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Commission for Aeronautical Meteorology  
Fifteenth Session

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**Montréal, 7 to 18 July 2014**

## **REPORT ON AGENDA ITEM 3**

*(All Agenda Items considered conjointly with the  
Fifteenth Session of the Commission for Aeronautical Meteorology  
of the World Meteorological Organization)*

This report will be subject to review by the Air Navigation Commission and the Council of ICAO, and the Executive Council of WMO. The decisions of these bodies on the recommendations of the Meeting will be set forth in a Supplement to the Report of the Meeting, which will be issued in due course.

**Agenda Item 3: Integrating meteorological information exchange developments into the future system wide information management environment**

**3.1: Meteorological information exchange developments in support of future international air navigation requirements**

3.1.1 The meeting noted the efforts made by the Meteorological Aeronautical Requirements and Information Exchange Project Team (MARIE-PT), in coordination with the Air Traffic Management Requirements and Performance Panel (ATMRPP) and the WMO CAeM Expert Team on Meteorological Services to ATM and Meteorological Information (ET-M&M) in considering the future need to understand and define the requirements for aeronautical information to support trajectory-based operations (TBO). The meeting noted that the notion of TBO was intended to be an all-encompassing operational improvement covering the air traffic management (ATM) requirements through all phases of flight. As a result the meeting noted a draft concept of operations and roadmap and agreed that the document, once finalized, should be used to facilitate the development of the future ATM requirements for aeronautical meteorological information.

3.1.2 The meeting agreed on the importance of the continued identification of requirements and development of capabilities, forming a significant and necessary component of a system meeting the ATM community's goals concerning TBO. The meeting formulated the following recommendation accordingly:

**Recommendation 3/1 — Aeronautical meteorological information to support trajectory-based operations**

That an appropriate ICAO expert group (or groups), in close coordination with WMO, be tasked to:

- a) finalize a draft concept of operations and roadmap concerning aeronautical meteorological information integration for trajectory-based operations (TBO); and
- b) using the result of a) above, establish further air traffic management requirements and aeronautical meteorological service capabilities to support TBO consistent with the *Global Air Navigation Plan* (Doc 9750).

3.1.3 The meeting noted some concerns expressed relating to the implementation of the expected draft provisions for the use of extensible markup language (XML)/geography markup language (GML) for the exchange of meteorological information, namely METAR/SPECI, TAF and SIGMET. These provisions were introduced as a part of Amendment 76 to Annex 3 — *Meteorological Service for International Air Navigation* for States in a position to do so which became applicable in November 2013 and it was noted that these provisions were proposed for inclusion as a Recommended Practice for all States as a part of draft Amendment 77 to Annex 3 which would become applicable in November 2016, if adopted. A survey was proposed to assess the level of preparedness of States for the implementation of these provisions, which was noted to be the first major step of the migration to the use of digital aeronautical meteorological information. However, the meeting was of the opinion that a survey relating to States' intentions in this regard would be premature at this stage. It was noted that attention should be paid to the levels of implementation over time to facilitate a smooth transition for those States, with air navigation service providers and aeronautical meteorological service providers actively and collaboratively engaged in the migration.

**Agenda Item 3: Integrating meteorological information exchange developments into the future system wide information management environment**

**3.2: Integration of meteorological information in the future system-wide information management (SWIM) environment through the development of new forms of data representation**

3.2.1 The meeting noted an expectation that existing information exchange systems could constrain the implementation of operational improvements to the global air traffic management (ATM) system. The limitations of the systems include the lack of harmonization of information (including aeronautical information, meteorological information and flight information), proprietary interfaces and data formats, message-size limitations and a non-scalable approach to information exchange within the present infrastructure.

3.2.2 The meeting agreed that a careful migration of meteorological information into a system-wide information management (SWIM) environment is required in order to allow the ATM system to develop along with the expectations of the *Global Air Navigation Plan* (Doc 9750). It was also noted that such a migration would need to consider various significant issues including the potential separation between the service provider and the user due to increased levels of automation; the quality of service which would necessitate an increased use of metadata to enable a user assessment of the data usability; the integration of the “human in the loop” in an automated or semi-automated environment; the move from a product-centric to a data-centric environment; an information interoperability framework; information exchange services and models; determination of authoritative sources; local information integration; and governance. Due to the complexity of this undertaking, the meeting agreed to a set of tasks (as provided in Appendix A) to be used as a basis for the development of requirements to integrate meteorological information into the SWIM environment.

3.2.3 The meeting noted the need to coordinate the work done in this area with other related information domains contributing to SWIM and to consider the principles of transparent governance and risk mitigation during the development of aeronautical meteorological information requirements and services. The meeting formulated the following recommendation accordingly:

**Recommendation 3/2 — Inclusion of aeronautical meteorological information in the future SWIM-enabled environment**

That ICAO through an appropriate expert group, in close coordination with WMO, develop provisions to enable the inclusion of aeronautical meteorological information in the future system-wide information management (SWIM) environment consistent with the *Global Air Navigation Plan* (Doc 9750), by adhering to the following principles:

- a) the outline provided in Appendix A forms the initial basis for foreseen implementation milestones, and where this outline and associated milestones are reviewed on a regular basis (every 12 months) to reflect changes in the alignment between, and the priorities of, the SWIM related aviation system block upgrade (ASBU) modules and operational improvement areas;

- b) ongoing coordination with (an) appropriate ICAO expert group(s) tasked with developing the SWIM concept to ensure that the meteorological elements of SWIM meet the GANP objectives;
- c) any duly justified meteorological consideration on the future development of the physical infrastructure layer (network connectivity), the messaging infrastructure, the information exchange models and the information exchange services should be made based on the core architectural principle of service orientation and in coordination with the SWIM GANP objectives alongside other information exchange models;
- d) the evolution towards an information management environment should be guided by a roadmap including a transparent system of governance and risk mitigation actions and the foreseen role of existing ICAO information exchange functions for aeronautical meteorology such as regional OPMET databanks (RODB), inter-regional OPMET gateways (IROG) and internet based services.

