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ATIEC 2021

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IWXXM Update

Implementation Status and Future Plans

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Smart. Secure. Shareable. Aviation Information. Overview of IWXXM

Status of IWXXM Implementation

Future Plans for IWXXM



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- kotten@avmet.com

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- ICAO Meteorological Information Exchange Model (IWXXM)
- Extensible Markup Language (XML)
 - Markup language that defines a set of rules for encoding documents
 - Emphasizes simplicity, generality, and usability across the internet and applications
 - Defined by free open standards
 - International Organization for Standardization (ISO)
 - Open Geospatial Consortium (OCG)

- IWXXM will replace traditional alphanumeric code (TAC) as the standard format for the exchange of meteorological information
- Unlike TAC, IWXXM is intended for machine to-machine information exchange
 - Visualization will be at the discretion of end users

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Implementation Status

- IWXXM Version 3.0 implemented in March 2019
 - Past version updates tied to ICAO Annex 3 updates
 - Future version updates as needed
 - World Meteorological Organization (WMO) develops the
 schema to support ICAO MET information requirements
- IWXXM became a Standard in ICAO Annex 3, Meteorological Services for International Air Navigation, in November 2020
 - All States are now **required** to disseminate weather messages in digital IWXXM format

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Implementation Status

- Global IWXXM Implementation
 - ICAO Regions (EUR/NAT, MID, SAM, NACC, APAC) held various IWXXM Implementation
 - Workshops since 2016
 - Bi-lateral AMHS testing conducted between various States
 - Regional OPMET Databanks (RODBs) and Regional OPMET Centres (ROCs) functioning as translation centres

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Implementation Status

- U.S. Implementation
 - Conducted bi-lateral testing with European, Asian, and Caribbean States
 - National Weather Service (NWS) currently still in the process of implementing IWXXM for international dissemination (not yet operational)
 - NWS will create IWXXM versions of forecast and warning products at point of production (AWIPS)
 - TAC translation should not be necessary (for long)
 - NWS will disseminate to FAA for international distribution via AMHS and WIFS

Transition from TAC to IWXXM

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- ICAO METP plans to remove TAC as a Standard in ICAO Annex 3 between 2025-2030, establishing IWXXM as the sole primary format for MET information exchange
- Legacy systems need to prepare for ingesting IWXXM long-term (rather than relying on TAC translation)
- Future systems and services will provide output in IWXXM only (e.g., future ICAO Hazardous Weather Information System (HWIS))
- ICAO METP developed MET-SWIM Roadmap to outline transition away from TAC and toward SWIM services

Transition from TAC to IWXXM



Figure 2. MET-SWIM in Block 1 (2019-2024).

Figure from MET-SWIM Roadmap, Version 2.3

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Transition from TAC to IWXXM



Figure 3. MET-SWIM in Block 2 (2025-2030).

Figure from MET-SWIM Roadmap, Version 2.3

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Transition from bulletins to single messages

- Given increased volumes of data and frequency, bulletins no longer serve a purpose with IWXXM exchange
 - AFTN and AMHS exchange requires bulletins, but SWIM architecture offers a range of alternative approaches for exchange
 - SWIM to be implemented in 2025

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 Individual reports should be made available as part of the base MET services so that additional SWIM services can be built upon this base service

- Increased resolution of information in IWXXM
 - XML allows freedom and flexibility to incorporate additional information previously limited by TAC constraints
 - Example possibilities:
 - 15, 5, or 1 minute METAR observations
 - Removal of rounded values in METARs
 - Added information within TAF for specific decision-making
 - Information to support de-icing operations
 - Finer resolution of ceiling and Cb forecast information
 - Enhanced uncertainty/probability information
 - Information for arrival rate decision-making

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- IWXXM Extensions
 - Until recently ICAO METP has been focused on meeting November 2020 effectiveness of IWXXM dissemination
 - •. Effort now begins on standardizing the use of extensions
 - Common means of referencing extensions
 - Developing process to move common (State) extensions to a Standard within the schema

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- IWXXM Information Services
 - Nov. 2020 IWXXM implementation was a one-to-one
 - Informational content of TAC repackaged in IWXXM
 - Adding value to IWXXM messages
 - Met community has more detailed information than can currently be communicated in legacy TAC
 - Utilize XML capability to add high resolution information to IWXXM messages
 - Developing SARPs for Information Service and standard interoperability

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Thank you!

Questions? Contact:

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Backup Slides

IWXXM

AIXM

FIXM

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- IWXXM is 1 of 3 information sets used in aviation
 - Aeronautical Information (AIXM)
 - Charted routes, aerodromes, FIRs
 - NOTAM
 - Airspace restrictions
 - Flight Information (FIXM)
 - Flight plans
 - Traffic management
 - Aircraft type/performance
 - Route preferences

- IWXXM is a key enabler of System Wide Information Management (SWIM) concepts
 - SWIM provides one standard "connection" that uses universal programming language across all data, allowing more efficient data sharing among aviation stakeholders
 - SWIM streamlines connections among different systems, providing access to multiple systems through one connection
 - SWIM core services will enable systems to:
 - Request and receive information when needed
 - Subscribe for automatic receipt
 - Publish information and services as appropriate

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Smart. Secure. Shareable. Aviation Information. Why move from a 1-2 line TAC METAR to a 5page IWXXM METAR?

- Enables commonality across aviation system
 domains (e.g., weather, flight, aeronautical info.)
 Allows the geographic position and time of information to be easily integrated with multiple systems
- Supports the modernization of MET information
 - Higher resolution, user-definable visualization and integration, modernized communications infrastructure
- Separates the exchange from the use of information

IWXXM is a key enabler of System Wide Information Management (SWIM) concepts

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ERAL AVIATION		Ove	rview	
	• Ex	change of MET information		
		Current:		
EUROCONTROL	TAC Data Producer	Aeronautical Fixed Telecommunications Network (AFTN) OR Aeronautical Message Handling System (AMHS) Basic	TAC Data Consumer	
ΔΤΙΕ	 TAC products are exchanged via AFTN or AMHS-Basic connections 			
		Future:		
2021	MET Data	AMHS with File Transfer Body Part (FTBP)	IWXXM Data and	
Smart.	Providers	OR HTTP with Publish/Subscribe and Request/Response	Consumers	
SWIM will not be required until 2025, but early adoption of SWIM principles is highly encouraged				
Shareable.		 IWXXM products will be exchanged via AMHS with FTBP or 		
Aviation Information.		HTTP with publish/subscribe and request/respon	se capability	

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Implementation Status

- Initial MET products required to be exchanged in IWXXM format by ICAO Annex 3 in November 2020:
 - TAF
 - METAR
 - SPECI
 - SIGMET
 - AIRMET

- Volcanic Ash Advisory
- Tropical Cyclone Advisory
- Space Weather Advisory
- SIGWX* ("test" status by 2021, operational by 2022)

Future is data-centric, rather than product-centric!