Deciding with Data | Leveraging information to make better data-driven choices.

International Transition from TAC to IWXXM

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Presentation Overview

- Introduction and Background
  - Overview of IWXXM
  - International Governance
  - ICAO Annex 3 Amendment Schedule
- Implementation Status
  - Global
  - Regional
- Future Plans and Path Forward
  - Making IWXXM Desirable
  - Distribution of IWXXM via Information Services

Introduction and Background

- Traditional Alphanumeric Code (TAC)
  - Teletype data format used across MET domain for decades
  - Restraints include character limits, rigidity in content, etc.
- ICAO Meteorological Information Exchange Model (IWXXM)
  - Data format (extended markup language (XML)) for the international exchange of aeronautical meteorological (MET) information
  - Intended for machine-to-machine information exchange
  - Will replace TAC as the primary data format for international exchange
- Rationale for Transition
  - IWXXM akes information “digital” and supports the modernization of MET information
  - IWXXM is less restrictive than TAC; allows for innovation and creativity
  - Enables commonality with other aeronautical domains (AIXM, FIXM, AIRM, etc.) as key components of System Wide Information Management (SWIM)

Introduction and Background

METAR in TAC format:

METAR KDCA 221852Z 04007KT 10SM
FEW075 SCT250 27/09 A3016 RMK A02
SLP211 T02720094

METAR in IWXXM format:

```
<iwxxm:observation>
    <iwxxm:MeteorologicalAerodromeObservation cloudAndVisibilityOK="false">
        <iwxxm:airTemperature uom="Cel">27.2</iwxxm:airTemperature>
        <iwxxm:dewpointTemperature uom="Cel">09.4</iwxxm:dewpointTemperature>
        <iwxxm:qnh uom="hPa">1021.1</iwxxm:qnh>
        <iwxxm:surfaceWind>
            <iwxxm:AerodromeSurfaceWind variableWindDirection="false">
                <iwxxm:meanWindDirection uom="deg">40</iwxxm:meanWindDirection>
                <iwxxm:meanWindSpeed uom="[kn_i]">7</iwxxm:meanWindSpeed>
            </iwxxm:AerodromeSurfaceWind>
        </iwxxm:surfaceWind>
        <iwxxm:visibility>
            <iwxxm:AerodromeHorizontalVisibility>
                <iwxxm:prevailingVisibility uom="sm">10</iwxxm:prevailingVisibility>
            </iwxxm:AerodromeHorizontalVisibility>
        </iwxxm:visibility>
        <iwxxm:cloud>
            <iwxxm:AerodromeCloud>
                <iwxxm:layer>
                    <iwxxm:CloudLayer>
                        <iwxxm:amount xlink:href="http://codes.wmo.int/49-
                        2/CloudAmountReportedAtAerodrome/FEW" xlink:title="Few"/>
                        <iwxxm:base uom="[ft_i]">7500</iwxxm:base>
                    </iwxxm:CloudLayer>
                </iwxxm:layer>
                <iwxxm:layer>
                    <iwxxm:CloudLayer>
                        <iwxxm:amount xlink:href="http://codes.wmo.int/49-
                        2/CloudAmountReportedAtAerodrome/SCT" xlink:title="Scattered"/>
                        <iwxxm:base uom="[ft_i]">25000</iwxxm:base>
                    </iwxxm:CloudLayer>
                </iwxxm:layer>
            </iwxxm:AerodromeCloud>
        </iwxxm:cloud>
    </iwxxm:MeteorologicalAerodromeObservation>
</iwxxm:observation>
```

Data source: beta.aviationweather.gov

Introduction and Background

METAR in IWXXM format:

