

International Civil Aviation Organization



ICAO

**NINTH MEETING OF THE ASIA AND PACIFIC
METEOROLOGICAL REQUIREMENTS
WORKING GROUP (MET/R WG/9)**

Web-conference, 07 May 2020 and 11 – 14 May 2020

Agenda Item 3: Review progress on the work programme

**APAC USER REQUIREMENTS FOR SWIM-BASED MET INFORMATION
SERVICES SUPPORTING ATFM**

(Presented by Australia, Hong Kong China, and Thailand)

SUMMARY

This paper presents a refined proposal to develop APAC use cases and user requirements for SWIM-based MET information services supporting ATFM.

1. INTRODUCTION

1.1 At the APAC Meteorology/Air Traffic Management (MET/ATM) Seminar and the Eighth Meeting of the ICAO APAC Meteorological Requirements Working Group (MET/R WG/8) held in May 2019, Australia, Hong Kong China, and Thailand presented the recent global and regional developments relating to MET and ATM in the SWIM (System-Wide Information Management) environment (Appendix A) and proposed to develop a regional document for SWIM-based MET information services specifically to support ATFM in the Asia/Pacific Region.

1.2 The meeting was informed of the SWIM-based MET information service described in the *Plan for Meteorology in System-Wide Information Management* (the MET-SWIM Plan) being developed by the ICAO Meteorology Panel Working Group on Meteorological Information Exchange (WG-MIE), which outlined the concepts of how MET information should be exchanged and disseminated in the SWIM environment (Appendix A). Examples of use cases and potential benefits of SWIM-based MET information services to better support Air Traffic Flow Management (ATFM) were also provided.

1.3 MET/R WG/8 recognized a need for a regional document capturing the requirements for SWIM-based MET information services to support ATFM, supplementing the relevant global documents. This paper discusses the way forward to develop such material to document user requirements and use cases for future SWIM-based MET information services supporting ATFM in the APAC Region.

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2. DISCUSSION

Proposed Document on the APAC Region User Requirements for SWIM-based MET Information Services Supporting ATFM

2.1 The APAC Regional Framework for Collaborative ATFM has been developed and maintained by the Air Traffic Flow Management Steering Group (ATFM/SG) to provide, among other things, the performance improvement plan to address the ATFM implementation and operational issues in the region. The core concept of the Framework is the Distributed Multi-Nodal ATFM Network, i.e. a network of Air Navigation Service Providers (ANSPs) and/or Sub-Regional Groups leading independent ATFM operation within their area of responsibility and connecting to each other through information sharing framework.

2.2 The Third Meeting of System-Wide Information Management Task Force (SWIM TF/3) held in May 2019 agreed that the SWIM implementation to support cross-border ATFM operation should be given high priority. To prepare for the transition of the provision of MET information in a SWIM environment, a regional document for SWIM-based MET information services to support the specific operational mode of cross-border ATFM in APAC Region, as detailed in the aforementioned Framework, is proposed to be formulated. Draft topics to be included in the document are outlined in Appendix C.

2.3 An ad-hoc group consisting of both MET and ATFM communities is proposed to be established to continue the development of this document. States/Administrations are invited to join the ad-hoc group to provide input to the document. It is important to note that the proposed document is expected to be a living document to ensure it will be consistent with the relevant global and regional documents and cover the possible new use cases expectedly enabled by SWIM.

2.4 MET/R WG/8 discussed the proposal and recognized a need for a regional document for SWIM-based MET information services to support ATFM, supplementing the relevant global documents. The proposal was further discussed at MET SG/23 (MET SG/23 WP/25) and the meeting adopted the following Decision:

Decision MET SG/23-7: Development of APAC User Requirements for SWIM-based MET Information Services Supporting ATFM	
<p>What: That, MET/R WG, in conjunction with the ATFM SG, establish an ad-hoc group to develop use cases and user requirements for future SWIM-based MET information services supporting ATFM.</p>	<p>Expected impact:</p> <p><input type="checkbox"/> Political / Global</p> <p><input type="checkbox"/> Inter-regional</p> <p><input type="checkbox"/> Economic</p> <p><input type="checkbox"/> Environmental</p> <p><input checked="" type="checkbox"/> Ops/Technical</p>
<p>Why: To further support a proposal presented by Australia, Hong Kong China and Thailand to develop a regional document for SWIM-based MET information services specifically to support ATFM in Asia/Pacific Region, taking into account the need to reflect the requirements of the ATFM community in the proposal and the need for more mature terms of reference for the proposal.</p>	<p>Follow-up: <input type="checkbox"/> Required from States</p>
<p>When: As soon as practicable</p>	<p>Status: Adopted by Subgroup</p>
<p>Who: <input checked="" type="checkbox"/> Sub groups <input type="checkbox"/> APAC States <input type="checkbox"/> CAO APAC RO <input type="checkbox"/> CAO HQ <input type="checkbox"/> Other: XXXX</p>	

2.5 Following the discussion at MET SG/23, Australia, Hong Kong China, and Thailand revised the proposal and presented it to ATM SG/7 in August 2019 for discussion by the ATM community. ATM SG/7 adopted the following action item in the ATM SG Task List:

ATM SG Action Item 7/7

Circulate an invitation to ATFM experts to support the proposal in the Decision by encouraging subject matter experts from ATFM/SG to participate in an ad-hoc group to develop use cases and user requirements for future SWIM-based MET information services supporting ATFM (in consultation with ATFM/SG Chair, notify ATFM/SG participants and request they engage/participate).

