How MH370 Has Changed Global Aircraft Tracking

eTOD Explained
A new solution for electronic terrain and obstacle data management will help improve flight safety

SESAR
Massimo Garbini talks about SESAR Deployment Manager

NEXTGEN
NextGen's foundation pieces are beginning to settle into place

WEATHER
Detailed and timely weather prediction is crucial to flight safety
Accurate terrain and obstacle information is of great importance for the safety of flights. This applies in particular for the approach phase, where aircraft intentionally reduce their altitude and maintaining safety margins is crucial. As air traffic volumes increase and airspace capacity grows closer to saturation, there becomes a need for more sophisticated routes and procedures to increase efficiency, while reducing fuel consumption and emissions. To maintain safety margins, accurate and detailed terrain and obstacle data is essential. Growing numbers of obstacles around airports, as well as a growing number of aircraft equipped with enhanced ground proximity warning systems and synthetic vision, are contributing to the demand for accurate and up-to-date terrain and obstacle data.

With the help of precise and reliable electronic terrain and obstacle data (eTOD), used by inflight and ground-based applications, substantial benefits in safety and efficiency are achieved. Consequently, ICAO requires all member states to ensure the availability of eTOD for Area 1 (the complete state territory) and Area 4 (a rectangle at CAT IIIb runways) for all aerodromes regularly used by international civil aviation. By November 12, 2015, Area 2 (the vicinity of an aerodrome) territory) and Area 4 (a rectangle at CAT II/III runways) for all aerodromes and surveyors – storing the consolidated data, assessing the criticality of obstacles, and then publishing the data. Due to the numerous data originators, fast-changing obstacles such as cranes and construction sites, various data formats, extensive data requirements and numerous data users, managing the electronic terrain and obstacle data in a reliable and cost-efficient way is a challenging task that requires a shift from product-centric to the data-centric view.

The technology
COMSOFT’s Aeronautical Information Management Database (CADAS-AIMDB) is the ideal solution for state-of-the-art eTOD management. It has been chosen by numerous customers around the world as their central database for managing

aeronautical data. It is a fully featured AIXM 5.1 database that implements the temporality model. In addition to its obstacle storage, in accordance with AIXM 5.1, the database supports the storage of terrain data and the complete set of metadata for terrain and obstacles as defined by ICAO Annex 15. Consequently it supports all data necessary for eTOD. CADAS-AIMDB stores terrain data in a vast number of widespread raster and vector data formats, including Shapefile, GML, GeoTIFF, WorldImage, ArcCord and GML image formats. The stored data is available to third-party applications via OGC-compliant WCS (web coverage service) and WMS (web map service) and WFS (web feature service) interfaces, opening up the system to interoperate with many third-party tools and facilitate a high degree of automation by seamless integration with other systems.

Obstacle data is encoded in the AIXM 5.1 format, while available import formats are CSV, AIXM 4.5 and AIXM 5.1, while it is also possible to manage obstacles directly via CADAS-AIMDB’s user interface. Obstacles are exported to third-party applications via CADAS-AIMDB’s open web service interface in the AIXM 4.5 or AIXM 5.1 format.

In addition to electronic terrain and obstacle data storage in CADAS-AIMDB, COMSOFT offers the obstacle assessment software OMEGA, made by R.I.S.K., which is fully integrated with CADAS-AIMDB. OMEGA is a collaborative document management system specifically designed for aeronautical information publications such as eAIPs, supplements and circulars. It is used by AIS offices to increase workflow automation for the management, editing and the automatic definition of coverage areas, obstacle collection surfaces and obstacle assessment, enabling the user to identify which obstacles are relevant for aviation safety. Furthermore, preliminary checks of planned structures, preparation of aerodrome certification documentation, and prospective aerodrome development, are all supported by this tool. Together, CADAS-AIMDB and OMEGA encompass the complete production line for eTOD, including data collection, consolidation, storage and assessment, enabling a seamless workflow between all concerned parties. Throughout the workflow, all data is shared electronically, either as a whole or just the critical parts.

