INTERNATIONAL CIVIL AVIATION ORGANISATION

REPORT
OF
SWIM WORKING SESSION: FROM BUSINESS REQUIREMENTS TO PRACTICAL SOLUTIONS

Jakarta, Indonesia

6 – 8 November 2024

The views expressed in this Report should be taken as those of the Meeting and not the Organization

Approved by the Meeting and published by the ICAO Asia and Pacific Office, Bangkok

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PART I – HISTORY OF THE MEETING

1. Introduction

1.1 The *SWIM Working Session: From Business Requirements to Practical Solutions* was held from **6 to 8 November 2024** in Jakarta, Indonesia.

2. Attendance

2.1 The Working Session was attended by **73** participants and **38** Observers from **9** States/Administrations and **3** International Organizations, including Hong Kong China, Indonesia, Japan, Pakistan, Singapore, Sri Lanka, Thailand, USA, Vietnam, IATA, CANSO and ICAO. In addition, there were 38 observers from Indonesia attending this Working Session. The list of participants is provided in **Attachment 1.**

3. Opening Ceremony

3.1 Mr. Syamsu Rizal, the Director of Air Navigation, DGCA Indonesia, opened the working session. Mr. Rizal warmly welcomed all participants and expressed appreciation to Member States/Administrations and International Organizations for joining the ICAO APAC SWIM Working Session. He shared that SWIM is a comprehensive framework designed to revolutionise how we manage, exchange, and utilise information across the aviation industry. He reiterated that SWIM is vital for ensuring that all stakeholders, from regulators, Air Navigation Service Providers, airlines, airport operators, meteorological services, and UAS Traffic Management providers, can share information seamlessly. He stated SWIM enables more informed decision-making, mitigates operational delays, enhances safety, and ensures that air traffic flows efficiently across our skies. He thanked all speakers for accepting the invitation to speak in the Session and sharing their expertise, and he strongly encouraged participants to participate actively in the Working Session. He recommended participants to share their insights, voice their concerns, and remain open to fresh perspectives. Lastly, he shared the hope that this Working Session will shape the path forward for aviation in the Asia-Pacific Region, setting new benchmarks for safety, efficiency, and innovation in the years to come and promoting the ICAO Initiative: No Country Left Behind.

3.2 Mr. Setio Anggoro, EVP of ANS Planning and Development AirNaV Indonesia, represented Mrs. Polana B Pramesti, President Director of AirNav Indonesia and welcomed all participants to the Session.

4. Officers and Secretariat

4.1 Dr. Amornrat Jirattigalachote, Strategic Planning Manager (Engineering), Policy and Strategy Management Bureau of AEROTHAI, moderated the Session.

4.2 Ms. Soniya Nibhani, Regional Officer ANS (CNS) Implementation, facilitated the Session with the support of Ms. Varapan Meefuengsart, the Programme Assistant from the ICAO Asia and Pacific Regional Office.

5. Organisation, Working Arrangements, Language and Documentation

5.1 The Working session was organised for three days per the program in **Attachment 2**. The Session included six (6) presentations from various SWIM experts. All presentation materials are uploaded on the Meeting webpage on the ICAO APAC Website.

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PART II – SUMMARY OF DISCUSSION

Day 1

Setting the Scene

6.1 Dr. Amornrat Jirattigalachote, ICAO APAC SWIM Task Force (SWIM TF) Co-Chair, briefly recalled the SWIM Business Requirements Working Session conducted in Bangkok, Thailand on 6-7 November 2023. As a continuing series of the Working Session aforementioned, she explained the expected outcomes of this Session to provide participants with firsthand experience in developing SWIM technical capabilities needed to address specific operational requirements of their interests. She added that the Session is also expected to help the SWIM TF understand how it can better support its members in their SWIM implementations towards the 2024-2030 Asia/Pacific SWIM Implementation Timeframe. She reiterated that SWIM is not developed and implemented for its own sake; and its benefits lie in how SWIM can help improve the current operations and enable the future ATM operational concept. Specifically, she recalled the recent the 14th Air Navigation Conference (AN-Conf/14) **Recommendation 3.2/2** about transition to Flight and Flow Information for a Collaborative Environment (FF-ICE) services and the 2034 global cessation of ICAO 2012 flight plan. She emphasised the need to implement SWIM, as this is necessary to be ready for the global cessation of ICAO 2012 flight plan and to enable the FF-ICE operation.

