


Federal Aviation
Administration

Weather Exchange Model

Presented to: ICAO/WMO Asia-Pacific MET-ATM
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Background

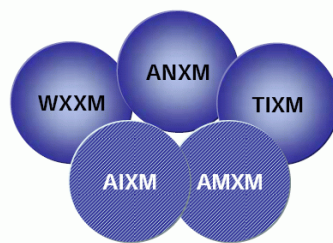
- **ICAO has recognized that legacy alpha-numeric text messages can not support future ATM requirements.**
- **ICAO has recognized XML is the future on how weather information, such as METAR and TAF, can be exchanged**
- **ICAO in coordination with WMO is working towards endorsing WXXM at the Con-Joint Divisional Meeting in 2014**

What is FAA doing with others

- FAA and EuroControl experts have been engaged to develop a data model and XML exchange format that can support ICAO and non-ICAO weather products taking into consideration the work ongoing at WMO.
- Experts from FAA and EuroControl interchange with experts from WMO, especially in documenting schema in appropriate references



WXXM is only one area of consideration



- Established
- Under development

- AIXM – Aeronautical Information Exchange Model
- AMXM – Airport Mapping Exchange Model
- WXXM – Weather Information Exchange Model
- ANXM – Airport Operations Information Exchange Model
- TIXM – Terrain Information Exchange Model

WXXM is one of several components to enable NextGen and SESAR interchanges

Source: Sam Van Der Stricht, "Digital AIM Evolution" Singapore Global AIM Congress, 2008



Raw (non-WXXM) METAR Example

```
METAR KTTN 051853Z 04011KT 0800 SN BKN003 OVC010 M02/M02 Q1013 NOSIG
```

```
METAR EGLL 062050Z 30003KT CAVOK 03/02 Q1000
```

- Compact – does not require much bandwidth
- Intended for humans – difficult to ingest in automation
- Prone to coding errors such as an extra space
- Quality Control – difficult to ensure correctness
- Other raw text formats include PIREP, AIREP, AIRMET, SIGMET, TAF .
 - All of these products have similar characteristics



WXXM Encoded METAR Report

```
<awm:METAR>
<awm:rawText>MYGF 101400Z AUTO VRB02KT 9999 FEW015 24/15 A3005 </awm:rawText>
<awm:aerodromeObservation>
  <aws:Observation gml:id="108">
    <aws:SamplingTime>
      <gml:TimeInstant gml:id="108">
        <gml:TimePosition>2010-11-10T14:00:00Z</gml:TimePosition>
      </gml:TimeInstant>
    </aws:SamplingTime>
    <aws:procedure xmlns:href="urn:fdc:faa.gov:Sensor:WeatherStations:01234" />
    <aws:ObservedProperty xmlns:href="https://www.eurocontrol.int/ont/awm/1.1/awm.owl#Aerodrome" />
    <aws:ObservedContext xmlns:href="PIR" />
    <aws:result>
      <awm:Aerodrome gml:id="1010">
        <aws:airTemperature uom="C">24</aws:airTemperature>
        <aws:dewpointTemperature uom="C">15</aws:dewpointTemperature>
        <aws:verticalVisibility uom="NM">0</aws:verticalVisibility>
        <aws:windDirection uom="deg">0</aws:windDirection>
        <aws:horizontalVisibility>
          <awm:HorizontalVisibility gml:id="1011">
            <aws:airmassVisibility uom="NM">6.21</aws:airmassVisibility>
          </awm:HorizontalVisibility>
        </aws:horizontalVisibility>
        <aws:windSpeed uom="kt">2</aws:windSpeed>
        <aws:rate uom="hPa">900</aws:rate>
        <aws:qnh uom="hPa">900</aws:qnh>
        <aws:cloudCondition>
          <aws:CloudCondition gml:id="1014">
            <aws:base uom="ft">1500</aws:base>
            <aws:cloudAmount>FEW</aws:cloudAmount>
          </aws:CloudCondition>
        </aws:cloudCondition>
      </awm:Aerodrome>
    </aws:result>
  </aws:Observation>
</awm:aerodromeObservation>
<awm:appListTop>
  <awm:Aerodrome gml:id="102">
    <gml:Identifier codeSpace="urn:icao:code:Aerodrome">MYGF</gml:Identifier>
    <gml:Location>
      <gml:Point gml:id="105" srsName="urn:ogc:def:crs:EPSG::4070" srsDimension="3">
        <gml:pos>26.55 -78.70 2.0</gml:pos>
      </gml:Point>
    </gml:Location>
  </awm:Aerodrome>
</awm:appListTop>
</awm:METAR>
```

