

MET Developments in a Global Context

The WXXM goes international

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The evolving Global Air Transport System

- The ambition of the Global Air Transport community:
 - increase user flexibility
 - maximise operating efficiencies
 - increase system capacity
 - improve safety levels

Target 2020

Together, we will save



8 to 14 minutes



300 to 500 kg of fuel



948 to 1575 kg of CO₂

on average per flight.

SESAR's key performance targets for 2020 are to:

- enable a threefold increase in capacity
- improve safety by a factor of 10
- reduce by 10% the environmental impact per flight
- cut ATM costs by 50%

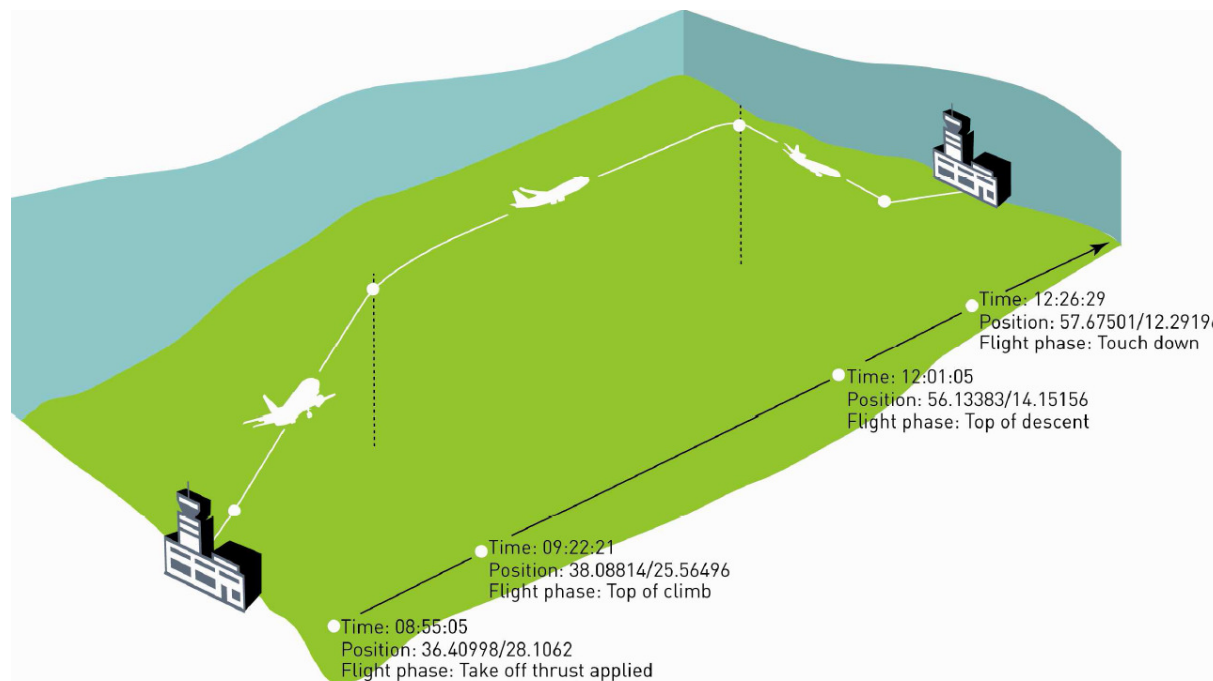
The evolving Global Air Transport System

By means of.....

a holistic, cooperative and collaborative decision-making environment, where the diverging expectations and interests of all members of the Air Transport community are balanced (to achieve equity, access and system efficiency)

The evolving Global Air Transport System

- In essence, a **time ordered ATM System**
 - Founded on **knowledge based decision making** and enabling decision-makers to make executive **choices** according to their own objectively-determined thresholds for action



The evolving Global Air Transport System



and MET

- Knowledge based ATM decision making
=
Weather assimilated decision making
 - The intelligent use of the characteristics of uncertainty that is associated with MET
- *Making the **ATM System** more **robust** and more **predictable** by **integrating weather** information in all phases of **ATM decision making** and making this information available to all stakeholders*

