Enabling Information Sharing thru Common Services

AIXM - Status and Evolution

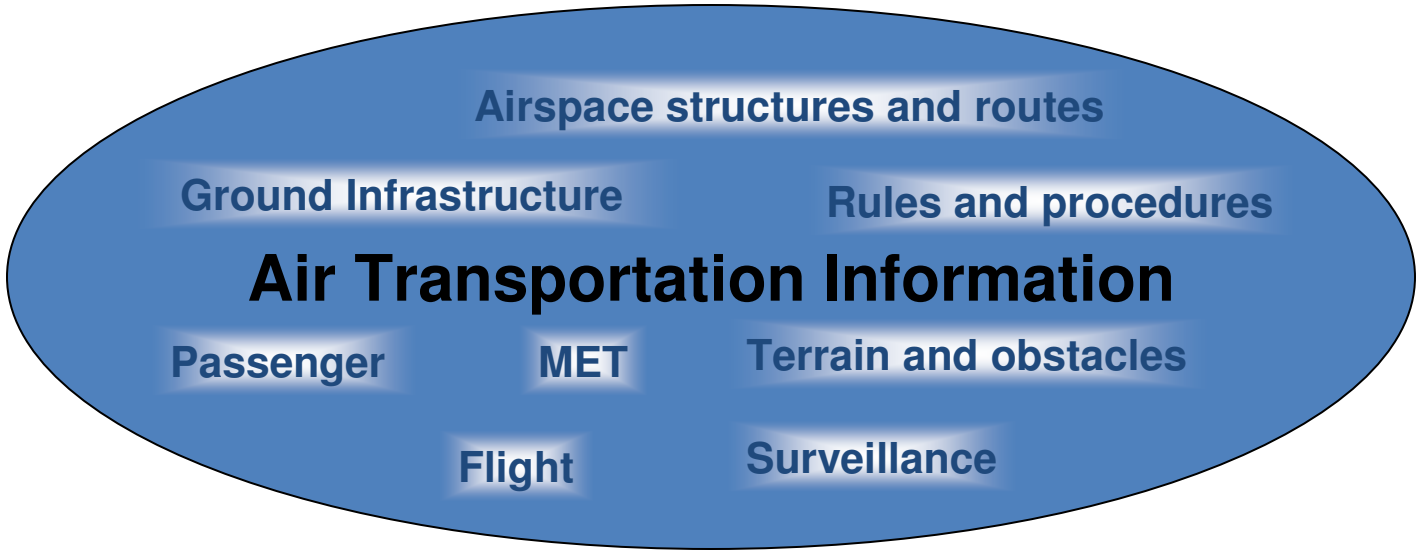
Presented To: Information Structures Theme

Presented By: Eddy Porosnicu (Eurocontrol)

Date: 30 August 2011

Introduction

- *"Never let an aircraft take you somewhere your brain didn't get to five minutes earlier"*



The structure of the information is captured in models

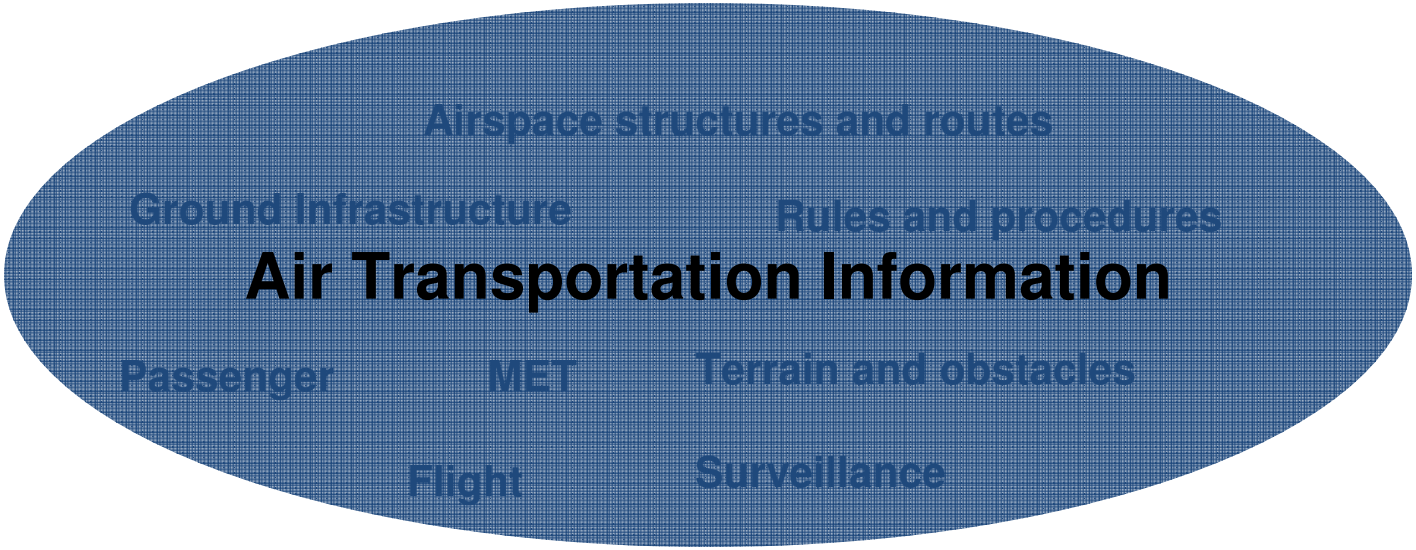
AIXM

- Aeronautical Information
  - ground infrastructure (airports, navaids)
  - airspace structure and routes
  - rules and procedures
  - obstacles
- Exchange
  - Database to database (initial)
    - European AIS Database (EAD)
  - Database to client application (more recent)
- Model
  - Conceptual / logical information model
  - Classes (hierarchies), attributes, associations, data types, constraints