SP/01 - Hong Kong's SWIM Journey – SWIM for Enhanced ATM Services

6.2 Mr. Henry Chan, Electronics Engineer, Hong Kong Civil Aviation Department, shared the benefits SWIM can provide to its implementers and users. He also described how SWIM can improve operations. He further explained improvements able to be achieved from SWIM in terms of data content, data updateability, data source, and enhanced decision making for all stakeholders. Moreover, he detailed examples of Hong Kong's SWIM use cases, including enhanced demand prediction, Air Traffic Flow Management (ATFM), Airport Collaborative Decision Making (A-CDM), ATFM/A-CDM Mutual Relationship, surveillance data sharing, and MET applications. Lastly, he elaborated on crucial challenges in SWIM development and the latest status of SWIM implementation in Hong Kong, China.

SP/02 - Japan's SWIM Journey – From R&D to Operational SWIM

6.3 Mr. Xiaodong Lu, Principal Researcher, Electronic Navigation Research Institute, Japan, explained the need to implement SWIM to handle the large amount of data in ATM and the complex relationships between different stakeholders' systems. He also emphasised the importance of creating a data-centric information environment on a network-centric operation infrastructure. He summarised the overall SWIM Concept of Operations and SWIM Framework. Moreover, he shared information about SWIM R&D activities in Japan, starting from conceptualisation, through tabletop discussions and practical validations, to operational implementation. He elaborated on the SWIM implementation plan and the possible architecture for SWIM Technical Infrastructure (SWIM TI) over CRV. He provided an example of the FF-ICE/R1 service implementation, utilising SWIM information services, on SWIM TI. Lastly, he provided the list of SWIM Information Services examples to support FF-ICE/R1 operations.

SP/03 - Thailand's SWIM Journey – Building a SWIM Community

6.4 Dr. Amornrat Jirattigalachote, Strategic Planning Manager (Engineering), AEROTHAI, Thailand, presented AEROTHAI's SWIM Journey of building the SWIM Community. She introduced the SWIM concept and its components along with the considerations for establishing global, regional, and national SWIM. She shared the AEROTHAI Journey of SWIM implementation, starting with research & development from 2014. She provided details of how AEROTHAI builds SWIM community throughout these years. Additionally, she explained SWIM interoperable framework in the Asia/Pacific Context and provided information on the tools considered useful to support SWIM implementation among stakeholders, e.g. training, guided discussion, and tabletop exercise. Moreover, she shared information about the Thailand Information Management Technical Working Group, comprised of Regulators, ANSP, AIS providers, MET service providers, airport operators, and airspace users (airlines, UAS experts). She also highlighted that, to provide an integrated work programme for all stakeholders, Thailand's SWIM

implementation roadmap and the corresponding detailed implementation plans are the main deliverables of this technical working group.

SP/04 – Singapore's SWIM Journey – Key Lessons Learned and Considerations

6.5 Mr. David Leow, Head (Design Authority), Civil Aviation Authority of Singapore (CAAS), presented a recap of Singapore's SWIM timeline and shared the details of CAAS SWIM implementation phases. He also explained CAAS SWIM key features such as an on-premise central Enterprise Messaging System (EMS), web-based SWIM registry, and Common aeRonautical Virtual Private Network (CRV) Gateway. It was stated that CAAS had completed the Phase 2 implementation, which is the Internet Gateway to allow CAAS services to be exposed through the general Internet for more consumers other than ANSPs, e.g. research institutes, airlines, and airport operators. Furthermore, he highlighted critical lessons learned from Singapore's experience, e.g. the importance of use cases in supporting cost/benefit analysis for SWIM, stakeholder awareness, the need for a national direction for SWIM development and operations. In the second part of the presentation, Mr. Leow explained what SWIM is and gave considerations and suggestions for the State's SWIM implementation. Particularly, he pointed out the significance of determining the main driver for SWIM programme and proposed the formation of a national Steering Committee for SWIM. Additionally, he shared examples of key factors to consider for SWIM implementation, including geographical locations of systems, cybersecurity, and regional involvement.

