International Civil Aviation Organization

MIDANPIRG AIM Task Force

Seventh Meeting (AIM TF/7)
(Cairo, 25-27 September 2012)

Agenda Item 3: Global Developments related to AIM

INTRODUCTION TO SYSTEM WIDE INFORMATION MANAGEMENT (SWIM)

(Presented by Jordon)

SUMMARY

The aim of this paper is to inform the meeting about the concept of SWIM – System Wide Information Management - covers a complete change in example of how information is managed along its full lifecycle and across the whole European ATM system, through globally interoperable system-wide information management (SWIM) Service improvement and through digital AIM.

Action by the meeting is at paragraph 3.

REFERENCES

- EUROCONTROL websites: *http://www.eurocontrol.int/services/system-wide-information-management-swim* & *http://www.sesarju.eu/programme/workpackages/swim/swim-presentations*
- MIDAD SG* Report

1. INTRODUCTION

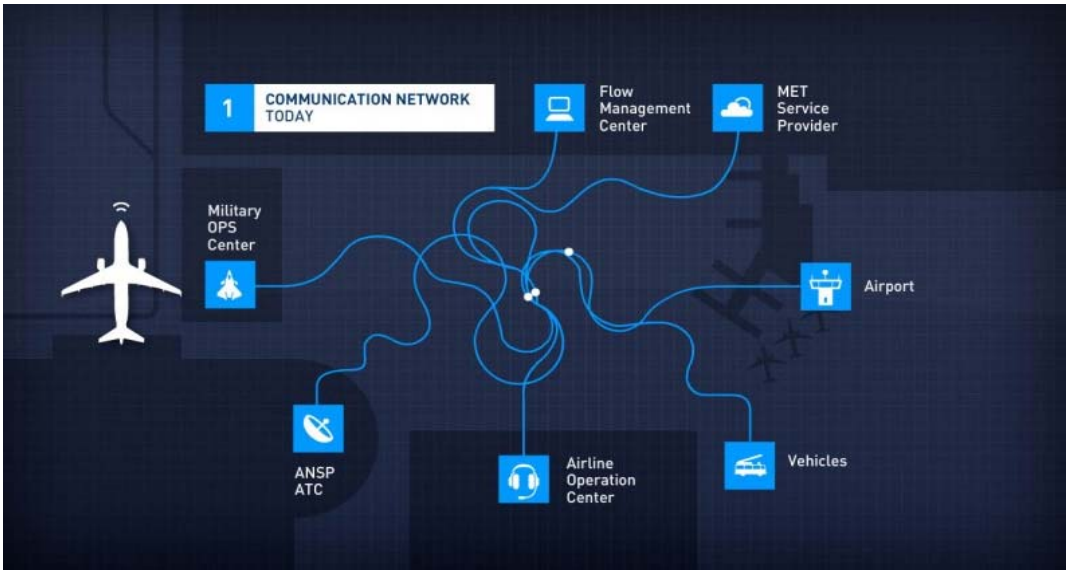
1.1 Current situation and need for change

1.1.1 Today's ATM system comprises a wide variety of ATM applications developed over time for specific purposes and is characterised by many custom/specific communication protocols and means between the various stakeholders, each with their own self-contained information systems: on board the aircraft, in the air traffic control centre, etcetera. Each of these interfaces is custom designed, developed, managed, and maintained individually and locally at a significant cost. Design of these custom interfaces often limits connectivity and interoperability.

