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COMMITTEE A

Agenda Item 3: Enhancing the global air navigation system
3.1: System-wide information management (SWIM)

ESTABLISHMENT OF COMESA SEAMLESS UPPER AIRSPACE (CSUA) REQUIRES SYSTEM-WIDE INFORMATION MANAGEMENT (SWIM) AS KEY ENABLER

(Presented by Kenya)

EXECUTIVE SUMMARY

The programme for establishing a seamless upper airspace in the Common Market for Eastern and Southern Africa (COMESA) Region requires interoperable systems and harmonized procedures for the seamless exchange of information within and across borders. System-wide information management (SWIM) has thus been identified as a key enabler for achieving seamless upper airspace operations over the COMESA Region. This paper emphasizes the need for ICAO to develop the necessary Standards and Recommended Practices (SARPs) and guidance material to ensure the envisioned "regional seamless skies" are supported by globally harmonized and efficient exchange of information.

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

1. INTRODUCTION

1.1 The Common Market for Eastern and Sothern Africa (COMESA) is a regional trading block that was established to achieve sustainable economic and social progress among sixteen States within the ICAO African and Indian Ocean (AFI) Region through increased co-operation and integration in all fields of development particularly in trade, customs and monetary affairs, transport, communication and information, technology, industry and energy, gender, agriculture, environment and natural resources.

1.2 Enhancement of transport infrastructure is a key goal in the development plans of COMESA and its regional partners. Several initiatives have been launched and undertaken in recent decades for the rationalization, liberalization and harmonization of air transport in the region. The current programme for the "Establishment of a seamless upper airspace in the COMESA Region" is the culmination of a twenty-year endeavour towards that goal.

1.3 The COMESA seamless upper airspace (CSUA) programme will be achieved through the introduction of key operational enablers such as system-wide information management (SWIM), with the objective to increase harmonization and coordination among the participating States guided by the ICAO aviation system block upgrade (ASBU) framework.

2. DISCUSSION

2.1 The CSUA programme is an initiative to establish a seamless upper airspace above FL245 over the flight information regions (FIRs) within the COMESA region. Seamless communications, navigation, and surveillance (CNS)/air traffic management (ATM) operation means an operation in contiguous airspace that is technically and procedurally interoperable, universally safe, and in which all categories of airspace users transition between FIRs, or other vertical or horizontal boundaries, without requiring a considered action to facilitate that transition and without any noticeable change in:

a) type or quality of service received,

b) air navigation and communications performance standards, and

c) standard practices to be followed.

2.2 The CSUA programme offers an opportunity to better align the upper airspace with regional traffic flows rather than with national boundaries, thereby supporting the concept of trajectory-based operations (TBO). For its realization, the programme relies on SWIM as a key enabler to provide seamless cross-boundary information exchange necessary for all stakeholders to share common situational awareness in order to facilitate collaborative decision making.

2.3 In order to fulfil that function, SWIM needs to build on a strong foundation of global standards and harmonized processes to ensure not only the interoperability of the various information management systems deployed but also the predictability of the system behaviour and/or outcome in support of operations.

2.4 Critical in this regard is the definition of basic SWIM information services that are supporting, for example, SWIM-enabled applications based on Manual on Flight and Flow — Information for a Collaborative Environment (FF-ICE, Doc 9965) to file the future equivalent of a flight plan, or to dynamically manage air traffic flows, the exchange of NOTAM-like messages, or aeronautical weather information to keep decision makers appraised of changing meteorological conditions affecting the operations. These basic SWIM information services need to be harmonized not just regionally, as for the CSUA programme, but internationally, to be able to optimize each flight along its entire trajectory from departure to its destination, and not just certain aspects of it. This means that operational personnel need to work closely with the information management experts by providing them with the necessary requirements for ICAO to define global standards for the implementation of basic SWIM information services.

2.5 The transition from aeronautical information services (AIS) to aeronautical information management (AIM) was expected to achieve, among other objectives, the adoption of a standardized aeronautical information exchange model (AIXM) to ensure interoperability between all systems, not only for the exchange of aeronautical data sets, but also for short-term notification of operationally significant changes (i.e. NOTAM). At this stage, however, the digital data sets are still considered immature for implementation under SWIM, and the data originators not fully involved in the process to

guarantee the required availability, quality and integrity of the aeronautical data to be exchanged; these being important prerequisites for the successful implementation of SWIM.

