

ELEVENTH AIR NAVIGATION CONFERENCE

Montreal, 22 September to 3 October 2003

Agenda Item 1 Introduction and assessment of a global air traffic management (ATM) : operational concept

GLOBAL AERONAUTICAL INFORMATION MANAGEMENT

(Presented by the United States)

SUMMARY

This working paper reflects the U.S. support of the ICAO global ATM operational concept. To further support the operational concept and to assist in facilitating the transition to new global CNS/ATM systems, it is understood that systems supporting aeronautical information and charts must be further developed and oriented more toward global requirements. This should only be accomplished in a way that would safely increase efficiency and cost-effectiveness to users. The goal, therefore, is to create a new approach to support global air traffic management systems and their associated information systems. The U.S. supports the creation of a global aeronautical information management methodology that specifically highlights the need for the introduction and development of a conceptual information data model for the storage, retrieval and exchange of aeronautical data.

Action by the conference is in paragraph 4.

1. INTRODUCTION

1.1 All aeronautical information sub-systems (e.g. aeronautical information databases, on-board flight information databases, NOTAMs, obstruction evaluation databases, aeronautical charts, meteorological information, air traffic flow management information) are considered as elements of a total aeronautical information system (AIS). Managing all AIS to ensure that timely, interoperable, quality-assured and secure information is actually being provided and exchanged on a worldwide basis elevates AIS to a global aeronautical information management (AIM) concept. At its most basic foundation, AIM is needed to oversee a progressive migration from the publication of mostly paper-based products derived from mainly manual

processes to the management of aeronautical information sub-systems in a globally exchangeable, electronic format.

1.2 It is envisioned by the operational concept that the global ATM system will require global aeronautical information of a specified quality. Thus, the ultimate goal of AIM would be to provide access to on-line, real-time, quality aeronautical information to any genuine user, any time, anywhere. To achieve this goal, aeronautical information must be provided and exchanged in electronic format based on a conceptually standardized data model. Strict quality control principles must be in place to ensure that aeronautical information is available, validated and secure to give the end-user the confidence in the correctness of the information received and assurance that it came from the correct source.

1.3 ICAO Annex 15 — *Aeronautical Information Services*, emphasizes the aspects of data management, quality assurance and integrity with aeronautical information. The importance of aeronautical information is changing significantly with the implementation of area navigation (RNAV), required navigation performance (RNP), and airborne automated navigation systems. Together with the development of low-cost electronic data storage and retrieval systems the role of AIS (to include mapping) becomes more important.

2. DISCUSSION

2.1 Many users require that aeronautical data be held in a database. For example, flight management systems (FMS), flight-planning systems, air traffic control systems, ground proximity warning systems, simulators, procedure design systems and charting systems, all hold AIS-derived data in databases. The task of maintaining these databases and verifying and validating the data is currently time-consuming, costly and prone to error, because many of the changes are still made by manual input. Traditionally, independent and unique databases have been created and maintained for many of these aeronautical information sub-systems. Each database is maintained separately and few share data. Each database may hold different subsets of the data and may also have different requirements for accuracy, integrity and resolution. Furthermore, each system will probably provide different interface capabilities designed to meet the particular requirement of the user of that system. Notwithstanding this, there exists a large degree of commonality between the fundamental principles and data underlying the design of each system.

2.2 From the U.S. Federal Aviation Administration's (FAA's) perspective, there have been various computer system upgrades that have moved their AIS data from their original (legacy) platforms to more modern architectures. The general issues are not unlike those in some other Member States:

- a) the AIS data has been placed on modernized platforms;
- b) modernization of legacy platforms still do not minimize the duplication of data or data discrepancies across lines of business and outside FAA;
- c) the real need to minimize AIS data duplication and discrepancies has not yet been met even with such modernization;
- d) all digital aeronautical cartographic and on-board AIS flight database products should be constructed and maintained using data derived from a authoritative AIS database;

- e) the most current data needed to maximize operational system capacity is still not readily available;
- f) all AIS information systems still need to be interoperable. They are not now without manual intervention;
- g) most importantly, there still exists the need to automatically and accurately collect, validate, process, store, retrieve, maintain, analyse and disseminate AIS data with minimal human intervention; and
- h) all AIS products should eventually be released in digital formats.

2.3 Having a common portal of AIS data from which everyone can access will derive specific benefits. One example would be a common digitized format for charts needed in the cockpit. By ensuring a central repository of digital datasets, there is a significant reduction in costs for maintenance of such charts and other associated products. This modelling methodology would, of course, be in compliance with ICAO's Annex 15, thus ensuring the goal of global harmonization.

2.4 This effort has already started within the FAA through a collaborative effort across functional lines such as AIS database management, aeronautical charting, airspace management, air traffic planning and procedures, flight procedures, and system engineering. The next step requires an AIM capability that would provide a formal framework for the information/data currently being collected, managed, analyzed and distributed by those involved with the FAA's AIS. AIM must have as its foundation a common data model.

2.5 The operational change that would go into effect throughout the FAA includes the life cycle role of AIS data — the convergence and ultimately the standardization of data; the automation of the processes for this convergence; the digital delivery of AIS data; and the harmonization of such data with that used by the international community.

2.6 Aeronautical Information Exchange Model (AIXM) is the only exchange model in operational use.

3. CONCLUSION

3.1 The FAA is interested in adopting the leading international aeronautical information model so that we can map our data and workflow processes within our AIS sub-systems and then upgrade these applications to take advantage of this new common data model. This adoption eliminates the need for each sub-system to negotiate their own data models with each other and then later be required to move to a different model based on international standards.

3.2 There are considerable benefits to be gained from placing AIS data under a common data exchange model, and thereby providing a single reference source for all AIS data around the globe under an aeronautical information management concept. For such a resource-intensive undertaking, the conference may wish to consider those aeronautical information concept and data exchange models currently evolving on a worldwide basis. This activity will save years in the globalization of aeronautical data exchange.

4. **ACTION BY THE CONFERENCE**

4.1 The conference is invited to agree on the following recommendation:

Recommendation 1/xx — Global aeronautical information management

That ICAO as a matter of priority:

- a) use the currently developed Aeronautical Information Conceptual Model/Aeronautical Information Exchange Model Reference (AICM/AIXM) as the basis for an aeronautical information exchange;
- b) encourage States to use this model until such time as ICAO develops Annex material and Standards and Recommended Practices (SARPs) based on AIXM for the Member States; and
- c) amend specifications regarding the electronic storage, provision and interrogation of charts and aeronautical information contained in ICAO Annex 4 — *Aeronautical Charts* and ICAO Annex 15 — *Aeronautical Information Services*.

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