Service improvement through integration of AIM, MET and ATM Information Services

B0-DATM EANPG COG AIM Task Force implementation practice

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Purpose of the presentation

- Provide a glance on the information related to EANPG COG AIM Task Force and its activities to support B0-DATM implementation;
- Demonstrate regional initiatives for Data centric environment established to enable Digital AIS products and services;
- Present AIM solutions for ATM needs;
- Provide AIM TF preliminary study results in preparation for digital AIS, MET and ATM services harmonisation.
COG AIM Task Force

Members: Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Republic of Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan and EUROCONTROL.
Terms of Reference

a) ensure that the planning and implementation of AIM in the Eastern Part of the European Region are coherent and compatible with developments in adjacent regions and are in line with the Global Air Navigation Plan and the Aviation System Block Upgrades (ASBU) methodology;

b) seek to achieve common understanding and support from all stakeholders involved in or affected by the AIM developments/activities in the Eastern Part of the ICAO European Region;

c) provide a platform for harmonization of developments and deployments in the AIM domain;

d) monitor the status of implementation of the required AIM facilities and services and the transition from AIS to AIM in the Eastern Part of the European Region, and provide necessary assistance and guidance to States in this respect;

e) develop proposals for the updating of relevant parts of the EUR ANP, as deemed necessary;

f) identify and review specific deficiencies and difficulties that constitute major obstacles to the provision of efficient AIM services in the States of the Eastern Part of the European Region, and recommend necessary remedial actions;

g) monitor and review technical and operating developments in the area of AIM and procedure design issues associated with AIM; and foster their implementation in the Eastern Part of the European Region in a harmonized manner;
Automation is needed to be interoperable

- Automation shall be introduced with the objective of improving the timeliness, quality, efficiency and cost-effectiveness of aeronautical information services.

- In order to meet the data quality requirements, automation shall:
  
  a) enable digital aeronautical data exchange between the parties involved in the data processing chain; and
  
  b) use aeronautical information exchange models and data exchange models designed to be globally interoperable.
Trajectory based digital AIM/ATM Environment
Prior to taking over an operating position, a controller should:

a) ensure that he has a full understanding of the air traffic situation including an awareness of clearances issued but not yet acted upon and any developing situation requiring early attention;

b) familiarize himself with the serviceability of all equipment under his charge and liable to be used during his tour of duty (e.g. radar, radio, approach aids, telephone lines and aerodrome lighting);

c) obtain all relevant information and familiarize himself with the meteorological situation and trends for his tour of duty and where practicable get a personal briefing from a meteorological office;

d) ensure he is fully conversant with the latest promulgated orders, instructions, notices and information, particularly with reference to the serviceability of aerodromes and other air navigation facilities.
8.2.4 **Recommendation.**— Automated pre-flight information systems providing a harmonized, common point of access by operations personnel, including flight crew members and other aeronautical personnel concerned, to aeronautical information in accordance with 8.2.1 and meteorological information in accordance with 9.4.1 of Annex 3 should be established by an agreement between the civil aviation authority or the agency to which the authority to provide service has been delegated in accordance with 2.1.1 c) and the relevant meteorological authority.

8.2.5 Where automated pre-flight information systems are used to provide the harmonized, common point of access by operations personnel, including flight crew members and other aeronautical personnel concerned, to aeronautical data, aeronautical information and meteorological information, the civil aviation authority or the agency to which the authority to provide service has been delegated in accordance with 2.1.1 c) shall remain responsible for the quality and timeliness of the aeronautical data and aeronautical information provided by means of such a system.

*Note.— The meteorological authority concerned remains responsible for the quality of the meteorological information provided by means of such a system in accordance with 9.4.3 of Annex 3.*
Digital cooperation perspectives

- Volcanic ash advisory information,
- Tropical cyclone advisory information
- METAR and SPECI
- TAF
- SIGMET
- AIRMET

If disseminated in digital form, shall be formatted in accordance with a globally interoperable information exchange model and shall use extensible markup language (XML)/geography markup language (GML).

*Note.*— *Guidance on the information exchange model, XML/GML and the metadata profile is provided in the* Manual on the Digital Exchange of Aeronautical Meteorological Information (*Doc 10003*).
Possible mechanism for geo-referenced integration

- The **Geography Markup Language (GML)** is the XML grammar defined by the [Open Geospatial Consortium (OGC)](http://opengeospatial.org) to express geographical features.
- GML serves as a modeling language for geographic systems as well as an open interchange format for geographic transactions on the Internet.
- Key to GML's utility is its ability to integrate all forms of geographic information, including not only conventional "vector" or discrete objects, but coverages (see also [GMLJP2](http://gmljp2.org)) and sensor data.


