Interface Specifications Document

Aeronautical Information Exchange Model (AIXM)

AFI AIM RBIS AIXM client interfaces specification template

Version 1.1

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APPROVAL SHEET

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1. GLOSSARY OF TERMS

Aeronautical data. A representation of aeronautical facts, concepts or instructions in a formalised manner suitable for communication, interpretation or processing.

Aeronautical Information Management (AIM). The dynamic, integrated management of aeronautical information through the provision and exchange of quality-assured digital aeronautical data in collaboration with all parties.

Aeronautical Information Product. Aeronautical data and aeronautical information provided either as digital data sets or as a standardised presentation in paper or electronic media. Aeronautical Information Products include:

— Aeronautical Information Publication (AIP), including Amendments and Supplements;
— Aeronautical Information Circulars (AIC);
— Aeronautical charts;
— NOTAM;
— Digital data sets.
Note.—Aeronautical information products are intended primarily to satisfy international requirements for the exchange of aeronautical information.

Aeronautical information service (AIS). A service established within the defined area of coverage responsible for the provision of aeronautical data and aeronautical information necessary for the safety, regularity and efficiency of air navigation.

Data. A representation of fact, concept, or instruction represented in a formalised form suitable for communication, interpretation or processing either by human and/or by automated systems.
Note. — This is the lowest level of abstraction, compared to information and knowledge.

Database. A collection of data stored in structured digital format so that appropriate applications may retrieve and update it.
Note. — This primarily refers to digital data (accessed by computers) rather than files of physical records.

Data accuracy. A degree of conformance between the estimated or measured value and the true value.

Data completeness. The degree of confidence that all of the data needed to support the intended use is provided.

Data Dictionary. or metadata repository, is a "centralised repository of information describing the contents, format, and structure of a database and the relationship between its elements, used to control access to and manipulation of the database.

Data format. A structure of data elements, records and files arranged to meet standards, specifications or data quality requirements.

Data integrity (assurance level). A degree of assurance that an aeronautical data and its value has not been lost or altered since the origination or authorised amendment.

Data Management. The management of resources and processes for the development and execution of the architectures, policies, practices and procedures that properly manage the full data lifecycle throughout the collection, validation, integration, storage, protection, exchange and delivery of accredited, quality-assured and timely data.

Data product. Data set or data set series that conforms to a data product specification (ISO 19131*).

Data product specification. Detailed description of a data set or data set series together with additional information that will enable it to be created, supplied to and used by another party (ISO 19131*).

Data quality. A degree or level of confidence that the data provided meet the requirements of the data user in terms of accuracy, resolution, integrity (or equivalent assurance level), traceability, timeliness, completeness and format.

Data resolution. A number of units or digits to which a measured or calculated value is expressed and used.

Data timeliness. The degree of confidence that the data is applicable to the period of its intended use.

Data traceability. The degree that a system or a data product can provide a record of the changes made to that product and thereby enable an audit trail to be followed from the end-user to the originator.

Data set. Identifiable collection of data (ISO 19101*).

Data set series. Collection of data sets sharing the same product specification (ISO 19115*).

Extensible Mark-up Language (XML). A step in the evolution of web data formats (beyond HTML).

Information. Data that:
(1) has been verified to be accurate and timely,
(2) is specific and organised for a purpose,
(3) is presented within a context that gives it meaning and relevance, and which
(4) leads to increase in understanding and decrease in uncertainty. The value of information lies solely in its ability to affect a behaviour, decision, or outcome.

Information Consumer. The person, application or system consuming an information service. Also called consumer.

Infrastructure. The logical and physical (i.e., hardware and software) elements that together provide (SWIM) functionality.

Internet. A system of computer networks that interconnect worldwide and use the Transmission Control Protocol/Internet Protocol (TCP/IP) for transmission and recovery of information.

Internet protocol (IP). A protocol used to route data packets from source to destination in an Internet (interconnected networks) environment.