The evolving Global Air Transport System

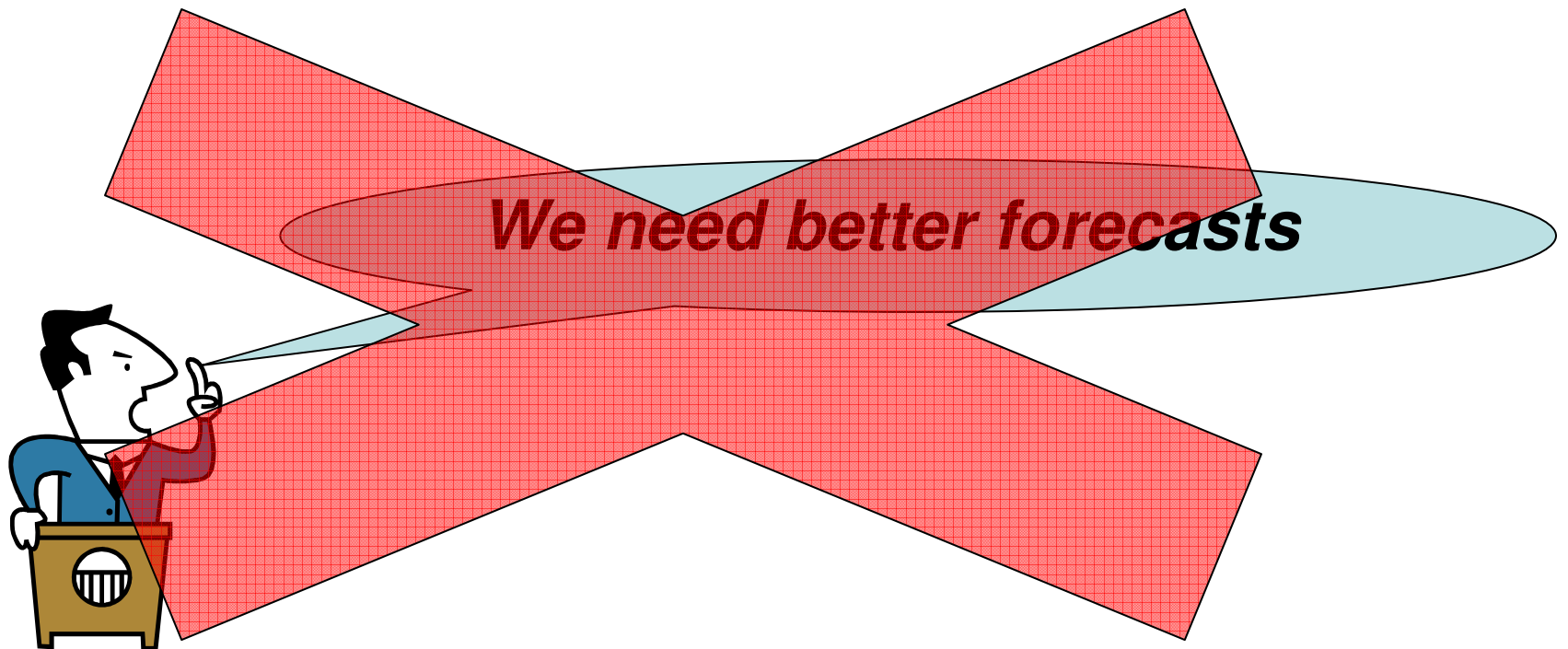


and MET

- New user requirements for MET
 - Regional level
 - SESAR
 - NextGen
 - ASIA/PAC (CARATS, Australia, ..)
 - Etc.

Regional user requirements for MET

What have we seen over the last years....