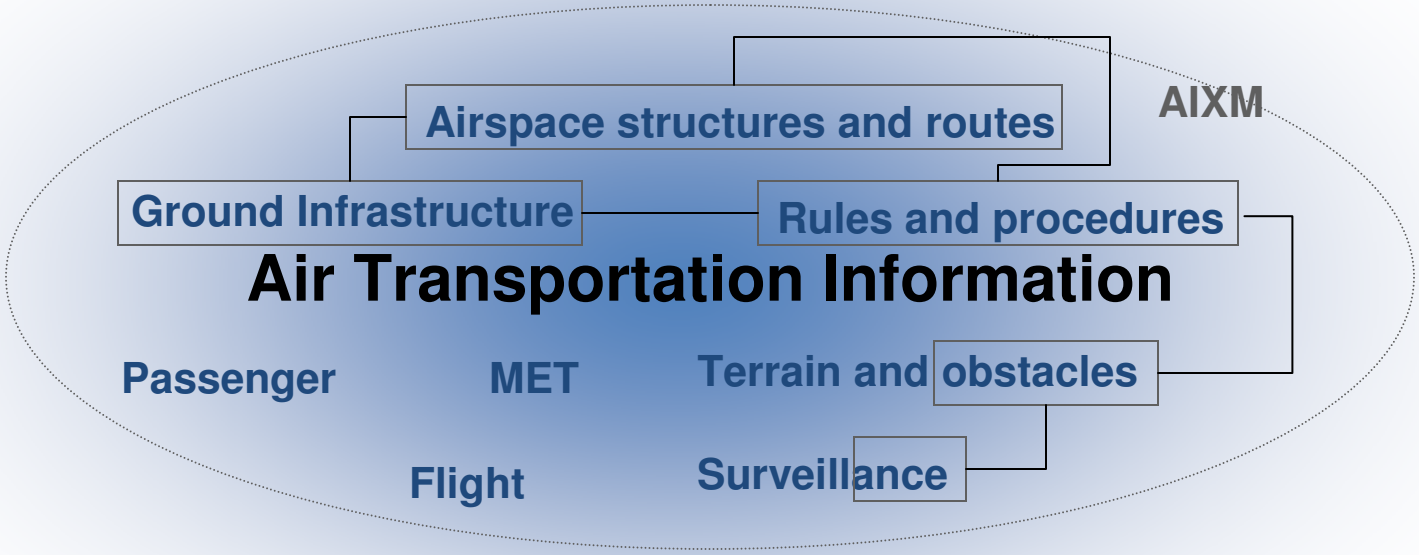
Content

- AIXM development challenges
  - Scope
  - Purpose
  - Domain evolution
  - Technologies
  - Relation with other models
- Current version(s)
  - Documentation
  - Implementation status
- Future evolution
  - New Change Control Process

AIXM Scope


Airspace structures and routes
Ground Infrastructure
Rules and procedures
Air Transportation Information
Passenger
MET
Terrain and obstacles
Flight
Surveillance

AIXM Scope

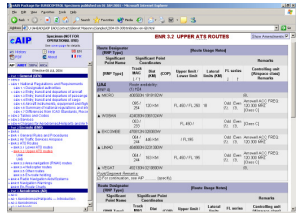

AIXM
Airspace structures and routes
Ground Infrastructure
Rules and procedures
Air Transportation Information
Passenger
MET
Terrain and obstacles
Flight
Surveillance

