

Aeronautical Information Services

Update on Aeronautical Information Exchange Model (AIXM)

Presented to: ATIEC 2016

By: D. Cowell (FAA), E. Porosnicu (EUROCONTROL)

Date: 22 August 2016

Aviation Information World - Forecasting the Future

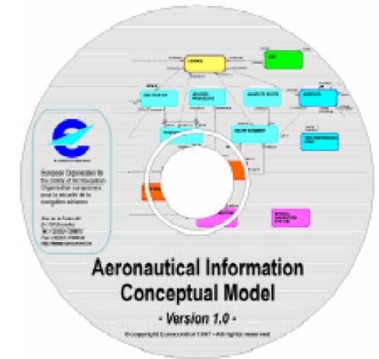


Content

- **AIXM versions in use**
- **New ICAO SARPS – data sets**
- **Change Control Board activity**



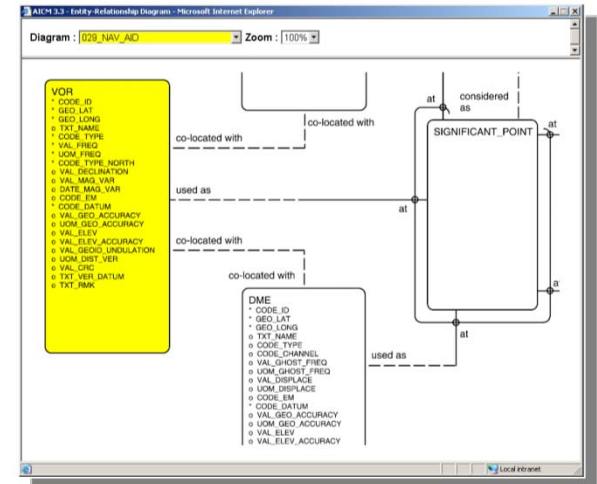
Some dates...



- **October 1997**
 - Aeronautical Information Conceptual Model (AICM) 1.0 as entity-relationship model
- **April 1998**
 - Aeronautical Information Exchange Model (AIXM) 1.1 based on SQL transactions on a reference relational model
- **March 2002**
 - AIXM 3.1 – first XML based version
- **October 2002**
 - AIXM 3.3 – first implementation in the European AIS Database
- **November 2005**
 - AIXM 4.5 – second version for EAD