Proposed Terms of Reference (TOR)

2.6 The proposed terms of reference regarding the scope and objectives of the document are as follows.

- 1) To focus on SWIM-based MET information services specifically addressing the needs of ATFM in the APAC Region;
- 2) To document user requirements and use cases from ATFM in the APAC Region to facilitate the development of future SWIM-based MET information services;
- 3) To supplement the global concept described in the MET-SWIM Plan prepared by the METP WG-MIE, and support the MET requirements being developed by the METP Working Group on Meteorological Requirements and Integration (WG-MRI) in a global sense and IWXXM development by METP WG-MIE for effective exchange of MET information supporting AFTM operation;
- 4) To assist SWIM TF in identifying and developing the specifications of information services required to support operations based on user needs;
- 5) To identify MET and ATFM data to be exchanged using SWIM-based Information Exchange Services (examples shown in Appendix B) to enable the effective MET/ATM integration and to provide the baseline for further development of the regional SWIM data catalogue and service catalogue; and
- 6) To identify other granular MET-related requirements from ATFM perspective such as update frequency and forecast lead time of MET information to better support the development of future MET Information Exchange Services.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) establish an ad-hoc group encouraging subject matter experts from both MET/R WG and ATFM/SG, to participate in an ad-hoc group and contribute to the development of use cases and user requirements for future SWIM-based MET information services supporting ATFM;
- b) review and endorse the proposed Terms of Reference; and
- c) discuss future plans and any relevant matters as appropriate.

APPENDIX A: SUPPLEMENTARY INFORMATION

Global and Regional SWIM Developments related to MET and ATM

3.1 According to the Sixth Edition of the ICAO Global Air Navigation Plan (Doc 9750 GANP) Aviation System Block Upgrades (ASBU) B2-SWIM (2025-2030)¹, the communication based on System-Wide Information Management (SWIM) concept (refer ICAO Doc. 10039 Manual on System Wide Information Management (SWIM) Concept) will improve the current human-to-human communication with machine-to-machine interconnection, enhancing efficiency in data distribution and accessibility through global interoperability among aviation stakeholders. In particular, dissemination of MET information using MET information service in SWIM is included as part of AMET thread in ASBU.

3.2 The ICAO/WMO Conjoint Meeting held in July 2014 recommended ICAO to collaborate closely with WMO to develop Meteorological Services for Terminal Area (MSTA), with one of the focuses on integrating the MSTA into the SWIM environment underpinning the future global interoperable ATM system.

3.3 In the APAC Region, the SWIM Task Force (SWIM TF) has been established since 2017 to develop SWIM-related components and supporting materials required for implementation in the APAC Region. The work of SWIM TF also includes the coordination of information with other Working Groups/Task Forces under APANPIRG to ensure that the operational requirements, particularly the ones specific to the region, are reflected and incorporated accordingly in the regional implementation strategies. SWIM TF/3 held in May 2019 agreed that the SWIM implementation to support cross-border Air Traffic Flow Management (ATFM) operation should be given high priority.

SWIM-based MET Information Services as described in MET-SWIM Plan

3.4 According to the MET-SWIM Plan, being developed by the ICAO Meteorology Panel Working Group on Meteorological Information Exchange (WG-MIE), the exchange of MET information between information producers and information consumers in the SWIM environment can be achieved using two main messaging mechanisms, namely request/reply and publish/subscribe information exchange patterns (Figure 1).

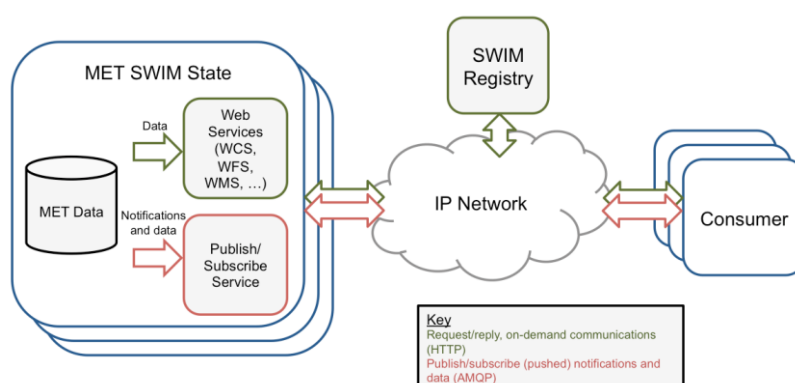


Figure 1: Mechanisms of SWIM-based MET information exchange services (Reference: the MET-SWIM Plan).