AIXM Purpose

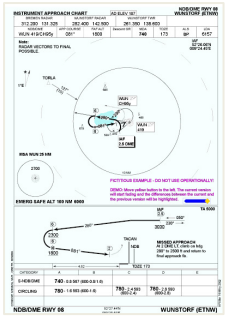
Database

Data exchange

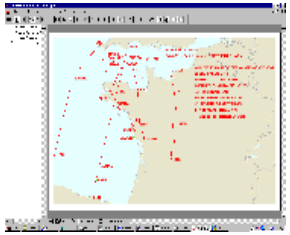
AIXM 3 & 4



AIP



Chart

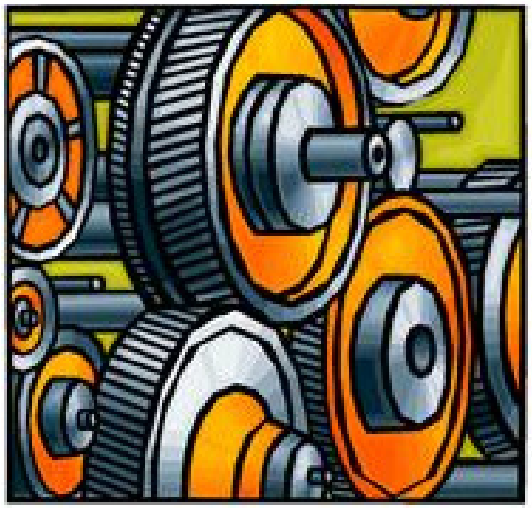


Client applications

AIXM 5

Other AIXM challenges

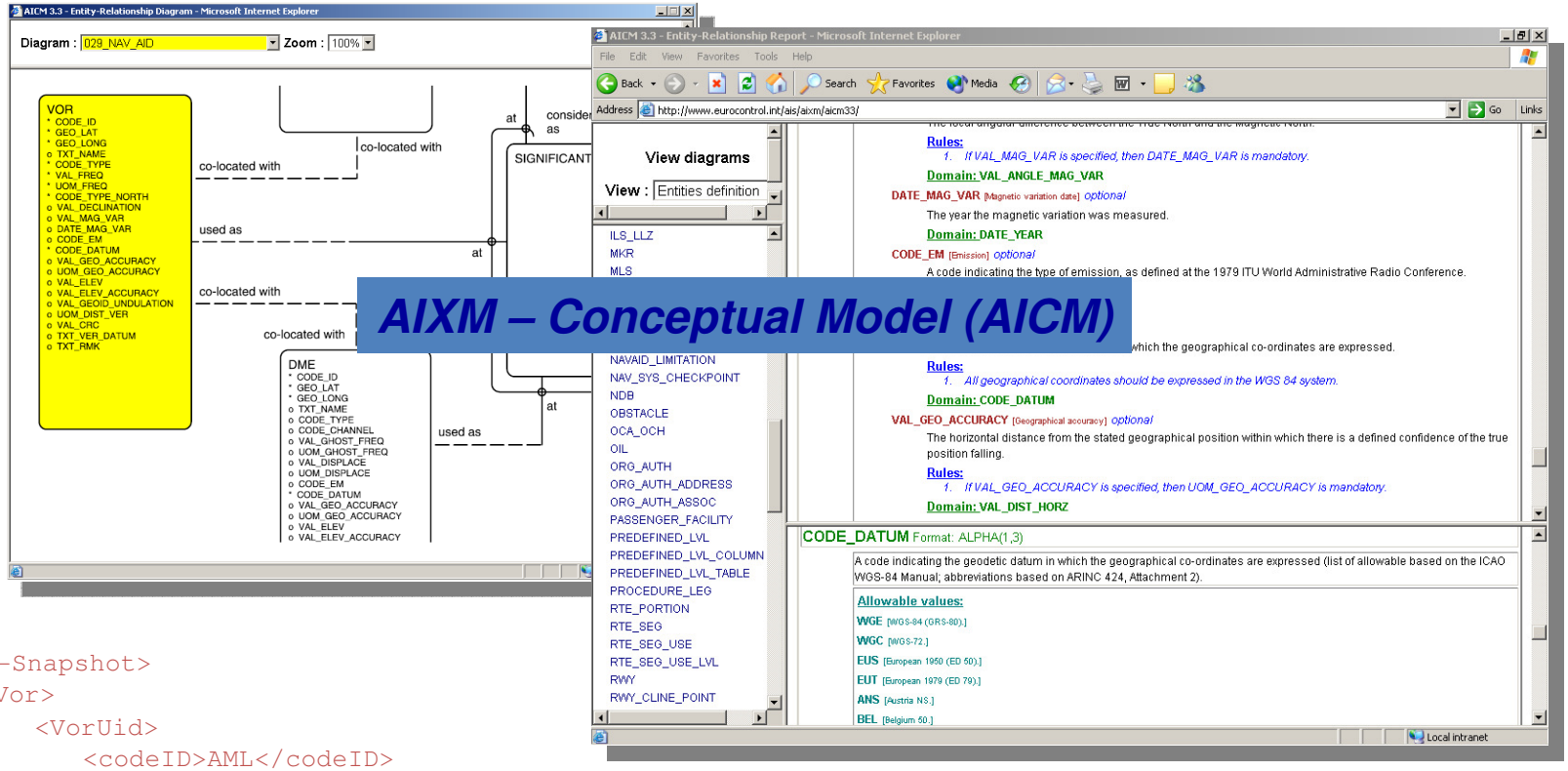
- Model evolution
  - Stability vs. Expansion of Capabilities
  - Remain in sync with the real world
- Extensibility
- Relations with other information models
  - WXXM, FIXM, etc.
  - SESAR / NextGEN



AIXM 3.x & 4.x

Database

Data exchange



AIXM – Conceptual Model (AICM)

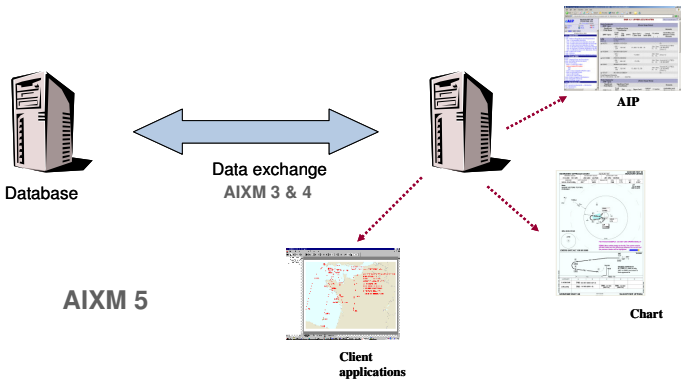
```
<AIXM-Snapshot>
    <Vor>
        <VorUid>
            <codeID>AML</codeID>
            <geoLat>34.3928N</geoLat>
            <geoLon>123.4333W</geoLon>
        </VorUid>
    …
</AIXM-Snapshot>
```

AIXM – Data Exchange Format (AIXM XML)

AIXM 3.x & 4.x

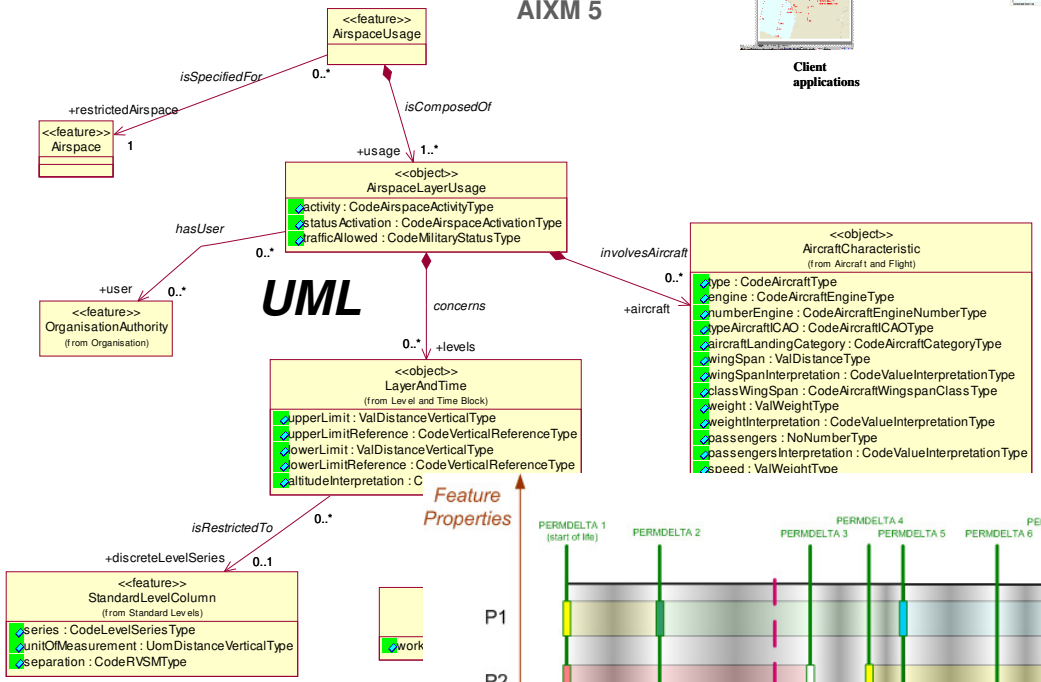

```
- <Ndb>
- <NdbUid mid="84977911">
  <codeId>OE</codeId>
  <geoLat>532548.63N</geoLat>
  <geoLong>0062543.68W</geoLong>
  </NdbUid>
- <OrgUid mid="75062126">
  <txtName>IAA IRELAND</txtName>
  </OrgUid>
  <txtName>DUBLIN</txtName>
  <valFreq>316</valFreq>
  <uomFreq>KHZ</uomFreq>
  <codeClass>L</codeClass>
  <codeDatum>WGE</codeDatum>
  <valGeoAccuracy>3</valGeoAccuracy>
  <uomGeoAccuracy>M</uomGeoAccuracy>
  <valCrc>ED9E9560</valCrc>
  <txtVerDatum>Malin Head</txtVerDatum>
- <Ntt>
  <codeWorkHr>H24</codeWorkHr>
  </Ntt>
  </Ndb>
```