Regional user requirements for MET

- Harmonised and efficient MET provision
 - common regulation, procedures and services
- Quality assured, timely, accurate, complete and up-to-date MET information
- Information sharing
 - Integration and interoperability of ATS, ATFM, airports, AIS, MET, AOCs and aircraft into an interactive system
- Coherent and consistent MET information
- Full compliance with the regulation



Global user requirements for MET



- Majority of the ICAO member States are not (yet) faced with aerodrome or airspace capacity issues
- Their requirements for MET services and products are well served by the provisions of ICAO Annex 3
- However, the requirements of individual regions and States should be addressed
- Proposed:
 - ICAO Standards lay down the baseline of requirements that all States should satisfy. Building on this clearly identified and agreed foundation, an additional layer of capabilities to address specific performance requirements related to congested airspace and aerodromes will be added

Global user requirements for MET



- User requirements for MET could differ around the globe
- MET provision capability could differ around the globe
- MET Information exchange needs to be standardised



- 1. First developments by EUROCONTROL; 2007
- 2. Conjoint FAA/EUROCONTROL approach; late 2008
 - Version 1.1 (WXCM, WXXM, WXXS); 2010
- 3. Core of NextGen Weather and SESAR MET Information Exchange
- 4. International standardisation
- 5. Global deployment

WXXM global standardisation



- Global standardisation towards global deployment
(and not shifting to reverse)
- High level consensus on:
 - One ‘source’ to provide the semantics and abstract structure of all the information that needs to be made available by MET service providers (Logical Data Model)
 - Multiple physical implementations of MET exchange envisaged: XML/GML, GRIB, Traditional Alphanumerical Codes (TAC), NetCDF, HDF5, etc. (Physical Data Models)
 - Introduction of Metadata (profile)

WXXM global standardisation



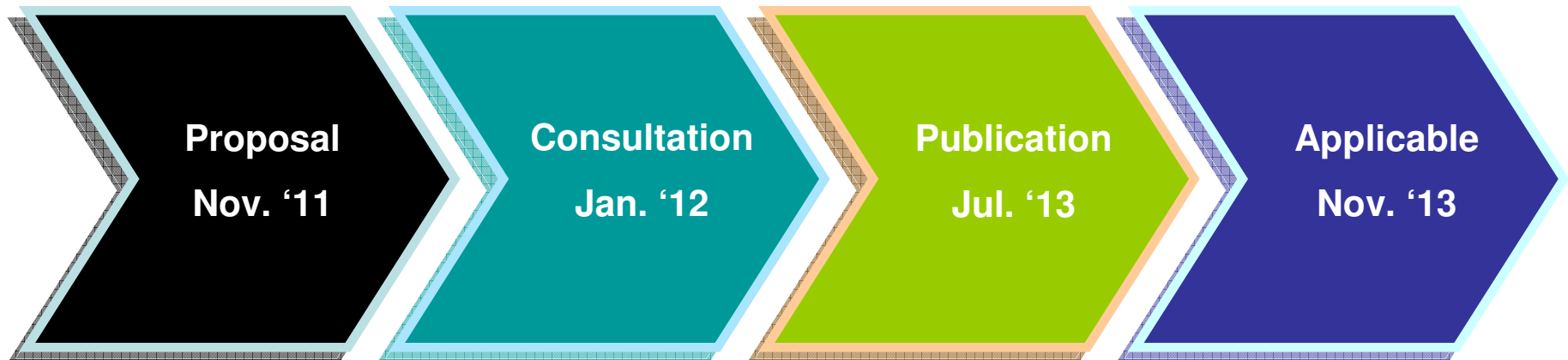
- ICAO Requirements
 - Logical level
 - Migration to a data centric environment for MET
 - Enable SWIM
 - Adhere to the principals developed for other domains = AIXM / FIXM
 - Physical level
 - Transition of TAC (TAF, METAR, SPECI) and SIGMET to XML-grammar (GML) as first step
 - Adhere to the principals developed for other domains = AIXM / FIXM
- Leading ICAO Study Group = Aerodrome Meteorological Observation and Forecast Study Group (AMOFSG)



WXXM global standardisation



- Timelines to consider
 - Currently based on regular update cycle of ICAO Annex 3
 - Updates every 3 years
 - Standard becomes applicable in November of year X
 - Standard will be published in July of year X
 - State consultation starts in January of year X-1
 - Proposals ready by November of year X-2