¹ Note that the current version of ASBU can be referred to at <https://www4.icao.int/ganportal/ASBU>

3.5 MET information to be exchanged in SWIM includes ICAO Meteorological Information Exchange Model (IWXXM) messages, gridded products and imageries. IWXXM is the SWIM model for exchange of MET information including volcanic ash advisory information, tropical cyclone advisory information, space weather advisory information, METAR and SPECI, TAF, SIGMET and AIRMET. The METP WG-MIE has proposed actions with regards to harmonization of IWXXM with other Exchange Models (XMs) and with the ATM Information Reference Model (AIRM) to support interoperability in SWIM.

3.6 The SWIM-based MET Information Exchange Services have the capability to geospatially and/or temporally filter a data set to provide the users' system with only the tailored information required to fulfill the specific users' needs. Appendix B provides examples of MET and ATFM data which could be exchanged using SWIM-based Information Exchange Services. Such identified data in Appendix B can assist the SWIM TF in better developing the MET and ATFM data catalogue as well as related service catalogue for the APAC Region.

Examples of Use Cases and Potential Benefits to ATFM Operations supported by SWIM-based MET Information Services

3.7 With the MET and ATFM data to be made available via SWIM-based Information Exchange Services, relevant MET data and ATFM data could be integrated to provide new fit-for-purpose information to better support ATFM. Some examples include:

- Integration of MET information in IWXXM with aerodrome information in Aeronautical Information Exchange Model (AIXM) to assess the crosswind at destination within a requested time period that in turn can be used to evaluate the impact on airport capacity and the need for ATFM measure (Figure 2, left)
- Integration of MET information in IWXXM with flight information in Flight Information Exchange Model (FIXM) to assess the number of flights crossing areas of significant weather phenomena mentioned in SIGMET reports (such as CBs and associated SEV TURB and SEV ICE) within a requested time period (Figure 2, right)
- Vertical cross-section of forecast headwind wind along with merging arrival routes for estimation of any possible change in flow rate at a waypoint.

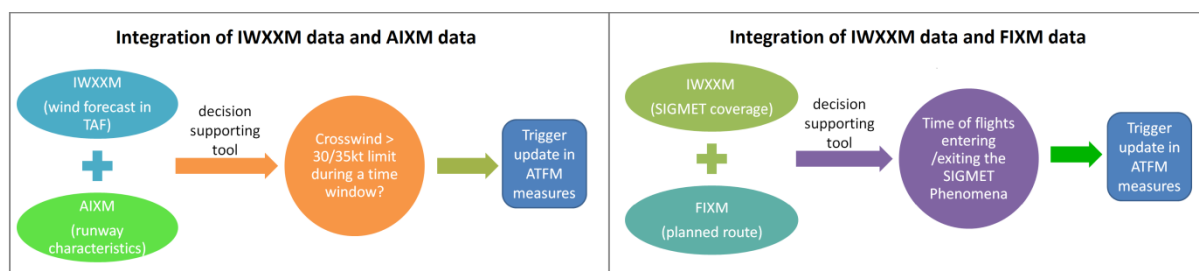


Figure 2: Scenarios showcasing integration of MET and non-MET information obtained from SWIM into decision supporting tool.

APPENDIX B: SAMPLES OF DATA CATALOGUE

Samples of MET data catalogue and ATFM data catalogue for SWIM-based operations

Sample MET data catalogue	Sample ATFM data catalogue
<p><u>Aerodrome</u></p> <ul style="list-style-type: none"> ● Surface wind and gust ● Headwind ● Windshear ● Turbulence ● Crosswind ● QNH ● Temperature and dew point ● RVR ● Visibility ● Cloud amount and type ● Lightning ● Radar data ● Wake vortex ● Weather phenomenon and intensity <p><u>Enroute</u></p> <ul style="list-style-type: none"> ● Wind ● Temperature ● CB clouds / deep convection area ● Icing ● Clear air turbulence ● Tropopause height ● SIGMET phenomenon and intensity ● Volcanic ash cloud ● Tropical cyclone ● Satellite data 	<ul style="list-style-type: none"> ● Departure aerodrome ● Destination aerodrome ● Flight identification ● Planned route/trajectory ● Estimated Off-Block Time (EOBT) ● Estimated Take-Off Time (ETOT) ● Estimated Landing Time (ELDT) ● Estimated Elapsed Time (EET) ● Calculated Take-Off Time (CTOT) ● Calculated Landing Time (CLDT) ● Target Off-Block Time (TOBT) ● Target Start Up Approval Time (TSAT) ● Target Take-Off Time (TTOT) ● Actual Off-Block Time (AOBT) ● Estimated Time Over (ETO) ● Calculated Time Over (CTO) ● Actual Time Over (ATO)

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(Draft)

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- including purpose of the document
- Section 2. Global Development
- including brief introduction of globally defined MET and ATFM information exchange models and exchange patterns, and relevant reference documents at global level
- Section 3. User requirements and use cases of future SWIM-based MET information services for ATFM operational scenarios in APAC
- including integration of MET and ATFM information in SWIM environment and its benefits in supporting cross-border ATFM operations in APAC
- Reference Sample catalogues of MET data and ATFM data