AIXM 5.x

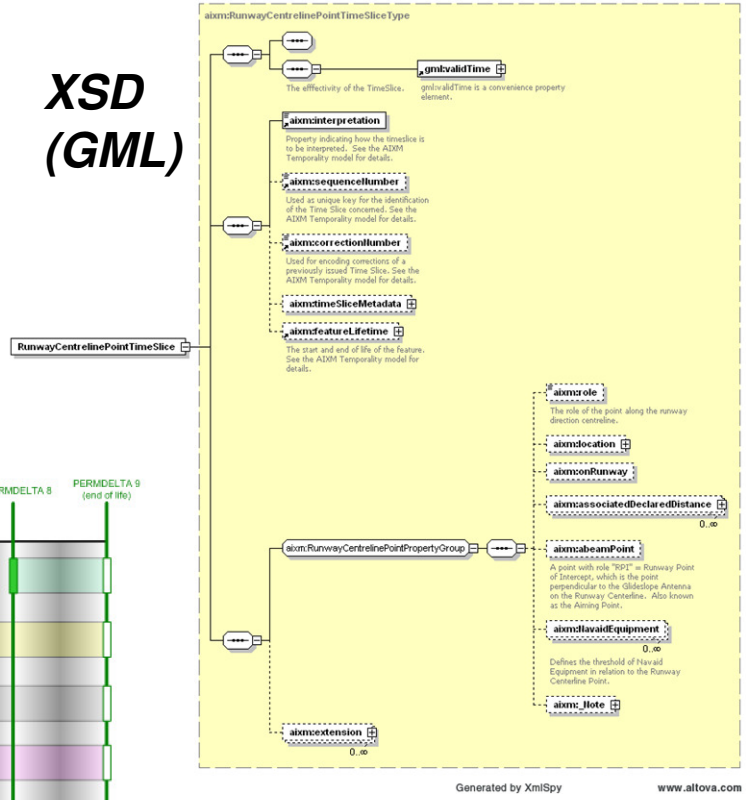


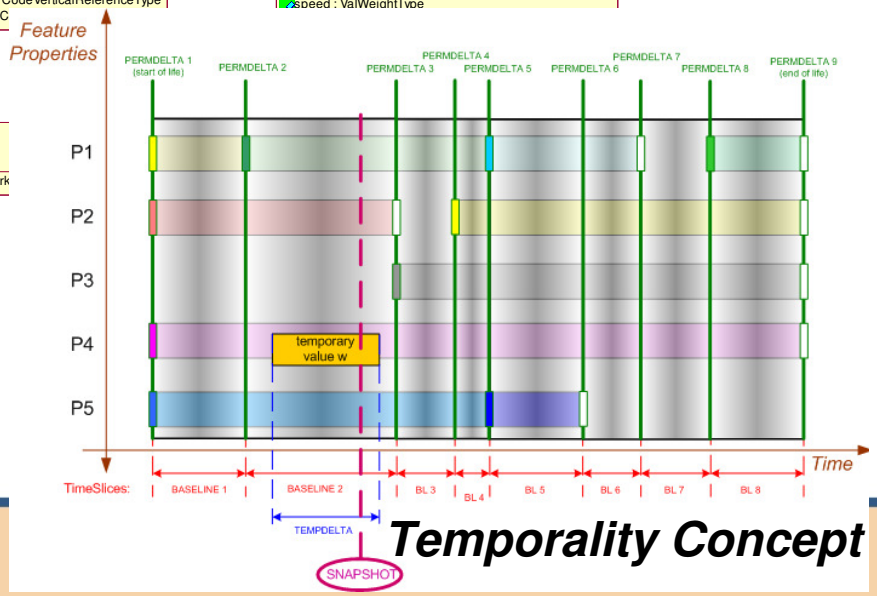
Air Transportation Information Exchange Conference - (featuring AIXM, WXXM and FIXM)

AIXM 5



XSD (GML)





Temporality Concept

EUROCONTROL

Federal Aviation Administration

AIXM 5.1 Example


```
- <aixm:AirspaceTimeSlice gml:id="AS01_TS01">
  - <gml:validTime>
    - <gml:TimePeriod gml:id="AS01_TS02_TP01">
        <gml:beginPosition>2009-11-07T08:00:00</gml:beginPosition>
        <gml:endPosition>2009-11-17T17:00:00</gml:endPosition>
      </gml:TimePeriod>
    </gml:validTime>
    <aixm:interpretation>BASELINE</aixm:interpretation>
    <aixm:sequenceNumber>1</aixm:sequenceNumber>
    <aixm:type>R</aixm:type>
  - <aixm:geometryComponent>
    - <aixm:AirspaceGeometryComponent gml:id="GC01">
      - <aixm:theAirspaceVolume>
        - <aixm:AirspaceVolume gml:id="AV01">
            <aixm:upperLimit uom="FT">60000</aixm:upperLimit>
            <aixm:upperLimitReference>MSL</aixm:upperLimitReference>
            <aixm:lowerLimit uom="FT">GND</aixm:lowerLimit>
            <aixm:lowerLimitReference>MSL</aixm:lowerLimitReference>
          - <aixm:horizontalProjection>
            - <aixm:Surface gml:id="S01" srsName="urn:ogc:def:crs:EPSG::4326" srsDimension="2">
              - <gml:patches>
                - <gml:PolygonPatch>
                  - <gml:exterior>
                    - <gml:LinearRing>
                      - <gml:posList>
                          11.282222 56.007778 11.173889 56.111944 11.4 56.25 11.6 56.25 11.793333 56.02 11.793333 56.958333 11.282222 56.00777
                        </gml:posList>
                      </gml:LinearRing>
                    </gml:exterior>
                  </gml:PolygonPatch>
                </gml:patches>
              </aixm:Surface>
            </aixm:horizontalProjection>
          </aixm:AirspaceVolume>
        </aixm:theAirspaceVolume>
      </aixm:AirspaceGeometryComponent>
    </aixm:geometryComponent>
  - <aixm:activation>
```