AIXM 4.5

- **Published: 2005**
 - Entity/Relationship
 - Custom XML schema
 - Core AIP data
- **Usage:**
 - European AIS Database (EAD) and European national systems
 - Around 20 other AIS national systems world-wide



```

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


First AIXM Conference

- April 2006, FAA HQ

Events planned for 2006

In addition to the AIXM 5 Public Design review, other AIXM events occurring in 2006 include:

| March 20-24, 2006 | Bangkok, Thailand |

ICAO AIS Implementation and AIS Seminar.

http://www.icao.int/cgi/goto_m_apac.pl?apac/meetings.htm

| June 2006 | Madrid, Spain |

Seminar of AIS issues and AIXM.

Global AIM Congress.

The conference will showcase aeronautical information management trends and issues including the release of the draft AIXM 5 model

www.eurocontrol.int/globalais06

| November 2006 |

AIXM 5 Release.

| Web Resource |
Official AIXM 5 web site: www.aixm.aero

FAA AIXM web site: www.faa.gov/aixm

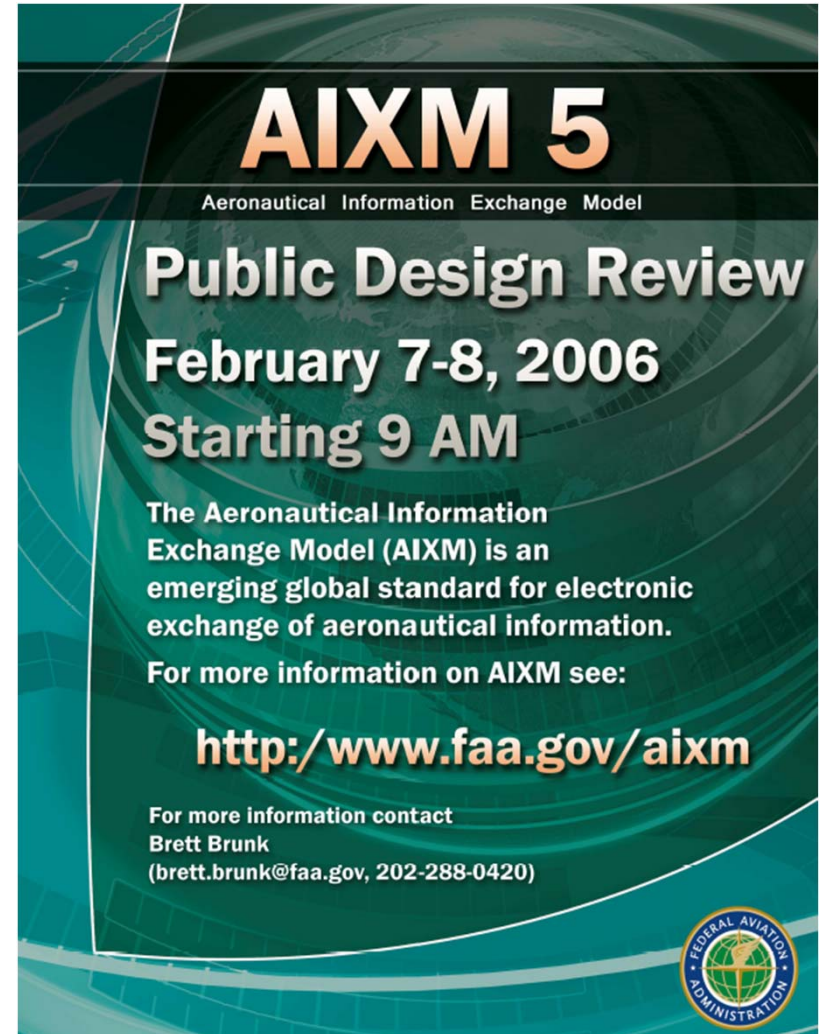
EUROCONTROL AIXM web site:
www.eurocontrol.int/aixm/

AICM and AIXM mailing list:
Keep up to date with latest AIXM developments, events and training opportunities.
Register for the mailing list by emailing brett.brunk@faa.gov.

ISO 19100 Geospatial Standards
www.iso211.org

GML Specification
www.opengeospatial.org

Federal Aviation
Administration



AIXM 5
Aeronautical Information Exchange Model

Public Design Review

February 7-8, 2006


Starting 9 AM

The Aeronautical Information Exchange Model (AIXM) is an emerging global standard for electronic exchange of aeronautical information.

For more information on AIXM see:

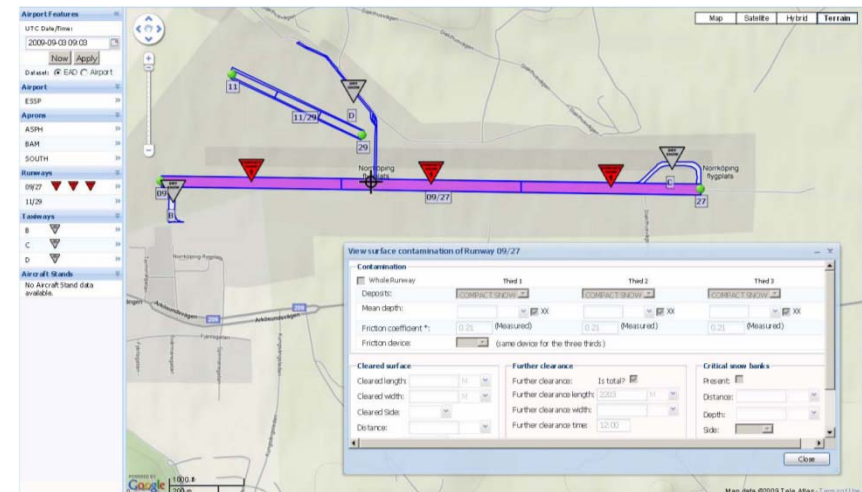
<http://www.faa.gov/aixm>

For more information contact
Brett Brunk
(brett.brunk@faa.gov, 202-288-0420)



AIXM 5.1

- **Published: FEB 2010**
- **Update of AIXM 5.0**
 - Usage/availability model
 - Notes vs. descriptions
 - Other adjustments to facilitate Digital NOTAM encoding
- **Usage**
 - see *AIXM Wiki* (www.aixm.aero/wiki)
 - *Data Sources*



AIXM 5.1.1 (minor update)

- **Published: April 2016**
- **First version released by the new CCB!**
- **Minor Update of AIXM 5.1**
 - Migration to Sparx EA
 - Alignment with GML 3.2.1
 - Small corrections UML/XSD
- **Usage**
 - *Recommended for new projects only*
 - *Fully forward/backwards compatible with AIXM 5.1 (mapping scripts provided)*

The image shows a screenshot of a Change Proposal document. At the top right, there is a logo for the Change Control Board (CCB) with the text 'AIXM' and 'Aviation Information Exchange Model'. Below the logo, the title 'Change Proposal' is followed by a table with the following details:

Change Proposal ID:	AIXM-168
target version:	AIXM 5.1.1