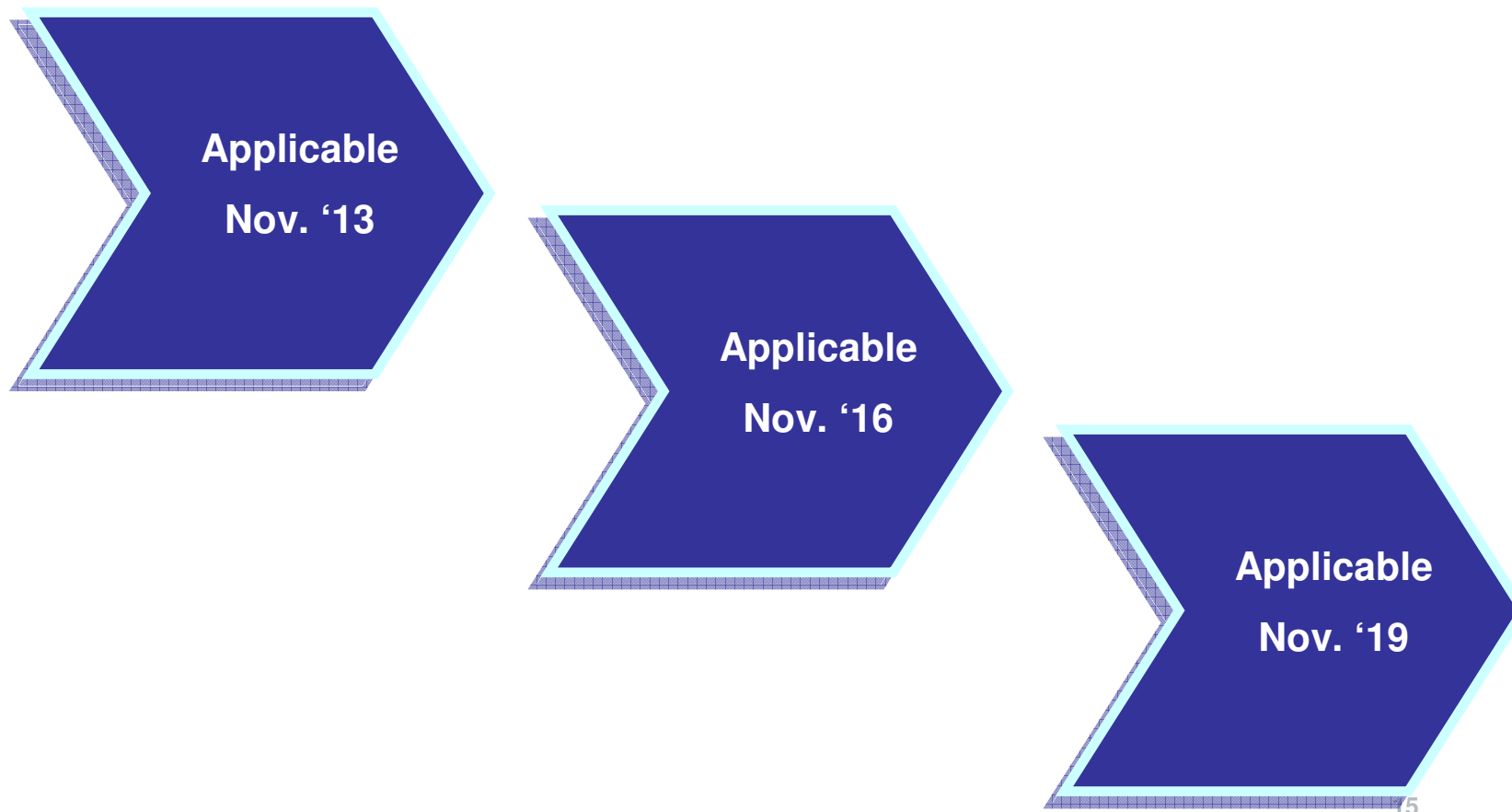




WXXM global standardisation



- Scope to consider



WXXM global standardisation



- Based on a realistic global deployment scenario
 - To serve every user and provider
 - Respecting past investments
 - Ensuring backward compatibility
- 'Reverse' is not an option





WXXM global standardisation



States in a position to exchange METAR, SPECI, TAF, SIGMET in a digital form under bilateral agreement should structure this information in accordance with WXXM and use XML/GML as the exchange format



METAR, SPECI, TAF and SIGMET are exchanged in a digital form, the information should be structured in accordance with WXXM and use XML/GML as the exchange format