AIXM documentation www.aixm.aero

AIXM
Aeronautical Information Exchange Model

EUROCONTROL > FAA > Download

- Home
- Introduction
- Key Concepts
- **Download**
- Implementation
- Community
- Archive

Download

This page contains the latest AIXM 5 Release: **AIXM 5.1**.

The Downloads

AIXM 5.1: AIXM Conceptual Model

This is the AIXM Conceptual Model.

The UML comes in a zip file that contains the Rational Rose model file (.mdl). There is a matching XMI export.

The following support material is available:
- the model exported as a Rational Rose Webview
- a simple HTML dictionary of the classes in the UML.

UML Model - 527 KB
XMI - 325 KB
WebView - 12, 818 KB
Dictionary - 3, 572 KB

Date: 01/02/2010

AIXM 5.1: AIXM XML Schema

The first zip file contains the AIXM XML Schema files. These include the core AIXM Schema files as well as the Schemas for ISO 19136 and ISO 19139 and the AIXM Basic Message.

The second zip file contains the same files as the first. However, the annotations are included in the AIXM XML Schemas for those who need that information.

The last zip file contains some short examples of AIXM 5.1 XML.

- **Rational Rose**
- **Web View**
- **XMI**
- **Enterprise Architect**

Implementation Guidance

- Use of xlink:href and UUID

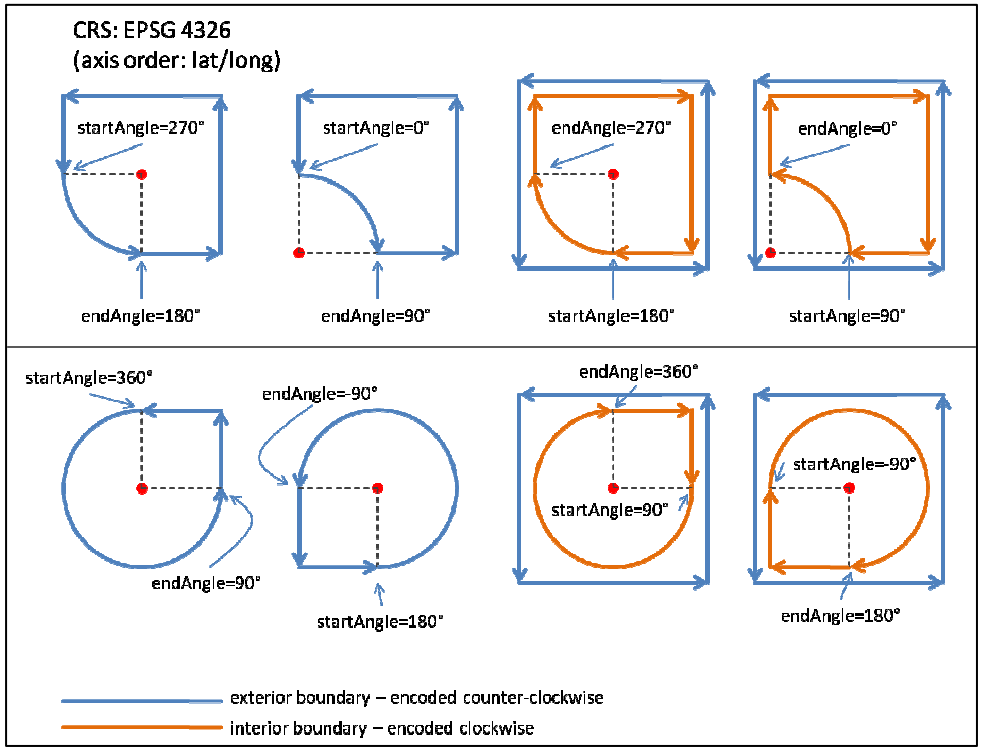
1 Scope 4
1.1 Introduction 4
1.2 References 4
1.3 Assumptions and Dependencies 4
2 Feature identification (UUID) 5
2.1 The gml:identifier property 5
2.2 Use of UUID 5
2.3 UUID version and codeSpace 6
2.4 The gml:id property 6
3 Feature Reference (xlink:href) 8


```
<aixm:clientAirspace xlink:href="urn:uuid:a82b3fc9-4aa4-4e67-8def-aaea1ac595j"/>
```


A.1. UUID algorithms 13

Implementation Guidance

- GML Guidelines for aviation data
  - Encoding rules / conventions
  - Profile
- OGC Aviation Domain WG
  - See OGC Portal



Implementation Guidance

- Metadata Profile
  - Requirements for Aviation Metadata
  - Guidance on the Aviation Metadata Profile
  - http://portal.opengeospatial.org/modules/admin/license_agreement.php?suppressHeaders=0&access_license_id=3&target=http://portal.opengeospatial.org/files/?artifact_id=41668