version:	1.0
last updated:	15 FEB 2016
status:	Implemented

The main title of the proposal is 'Migration to Sparx EA'. The document is structured as follows:

- Description:** Migrates the maintenance of the AIXM UML model from IBM Rational Rose to Sparx EA. Provides scripts that enable the generation of the AIXM XML Schema from the new Sparx EA environment. Provides guidelines for the migration of existing AIXM extensions to the new UML modelling environment. Provides scripts that enable the generation of AIXM XML extension schemas from an AIXM UML extension developed in Sparx EA.
- Rationale for change:** See <https://aixmccb.atlassian.net/browse/AIXM-132>. Up to and including AIXM version 5.1, the UML model was developed/maintained using IBM Rational Rose Data Modeller. There is a general interest in the AIXM community for migrating the UML model to a tool that is more flexible in terms of import/export of the model, less expensive, etc. Consensus has developed around the idea to migrate the UML model to Sparx EA.
- Impact assessment:** The migration to the new modelling environment does not have any impact on existing AIXM 5.1 users. No changes need to be made in the content and structure of the AIXM UML model or of the AIXM XML Schema. The migration is done to a large extent through automatic conversions between tools and the risk of discrepancies between the previous model and the new model is very low. However, as with any migration, the risk is not null. Therefore, the model resulting from the migration needs to be formally identified as a new AIXM version. The migration might have an impact on existing AIXM 5.1 extensions, as much as they need to be further maintained by their respective community. For this purpose, guidelines and scripts are being developed.
- Change Proposal details:** The reference AIXM 5.1 UML model, currently available as an .mdl file (IBM Rational Rose Data Modeller specific format) is replaced with an equivalent model provided in the form of a .eap file (Sparx EA specific format). The current XML schema components AIXM_Features.xsd and AIXM_DataTypes.xsd are replaced with identically named files generated (with a dedicated script) from the Sparx AIXM 5.1.1 EA model.

New AIXM web site



The screenshot shows the AIXM website homepage. The header features the AIXM logo and the full name 'Aeronautical Information Exchange Model'. Below the header is a navigation menu with links for Home, Versions, Usage and Implementation, Support, Governance, Library, and Contact. The main content area is divided into two columns. The left column contains a section titled 'Aeronautical Information Exchange Model' with a detailed description of its purpose and a list of information areas in scope. The right column contains sections for 'AIXM COMMUNITY' (with links to Forum, Wiki, and GitHub) and 'QUICK LINKS' (with links to various AIXM versions and related organizations). A 'LATEST NEWS' section at the bottom left highlights a recent update to the AIXM 5.1/5.1.1 UML.

