# Expert Team

## OPMET Data Representation

Meeting Summary: ET-ODR/2 (October 2009)

Jeremy Tandy 30-Oct-2009

# Executive summary

- XML-encoded OPMET data transfer over AFTN (Brussels-Hong Kong) successful (23-July-2009)
- ICAO Annex 3 amendment to permit XML-encodings of OPMET data-products expected Q4-2013
- WMO IPET-MDI (expert-team) identified as focal point for developing XML-encodings of OPMET data-products to support aviation community
- ICAO & WMO decision/endorsement timelines indicate that development of WMO IPET-MDI proposals to WMO CBS (Nov-2010) are on the critical path & will require aggressive activity schedules to deliver on time
- Evolution of WMO data-standards by WMO IPET-MDI must deliver a coherent approach for data clearing-house (WIS/GISC, GEOSS, INSPIRE) and emergency response scenarios (Common Alerting Protocol) in additional to operational meteorology (WMO Resolution 40 'essential' data, ICAO Annex 3 OPMET data)
- Contribution of expertise and effort to WMO IPET-MDI expected from:
  - SESAR work-package 8.1.6 (EUMETNET currently tendering)
  - INSPIRE Meteorology/Atmospheric and Oceanographic Thematic Working Group (EUMETNET proposal to establish E-INSPIRE-ET)
  - Open Geospatial Consortium Met-Ocean Domain Working Group
- Additional contributions from WMO members may be required to enable WMO IPET-MDI to deliver timely outputs

# ET-ODR rationale

- Operational Meteorological (OPMET) exchanged within Aviation community must be compliant with ICAO Annex 3
- Management and maintenance of OPMET data-representation systems delegated from ICAO to WMO
- WMO maintain 2 data-representation systems for OPMET data:
  - Traditional Alphanumeric Codes (TACs)
  - Table Driven Code Forms (TDCF) (BUFR, CREX, GRIB)
- TDCF tables/regulations include data models and data representation systems
- WMO is migrating from TAC to TDCF for data representation (endorsed by WMO Executive Council/Congress)
- Reluctance of the aeronautical user community to use the WMO TDCF due to their limited applicability for other aeronautical information
- WMO ET-ODR established to identify whether XML encoding of information using the BUFR-compatible data-model was possible across the Aeronautical Fixed Telecommunications Network (AFTN)

*WMO*
*OMM*

# ET-ODR progress report

- ET-ODR pilot project successfully delivered proof-of-concept with scope:
  - Presentation of a METAR instance of the three-level Modelling of WMO data products based on TDCF (BUFR/CREX) tables in XML
  - Exchange of the XML-encoded METAR instance via AFTN
- XML-encoded METAR sent from Brussels (Belgium) to Hong Kong (China) via London (UK), Singapore and Bangkok (Thailand) [23-July-2009]
- Several problems were observed:
  - Interpretation of IA-5 character-set encodings differs across AFTN resulting in minor (non-critical) changes to XML-encoded message
  - Message length limited to 1800 characters
- Conclusion:
  - XML is accepted as appropriate for encoding & exchange OPMET data within Aviation community

**WMO OMM**

# Data exchange trends in aviation

- Current OPMET data exchange limited to 'products' (TAF, METAR, SigWx etc.)

- Encoding of OPMET product in XML considered important step for ICAO in order to facilitate retirement of TACs

- But … the aviation community looks to increase the flight capacity within the global airspace & re-deploy the human as only a *monitor of an automated loop* rather than integral part of the loop (SESAR, NextGEN)

- Within aviation meteorology this implies minimizing the impact of weather sensitivities to air traffic – resulting in the need to improve the fidelity of information disseminated to end-users by exchanging datasets of observed and forecast phenomena which are unconstrained by traditional OPMET product specifications

**WMO**
**OMM**

# Timeline for standards development

**WMO CBS**
• WMO IPET-MDI propose:
-Candidate data model, controlled vocabularies & encodings (incl. XML)
-Governance/maintenance arrangements & publication mechanisms for WMO IPET-DRC
- Adjust WMO IPET-DRC mandate to maintain the data model & encodings (incl. XML) alongside TAC & TDCF

**WMO Executive Council**
• Endorse changes recommended by WMO CBS

**ICAO**
• Annex 3 amended to permit exchange XML-encoded OPMET products* under bi-lateral agreement between member states

[ *based on current data-product specifications   ]

| 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|------|------|------|------|------|------|

**WMO IPET-MDI**
• 2009-10 work programme

**WMO IPET-MDI**:

Inter-Programme Expert Team on Metadata & Data Interoperability

**WMO IPET-DRC**:

Inter-Programme Expert Team on Data Representations & Codes

**WMO IPET-MDI**
• 1.0 data exchange standards passed to WMO IPET-DRC for maintenance

**SESAR**
• Data exchange standards development complete

**ICAO Divisional Meeting**
• Endorse transition to from product- to data-centric information exchange
• Prepare roadmap to phase out TAC

WMO
OMM

# Candidate WMO IPET-MDI work programme 2009-10

- Assess current data-standards landscape;
  incl. WMO TAC, WMO BUFR, WMO GRIB(2), ISO 191xx, INSPIRE, Observations & Measurements, WXCM / WXXM, Flysafe, CF-NetCDF, HDF-5, CAP, KML, Atom …

- Develop candidate common data-models & controlled vocabularies, and consider how it can be mapped with the TDCF models (tables and regulations), to support:
  - Operational meteorology and hydrology (ICAO Annex 3 OPMET data, WMO Resolution 40 'essential' data)
  - Data clearing-house (WMO WIS/GISC, GEOSS, **INSPIRE**)
  - Emergency response (Common Alerting Protocol)

- Develop candidate data-encodings – including XML

- Demonstrate effectiveness of candidate encoding(s) within test-bed – aviation OPMET as a minimum

- Develop governance / maintenance arrangements for proposed data-standards – new terms of reference for WMO IPET-DRC & provision for changes to WMO technical regulations

**WMO OMM**

# Implications

- Development of data-exchange standards for OPMET to be fully integrated within WMO IPET-MDI workplan in collaboration with the IPET-DRC
- ET-ODR to remain dormant until candidate data-encodings are ready to test – whereupon the AFTN XML data-transfer pilot will be repeated by ET-ODR
- WMO IPET-MDI workplan 2009-10 on critical path to implement changes to support ICAO Annex 3 amendments circa 2013
- Failure of WMO to respond to ICAO requirements is likely to stimulate FAA / EuroControl to develop OPMET data-standards independent of WMO
- WMO IPET-MDI workplan 2009-10 involves significant volumes of work and will require aggressive activity schedules to deliver on time
- Funding arrangements for WMO enable IPET-MDI to meet only once prior to CBS
- Additional meetings of technical experts to deliver the workplan will need to be funded via contribution from WMO member-states supporting the technical expert
- Within Europe provision to support IPET-MDI should be likely in the form of SESAR work-package 8.1.6 (EUMETNET currently tendering for this work-package), INSPIRE Meteorological/Atmospheric and Oceanographic Thematic Working Group (INSPIMET follow-on proposal recommends establishment of E-INSPIRE-ET) and voluntary engagement in Open Geospatial Consortium (OGC) Met-Ocean and hydrology Domain Working Groups
- Coordination of these diverse groups will be required to deliver a coherent (set of) data-standards