



ICAO

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WORKING PAPER

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**THIRD MEETING OF THE NAM/CAR AIR NAVIGATION IMPLEMENTATION WORKING GROUP (ANI/WG)  
AERONAUTICAL INFORMATION MANAGEMENT (AIM) IMPLEMENTATION TASK FORCE  
(AIM/TF/3)**

Mexico City, 25 to 28 February 2020

**Agenda Item 2: Joint Meeting with ANI/WG AIDC Task Force (AIDC/TF)**

**AIXM INTEROPERABILITY**  
(Presented by the Secretariat)

<b>EXECUTIVE SUMMARY</b>	
Under this working paper the current implementation status of the revision of AIXM Interoperability towards the SWIM environment is presented.	
<b>Action:</b>	Described in Section 4
<b>Strategic Objectives:</b>	<ul style="list-style-type: none"><li>• Safety</li><li>• Air Navigation Capacity and Efficiency</li></ul>
<b>References:</b>	<ul style="list-style-type: none"><li>• Annex 15 to the Convention of International Civil Aviation</li><li>• ICAO Doc. 10066 - PANS AIM</li><li>• GANP 6th. Ed.</li><li>• ICAO Doc. 10039 - SWIM Manual</li><li>• ICAO ASBU Working Document (Edition 2, Version 3)</li></ul>

**1. Introduction**

1.1 With the expected growth in aviation demand and the necessity of improvement in air navigation capacity and efficiency, Air Traffic Management (ATM) system will be increasingly reliant on the accurate and timely information, which must be organized and provided by solutions that support system-wide interoperability and secured information access and exchange. Evolution of aeronautical information management is needed to integrate the AIM network on a System-Wide Information Management (SWIM) basis.

1.2 SWIM is an integral part of the Global Air Navigation Plan (GANP, Doc 9750) and is covered in a number of aviation system block upgrades (ASBUs) modules, which is related to service improvement through digital aeronautical and meteorological information management and integration (digital ATM information management (DATM), aeronautical meteorology (AMET)), as well as operational performance improvement through flight and flow information for collaborative environment (FF-ICE) and trajectory-based operation (TBO). SWIM will be a future global platform for the exchange of information and provision of information services via internet protocol (IP) using globally standardized information exchange models (XMs) such as Aeronautical Information Exchange

Model (AIXM), Flight Information Exchange Model (FIXM), ICAO Meteorological Information Exchange Model (IWXXM), etc.

## 2. Discussion

2.1 There are currently three information exchange models used on SWIM: AIXM; FIXM; and IWXXM. FIXM and AIXM are managed and developed by each exchange models Change Control Board (CCB), whereas IWXXM is managed and developed by an ICAO expert group in coordination with the World Meteorological Organization (WMO). Latest versions of each exchange model are AIXM v5.1.1, FIXM v4.1.0 and IWXXM v2.1.1. The estimated roadmap of each exchange model is shown in the below figure.



2.2 The operational concept associated to SWIM and its information services are still under development in the CAR Region, in addition the complete exchange and provision of electronic information is not ensured at the moment when a producer and a consumer use different exchange model versions in particular by the States Air Navigation Service Providers (ANSPs). As such, a review on the compatibility between different versions is required.

2.3 A compatibility analysis between different versions of exchange model, found that the complete transfer of information failed to be ensured due to particular data loss caused by addition/deletion of data elements and introduction of new capabilities during exchange models updates.

- AIXM v5.0, in comparison with the previous version, included full Aeronautical Information Publication (AIP) contents and encoding of Notice to Airmen (NOTAM). AIXM v5.0 was not fully compatible with the previous version because of schematic change from custom scheme to Geography Mark-up Language (GML) - compliant scheme. AIXM v5.1, which was released in 2010, included coding specification for X-NOTAM, and the advanced AIXM v5.1.1 was released in 2016. In result, forward/backward data mapping compatibility is ensured between AIXM v5.1 and v5.1.1.

2.4 It will be necessary that the AIM TF agrees the compatibility to be defined as data mapping compatibility without any data loss, and to be classified into forward and backward compatibility. Proposed common version method for cross-exchange models was based on semantic version 2.0 and its three types of version updates are as follows:

- a) A Major update: includes major changes such as adaptation of new scheme, removal or addition of capabilities or elements. Forward/backward compatibility is not guaranteed;
- b) A Minor update: includes new capabilities or elements. Forward/backward compatibility is guaranteed for non-deprecated elements or deprecated elements with replacement; and
- c) A Patch update: uses for bug fix. Forward/backward compatibility is guaranteed.

2.5 When SWIM is implemented without any compatibility between different versions of exchange models, an additional implementation of a converter would be required to exchange information, and this will result in a complexity of management, additional costs and a validation of conversion. In cases where such introduction of a converter is unavoidable for specific circumstantial reasons, a mapping guidance against the major changes or update should be developed (by ICAO) for the effective implementation of the converter.

2.6 A very important issue is the training of AIM technical personnel in the use the formats, as well as the information to be exchanged. An initial, as well as recurrent, training should be considered, in order to strengthen the knowledge regarding the use of the data exchange model (AIXM).

### **3. Conclusion**

3.1 In view of the above mentioned, the States should be aware that AIXM implementation is a very important step to achieve information and data systems interoperability.

3.2 In addition, it is considered important to make an initial AIXM interoperability test tentatively in August 2020, among the NACC States which confirm to be ready for the test. The Meeting should consider the possibility to develop other exchange tests among those States which that have specifically have implemented the AIXM 5.1. It is also important to coordinate (ICAO and ANSPs) with CNS specialists for a test programme scheduling properly by each one of them.

3.3 It is also undoubted that professional personnel to assist the AIM in the use of these formats is required, as well as to train the operators to ensure the information to be exchanged is included.

3.4 The Meeting shall agree with the AIM/TF Rapporteur on the proposal dates in which the exchange test should be made and the coordination with CNS. For this purpose, the NAM and CAR States that are ready to make the tests and the data to be exchanged should be taken into account.

- Canada
- Cuba (under development)

- Curaçao (Netherland Territories)
- Dominican Republic
- France Territories (EUROCONTROL)
- Jamaica (under development)
- Mexico
- Trinidad and Tobago(East Caribbean States)
- UK Territories (EUROCONTROL)
- United States
- COCESNA (Central American States)

**4. Suggested action**

4.1 The Meeting is invited to:

- a) request AIM/TF to distinguish exchange model elements into non-changeable and changeable elements and determine non-changeable elements after the tests programme in order to minimize the issue of compatibility towards SWIM implementation;
- b) make agreements on the tests programme mentioned in paragraph 3.2
- b) request ICAO and AIM TF to provide a mapping guidance, when there is a major change or update, to implement a converter efficiently; and
- c) The Meeting is invited to discuss about Bahamas and Haiti cases, taking into account that they require some specific attention in order to integrate both States to the AIXM Regional interoperability development