AIXM
Aeronautical Information Exchange Model

Home Versions Usage and Implementation Support Governance Library Contact

Aeronautical Information Exchange Model

The objective of the Aeronautical Information Exchange Model (AIXM) is to enable the provision in digital format of the aeronautical information that is in the scope of Aeronautical Information Services (AIS). The AIS information/data flows that are increasingly complex and made up of interconnected systems. They involve many actors including multiple suppliers and consumers. There is also a growing need in the global Air Traffic Management (ATM) system for high data quality and for cost efficiency.

In order to meet the requirements of this increasingly automated environment, AIS is moving from the provision of paper products and messages to the collection and provision of digital data. AIXM supports this transition by enabling the collection, verification, dissemination and transformation of digital aeronautical data throughout the data chain, in particular in the segment that connects AIS with the next intended user.

The following main information areas are in the scope of AIXM:

- Aerodrome/Heliport including movement areas, services, facilities, etc.
- Airspace structures
- Organisations and units, including services
- Points and Nav aids
- Procedures
- Routes
- Flying restrictions

AIXM takes advantages of established information engineering standards and supports current and future aeronautical information system requirements.

This web site provides complete documentation for the AIXM versions in use, including information about coding guidelines, support for implementation and links towards other relevant resources.

LATEST NEWS

12 August, 2016 - 14:57
AIXM 5.1/5.1.1 UML - now available for direct browsing on the main site
The possibility to navigate through the AIXM 5.1 and AIXM 5.1.1 UML classes, data types and diagrams is now available directly from the main web site. Please see the quick... [Read more](#)

AIXM COMMUNITY

Forum | **AIXM**

- Enter the AIXM Forum

Aixm
AIXM 5.1

- Visit our Wiki

GitHub

- Find AIXM related resources on GitHub

QUICK LINKS

- AIXM 5.1 (UML navigator)
- AIXM 5.1.1 (UML navigator)
- ICAO AIS-AIMSG
- Open Geospatial Consortium (OGC)
- European Commission - ADQ Regulation 73/2010
- World Wide Web Consortium (W3C)

- **AIXM versions**
 - 4.5, 5.0, 5.1/5.1.1
- **Usage/Implementation**