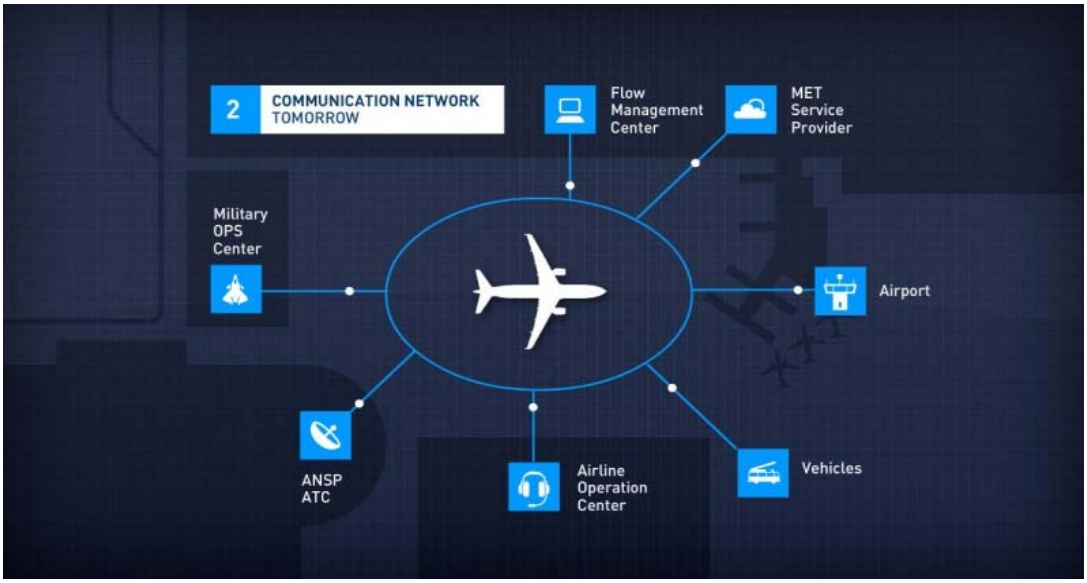
1.1.2 Aviation and the expected increased capacity demands, economic pressure and increased attention to environmental impact is relying more and more on accurate and timely information. Such information must be provided through means that support system-wide interoperability, secured seamless information access and information exchange organised over open means to bring information providers and users together into a net centric system. Further increased

automation service delivery will reduce the time to market for improved operations. SWIM – System Wide Information Management - enables data sharing between ATM services across the whole European ATM system and beyond in a consistent and efficient way.

1.1.3 The goal is to improve collaborative decision making and common situational awareness through the provision of quality information to the right people at the right time using mainstream Information Technology. SWIM is recognised to be a major enabler for the SESAR concept. This can be found back in the European ATM Master Plan (endorsed by the European Council in March 2009) which explicitly states the following: **"The whole basis of the SESAR Concept of Operations & business case is jeopardized if SWIM is neither implemented in its correct form nor sufficiently early".**



SWIM Today



SWIM Tomorrow

2. DISCUSSION

2.1 SWIM Principles

2.1.1 Building on the best practices from different information communities, the aim of SWIM is to provide information users with relevant and commonly understandable information. This information should be of the right quality, provided at the right time and delivered to the right place, so enabling the concept of net-centric ATM operations. In order to achieve this objective in an efficient way the following SWIM principles have been adopted:

- Separation of information provision / consumption;
- Loose system coupling;
- Using open standards. An open standard is one that is publicly available and has various rights to use associated with it. It may also have various properties of how it was designed (e.g. open process). The terms "open" and "standard" have a wide range of meanings associated with their usage; and
- Using Service Oriented Architecture.

2.2 SWIM Targeted Benefits

- **Safety** – All stakeholders will have access to the information they need, meaning that there will be greater predictability and thereby certainty about positions and trajectories of aircraft. Greater automation of ATM will allow air traffic controllers to focus more on monitoring and contingency planning and this will also reduce data entry errors.
- **Cost efficiency** – Shared information will lead to less duplication and increased predictability, as well as more efficient routing and leading to lower fuel consumption. As an added benefit, as the SWIM concept grows in maturity, standardisation of interfaces between systems will bring down equipment costs for air traffic control (ATC).
- **Environment**al impact - More efficient routing and flight profiles for all phases of flight with leads to lower aircraft fuel consumption in turn leads to lower CO2 emissions and environmental impact. Likewise will increased predictability on air traffic movements and gate usage at the airport lead to optimised usage of resources which will have a positive impact on the environment.

2.3.1 SWIM Beneficiaries

2.3.1 Aeronautics industry; air navigation service providers; air traffic controllers; aircraft operators; airports; International and State bodies; Passengers; Military; Pilots; Policy-makers; Professional associations; and Regulators.

2.4 Type of information needs to be shared within SWIM

- Aeronautical - Information resulting from the assembly, analysis and formatting of aeronautical data;
- Flight trajectory – the detailed route of the aircraft defined in four dimensions (4D);
- Aerodrome operations – the status of different aspects of the airport, including approaches, runways, taxiways, gate and aircraft turn-around information;
- Meteorological – information on the past, current and future state of earth's atmosphere relevant for air traffic';
- Air traffic flow – the network management information necessary to understand the overall air traffic and air traffic services situation;
- Surveillance – positioning information from radar, satellite navigation systems, aircraft datalinks, etc; and
- Capacity and demand – information on the airspace users needs of services, access to airspace and airports and the aircraft already using it.

3. AIRCRAFT SYSTEMS (AND SWIM)

3.1 The objective of SWIM Air-Ground Capability is to provide communication services between the aircraft and ground peer entities to support SWIM operational aspects. It defines, develops, demonstrates and validates the internetworking, routing, relaying, transport, and communication management functions required to meet safety, performance and Quality of Service (QoS), requirements imposed by SWIM and Information Management.