- More explicit semantics
- Intended for machines and humans
- Ease of validation
- Raw text can be included in or derived from WXXM
- More verbose (requires additional bandwidth)
- Greater flexibility to extract elements for use elsewhere



U.S. WXXM Workshop, November 2008

Organizations Represented

- EUROCONTROL
 - FAA
 - NOAA/ESRL
 - British Atmospheric Data Centre
 - NOAA/NWS
 - AFWA
 - MIT/LL
 - NCAR
 - Tectura/Boeing
- **Models and Schema to be based on ISO/OGC Standards and Best Practices**
 - ISO 191## series
 - GML 3.2
 - OGC Observation and Measurement Model (O&M)
 - **Version 1.0.1 of the WXXM/WXXS, developed by EUROCONTROL, will be basis for future conjoint versions**
 - **The WXXM/WXXS will, whenever possible, be aligned with the Climate Science Modeling Language (CSML) Best Practice...**

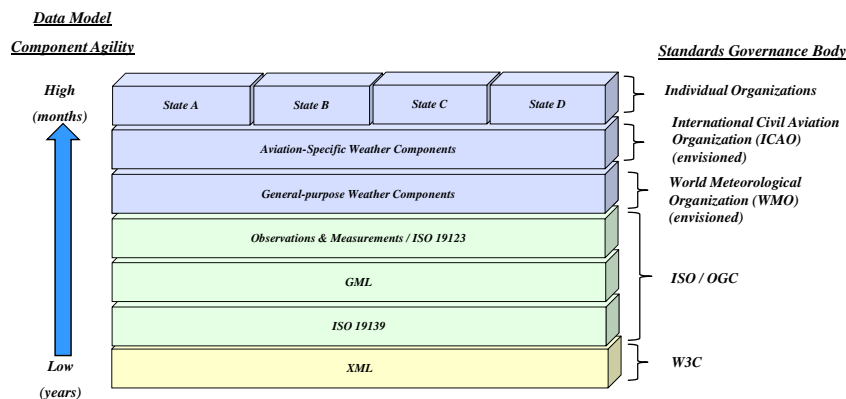


U.S. WXXM Workshop, November 2008 (cont.)

- **Features**
 - **Abstract UML model moved from Rational Rose to Enterprise Architect (lower cost, more popular commercial tool)**
 - **XML Schemas generated from UML (Open source tool)**
 - **Additional Products:**
 - PIREP and AIREP
 - Volcanic Ash Advisory
 - Graphical AIRMET (U.S.)
 - Gust Fronts, Microbursts
- **FAA designated to lead the migration of version 1.0.1**



Layered WXXM 1.1 Data Model



Composable, extensible data model balances standardization with the need for individual communities (FAA, Eurocontrol, DOD) to innovate



Continuing Effort - WXXM 2.0 (2011)

- **WXXM 2.0 goals:**
 - Increased simplicity and consistency
 - Improved documentation improvements
 - Support for additional weather data products
 - Address feedback from OGC OWS-7, NNEW, and other users
 - Analysis of combined use of AIXM/WXXM in Collaborative Air Traffic Management (CATM) concepts



Summary

- **WXXM 1.1 collaboration has been successful**
 - **Successfully used to demonstrate XML-based data exchanges between NOAA and the FAA in the U.S.**
 - **International demonstrations conducted within the context of the OGC interoperability program**
- **WXXM community is growing**
- **Version 2.0 will be available in 2011**
- **WXXM is a candidate for standardization within ICAO and WMO**



References

- **WXXM Models and Schemas:**
<http://wiki.ucar.edu/display/NNEWD/WXXM>
- **Eurocontrol OneSky site:**
<https://extranet.eurocontrol.int/>
- **AIXM Web Site:**
<http://www.aixm.aero>