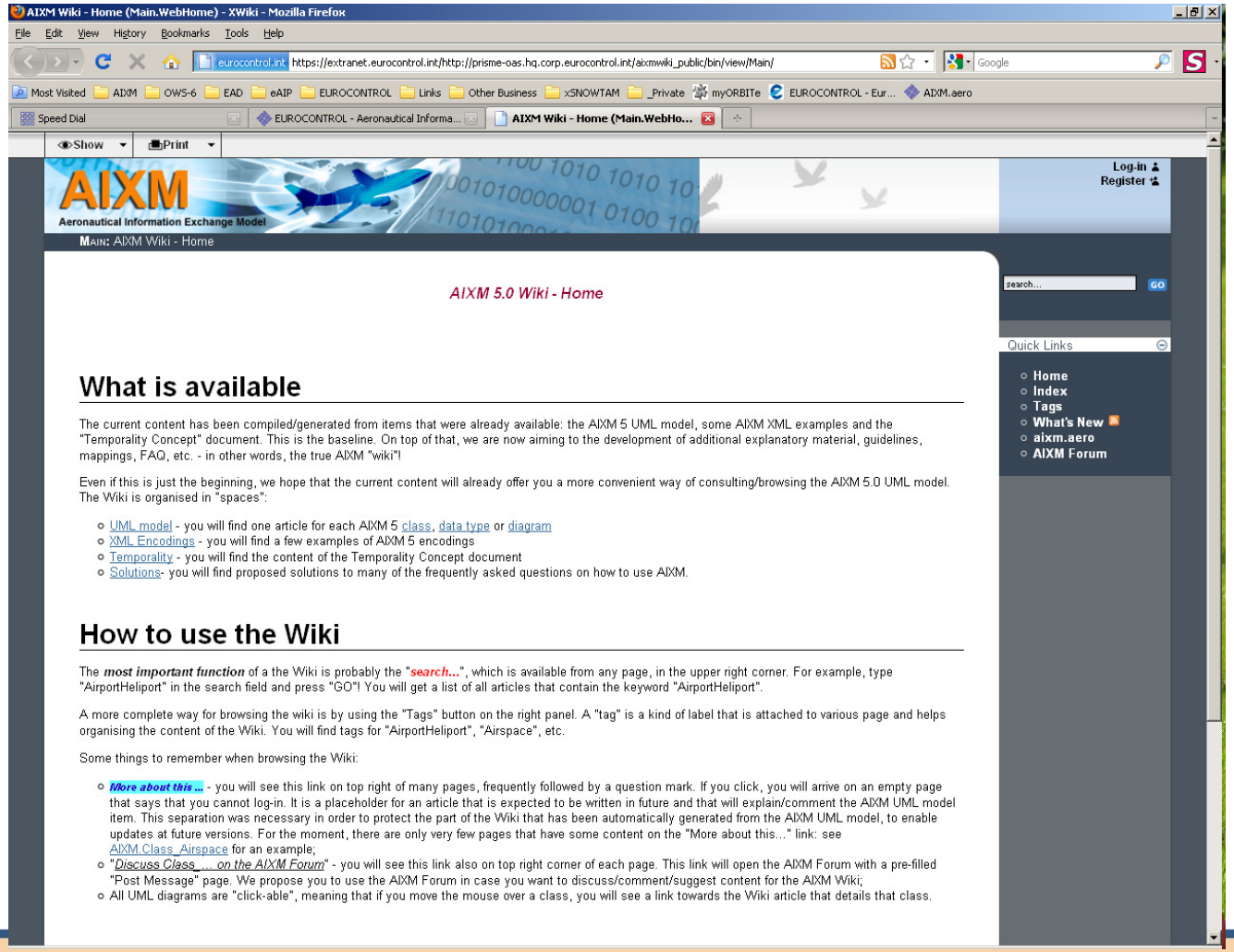
Requirement/Source	Annex 15	ADQ	INSPIRE IR	OWS-6
5.1.1 Resource Title				
5.1.2 Resource Abstract				
5.1.3 Resource Language				
5.2.1 Topic Category				
5.3.1 Geographic Bounding Box				
5.3.2 Spatial Reference System				
5.4.1 Temporal Extent				
5.4.2 Date of Publication				
5.4.3 Date of Last Revision				
5.4.4 Date of Creation				
5.4.5 Temporal Reference System				
5.5.1 Lineage				
5.5.2 Accuracy of Numerical Data				
5.6.1 Conditions Applying to Access and Use				
5.6.2 Limitations on Public Access				
5.7.1 Responsible Party				
5.7.2 Responsible Party Role				
5.8.1 Metadata Point of Contact				
5.8.2 Metadata Date				
5.8.3 Metadata Language				

Implementation Guidance

- Business Rules
  - Purpose: capture relevant data verification/validation rules from existing AICM 4.5 rules, ICAO Annexes 10/11/14/15, ICAO PANS-OPS, ARINC
  - using OMG Semantics of Business Vocabulary and Rules (SBVR) and ISO Schematron
  - See work in progress at www.aixm.aero/wiki