States in a position to do so, under bilateral agreement, should structure all meteorological information in accordance with WXXM



METAR, SPECI, TAF and SIGMET are exchanged in a digital form, the information shall be structured in accordance with WXXM

All other MET information should be structured in accordance with WXXM



WXXM global standardisation



2011

2013

2016

2019

2022

- What is required
 - Logical = WXXM
 - 1st iteration (for ICAO/WMO) which will specify the semantics and abstract structure (features, attributes and associations) for aeronautical MET information. Clear focus on METAR, SPECI, TAF and SIGMET exchange in a digital form
 - Physical
 - 1st iteration (for ICAO/WMO) specification for METAR, SPECI TAF and SIGMET exchange in digital form which shall:
 - use XML
 - comply with the GML specification for the encoding of geographical information
 - be expressed in the form of an XML Schema
 - be structured in accordance with defined features, attributes and associations (WXXM)
 - Metadata
 - 1st iteration (for ICAO/WMO) metadata profile for METAR, SPECI, TAF and SIGMET exchange in compliance with ISO 19115 and ISO 19139



WXXM global standardisation



2011

2013

2016

2019

2022

- What is required
 - Logical = WXXM
 - Major Release which will specify the semantics and abstract structure (features, attributes and associations) for aeronautical MET information
 - Physical
 - Major Release specification for METAR, SPECI TAF and SIGMET exchange in digital form (XML/GML-Schema)
 - 1st iteration specification for MET information exchange (exclusive of the METAR, SPECI, TAF and SIGMET Schema)
 - Metadata
 - Major Release metadata profile for METAR, SPECI, TAF and SIGMET exchange in compliance with ISO 19115 and ISO 19139
 - 1st iteration metadata profile for aeronautical MET information exchange (exclusive of the METAR, SPECI, TAF and SIGMET) in compliance with ISO 19115



WXXM global standardisation



2011

2013

2016

2019

2022

- What is required
 - Logical = WXXM
 - Major Release of WXXM to specify the semantics and abstract structure (features, attributes and associations) for all aeronautical meteorological information
 - Physical
 - Major Release specification for MET information exchange in digital form
 - Metadata
 - Major Release metadata profile for MET information exchange in compliance with ISO 19115 or ISO 19139



WXXM global standardisation



- Roles and Responsibilities
 - Ownership
 - Development
 - Maintenance
 - Support deployment
- Who will be the *custodian* of:
 - WXXM
 - Physical models (schema, formats, tables)
 - Metadata profile
- Respecting existing separation of concerns between organisations such as ICAO, WMO, ISO and OGC



WXXM global standardisation



- Custodians
 - WXXM
 - The unique representation for (MET) information (exchange) needs and its interrelationships with the rest of the air transport domain
 - Close to the business

- Physical models
 - The new representation of WMO coding practices
 - Especially an XML schema for TAC is very much content oriented and close to the development of code forms

- Metadata profile
 - Requires domain expertise, both from an air transport perspective and a meteorology perspective