2.6 To date, the transition from AIS to AIM across ICAO regions is still facing many challenges and the COMESA region is no exception. States are still struggling with technological challenges compounded by the lack of global standards and the requisite guidance and training material to facilitate the seamless exchange of information. This has hampered States like Kenya, who adopted the recommended AIXM in 2004, to readily exchange information with other AFI states.

2.7 The implementation of AFI-Centralised Aeronautical Database (AFI-CAD), championed by the ICAO Eastern and Southern African Office, Nairobi (ESAF) and Western and Central African Office, Dakar (WACAF) Regional Offices in an attempt to position the region for digital data and information exchange, is also not without challenges. Incompatibilities are ranging from different database models to differences in database implementations from various database vendors, even as the four key air navigation service providers (ANSPs), namely KCAA[1], ASECNA[2], NAMA[3] CAAU[4] and ATNS[5] that are hosting the AFI-CAD, work with global service providers to overcome the technological challenges.

2.8 These issues need to be resolved before information systems can be integrated under SWIM in support of initiatives like the above-mentioned CSUA programme. It is therefore suggested that the experiences gained in one information domain, namely the aeronautical information domain as in the examples given in paragraphs 2.5 to 2.7, should be leveraged across other information domains. Thus, global standards and uniform principles need to be adopted across the entire ATM system, as proposed by the *Global ATM Operational Concept* (Doc 9854) and reinforced by the *Manual on Air Traffic Management System Requirements* (Doc 9882) to ensure technical and operational interoperability.

2.9 SWIM governance is an important instrument towards that end. Using globally interconnected SWIM registry as a mechanism, governance needs to be realized through a common set of policies and standards that drive the overall behaviour of system participants to ensure interoperability of the system as a whole, and to ensure the seamless exchange of information in support of operational decision making.

2.10 Defining and ensuring consistent application of these policies and standards should be done under the auspices of ICAO at the global, regional, national and organizational level. Even though it is recognized that some local and regional differences will continue to exist, SWIM governance and compliance monitoring need to be applied to the local and regional levels, as appropriate, so as to allow for flexibility when needed by taking into account differences that are necessary due to specific operational requirements.

2.11 Finally, the importance of SWIM leveraging existing and mature global technical standards cannot be overemphasized. A key factor in the success of standardization is choosing information technologies which are open source, as promoted by one of the principles of service-oriented architecture. Another principle is the reusability of basic information services and the resulting ability to compose more complex services from these basic services thereby further reducing system cost. In addition, reducing the number of variables when implementing SWIM will support interoperability when

[1] KCAA – Kenya Civil Aviation Authority
[2] ASECNA – L'Agence pour la Sécurité de la Navigation aérienne en Afrique et à Madagascar
[3] NAMA – Nigerian Airspace Management Agency
[4] CAAU – Civil Aviation Authority Uganda
[5] ATNS – Air Traffic and Navigation Services, South Africa

connecting to multiple systems. Thus minimizing the need of having to develop multiple adaptations using specific software vendors/sources.

2.12 As evidenced by the COMESA air transportation initiatives, Kenya and other African States are willing to invest in new and advanced technologies and infrastructure projects in support of ambitious large-scale initiatives like the CSUA programme. However, care needs to be taken that these investments deliver on their promise of enabling new concepts to achieve operational efficiencies and thus contribute towards the vision of a seamless and interoperable global ATM operational system.

3. CONCLUSION

3.1 Enhancement of critical air transportation infrastructure is a key goal in the development plans of the COMESA region. SWIM has been identified as a key enabler for the COMESA seamless upper airspace programme.

3.2 Several challenges still need to be addressed for SWIM to deliver on its promise of enabling globally seamless information exchange, including standardized information exchange models, harmonized and interoperable technical implementations, definition of basic information services, common standards and principles, SWIM governance and compliance monitoring, the use of open standards, among others.

3.3 The Conference is invited to agree to the following recommendations:

Recommendation 3.1/x – Promote the use of system-wide information management (SWIM) as a key enabler for advanced air traffic management (ATM) operational initiatives

That the Conference:

a) note the ongoing ATM developments in the Africa-Indian Ocean (AFI) Region and support the initiative to establish a seamless upper airspace over multiple flight information regions in the Common Market for Eastern and Southern Africa (COMESA) Region by building on SWIM as a key enabler;

b) promote increased cooperation and partnership between ICAO, Member States and system vendors in addressing the interoperability and compatibility challenges with information exchange models; and

c) request ICAO to develop a robust set of standards and implementation guidance for global interoperable SWIM, including a mature SWIM governance framework with requisite policies and compliance monitoring enabled by globally interconnected registries.

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