SP/05- SWIM Sandbox

6.6 Mr. Wayne Osse, Co-Chair of the CANSO Digital Transition Workgroup, introduced the basic concept of SWIM. He also provided details of its components, especially SWIM TI. He introduced the SWIM Sandbox and its mapping with the SWIM components. Furthermore, he explained the key features, configurations, and technical details of the SWIM Sandbox and how to use it. Lastly, he introduced the SWIM Tool and elaborated on how it can be utilised together with the SWIM Sandbox to create and test a more advance SWIM platform, including SWIM information services. Participants were given the options for using the Sandbox as follows:

a. Access Test Web Page Try Me! with
User ID: apac-swim-sandbox-view
Password: n5eavn14qcqgpmd6oeugm4u4n3

or

b. Official download at sdkperf (sdkperf_jmsamqp)

SP/06- How to Develop Use Cases - Recap

6.7 Dr. Amornrat Jirattigalachote, Strategic Planning Manager (Engineering), AEROTHAI, Thailand, recapped how to develop use cases for SWIM. She explained various steps to conduct a user need analysis and provided examples of how to map use cases to SWIM requirements, e.g. (*i*) for ATFM and (*ii*) for the Ground Delay Program (GDP) to address airspace constraint due to MET condition integrated with A-CDM. She also shared that FF-ICE/R1 can be one of SWIM use cases to start with, to prepare for the global cessation of ICAO 2012 flight plan as per Recommendations 3.2/2 of AN-Conf/14.

Q&A Session:

6.8 The participants were notified about various State Letters informing the adoption and approval of relevant Annexes and PANS concerning FF-ICE services and SWIM:

1. Amendment 179 to **Annex 1**- **SL 2024/28**
2. Amendment 48 to **Annex 2**- **SL 2024/29**
3. Amendment 49 to **Annex 6 Part I**- **SL 2024/34**
4. Amendment 41 to **Annex 6 Part II**- **SL 2024/35**
5. Amendment 25 to **Annex 6 Part III**- **SL 2024/36**

6. Amendment 93 to **Annex 10, Vol II**- **SL 2024/24**
7. Amendment 92 to **Annex 10, Vol III**- **SL 2024/25**
8. Amendment 53 to **Annex 11**- SL 2024/31
9. Adoption of Amendment 43 to **Annex 15**: **SL 2024/40**
10. Approval of Amendment 34 to the Procedures for Air Navigation Services- ICAO Abbreviations and Codes (**PANS-ABC, Doc 8400**)- **SL 2024/46**
11. Approval of Amendment 12 to the Procedures for Air Navigation Services — Air Traffic Management (**PANS-ATM, Doc 4444**)- **SL 2024/41**
12. Approval of Amendment 3 to the Procedures for Air Navigation Services — Aeronautical Information Management (**PANS-AIM, Doc 10066**)- **SL 2024/42**
13. Approval of the first edition of the Procedures for Air Navigation Services — Information Management (**PANS-IM, Doc 10199**)- **SL 2024/39**
14. Approval of Amendments 11, 10, 3 to the Procedures for Air Navigation Services — Aircraft Operations (**PANS-OPS, Doc 8168**), Volumes I, II, III respectively- **SL 2024/45**

6.9 Participants shared their concerns about frequent changes in versions of various standardised information exchange models and queried about the version they should adopt for their SWIM implementation. It was informed that version changes will likely to continue as more features and needs evolve with time. Still, it was added that further significant changes in the FIXM v4.3 is not foreseen for the next few years.