Metadata. Data about data (ISO 19115*)
Note. — A structured description of the content, quality, condition or other characteristics of data.

Origination (aeronautical data or aeronautical information). The creation of the value associated with new data or information or the modification of the value of an existing data or information.

Originator (aeronautical data or aeronautical information). An entity that is accountable for data or information origination and from which the AIS organisation receives aeronautical data and information.

Quality. Degree to which a set of inherent characteristics fulfils requirements (ISO 9000*).

Traceability. Ability to trace the history, application or location of that which is under consideration (ISO 9000*).

Validation. Confirmation, through the provision of objective evidence, that the requirements for a specific intended use or application have been fulfilled (ISO 9000*).

Verification. Confirmation, through the provision of objective evidence, that specified requirements have been fulfilled (ISO 9000*).

Service (application function). An implementation-independent reusable operational function that may be discovered as self-describing interfaces, and invoked using open standard protocols across networks. Services can be combined and orchestrated to produce composite services and operations processes, in accordance with predefined policies, security and service level agreements.

Service Provider. An organisation or entity providing a service. Refers (in this document) to ATM Service Providers (ASPs) or vendors that provide network or other value-added services; distinct from an information provider.

2. ABBREVIATIONS AND ACRONYMS

Abbreviation	Description
AFTN	Aeronautical Fixed Telecommunication Network
AIC	Aeronautical Information Circular
AICM	Aeronautical Information Conceptual Model
AIM	Aeronautical Information Management
AIP	Aeronautical Information Publication
AIRAC	Aeronautical Information Regulation and Control
AIS	Aeronautical Information Service
AIXM	Aeronautical Information Exchange Model
AMHS	Aeronautical Message Handling System
API	Application Program Interface
ARO	ATS Reporting Office
ATC	Air Traffic Control
ASBU	Aviation System Block Upgrade
ATM	Air Traffic Management
ATN	Aeronautical Telecommunication Network
ATS	Air Traffic Service
COTS	Commercial Off the Shelf Software
CSV	Common Separated Value
DMZ	Demilitarized Zone
eAIP	Electronic Aeronautical Information Publication
eTOD	Electronic Terrain and Obstacle Data
FPD	Flight Procedure Design
GANP	Global Air Navigation Plan
GATMOC	Global Air Traffic Management Operational Concept
GIS	Geographical Information System
GML	Geography Mark-Up Language
GUI	Graphical User Interface
HMI	Human Machine Interface
HTML	Hyper Text Mark-up Language
ICAO	International Civil Aviation Organisation
IFPD	Instrument Flight Procedure Design
IP	Instrument Landing Systems
NOTAM	Notice to Airmen
PDF	Portable Document Format
PIB	Pre-flight Information Bulletin

Abbreviation	Description
SAT	Site Acceptance Testing
SNMP	Simple Network Management Protocol
SOA	Service Orientated Architecture
SWIM	System Wide Information Management
TCP/IP	Transmission Control Protocol/Internet Protocol
XML	Extensible Mark-up Language

3.   INTRODUCTION

3.1   In order to release the latent capacity in the Air Traffic Management (ATM) system and to create new capacity, ATM is required to evolve and implement the means to provide the necessary capacity in a safe, timely, efficient and cost-effective way.

3.2   ATM will depend extensively on the provision of timely, relevant, accurate, and quality assured information that allows the ATM Community to make informed decisions, which will need to be taken on the basis of Collaborative Decision Making (CDM) rather than in isolation.

3.3   When shared on a systemwide basis and using advances in the corresponding technologies, information will allow the ATM Community members to conduct their business and operations in an efficient and cost effective way.

3.4   The traditional product centric provision of Aeronautical Information has to be replaced by a data centric and systems oriented solution, one in which timely and reliable data is made available permanently and dynamically for use in applications that perform the required tasks, be it flight planning, flight management, navigation, separation assurance, CDM or any other strategic or tactical ATM activity.