 - Coding Guidelines
 - Business Rules
 - Digital NOTAM
- **Support**
 - Wiki
 - Training
 - Open source
 - Commercial products
 - AIXM Viewers
- **Governance (CCB)**
- **Library**



Content

- AIXM versions in use
- **New ICAO SARPS – data sets**
- Change Control Board activity



New Annex 15 and PANS-AIM

- **A real milestone for the global AIS transition from paper to digital data!**
 - Data sets (AIP, Terrain, Obstacle, Airport Mapping, Instrument Flight Procedures)
 - Possibility to eliminate AIP pages if the corresponding data set is provided (waypoints, routes, airspace, etc.)
- **State Letter in preparation**



Use of AIXM

- **AIP Data Set**
 - AIXM 5.1 Coding guidelines in development
 - Including data verification/validation rules
 - Including sample data set(s)
- **Airport Mapping Data Set**
 - ED-99A/DO-272A Mapping Guidelines for AIXM 5.1 available
<http://www.aixm.aero/sites/aixm.aero/files/imce/library/ed99atoaixm5.1mappingv0.6.doc>
- **Obstacle Data Set**
 - AIXM 5.1 coding guidelines / data verification guidelines to be further developed (see eTOD Manual from EUROCONTROL)
- **Instrument Flight Procedures Data Set**
 - Will probably need AIXM 5.2 for complete coverage



ICAO IMP

- **WG “Services”**
 - Concept for Information Services (Draft)
 - *Aeronautical Information Publication (AIP) Service*
 - *Flight Procedure Information Service*
 - *Aerodrome Mapping Information Service*
 - *Obstacle Information Service*
- **Matching the ICAO Data Sets**
- **Awaiting the finalization of the IMP work**
 - AIXM 5.x data sets as payload
 - See if any AIXM improvements are necessary in order to fully support the deployment of such services



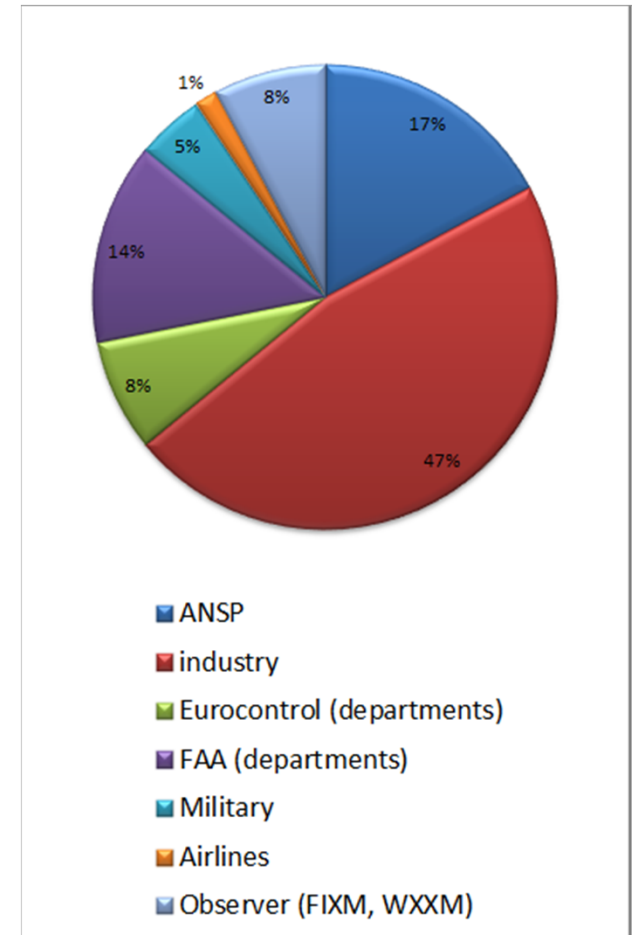
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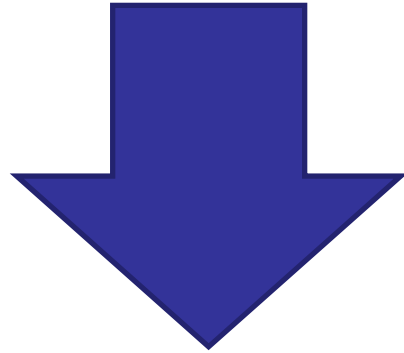


AIXM CCB

- **AIXM Change Control Board**
 - Established based on the ICAO AIS-AIMSG recommendations
 - In close contact with the ICAO IMP
 - CCB process to be aligned with eventual IMP decisions
 - Membership implies acceptance of the Charter
 - <http://www.aixm.aero/page/governance>
 - Current situation
 - 64 members
 - including FIXM & WXXM observers
 - FAA & Eurocontrol ensuring the secretariat and support



CCB Mandate



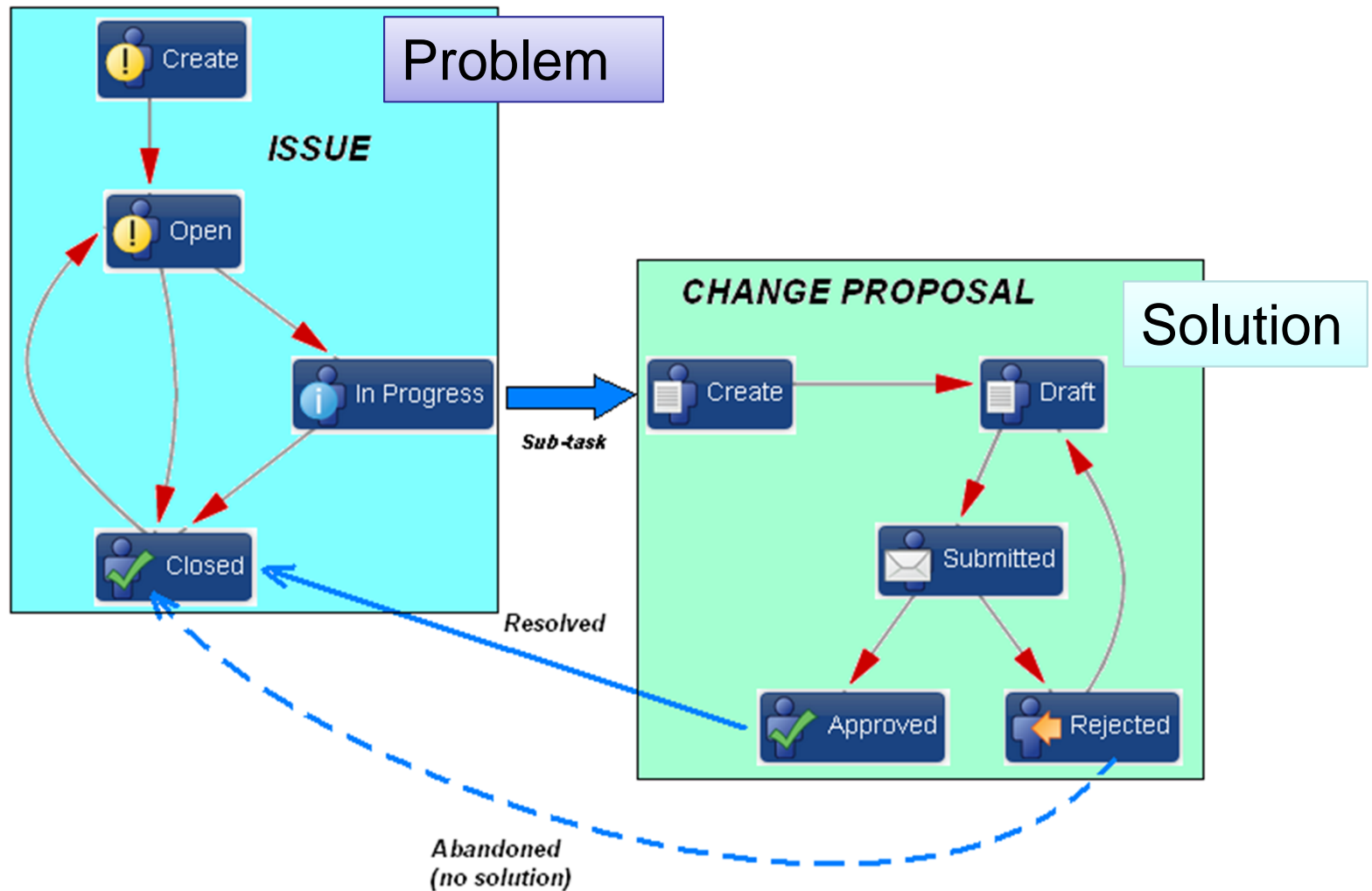
Protect investments



Ensure progress







CCB Process









AIXM Release Plan

- **Minor Release - AIXM 5.1.1**
 - **Published April 2016**
 - 15 changes, solving 17 issues in full, 1 partially
 - 1 issue closed without change
 - *Still to finalize*
 - *Temporality Concept clarifications (no real changes!)*
 - *Feature Identification and Reference clarifications (no real changes!)*

Issue Statistics: AIXM 5.1.1 - AIXM Issues (Issue Type)