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**GML Profile**

AIXM is a GML 3.2.1 compliant schema. This means both that AIXM applies the GML rules for application schemas (such as derivation from the gml:AbstractFeature, compliance with object/property model, etc.) and that the GML geospatial elements are available in AIXM for the encoding of positions, lines, surfaces, etc. However, only a small sub-set of the GML capabilities are necessary for the encoding of aeronautical data. In addition, there are some specialities of the aeronautical data (such as the reference to State borders, used of arcs and circles, etc.) that require special handling in GML. For this purpose, a GML profile and associated guidelines for use of GML for aviation data has been developed by the Aviation Domain Working Group of OGC and is made available on the OGC Web site.

[Guidance and Profile of GML for use with Aviation Data](http://www.aixm.aero/page/aixm-51-specification)

*Note: a revised version of this document is now available in relation with the AIXM 5.1.1 version.*
GML for use with Aviation Data

Open Geospatial Consortium

Approval Date: 2012-03-23

Publication Date: 2012-05-15

External identifier of this OGC® document: http://www.opengis.net/doc/DP/gml-aviation-guidance

Reference number of this document: OGC 12-028

Editors: OGC Aviation Domain Working Group

Guidance and Profile of GML for use with Aviation Data

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GML 3.2.1 and GIS are friends

11.1 Aerodrome mapping data — requirements for provision

11.1.1 Recommendation.— Aerodrome mapping data should be supported by electronic terrain and obstacle data for Area 3 in order to ensure consistency and quality of all geographical data related to the aerodrome.

Note 1.— Accuracy and integrity requirements for aerodrome mapping data are contained in Annex 14, Volume I, Appendix 5.

Note 2.— Electronic terrain and obstacle data pertaining to Area 3 and aerodrome mapping data may be originated using common acquisition techniques and managed within a single geographic information system (GIS).

Note 3.— Supporting material with respect to the processing of electronic terrain and obstacle data and aerodrome mapping data is contained in Radio Technical Commission for Aeronautics (RTCA) Document DO-200A and European Organization for Civil Aviation Equipment (EUROCAE) Document ED-76 — Standards for Processing Aeronautical Data.
GML competition

Annex 3 – 13; Annex 11 – 0; Annex 15 - 1
Annex 15 - Common reference systems for air navigation

1.2.1 Horizontal reference system
1.2.2 Vertical reference system
1.2.3 Temporal reference system

Annex 3 - Supply, use, quality management and interpretation of meteorological information

• 2.2.4 Recommendation.— The quality system should provide the users with assurance that the meteorological information supplied complies with the stated requirements in terms of the geographical and spatial coverage, format and content, time and frequency of issuance and period of validity, as well as the accuracy of measurements, observations and forecasts.
GML in industrial standards

Appendix G
G-4

G.3 Threshold Value $T_F$

For the definition of the threshold value, the use of the CityGML Level of Detail (LOD)\(^3\) approach and the different horizontal accuracy requirements ($A_H$) for Areas 1 to 4 is recommended. The value of the threshold $T_F$ is set to $2^*A_H$.

With the proposed threshold value, the minimum dimension of a polygonal obstacle would be:

- Area 1: 100 x 100m
  for helicopter requirements: 32 x 32m;
- Area 2: 10 x 10m;
- Area 3: 1.0 x 1.0m;
- Area 4: 5.0 x 5.0m.

\(^3\) The term Level of Detail (LOD) is used in 3D applications and virtual reality to describe how particularized an object is when it is presented to the user (e.g. CityGML specifications)

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**SWL example**

Boundary for significant weather
- Snow / Blowing snow
- Thunderstorm / Hail
- Moderate / Severe Icing
- Moderate / Severe Turbulence
- Rain / Drizzle / Freezing precipitation

- **MET MAP 0900**
- **MET MAP 1200**
- **MET MAP 1500**

**NOTES:**
1. Pressure in hPa and speeds in knots.
2. Vis in m included if less than 5000 m. implies vis 200 m or less.
4. Altitude in hectofeet AMSL. XXX = above 10 000 ft.
5. Only significant weather and/or weather phenomena causing visibility reduction below 5000 m included.
MET/AIS/ATM information combine
AIM TF advanced AIM products and services

Trends for Digital AIS/AIM Transformation:

• Trajectory based information production with possible ATM system integration;

• Merging of the aeronautical information with the satellite imagery;

• Aeronautical chart production with embedded feature attributes;

• Environment provision for aeronautical prototyping, modeling and studies to support PBN implementation;

• Data originators involving into digital aeronautical data chain;

• Pre-flight and post-flight Integrated briefing using WEB services;

• Possible integration with digital information of other domains.
Conclusion

• In order to support the harmonization of the digital AIS, MET and ATM information services, their information exchange models have to be ‘equipped’ with GML;

• The common GML approach for each type of the information exchange model has to be added to the Global ANP;

• We need to establish the common interoperable environment to portray integrated digital AIS, MET and ATM information;

• AIM Task Fore is of the opinion that Geographical Information System (GIS) is one of the candidate that has necessary capacity to meet harmonization needs of digital AIS, MET and ATM information.
Thank you for your attention

Any questions?

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