concepts and domains.	
REFERENCES	
<ul style="list-style-type: none"> • Annex 3 – Meteorological Service for International Civil Aviation • Annex 15 - Aeronautical Information Services • Doc 9750 Global Air Navigation Plan, Fifth edition • Doc 9854 ATM Operational Concept • Doc 10003 Manual on the digital exchange of aeronautical meteorological information • Doc 10039 Manual on SWIM concept (Disclaimer) • Doc 10045 – Report of the MET Divisional Meeting (MET/DIV) 	
ICAO strategic objectives:	<ul style="list-style-type: none"> <i>A - Safety</i> <i>B – Air navigation capacity and efficiency</i> <i>E – Environmental protection</i>

1. Introduction

1.1 Annex 3, in its amendment 77, includes the transmission of OPMET messages in XML/GML format.

1.2 Doc 10045 includes several recommendations related to System Wide Information Management (SWIM).

1.3 Annex 15, in Chapter 3, 3.6 introduces the issue of automation, stating that its use seeks to improve the timeliness, quality, efficiency and profitability of aeronautical information services. It further indicates that, for data quality purposes, automation shall:

- a) permit the digital exchange of aeronautical data amongst those involved in the data processing chain; and
- b) use aeronautical information and aeronautical data exchange models designed for global interoperability.

1.4 The fifth edition of Doc 9750 includes facilities related to system-wide information management (SWIM) in Block 1 of the ASBU methodology, under performance improvement area 2--globally interoperable systems and data.

1.5 The SWIM Manual (Doc 10039) provides a vision of globally interoperable information management and the transition to a mixed operating environment.

1.6 Proposal for amendment 79 to Annex 3 includes issues related to SWIM.

2. **Analysis**

2.1 The Global Air Navigation Plan (GANP) includes the importance of information management for the ATM operational concept.

2.2 Conceptually, information management has a dual purpose:

- a) to monitor and control the quality, consistency and usefulness of the “shared vision”, which is the basis for common situational awareness; and
- b) to provide mechanisms to support stakeholders in the management of information exchange rules, roles and responsibilities. This determines what type of information is shared by whom, with whom, where, when, why, how, how much, with what frequency, with what level of quality, in what way, what for, at what cost, under whose responsibility, under what circumstances, with what security levels, etc.

2.3 In the current circumstances, information management is essential for safety, and attention must be paid to all aspects related to data quality and security, and to information sources. In the Global Air Navigation Plan, safe management of information is fundamental for enhancing the whole aviation system.

2.4 It is very important to know the relationship between the GANP, the ASBUs and their operational impact. It should be noted that the objective of the GANP is to achieve a globally interoperable air traffic management system for all users during all flight phases that meets the agreed levels of safety, provides optimum cost-effective operations, is environmentally sustainable and meets national security requirements. SWIM implementation is one of the most important challenges in achieving this objective. The ATM community will largely depend on the provision of timely, relevant, accredited, and quality information in order to collaborate and make decisions based on this information. System-wide information exchange will allow the ATM community to perform its activities and operations in a safe and efficient manner.

2.5 When analysing the GANP document, the meeting will note that this module follows after module B0-DATM – Service improvement through digital aeronautical information management. Other modules that contribute to SWIM are B0-AMET, B1-DATM and B1-AMET.

2.6 The scope of SWIM is shown in Figure 1. It includes standards concerning information exchange models and the infrastructure required for the exchange of information between SWIM-enabled applications. SWIM-enabled applications use or provide SWIM information services using SWIM standards.

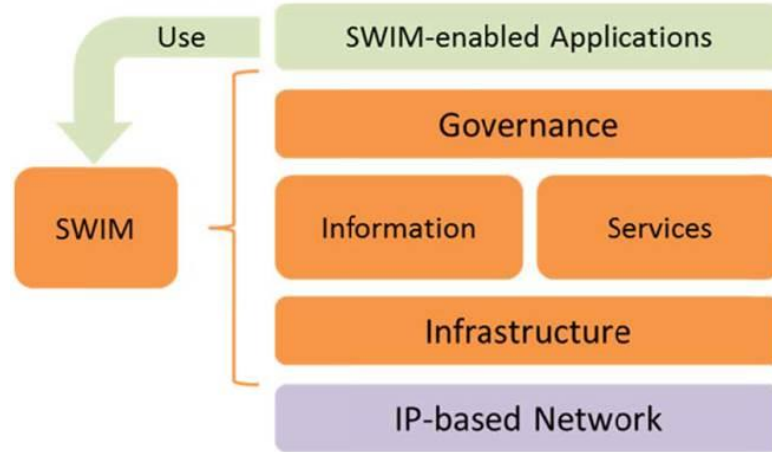


Fig. 1 – Scope of SWIM

2.7 Global interoperability is achieved through the use of common information exchange models for information elements of interest, the use of common information exchange services, and the use of the appropriate technology and standards.