3.2 It is envisioned that all end-state data communication needs for SESAR will be satisfied by SWIM. This includes high bandwidth, time critical and near real time data communication. In order to achieve that goal, it will be necessary for SWIM Air-Ground Capability to manage the underlying datalink A/G resources to assure QoS requirements.

3.3 SWIM air-ground capability is an important enabler for IFR equipped general aviation. The increased use of regional airport with mixed mainline/business/regional/general aviation traffic requires access of business and general aviation to SWIM, both publishing relevant data to SWIM as well as subscribing to specific information.

4. SWIM TECHNICAL ARCHITECTURE

4.1 SWIM Technical Architecture aims at designing and providing demonstration prototype for replacing data level interoperability and closely coupled interfaces with a open, flexible, modular and secure technical architecture that support users and their applications to share information in a transparent and efficient manner. SWIM technical architecture considers the SWIM Suit project and deliverable as baseline upon which the proposed final SWIM technical architecture will be designed and prototyped. Digital AIM is also providing initial technical architecture which will be considered as well for SWIM technical Architecture design and prototyping.

4.2 SWIM scope in terms of data coverage is neither limited nor pre-defined. All information of concern to air traffic management is considered to be in-scope. Conceptually, the SWIM technical architecture shall provide a foundation upon which data and services can be added as necessary to support ATM stakeholders' requirements.

4.3 The distributed processing environment in SWIM is focused on the best possible support of information sharing which is a prime requirement of the ATM network. It is also easily scalable and robust, meeting the ATM requirement of easy addition of new partners and overall reliability.

4.4 The SWIM technical architecture provides the mechanisms which support the partners in managing the (3 Rs) **R**ules, **R**oles and **R**esponsibilities of information sharing as defined.

4.5 In short, for supporting seamless information interchange between all providers and users of shared ATM information, the SWIM technical architecture provides:

- A set of technical services necessary to support interactions between systems: those services should be selected from the field proven solution from the market.
- An access to the SWIM physical network.

5. AIM, SWIM , AND MIDAD

5.1 The need for a strategic evolution towards Aeronautical Information Management (AIM) is urgently needed in a manner that will ensure the availability of aeronautical information to any ATM user in a globally interoperable and fully digital environment.

5.2 It was highlighted that, as part of system-wide information management (SWIM), AIM is required to support evolving requirements for, inter alia, collaborative decision making (CDM), performance-based navigation (PBN), ATM system interoperability, network-centered information exchange, and to take advantage of improved aircraft capabilities.

5.3 The implementation of the different phases of the ICAO Roadmap for the transition from AIS to AIM requires the presence of (One single source of Aeronautical Information a reference database of quality-assured aeronautical information)

5.4 The MIDAD initiative is a very advanced approach to fulfill the airspace user needs in aeronautical data, aeronautical obstacle, and terrain data requirements. It will build, in a large extend, the basis for and assist the implementation and usage of the Global Satellite Navigation System (GNSS) technology in the Middle East Region. Furthermore, it will be an important enabler for Aerodrome CDM (Collaborative Decision Making).

5.5 The implementation of the **SWIM** concept will enable direct ATM business benefits to be generated by assuring the provision of commonly understood quality information delivered to the right people at the right time. Given the transversal nature of SWIM which is to go across all ATM systems, data domains, and business trajectory phases (planning, execution, post-execution) and the wide range of ATM stakeholders.

6. CONCLUSION

6.1 Enabling SWIM is a challenging change for ATM. Although many building blocks are already available, full SWIM deployment will take time. Firstly to prototype and validate some of the newer SWIM concepts. And more importantly to organize the commonly shared information and develop and deploy the associated changes in the different user systems and applications. This major change requires a close collaboration between the ATM stakeholders. To accomplish this, all stakeholder groups (including AIM) will be involved from the start in the development of the SWIM requirements, prototypes, roadmaps and deployment plans covering all technical and governance related aspects.

7. ACTION BY THE MEETING

7.1 The meeting is invited to:

a) note the paper;

b) take into consideration the SWIM developments during the discussion of the progress made towards aim implementation in the MID Region;

c) take into consideration the SWIM during the discussion of the detail studying for current and future ATM Requirements in particular, and establishment of MIDAD;

d) contribute actively in the best afford METHOD TO the development of SWIM; and

e) ICAO to provide states with more detailed and specific technical specifications about SWIM, and incorporate them in the related Annex, and Documents.

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