

**INTERNATIONAL CIVIL AVIATION ORGANIZATION
AFI REGION AIM IMPLEMENTATION TASK FORCE**

(Dakar, Senegal, 20 – 22nd July 2011)

Agenda item: *Implementation of a African Regional Centralised Aeronautical Database (AFI - CAD)*

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SUMMARY

New and future technologies in air navigation require the availability and timely exchange of accurate and quality assured digital Aeronautical Information within Air Traffic Systems. One of the ICAO requirements as defined in the ICAO AIS to AIM Roadmap is the creation of a centralised repository for Aeronautical Information. This paper describes the implementation of a Centralised Aeronautical Database (CAD) by ATNS and the benefits it holds for aviation in South Africa and the African Continent.

1. Introduction

- 1.1 This paper provides information on the implementation of a Centralised Aeronautical Database in South Africa and the benefits it holds for the entire African Aviation Community.
- 1.2 The Eleventh Air Navigation Conference (AN-Conf/11) held in Montréal in September 2003 endorsed the operational concept and recognized that, in the global air traffic management (ATM) system environment envisaged by the operational concept, aeronautical information service (AIS) would become one of the most valuable and important enabling services.
- 1.3 ICAO specifies certain requirements to be met by contracting states for the transition from AIS to AIM. These requirements include the creation of a centralised repository of Aeronautical Information.

2. General

- 2.1 The ICAO Global Air Navigation Plan (DOC 9750) defines strategic initiatives which have a direct bearing on current and future Aeronautical Information Management (AIM). The Strategic Objective of AIM is ***"To achieve a uniform and efficient aeronautical information management structure, based on system wide information management, in support of all phases of flight."***

System Wide Information Management (SWIM) makes it possible to exchange data via a standardized interface between all ATM stakeholders.

To achieve this, Aeronautical Information Services (AIS) has to transition from a general "paper based" information sharing environment to a "digital" information sharing platform.

ATNS South Africa, has acquired a solution identical to the European AIS Database (EAD) currently used by Eurocontrol and the European ATM Community, to ensure that ATNS and South Africa aligns itself with global initiatives and technologies.

- 2.2 The CAD system will provide different kinds of services and functionality through various subsystems. The main subsystems are:

- CAD BASIC - Web-presence for Airline Operators, Pilots and the General Aviation Public)
- SDO – Static Data Operation (input and output of static information)
- GT - Graphical Tools (GIS visualisation of static and dynamic aeronautical information, airspace design)
- eAIP – Aeronautical Information Publication (authorising of aeronautical documents),
- PAMS – Published AIP Management System (document management system for aeronautical documents and charts)
- eCharting – Aeronautical Chart Production
- AST – Accountable Sources Toolkit
- System to System Interfaces - allows users to integrate into the CAD system with existing or new systems

The CAD solution has the capability to expand to the following subsystems if required:

- BF - Briefing Facilities (OPMET and Flight Planning)
- INMO – Integrated NOTAM and Meteo Operations (dynamic information)
- MessageServer – Message Handling System supporting both MHS and AMHS

- 2.3 **Integrated NOTAM and Meteo Operations (INMO)** - INMO provides facilities for processing, checking, and creating international and national NOTAM (including SNOWTAM, ASHTAM etc.) and other relevant dynamic aeronautical data to be handled by Aeronautical Information Services. The INMO data is checked against the SDO data and against all other INMO data in order to ensure coherence and prevent double publications.

Dynamic information like NOTAM can be linked to static data elements, making it possible to identify e.g. all NOTAM affecting a specific facility.

Within its INMO Data User part, this subsystem also covers the Briefing (generation of PIBs and NOTAM summaries). INMO includes Graphical Reporting in the Graphical Tools GIS subsystem, allowing the user to visualize the geographical location and impacted area/feature of a NOTAM.

- 2.4 **Briefing Facilities (BF)** - Within the Briefing Facilities subsystem, AIS covers functionality covered by Briefing and Flight Planning Offices. BF allows clients to file flight plans, validate them against the SDO, select from a route catalog. Flight Plan Officers receive flight plans in a dynamic list allowing them to easily identify the status of filed flight plans and to manage them according to procedures.

The functionality covered in BF is intended for aircraft operators as clients of ANSPs (allowing them to efficiently design and file flight plans with a high probability of acceptance, because they are already pre-checked and validated) and for Flight Plan officers to manage received flight plans.

Internet-based flight plan submission has a positive effect on aircraft operators who get a superior functionality and a more user-friendly interface to Flight Plan offices and it has a positive effect on Flight Plan officers due to the very much improved quality of the received flight plans and the reduced need for telephone interactions.

Briefing Facilities furthermore include an integrated briefing package including an automatic NOTAM, and MET briefing associated to a flight plan. Briefing Facilities Flight Planning and INMO are fully integrated.