2.8 These ATM information models have been defined in harmonised conceptual and logical data models. The models describe the data used in different information domains, such as the aeronautical, flight, meteorological and surveillance domains. They also describe the logical format and the structure of the data elements that make up these domains.

2.9 Similarly, information services must be defined, stating which services are provided, their behaviour, performance levels and ways to access them.

2.10 SWIM becomes necessary because the existing information exchange model restricts the implementation of future operating enhancements to improve performance. The main limitations are:

- a) systems are not designed and implemented for global interoperability under the parameters agreed at global level;
- b) many interfaces that were designed to support point-to-point or application-to-application exchange have limited flexibility to accommodate new users, additional systems, new contents or modified formats;
- c) limitations in message size and a non-scalable approach to information exchange;
- d) the existing infrastructure can make it difficult and expensive for the user to have timely access to the information originated by another stakeholder;
- e) the existing variety of exchange systems and models can make it difficult to design security schemes for all systems and stakeholders in order to meet the growing needs for an open and timely exchange of data, while respecting the legitimate security concerns of all the parties concerned; and
- f) at present, most organisations manage their own ATM information in a partial and isolated manner, resulting in duplication and inconsistencies.

2.11 The Meeting will agree with the Secretariat in that the various ATM and non-ATM areas should work together to implement SWIM within each State. Accordingly, it is imperative to coordinate at national level and develop a roadmap together with all the areas involved, in order to implement the data exchange domains and thus have a local intranet available. As a first step, a comprehensive analysis

should be made of available facilities and the investments required to have all aviation system data available in an interoperable format.

2.12 The Meeting shall recall that the MET Divisional Meeting (MET/DIV) formulated several recommendations related to SWIM and meteorological messages. The MET/DIV noted that aeronautical meteorology was a link that goes through the improvement area of ASBU efficiency titled “Globally Interoperable Systems and Data” and that, through the SWIM of the future, aeronautical meteorological information would be a key enabler for the implementation of a globally interoperable and harmonized air traffic management system. In addition, the meeting took note that integrating the information related to meteorological service for terminal area in the future System Wide Information Management (SWIM) environment will be the basis for the future globally interoperable ATM system.

2.13 In order that meteorological information could access the SWIM environment, the ICAO Meteorological Information Exchange Model (IWXXM) should be implemented, which is a format to report meteorological information in XML/GML. IWXXM includes representations based on XML/GML for standardized products in Annex 3 of the International Civil Aviation Organization (ICAO), and in the World Meteorological Organization (WMO) Technical Regulation No. 49, Vol. II, as METAR/SPECI, TAF, SIGMET, AIRMET, and Volcanic Ash Advisories. IWXXM products will be used for operational meteorological information exchange in aviation. States, besides IWXXM, should consider implementing other standard information exchange models (AIXM, FIXM, AIDX), as well as the communication and IT infrastructure that will facilitate SWIM implementation. According to the fifth edition of the GANP, the facilities and technologies for SWIM implementation would be available by 2019; consequently, SWIM implementation planning should be focused on 2019 and beyond.

3. **Conclusion**

3.1 In view of the above, the scope of system-wide information management (SWIM) will include all aeronautical information exchanged at a global level.

3.2 SWIM implementation will require the implementation of applications, information exchange standard models and infrastructure, using a common methodology for information elements of interest, in addition to the appropriate technology and standards.

4. **Suggested action**

4.1 The Meeting is invited to:

- a) analyse the information provided in this working paper;
- b) take note of the information exchange models that must be implemented and develop action plans for their implementation, working together with the areas involved; and
- c) suggest actions to be carried out in the States for SWIM implementation; and
- d) take any other actions it may deem appropriate.