Towards global deployment

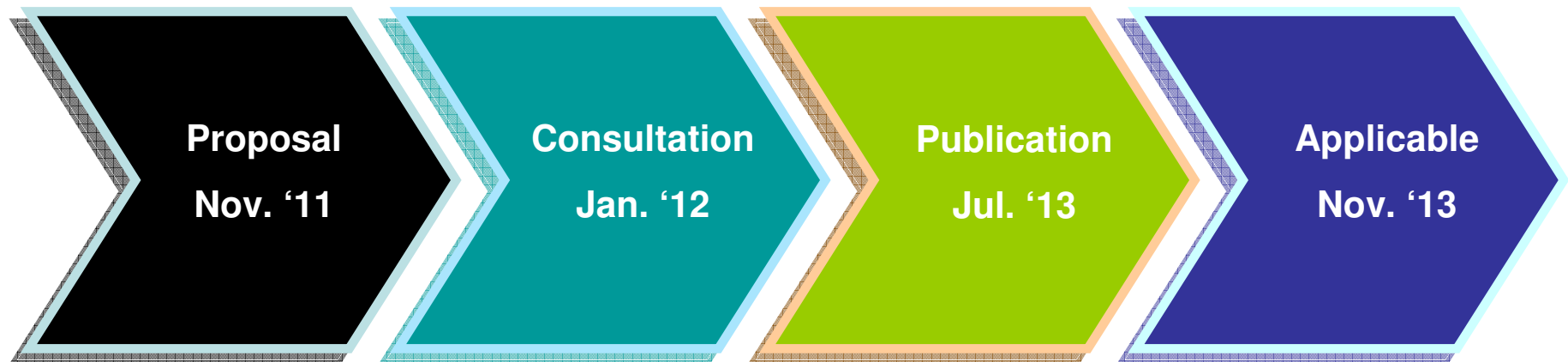


- Custodians



- Involvement from ICAO-, WMO-Member States and OGC Members crucial in development, maintenance of required Standards
- EUROCONTROL and FAA, founding members of SESAR and NextGen, are committed to deliver a globally interoperable ATM shared information environment including MET
- EUROCONTROL and FAA directly and/or via the SESAR Programme and NextGen, will continue to support the foreseen custodians

What will / needs to happen...



What will / needs to happen...



- Discussions at the level of ICAO Study Groups and WMO Expert Teams need to reach consensus on abstract ICAO / WMO text for inclusion in ICAO Annex 3 -- November 2011
 - Based on the commitment of ICAO and WMO to migrate to a data-centric ATM information environment
 - Endorsed by the ICAO Air Navigation Commission and WMO Commission on Aeronautical Meteorology and WMO Commission on Basic Systems
 - WMO IPET-DRC meeting in September '11
 - ICAO AMOFSG meeting in September '11
- Development of supporting technical specifications and guidance material – Q1/Q2 2012

What will / needs to happen...



- Improving awareness
- identify issues and risk upfront
 - EUROCONTROL and FAA will participate in regional ICAO and when required WMO meetings
 - WXXM wiki
 - Bug and issue repository
 - And.....



The screenshot shows a web browser window displaying the website <http://www.wxxm.aero>. The page features a large header with the WXXM logo (W, X, X, M) and the text "Weather Information Exchange Model". Below the header, there is a navigation menu with links for Home, Introduction, Standards, and Related Links. The main content area is titled "Meteorological Information Exchange" and includes a description of the WXXM models, a list of major tenets, and a section for site content. The right sidebar contains links for "Download WXXM", "WXXM Wiki", and "Development", along with a paragraph explaining the development of WXXM by the FAA and EUROCONTROL. Logos for EUROCONTROL and the Federal Aviation Administration are also present.

WXXM Weather Information Exchange Model

EUROCONTROL > WXXM > Home

Meteorological Information Exchange

The Weather Information Exchange Models and Schema (WXCM-WXXM-WXXS) are designed to enable a platform independent, harmonized and interoperable meteorological information exchange covering all the needs of the air transport industry.

WXCM-WXXM-WXXS

The WXCM-WXXM-WXXS takes advantages of existing and emerging information engineering standards and supports current and future aeronautical meteorological information system requirements.

The major tenets are:

- Support for the latest ICAO and other user requirements for meteorological information by one single representation
- Alignment with ISO standards for geospatial information, including the use of the Geography Markup Language (GML)
- Alignment with OGC Best Practices for geospatial information, including the Observation & Measurement model
- Modularity to support future requirements

When the 3-tiered model(WXCM-WXXM-WXXS) is referred to as a single entity, the term used is 'WXXM'.

Site Content

This site:

- Introduces you to WXCM-WXXM-WXXS and its key concepts
- Allows you to download the UML and the XML Schema documents

Download WXXM

WXXM Wiki

Development

→ WXXM was developed by the US Federal Aviation Administration (FAA) and the European Organisation for the Safety of Air Navigation (EUROCONTROL) with support from the international community.

EUROCONTROL FEDERAL AVIATION ADMINISTRATION

A photograph of two airplanes on a tarmac at sunset or sunrise. The sky is a warm, golden-brown color, and the ground is dark. The text "Thank you" is overlaid in the center in a white, sans-serif font. The airplane on the left is smaller and has a tail fin. The airplane on the right is larger and has a tail fin. Both airplanes are facing left.

Thank you