- 2.5 **MessageServer** - The Message Handling provides AIS with an interface to AFTN/CIDIN and AMHS/X400.

The MessageServer is providing message handling services according to following International Civil Aviation Organization (ICAO) standards:

- AFTN (Aeronautical Fixed Telecommunication Network)
- CIDIN (Common ICAO Data Interchange Network)
- AMHS (Aeronautical Message Handling Services)

The principle of operation of the MessageServer is to receive, tag, store and validate messages until they are routed to final destinations. Together with the other AIS modules the solution is not only a pure message router, but comes with sophisticated HMI supporting the operators.

- 2.6 These AIS solutions are designed to be platform independent. It can run on different hardware architectures and operating systems, the most common choices being Linux, Solaris and HP-UX. The server software is based on Oracle and Java J2EE, the client software is mainly Java or HTML based (able to run in a browser) and/or can be virtualized on any client platform.

It is even possible to run these AIS subsystems on different hardware and operating system platforms at the same time. This can be advantageous in high-availability configurations, as this prevents errors affecting on hardware or operating system platform to affect the overall system.

The CAD system is identical to the European AIS Database (EAD), this allows for the synchronisation and information sharing between the CAD and EAD and any other compatible databases.

2.7 One of the key benefits of the CAD system is that it would allow for the definition of a data "Provider" or "User". A Data Provider (Usually Data Originators, Air Navigation Service Providers or State Civil Aviation Authorities) will be responsible for the following main functions in SDO:

- **SDO Slot Management** - The Slot Management provides a set of functionalities to co-ordinate and checks static data changes and makes it effective at a future date (Effective date).
- **SDO Static Data Maintenance** - The Static Data Maintenance provides a set of functionalities to insert and maintain static data changes based on the SDO data model entities.
- **Upload & Download Management** - The Upload & Download Management provides a set of functionalities to upload and download aeronautical data in the ARINC 424 or AIXM (XML syntax) exchange format.

Data "Providers" such as Air Navigation Service Providers and State Civil Aviation Authorities would insert aeronautical data into "Private Slots" based on a common effective date into the CAD system following various review and quality auditing processes.

Each data "Provider" would then review these "Private Slots" and "Commit" the data to the "Public Slot" which corresponds to a common AIRAC effective date. The "Public Slot" is then reviewed for "Consistency" and then committed into the CAD system.

The information would then be used in creating the required publications (AIP, Supplement or AIC). The publications will then be available in the Published AIP Management System (PAMS) application on the CAD system.

The CAD system also contains various internal verifying and quality checking processes to ensure the data is entered in a standard format and is of the highest quality.

Data Users (Usually Aircraft Operators, Airport Operators/ Developers, Military and General Aviation) are able to perform the following functions using the CAD internet based applications:

- **Generate Reports** - Execute pre-defined and saved user-defined reports.
- **Manage User-defined Reports** - Define new reports by using the whole range of the supplied SDO database views.

Aeronautical data not previously accessible in digital format (topographical and obstacle data, etc.) will thus be entered into the CAD system and be available to the entire aviation community, either through direct connection or through an internet based interface.

Information could be loaded either individually or per bulk upload which would minimize the chance of data errors or corruption.

- 2.8 The CAD system would also provide data to the ATM systems within ATNS ensuring System Wide Information Management (SWIM) from a single repository of Aeronautical Information.

Sharing of this information will not be confined to ATNS systems but can be defined to other aviation subsystems using the appropriate exchange model. The current exchange models developed and defined through combined international collaboration of Eurocontrol, FAA, etc. for the exchange of information include:

- Aeronautical Information Exchange Model (AIXM)
- Airport Mapping Exchange Model (AMXM)
- Weather Information Exchange Model (WXXM)
- Environmental Information Exchange Model (ENXM)

Information exchange models currently under development include the "Terrain Information Exchange Model" and "Flight Object Exchange Model".

These different exchange models will ensure that information is structured in a standard logical format able to be interpreted by a "Ground station" or a "Cockpit", and ensure that current, accurate, quality assured digital data is available for the entire aviation community.

3. Conclusion

- 3.1 The CAD is a vital asset and is essential for the role of AIS in the evolving world of ATM. Computer-based navigation systems, area navigation (RNAV), required navigation performance (RNP) and other ATM requirements necessitates the need for AIS to be able to provide and manage digital, quality assured information in a timely manner.
- 3.2 Through collaboration and information sharing, a global interoperable ATM system network can be created that enables ATNS and the African Continent to safely handle more traffic in the same amount of space during the same amount of time. The CAD system would effectively link the full range of services from airspace design to flight planning, airport operations planning and flight separation assurance by ensuring the integrity and quality of the aeronautical data contained throughout the African Aviation Community.
- 3.3 The South African CAD enables South Africa and any other interested States to achieve the requirements as required by ICAO in achieving the Global ATM goals.
- 3.4 The meeting is requested to note the information supplied in the information paper.