From data input to publication
The initial import of data is a major undertaking when deploying a new, central database. Often, data is scattered on numerous data sources in many different data formats. As a turnkey solution provider, COMSOFT offers data migrations as a service to give its customers a fast and smooth migration. COMSOFT’s electronic AIP solution, CADAS-EPS, is a collaborative document management system specifically designed for aeronautical information publications such as eAIPs, supplements and circulars. It is used by AIS offices to increase workflow automation for the management, editing and

**Note**: The diagram illustrates the data flow and process steps involved in managing terrain and obstacle data within a central database framework, including data input, output, and the integration of various software tools such as COMSOFT’s Aeronautical Information Management Database (CADAS-AIMDB) and OMEGA. It shows the central collection and storage of data as a key precondition for efficient data use by a variety of systems.
A new solution for electronic terrain and obstacle data management will help improve flight safety

Michael Kupsch, COMSOFT

Accurate terrain and obstacle information is of great importance for the safety of flights. This applies in particular for the approach phase, where aircraft intentionally reduce their altitude and maintain safety margins is crucial. As air traffic volumes increase and airspace capacity grows closer to saturation, there becomes a need for more sophisticated routes and procedures to increase efficiency, while reducing fuel consumption and emissions. To maintain safety margins, accurate and detailed terrain and obstacle data is essential. Growing numbers of obstacles around airports, as well as a growing number of aircraft equipped with enhanced ground proximity warning systems and synthetic vision, are contributing to the demand for accurate and up-to-date terrain and obstacle data.

With the help of precise and reliable electronic terrain and obstacle data (eTOD), used by inflight and ground-based applications, substantial benefits in safety and efficiency are achieved. Consequently, ICAO requires all member states to ensure the availability of eTOD for Area 1 (the complete state territory) and Area 4 (a rectangle at CAT III runway) for all aerodromes regularly used by international civil aviation. By November 12, 2015, Area 2 (the vicinity of an aerodrome) will follow. Providing terrain and obstacle data electronically is also explicitly required in the transition from Aeronautical Information Services (AIS) to Aeronautical Information Management (AIM) and an important prerequisite for implementing Aviation System Block Upgrades B0-SNET and B1-SNET.

The technology

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Flight Data

Area 2, the vicinity of an aerodrome, consists of 2a – the area around a runway; 2b – extending from the ends of Area 2a in the direction of departure; 2c – outside of 2a and 2b up to 10km from the boundary of 2a; and 2d – outside of 2c up to 45km from the ARP or to an existing TMA boundary.

The publication of accurate terrain and obstacle data is not only a crucial prerequisite of the AIS to AIM migration and an ICAO requirement; it also contributes to increasing safety and efficiency through the availability of necessary data. Central collection and storage of data is the ideal precondition for efficient data use by a variety of systems. In addition, it assures that all systems share access to the latest data. With COMSOFT’s core AIM database forming an integral part of the AIS to AIM transition, the ICAO-compliant eTOD solution from COMSOFT is easily implemented and, due to its open interfaces, easily integrated with existing systems. With the help of further components for obstacle assessment and eAIP publication, COMSOFT offers the complete solution for seamless eTOD implementation.

Additionally COMSOFT is able to provide data migration, AIM training and change-management support. This solution is not only critical for future data requirements, but also beneficial and prepared for today’s increasing service demands.

Prepared for now

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CADAS-AIMDB AT A GLANCE

- Fully featured AIXM 5.1 database
- Web interface
- Terrain data support, including:
  - Support for a vast number of data formats, including Shapefile, GML, GeoTiff, WorldImage, ArcGrid and GDAL image formats
  - OGC-compliant WCS, WMS and WFS interfaces
- Obstacle data support, including:
  - Import formats: CSV, AIXM 4.5, AIXM 5.1
  - Export formats: AIXM 4.5, AIXM 5.1
  - Open web service interface
- Supporting terrain and obstacle metadata in accordance with ICAO Annex 15

Data for Area 3 (aerodrome/heliport area) is recommended by ICAO, while data for Area 4 (a rectangle at CAT II/III runways) is already mandatory.