METAR KDCA
FEW075 SCT
SL

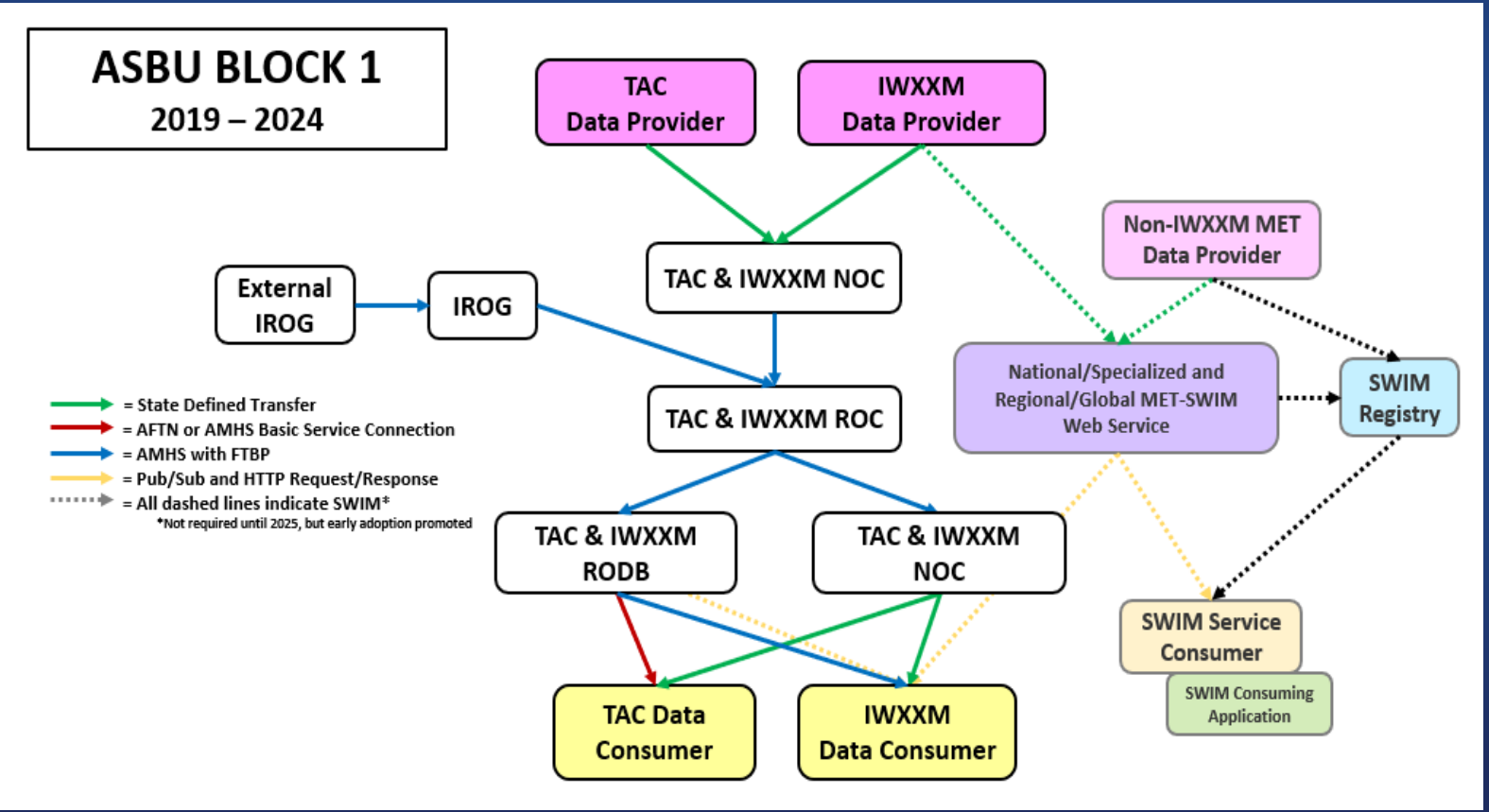
```
<iwxxm:aerodrome>
	<aixm:AirportHeliport gml:id="uuid.9a90ec91-6b41-4c22-96ed-0b39053aed3d">
		<aixm:timeSlice>
			<aixm:AirportHeliportTimeSlice gml:id="uuid.34509e41-0e7e-44a3-aa81-
			16159817dc5d">
				<gml:validTime/>
				<aixm:interpretation>SNAPSHOT</aixm:interpretation>
				<aixm:designator>KDCA</aixm:designator>
				<aixm:name>Washington/Reagan-National Arpt, VA, US</aixm:name>
				<aixm:locationIndicatorICAO>KDCA</aixm:locationIndicatorICAO>
				<aixm:ARP>
					<aixm:ElevatedPoint srsDimension="3" srsName="http://www.open
					gis.net/def/crs/EPSG/0/4979" gml:id="uuid.380846d7-01b7-4c8b-
					b908-2a96700c5533">
						<gml:pos>-77.034 38.847 4</gml:pos>
					</aixm:ElevatedPoint>
				</aixm:ARP>
			</aixm:AirportHeliportTimeSlice>
		</aixm:timeSlice>
	</aixm:AirportHeliport>
</iwxxm:aerodrome>
```

```
<iwxxm:observation>
	<iwxxm:MeteorologicalAerodromeObservation cloudAndVisibilityOK="false">
		<iwxxm:airTemperature uom="Cel">27.2</iwxxm:airTemperature>
		ewpointTemperature>

		Direction="false">
		">40</iwxxm:meanWindDirection>
		>7</iwxxm:meanWindSpeed>

		0</iwxxm:prevailingVisibility>

		:href="http://codes.wmo.int/49-
		rtedAtAerodrome/FEW" xlink:title="Few"/>
		ft_i]">7500</iwxxm:base>

		:href="http://codes.wmo.int/49-
		rtedAtAerodrome/SCT" xlink:title="Scattered"/>
		ft_i]">25000</iwxxm:base>

			</iwxxm:CloudLayer>
		</iwxxm:layer>
	</iwxxm:AerodromeCloud>
</iwxxm:cloud>
</iwxxm:MeteorologicalAerodromeObservation>
</iwxxm:observation>
```