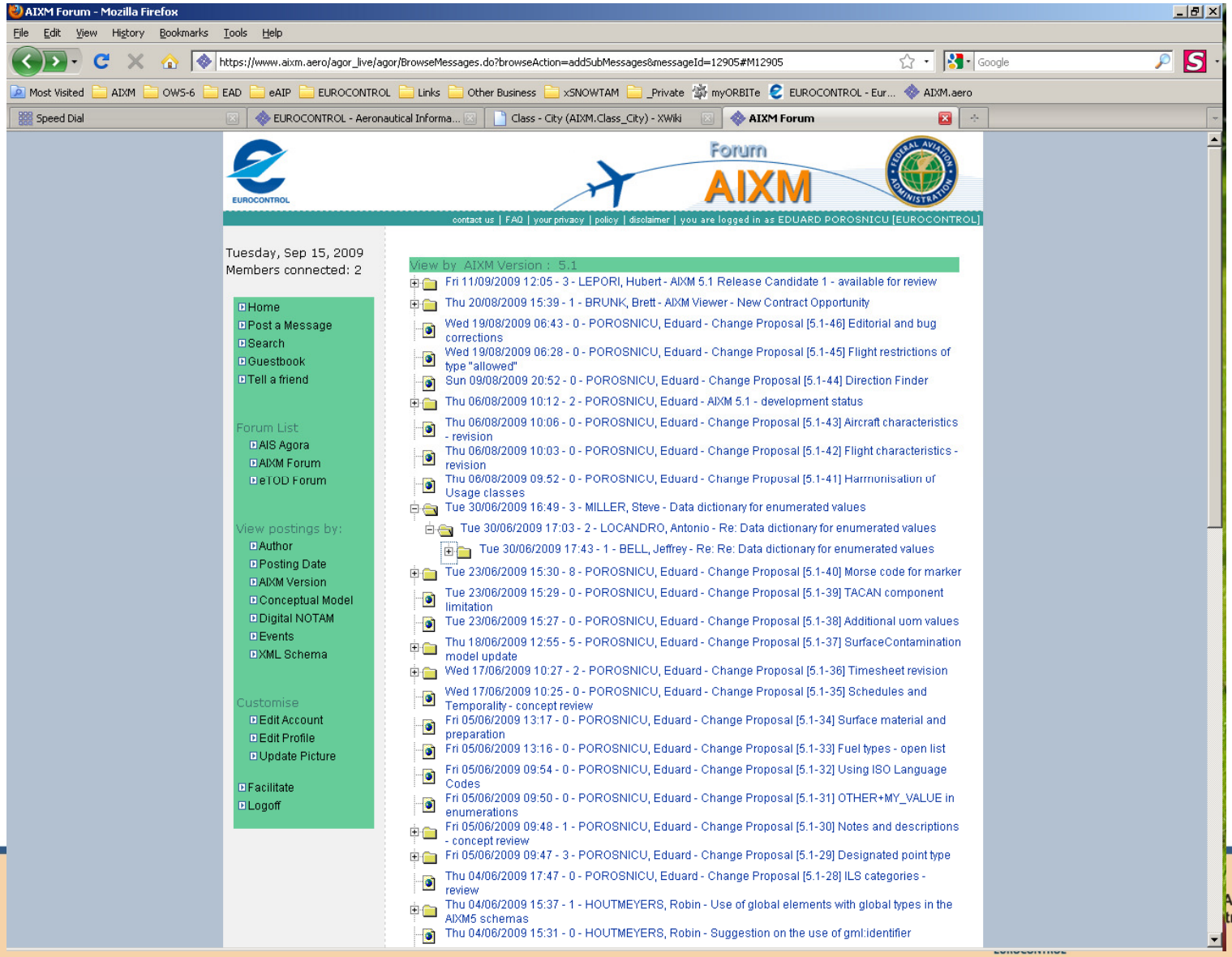
- CRC
  - Purpose: Enable the encoding of CRCs
  - work in progress, including a CRC schema (extension to AIXM 5.1). Some aspects still being investigated (e.g. which attributes are subject to CRC wrapping, all or selected ones?)

AIXM - Wiki



www.aixm.aero/wiki

AIXM Forum


AIXM Forum - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://www.aixm.aero/agor_live/agor/BrowseMessages.do?browseAction=addSubMessages&messageId=12905#M12905
Most Visited AIXM OWS-6 EAD eAIP EUROCONTROL Links Other Business xSNOWTAM _Private myORBITe EUROCONTROL - Eur... AIXM.aero
Speed Dial
EUROCONTROL - Aeronautical Informa...
Class - City (AIXM.Class_City) - XWiki
AIXM Forum
EUROCONTROL
Forum AIXM
contact us | FAQ | your privacy | policy | disclaimer | you are logged in as EDUARD POROSNICU [EUROCONTROL]
Tuesday, Sep 15, 2009
Members connected: 2
Home
Post a Message
Search
Guestbook
Tell a friend
Forum List
AIS Agora
AIXM Forum
eTOD Forum
View postings by:
Author
Posting Date
AIXM Version
Conceptual Model
Digital NOTAM
Events
XML Schema
Customise
Edit Account
Edit Profile
Update Picture
Facilitate
Logoff
View by AIXM Version : 5.1
Fri 11/09/2009 12:05 - 3 - LEPORI, Hubert - AIXM 5.1 Release Candidate 1 - available for review
Thu 20/08/2009 15:39 - 1 - BRUNK, Brett - AIXM Viewer - New Contract Opportunity
Wed 19/08/2009 06:43 - 0 - POROSNICU, Eduard - Change Proposal [5.1-46] Editorial and bug corrections
Wed 19/08/2009 06:28 - 0 - POROSNICU, Eduard - Change Proposal [5.1-45] Flight restrictions of type "allowed"
Sun 09/08/2009 20:52 - 0 - POROSNICU, Eduard - Change Proposal [5.1-44] Direction Finder
Thu 06/08/2009 10:12 - 2 - POROSNICU, Eduard - AIXM 5.1 - development status
Thu 06/08/2009 10:06 - 0 - POROSNICU, Eduard - Change Proposal [5.1-43] Aircraft characteristics - revision
Thu 06/08/2009 10:03 - 0 - POROSNICU, Eduard - Change Proposal [5.1-42] Flight characteristics - revision
Thu 06/08/2009 09:52 - 0 - POROSNICU, Eduard - Change Proposal [5.1-41] Harmonisation of Usage classes
Tue 30/06/2009 16:49 - 3 - MILLER, Steve - Data dictionary for enumerated values
Tue 30/06/2009 17:03 - 2 - LOCANDRO, Antonio - Re: Data dictionary for enumerated values
Tue 30/06/2009 17:43 - 1 - BELL, Jeffrey - Re: Re: Data dictionary for enumerated values
Tue 23/06/2009 15:30 - 8 - POROSNICU, Eduard - Change Proposal [5.1-40] Morse code for marker
Tue 23/06/2009 15:29 - 0 - POROSNICU, Eduard - Change Proposal [5.1-39] TACAN component limitation
Tue 23/06/2009 15:27 - 0 - POROSNICU, Eduard - Change Proposal [5.1-38] Additional uom values
Thu 18/06/2009 12:55 - 5 - POROSNICU, Eduard - Change Proposal [5.1-37] SurfaceContamination model update
Wed 17/06/2009 10:27 - 2 - POROSNICU, Eduard - Change Proposal [5.1-36] Timesheet revision
Wed 17/06/2009 10:25 - 0 - POROSNICU, Eduard - Change Proposal [5.1-35] Schedules and Temporality - concept review
Fri 05/06/2009 13:17 - 0 - POROSNICU, Eduard - Change Proposal [5.1-34] Surface material and preparation
Fri 05/06/2009 13:16 - 0 - POROSNICU, Eduard - Change Proposal [5.1-33] Fuel types - open list
Fri 05/06/2009 09:54 - 0 - POROSNICU, Eduard - Change Proposal [5.1-32] Using ISO Language Codes
Fri 05/06/2009 09:50 - 0 - POROSNICU, Eduard - Change Proposal [5.1-31] OTHER+MY_VALUE in enumerations
Fri 05/06/2009 09:48 - 1 - POROSNICU, Eduard - Change Proposal [5.1-30] Notes and descriptions - concept review
Fri 05/06/2009 09:47 - 3 - POROSNICU, Eduard - Change Proposal [5.1-29] Designated point type
Thu 04/06/2009 17:47 - 0 - POROSNICU, Eduard - Change Proposal [5.1-28] ILS categories - review
Thu 04/06/2009 15:37 - 1 - HOUTMEYERS, Robin - Use of global elements with global types in the AIXM5 schemas
Thu 04/06/2009 15:31 - 0 - HOUTMEYERS, Robin - Suggestion on the use of gml:identifier