3.2.4 Noting the needs of users for consistent, coherent, accurate, authoritative and fit-for-purpose meteorological information, the meeting discussed and noted that a number of governance and technical issues, listed in Appendix B, would need to be addressed by an ICAO expert group responsible for the implementation of SWIM to ensure that the meteorology-related developments are fully aligned with the guiding principles respecting the mandates of both ICAO and WMO. In this regard the meeting formulated the following recommendation accordingly:

**Recommendation 3/3 — Further development of the SWIM concept relating to meteorology**

That ICAO through an appropriate expert group, in close coordination with WMO, ensure that the issues in Appendix B are addressed in relation to the meteorological component of SWIM

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## APPENDIX A

### METEOROLOGICAL INFORMATION INTEGRATION FOR TRAJECTORY-BASED OPERATIONS TASKS

*(Note.— This is based on the assumption of a three-year amendment cycle.)*

#### 1. TRANSITION

The main principles and considerations for the evolution of MET information exchange provisions are expressed in a foreseen end-state of this evolution by 2025. Intermediate steps are defined in line with the regular amendment cycle of Annex 3 to support the transition towards this full migration by 2025.\*

##### *1) Amendment 77 to Annex 3 (with intended applicability in November 2016)*

- Introduction of an updated IWXXM (logical level) to reflect additional aeronautical meteorological information elements currently contained in the defined Annex 3/Technical Regulations [C.3.1] products or templates (evolution of IWXXM version 2013)
- Introduction of recommended practice for XML/GML-based exchange format for METAR, SPECI, TREND, TAF and SIGMET (upgrade of IWXXM version 2013)

##### *2) Amendment 78 to Annex 3 (with intended applicability in November 2019)*

- Introduction of an updated IWXXM (logical level) to reflect all aeronautical meteorological information elements contained in the products, templates and services that Annex 3/Technical Regulations [C.3.1] supports
- Introduction of a separate chapter on information exchange services including:
  - the general principles and in some cases recommended practices to provide all gridded data products currently part of Annex 3/Technical Regulations [C.3.1] as an information exchange service in a recommended exchange format;
  - recommended practices to provide all gridded data products as an information exchange service in a recommended exchange format; and
  - introduce newly defined and agreed services.

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\* It should be recognized that at the time of writing, the SWIM concept and globally applicable AIRM is under development. The content of the paper is based on the concepts, notions and principles discussed by the 12th Air Navigation Conference, reflected in the GANP and ASBUs, endorsed by the 38th Assembly. The details of implementing the defined intermediate steps can therefore slightly change in content or time.

**3) Amendment 79 to Annex 3 (with intended applicability in November 2022)**

— Restructuring to reflect that Annex 3/Technical Regulations [C.3.1] described core aeronautical meteorological information elements and aeronautical meteorological information exchange services at the logical level to support international air navigation, including:

- an updated IWXXM (logical level) to reflect all meteorological information elements and services contained in Annex 3/Technical Regulations [C.3.1]; and
- recommended practices for the physical exchange formats of these services

**4) Amendment 80 to Annex 3 (with intended applicability in November 2025)**

- Modifications required by emerging service needs; and
- Removal of product requirements.

## **2. EXPERT GROUP TO SUPPORT DEVELOPMENT**

2.1 Considering the complexity and multidisciplinary aspects of the proposed transition, it is proposed to set up an expert group to support, in close coordination with ICAO groups involved in the development of SWIM, the specific development of provisions for aeronautical meteorological information exchange as integral component of SWIM.

2.2 This expert group should:

- a) identify aeronautical meteorological information services to include in subsequent versions of IWXXM;
- b) support the development of subsequent versions of the IWXXM logical data model;
- c) support the development of the physical data models and exchange formats to support the information services defined in the IWXXM logical data model;
- d) identify implementation considerations for States for implementing aeronautical meteorological information services, for providers and users, and
- e) identify potential training needs for making available aeronautical meteorological information services by SWIM-enabled applications.

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**APPENDIX B**

**GUIDING PRINCIPLES AND ISSUES RELATING TO THE METEOROLOGICAL  
COMPONENT OF SYSTEM WIDE INFORMATION MANAGEMENT (SWIM)**

ICAO should consider:

- a) whether meteorological information exchange services could be identified as from an authoritative source and who that authoritative source is;
- b) whether the intended use of the meteorological information exchange services could be identified;
- c) whether meteorological information exchange service could be identified for its originating data source and all the processing steps until it is made available to the user;
- d) whether meteorological information exchange services could be event driven;
- e) that meteorological information exchange services should be traceable to enable post-operations and accident/incident investigation;
- f) that appropriate coordination is established between the ICAO expert groups concerned with meteorology and SWIM respectively;
- g) that aircraft-derived data related to meteorology be included in the SWIM environment; and
- h) that guidance material be developed to support States in regulating SWIM-enabled applications.

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