Data source: beta.aviationweather.gov

Introduction and Background

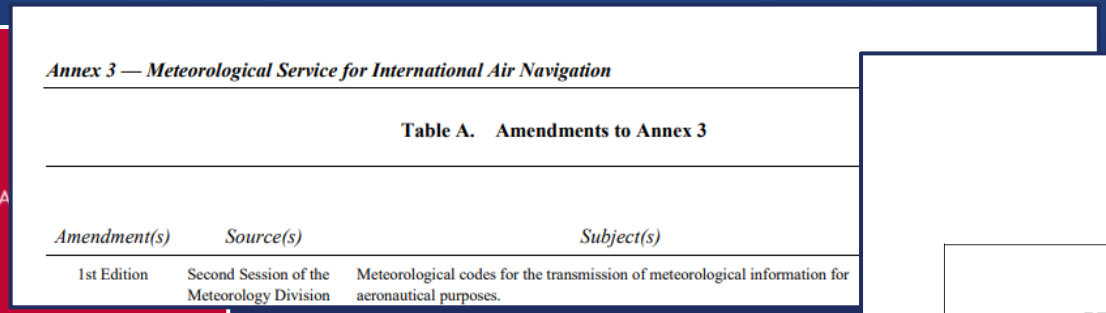
- IWXXM typically exchanged via Aeronautical Message Handling System (AMHS) and File Transfer Body Part (FTBP)