Implementations

ICAO adoption: AIS-AIMSG

AIXM 5.1 – Implementation in the European AIS Database (EAD)

Air Transportation Information Exchange Conference - (featuring AIXM, WXXM and FIXM)

2011 — R6 — Obstacle model based on AIXM 5.1

2011 2012 — R6E1 R7 — Download Minimum SDO in AIXM 5.1 (progressively)

2012 — R7 — Upload SDO based on AIXM 5.1 to support **Digital NOTAM – initial**

2012 2014 — R8 R9 — Remaining SDO based on AIXM 5.1 **Digital NOTAM – Increment 1**

EUROCONTROL

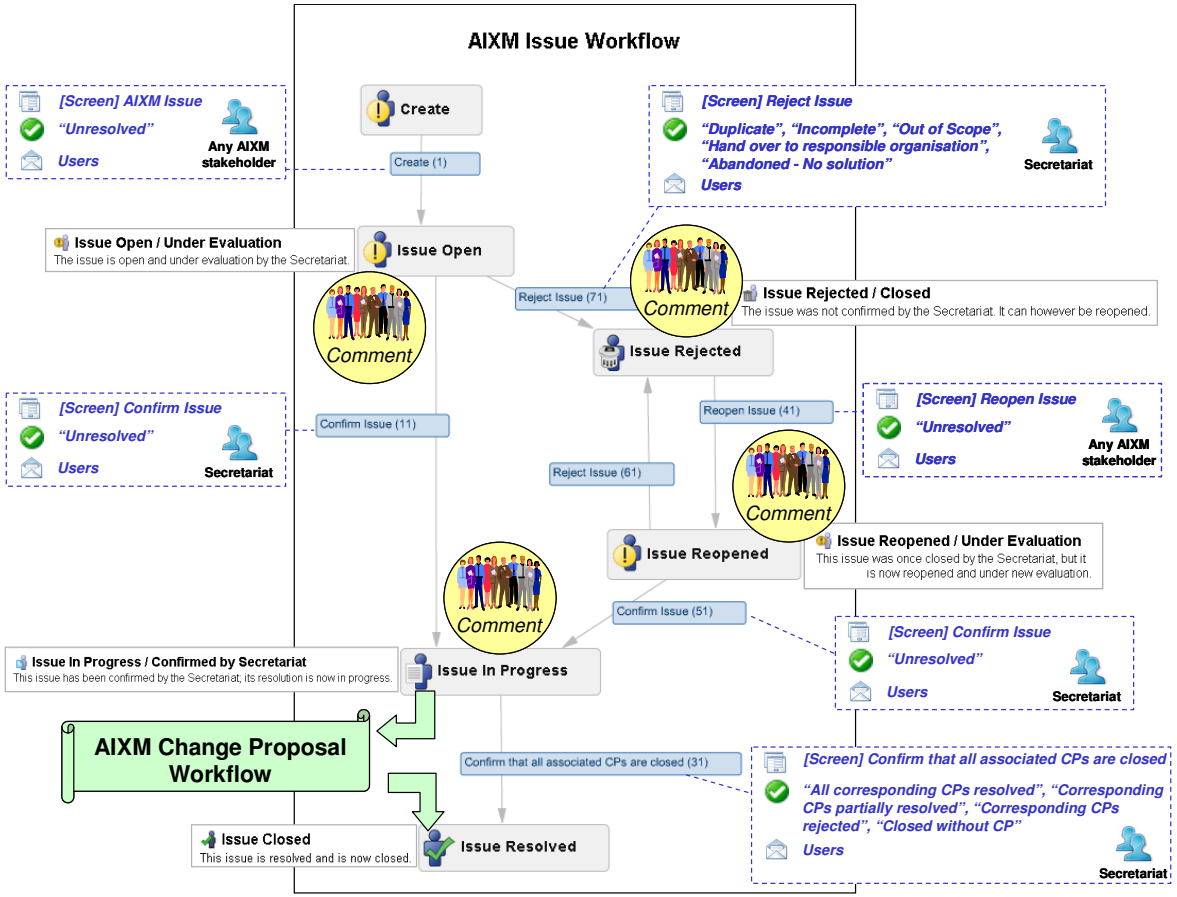
Federal Aviation Administration

AIXM Change Control Process

- Transparency

- Stakeholder representation
  - States
  - Air Navigation Service Providers
  - FPL Service Providers
  - Airlines
  - Airports
  - Manufacturing industry
  - Military

AIXM Change Control Process



<u>Day 3</u> :

*** AIXM CCB Session**

Future versions policy

- Major Version (v.5, v.6, etc.)
  - includes major conceptual changes to the model, which do not permit a mechanical conversion between that version and the previous version;
- Intermediate Version (v.5.x, v.6.x, etc.)
  - only changes that allow a two-way mechanical conversion with the previous version (including by the use of an extension of the previous version); (AIXM 5.2 not earlier than 2013);
- Minor Version (v.5.1.x, v.5.2.x, etc.)
  - limited to bug fixing, spelling corrections, …

Summary / Conclusion

- AIXM 5.1 – in implementation
  - Guidance material in focus
  - Digital NOTAM as flagship project(s)
- ICAO adoption
- AIXM evolution
  - stability and predictability
  - transparency
  - formal AIXM CCB starting now

Questions & Answers / Feedback

More Information/Contacts

- www.aixm.aero