Issue Type	Count	Percentage
 Bug Report	13	 68%
 Improvement	6	 32%
Total	19	

Issue Statistics: AIXM 5.1.1 - AIXM Issues (Status)

Status	Count	Percentage
 ISSUE IN PROGRESS / C...	1	 5%
 ISSUE CLOSED	17	 89%
 ISSUE REJECTED / CLO...	1	 5%
Total	19	

AIXM Release Plan

- **[2018] Regular Release - AIXM 5.2**

- 58 issues already open in JIRA (23 still to be confirmed)
 - *more issues expected to be raised in the coming months*
- expected work areas
 - *PBN procedures and other SID/STAR/IAP issues*
 - *route data*
 - *vertical reference systems*
 - *alignment of definitions*
 - *additional items required by ICAO SARPS changes*
 - *support for latest airport mapping specs*
 - *seaplane landing area*
 - *AIP mapping gaps*
 - *additional data items coming from various regions (US, Europe, etc.) , if relevant for international use*
 - *Otherwise -> regional extension*
 - *support for OCAS (Obstacle Collision Avoidance System)*

- **AIXM CCB Meeting in Brussels, 5-7 Dec 2016**

Issue Statistics: AIXM Issues (Status)

Status	Count	Percentage
ISSUE OPEN / UNDER EV...	23	28%
ISSUE IN PROGRESS / C...	35	42%
ISSUE CLOSED	18	22%
ISSUE REJECTED / CLO...	7	8%
Total	83	

Two Dimensional Filter Statistics: AIXM Issues - Unreleased

Components	ISSUE OPEN / UNDER EV...	ISSUE IN PROGRESS / C...
Aerial Refuelling	0	1
Aircraft and Flight	0	2
Airport/Heliport	0	3
Airspace	1	2
Geometry	0	1
Holding	0	2
Points	1	2
Procedure	0	9
Routes	1	8
Schedules	1	3
Total Unique Issues:	23	34



AIXM interoperability issues

- **Difficulties identified by implementers**
 - Different UUID for same feature in different systems
 - Limited set of TimeSlices in different systems
 - Lat/Long versus Long/Lat
 - Extension schemas not available
 - Etc.
- **Dedicated AIXM CCB telcons**



AIXM interoperability issues

- **Way forward**

- Define minimal interoperability rules for specific scenarios

- AIS publishing data under ICAO SARPS (including provision of data to DAT providers or to another ANSP)
- Hub scenario (EAD, other regional implementations)
- Data originator(s) to/from ANSP (particular case – procedure designer, airport data originator)
- AIS to ATC (adaptation data, including cross-border data),
- flight simulator

- Issues which might concern other XMs (such as unique identification) will be also raised in the IMP



Conclusions

- **3 versions in use (4.5, 5.0, 5.1)**
- **AIXM 5.1.1 available – minor release**
 - Suggested for new projects and maintenance of extensions
 - Fully backwards / forward mapping with AIXM 5.1 supported with scripts
- **AIXM 5.2 – regular release (2018)**
- **Focus on the development of coding guidelines, interoperability scenarios and data verification rules/services**