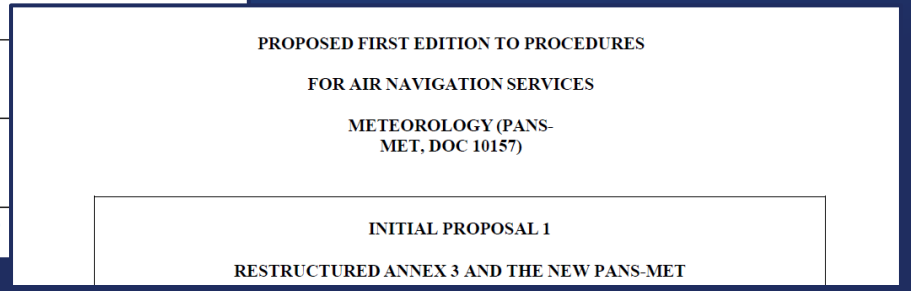


Data source: ICAO METP MET-SWIM Roadmap, Version 2.3, Figure 2

Introduction and Background

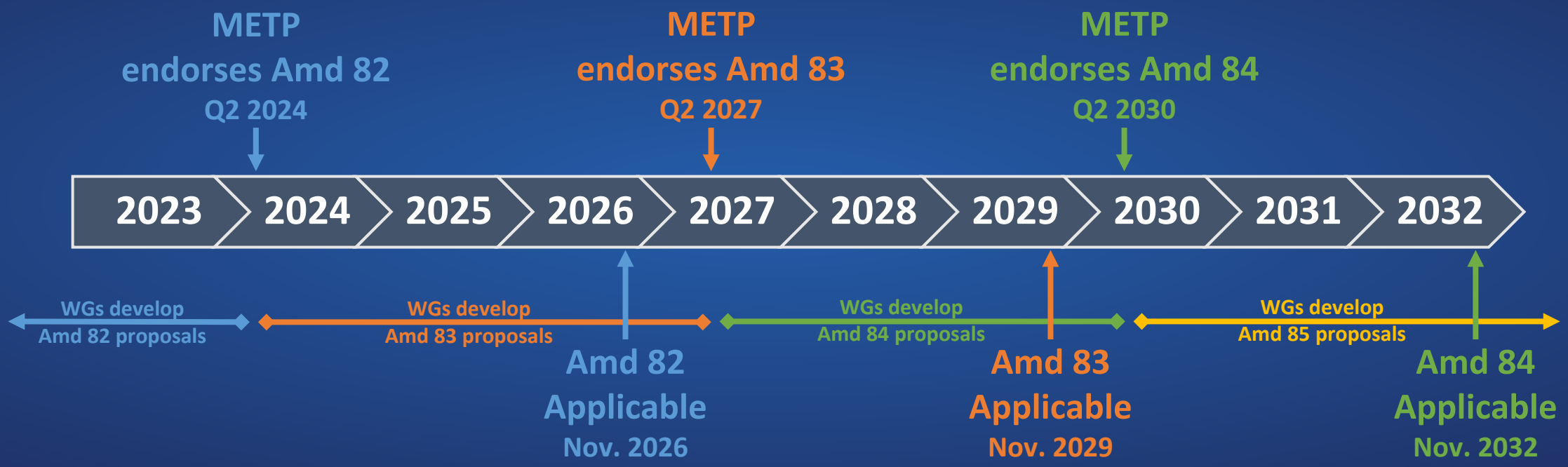
- International Governance
  - Technical specifications under remit of World Meteorological Organization (WMO)
    - Ex: Schemas, metadata, versions, headers, etc.
    - Task Team on Aviation Data (TT-AvData)
    - WMO *Manual on Codes* (WMO-No. 306), Volume I.3, Part D
  - Requirements under remit of ICAO Meteorology Panel (METP)
    - Ex: Types of information for dissemination (METAR, TAF, etc.)
    - ICAO METP Working Group on MET Information Exchange (WG-MIE)
    - ICAO Annex 3, *Meteorological Service for International Air Navigation*, and ICAO Doc 10157, *Procedures for Air Navigation Services – Meteorology*





Introduction and Background

- ICAO METP work program structured around three-year amendment cycle of ICAO Annex 3:



- IWXXM became a Standard for all States in Nov. 2020 with applicability of Amendment 79 to ICAO Annex 3; IWXXM and TAC now both Standard formats

Global Implementation

- Enabling language in ICAO Annex 3 and PANS-MET:
  - Amendment 78 (Nov. 2018): "***Recommendation –*** *Until 4 November 2020, ___ information should be disseminated in IWXXM GML form in addition to the dissemination in [abbreviated plain language].*"
  - Amendment 79 (Nov. 2020): "*___ shall be disseminated in IWXXM GML form in addition to the dissemination [in abbreviated plain language].*"
  - Amendment 81* (Nov. 2024): Unchanged from Amd 79; IWXXM and TAC still Standards
- IWXXM Version 2021-2 released in November 2021 to meet requirements of Amendment 80 to ICAO Annex 3
  - Ex: World Area Forecast System (WAFS) Significant Weather (SIGWX)
- ICAO to host Global IWXXM Extension Repository via SharePoint
  - Will aid in identifying extensions that should be raised to core schema

** Amendment 80 to ICAO Annex 3 was an abbreviated Amendment due to COVID-19 and did not contain any language regarding data formats*

Regional Implementation

- ICAO Planning and Implementation Regional Groups (PIRGs)
- Provide support and coordination for ICAO Member States
  - “No State left behind”
  - IWXXM implementation workshops
  - Regional MET groups (ex: EUR METG, APAC MET/SG) and information exchange sub-groups (ex: EUR DMG, APAC MET/IE)
    - EUR: https://eur-rodex.austrocontrol.at/IWXXM-Status.php
    - APAC: https://docs.google.com/spreadsheets/d/1WEcGfMRZq2dgHsfdpFhiefJEcA8OeMhfbCJHTqA7NX0/edit#gid=0
  - Bi-lateral agreements among States for provision of IWXXM information