6.10 SWIM experts informed that the current version of FIXM is FIXM v4.3, which has been adopted by ATM SG/12 by *Draft Conclusion ATM/SG/12-3 – Agree to the Adoption of FIXM Ver. 4.3.0 in Asia/Pacific Region as the Standard Format* and will be presented to APANPIRG/35 for endorsement. Therefore, FIXM v4.3, along with a potential FIXM v4.3 Extension, is considered a stable information exchange model to support information exchange for FF-ICE/R1 services implementation. Furthermore, for the version of AIXM, it was informed that, as per the Asia/Pacific Seamless ANS Plan v3.0, ATM systems should be supported by aeronautical information digital data exchange of, at a minimum, version AIXM 5.1. For IWXXM, the following compatibility table showing IWXXM versions, associated report packages, and relevant ICAO Annex 3 requirements were referred. It was also informed that the latest version of the compatibility table maintained by WMO can be accessed via https://github.com/wmo-im/iwxxm/wiki/Package-Compatibility

IWXXM Version	METAR/ SPECI	TAF	SIGMET	AIRMET	TCA	VAA	SWA	WAFS SIGWX F/C	VONA	QVA	Requirements
1.1	1.1.0	1.1.0	1.1.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Am76
2.1	2.1.1	2.1.1	2.1.1	2.1.1	2.1.1	2.1.1	N/A	N/A	N/A	N/A	Am77
3.0	3.0.0	3.0.0	3.0.0	3.0.0	3.0.0	3.0.0	3.0.0	N/A	N/A	N/A	Am78
2021-2	3.1.0	3.0.1	4.0.0	3.1.0	3.1.0	3.1.0	3.0.1	1.0.0	N/A	N/A	Am79 + Am80
2023-1	3.1.0	3.0.1	4.0.1	3.1.1	3.1.0	3.1.0	3.0.1	1.1.0	N/A	N/A	Am79 + Am80
2025-2	3.2.0	3.0.1	4.0.1	3.1.1	3.1.0	3.2.0	3.1.0	1.1.1	1.0.0	1.0.0	Am82

6.11 In response to query about recommendation on the set of data which should be made available through SWIM, it was informed that SWIM TF is developing a list of APAC Common SWIM Information Services. For each of APAC Common SWIM Information Services list, type of information to be exchanged will also be included.

6.12 In response to suggestions requested from participants about recommended options for SWIM implementation at the national level, several options were suggested:

a. Before opting for cross-border SWIM implementation, States can start with implementing it nationally.

b. One approach may be to focus on SWIM implementation at critical/large airports that have high volume of traffic. A use case may be crafted for such airports, which the implementation of SWIM is likely to be most beneficial. After successfully implementing identified use case, more use cases can be added and scope may be extended to include more airports.

c. Another suggested approach was to start with a simple use case such as sharing flight information among internal systems within an organisation for the ease of implementation and to enjoy a low-hanging-fruit benefit. After having better SWIM understanding and more experience, this approach can be extended to include more complex use cases.

d. All proposed approaches may have their advantages and disadvantages. The selection of an approach should be done after the thoroughly consultation with all relevant stakeholders.

6.13 In response to a question about the cybersecurity measures taken for EMS, it was noted that several basic options could be possible, e.g. authentication using a user ID and password, use of VPN to establish EMS-to-EMS connections. Other more advance options such as using enterprise digital identity, PKI, and time synchronisation, could also be implemented. More information about proposed recommendations can be found in ICAO Doc 10204 Manual on Information Security, which will be published within the end of 2024.

Day 2

6.14 On Day 2, the SWIM TF Co-Chair recapped key messages from the presentations shared by different experts on Day 1.

6.15 Afterwards, the working Session was divided into seven groups. Each group was assigned to brainstorm use cases and choose one for developing and testing message exchange on SWIM TI using the SWIM Sandbox provided. All groups were required to present a selected use case and explain SWIM based on their understanding, perspective, and language. It was also expected that, after having a firsthand experience in testing information exchange over the basic SWIM TI, each group would share the next step for their Organisation to implement SWIM and identify gaps/issues on which SWIM TF can help APAC States/Administrations. The nine groups were required to work on the task within Day 2 and submit their presentations to the ICAO Secretariat and SWIM TF Co-Chair before 0800 PM (local time) of Day 2.