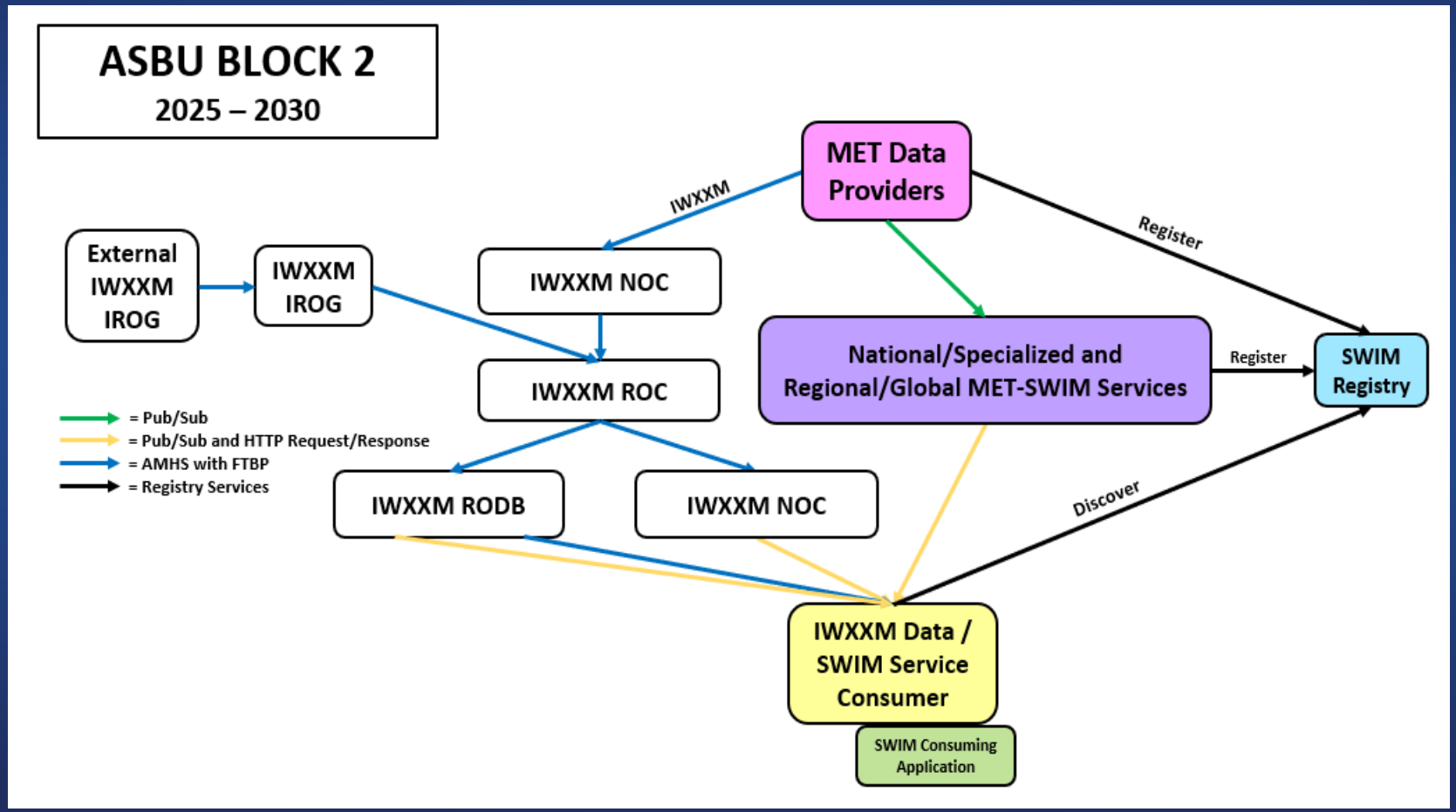
Data source: ICAO Middle East Region (MID) Office; www.icao.int/MID

Future Plans and Path Forward

- Making IWXXM Desirable
  - Proving value of IWXXM over TAC and value of transition (cost, resources, workload, etc.)
  - Adding content into IWXXM messages previously restricted by limitations of TAC format
    - Ex: De-icing information, temperature, pressure, etc. in IWXXM TAFs
  - Making new information only available in IWXXM format
  - Improving communication of new IWXXM releases and schedule
  - Removing TAC as a Standard from ICAO Annex 3
    - ICAO METP targeting Amendment 83 with applicability in November 2029
- Distributing IWXXM via Information Services
  - Implementation of MET-SWIM services
    - Ex: Aerodrome observation and forecast services, Quantitative Volcanic Ash (QVA) information service, Space Weather (SWX) information service, etc.
    - Determining future mechanisms of exchange – publish/subscribe? Request/reply?
    - Developing requirements for information service providers

Future Plans and Path Forward

- Distributing IWXXM via Information Services



Data source: ICAO METP MET-SWIM Roadmap, Version 2.3, Figure 3

Questions?

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Thank You!
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