Day 3

6.16 The seven groups delivered their presentation using the Report-out template.

6.17 On a suggestion for SWIM TF to determine a common SWIM Implementation service provider for the APAC region, SWIM experts informed that ownership of SWIM information is with the data originator. Therefore, it is more practical for States to determine SWIM information service providers for their State/Administration.

6.18 Vietnam requested that similar SWIM workshops be organised in Vietnam to provide an opportunity for their leaders, as well as representatives from various sectors, to gather, exchange ideas, share insights, and understand the current status of SWIM implementation in the region. Vietnam reiterated that this would help Vietnam gain a comprehensive perspective on the roadmap towards SWIM. ICAO Secretariat shared that there is a plan to conduct another working session in 2025 to support States meeting the ICAO APAC SWIM Implementation timeline of 2024-2030. ICAO Secretariat will coordinate with Vietnam to further agree on the event hosting in Vietnam.

6.19 For the request to provide Policy and Regulatory Support for SWIM implementation, the ICAO Secretariat referred to the commitment under Air Navigation Services **"Expediting the implementation of ICAO provisions related to System Wide Information Management (SWIM)"**

done by Ministers of Civil Aviation from APAC States by adopting *Asia and Pacific Ministerial Declaration on Civil Aviation (Delhi)* also known as *Delhi Declaration*, during the Second Asia Pacific Ministerial conference in New Delhi from 11-12 September 2024.

6.20 Thailand informed that it is developing an AIS/AIM implementation roadmap and a SWIM implementation roadmap for Thailand, like Vietnam.

6.21 For a query, the SWIM TF Co-Chair informed us that when SWIM TF was established in 2017, it was formed under ACSICG and moved under CNS SG in 2018.

6.22 On the request to provide a SWIM Implementation roadmap for APAC States/Administrations, it was informed that SWIM TF has a SWIM implementation roadmap due for updates. It was agreed that SWIM TF Experts will update the roadmap and present it to the SWIM TF/10 Meeting for adoption.

6.23 Participants requested a pictorial roadmap from the ICAO APAC office to help States transition from FPL2012 to the FF-ICE Flight plan by 2034, along with supporting States to implement SWIM and FF-ICE R1. SWIM Experts informed that to achieve these objectives, collaboration and contributions from other contributory bodies under ATM SG and AOP SG are required. Therefore, SWIM TF alone cannot prepare it.

6.24 On the suggestion to establish an online central information resource centre for educational / training material, the participants were informed about the APAC-SWIM group on the ICAO Secure portal, where many relevant materials were posted.

6.25 Information about the *Plan for Aeronautical Meteorological (MET) Information in System-Wide Information Management (SWIM)* produced by the ICAO MET Panel was shared with participants. The document can be downloaded at this link.

7. Closing of the Session

7.1 SWIM TF Co-Chair summarised key discussions of three days and key lessons learned from seven presentations. It was concluded that four critical domains, in which the working session expects SWIM TF to help better, are as follows:

a. SWIM Implementation Guidelines
b. Technical Assistance for SWIM Implementation
c. SWIM Training
d. SWIM policy development

7.2 Participants were informed that ICAO APAC SWIM Technical Infrastructure Profiles v1.0 is ready for reference and can be downloaded from this link. Other documents are under preparation.

7.3 SWIM TF Co-Chair shared gratitude to participants for their active participation and sharing of ideas. She summarised the key messages and observations from the Working Session. She also extended sincere appreciation to all speakers for joining the Session.

7.4 The Working Session also encouraged all APAC Member States/Administrations to participate and contribute in such sessions so that comprehensive regional requirements can be addressed in the design of APAC SWIM architecture. Lastly, the ICAO Secretariat expressed appreciation and gratitude to the event participants and requested to share preferred topics for future working sessions.

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ICAO Asia/Pacific System-Wide Information Management (SWIM) Working Session
6 – 8 November 2024

SWIM Working Session: From Business Requirements to Practical Solutions

Overview Following a SWIM brainstorming session in November 2023 where regional stakeholders shared ideas on how SWIM can improve their operations, this working session aims to provide participants with a firsthand experience on developing SWIM technical capabilities needed to address specific operational requirements of their interests. It is also expected that this session will help the SWIM TF to understand how it can better support its members in their SWIM implementations towards the 2024-2030 Asia/Pacific SWIM Implementation Timeframe.

Moderated by	Amornrat Jirattigalachote (ICAO Asia/Pacific SWIM Task Force Co-Chair) Strategic Planning Manager (Engineering) Aeronautical Radio of Thailand Ltd. (AEROTHAI)
Facilitated by	Soniya Nibhani ICAO Asia/Pacific Regional Officer, Air Navigation Services Implementation

Target Participant

- Operational expert
  Expected role in working session: To develop operational requirement aligned with their organization's specific need
- Technical expert (preferably, software engineer)
  Expected role in working session: Utilizing the SWIM Sandbox which will be provided during the session, to develop a SWIM service prototype to address the operational requirement crafted by their operational expert

Wednesday 6 November 2024

**UTC+07.00*

0900-1000	**Opening Ceremony**
1000-1030	--- Break ---
1030-1035	**Setting the Scene** Speaker: Amornrat Jirattigalachote, ICAO Asia/Pacific SWIM Task Force Co-Chair, Strategic Planning Manager (Engineering), AEROTHAI
1035-1055	**Hong Kong's SWIM Journey – SWIM for Enhanced ATM Services** Speaker: Henry Chan, Electronics Engineer, Hong Kong Civil Aviation Department

1055-1115 **Japan's SWIM Journey – From R&D to Operational SWIM**
Speaker: Xiaodong Lu, Principal Researcher, Electronic Navigation Research Institute (ENRI)

1115-1135 **Thailand's SWIM Journey – Building a SWIM Community**
Speaker: Amornrat Jirattigalachote, Strategic Planning Manager (Engineering), AEROTHAI

1135-1155 **Singapore's SWIM Journey – Key Lessons Learned and Considerations**
Speaker: David Leow, Head (Design Authority), Civil Aviation Authority of Singapore

1155-1300 --- Lunch ---

1300-1330 **Q & A**
Panelist:

- Henry Chan, Electronics Engineer, Hong Kong Civil Aviation Department
- Xiaodong Lu, Principal Researcher, Electronic Navigation Research Institute (ENRI)
- David Leow, Head (Design Authority), Civil Aviation Authority of Singapore
- Wayne Osse, Co-Chair of CANSO Digital Transition Workgroup
- Amornrat Jirattigalachote, Strategic Planning Manager (Engineering), AEROTHAI

1330-1415 **SWIM Sandbox**
Speaker: Wayne Osse, Co-Chair of CANSO Digital Transition Workgroup

1415-1430 **How to Develop Use Cases - Recap**
Speaker: Amornrat Jirattigalachote, Strategic Planning Manager (Engineering), AEROTHAI

1430-1500 --- Break ---

1500-1645 **Working Session - Operational Requirements Development**
All participants

1645-1700 **Wrap Up**

Thursday 7 November 2024

**UTC+07.00*

0900-0905 **Day 1 Recap**
Speaker:
Amornrat Jirattigalachote, ICAO Asia/Pacific SWIM Task Force Co-Chair, Strategic Planning Manager (Engineering), AEROTHAI

0905-1200 **Working Session – SWIM Service Prototype Development**
All participants
**Break as appropriate*

1200-1300 --- Lunch ---

1300-1615 **Working Session – SWIM Service Prototype Development (con't)**
All participants
**Break as appropriate*

1615-1630 **Wrap Up**

Friday 8 November 2024

**UTC+07.00*

0900-0905 **Day 2 Recap**
Speaker:
Amornrat Jirattigalachote, ICAO Asia/Pacific SWIM Task Force Co-Chair, Strategic Planning Manager (Engineering), AEROTHAI

0905-1200 **Team Presentation – Report out from Working Session**
All participants
**Break as appropriate*

1200-1300 --- Lunch ---

1300-1515 **Team Presentation – Report out from Working Session (con't)**
All participants
**Break as appropriate*

1515-1530 **Wrap Up**