3.5   One key enabler of the ATM system is interoperability. It is essential that the new definition of aeronautical data is provided in a common, system and platform independent format (or a set of harmonised formats) within a virtual information management system.

3.6   The objective is to ensure consistency, authenticity and appropriate coverage of the data, and to provide accessibility to the data by all users of the ATM network, both on the ground and in the air. The enlarged scope of Aeronautical Information Management (AIM) includes all categories of information required to support the new ATM system.

3.7   Aeronautical Information Exchange Model – AIXM, is designed and developed by EUROCONTROL and the Federal Aviation Agency for distribution of digital aeronautical data.

3.8   ICAO Annex 15, item 3.5 emphasizes the use of automation in AIS. It points out that fulfilment of data quality in automation should be through the use of aeronautical information/data exchange models which are globally interoperable. The purpose of the Aeronautical Information Exchange Model is to provide digital Aeronautical data for system-to-system exchange within the scope of Aeronautical Information Services.

3.9   An application implementing AIXM has the ability to be interfaced with other applications and devices for data exchange. AIXM application system has a reposit of aeronautical data/aeronautical information which can be retrieved as digital data in XML format for AIP/eAIP production, NOTAM generation and Flight planning among others. Methods of data exchange/retrieval from AIXM application system or related systems could include use of Webservices/APIs, AMHS or Data link.

3.10   States implementing AIXM should take into consideration the need to describe the architecture of the system which is data dependent on AIXM application system, as well as application aiding AIXM application system achieve the goal of aeronautical digital data exchange.

4. PURPOSE

4.1 The purpose of this document is to provide a description of devices and applications currently in use or intended to be integrated into the AIXM application system. Such a description would be useful for planning the implementation of the AIXM application system. It provides essential information to the system developers - for system design - as well as system support personnel.

5. SCOPE

5.1 This document provides a template to assist States describe and document application systems within the AIS environment which are to be integrated to AIXM application system. This could include the description of architecture and interfaces of the following application systems among others:

a) Instrument Flight Procedure,

b) Air Traffic Services systems,

c) Cartography,

d) AIP/eAIP,

e) AMHS

f) external AIXM databases and

g) Classical text and digital NOTAM

6. REQUIREMENTS

6.1 The following are the minimum properties of the application system to be interfaced with AIXM application. In some scenarios, they might not be applicable:

6.1.1 Architecture – Component assembly

Every system design involves assembling and organization of the system components in a manner that will enable interrelation and smooth operations. In this case, what to be considered include the relationship between system components.

6.1.2 Platform – Operating system, Server, Client access

System architecture includes a platform which the systems run on. This will include the hardware operating system, server hosts, mode of application system hosting (cloud or local).

6.1.3 Communication network; LAN, WAN Closed network, Internet.

How are components of communications implemented. Is communication through LAN, Closed network or over the internet.

6.1.4 Organization-in-charge

The organization which has authority over the provision of support and maintenance of the application system.

6.1.5 Interface with other applications

How does the application integrate with other applications for data exchange/transfer, allowable format of data transfer and the structure of the formatted data. A clear description of data structure and format should be captured.

6.1.6 Vendor: Name, Contacts

Provide details of the vendor including the name and contacts and validity of contract with the organization in charge of the system.

6.1.7 Available documentation, guide and support.

This will include enumeration and description of the available system documentation, guide and technical support.

6.2 It is recommended that [State and/or Service provider Name] complete the form as listed in Appendix 1 of this document considering the minimum properties of the application system to be interfaced with AIXM application.

6.3 Additionally pictorial or sketch illustration of the design and architecture is highly recommended for clarity, and to facilitate the configuration management plan of the system architecture.

6.4 This should include any additional system interfaces as listed in section 5 above including any additional functional specifications of identified subsystems as listed in section 7 below.

7. ADDITIONAL FUNCTIONAL SPECIFICATIONS FOR SUBSYSTEMS

7.1 GENERAL

7.1.1 The below list of additional functional specifications for subsystems to the AIXM database should be considered by [State and/or Service provider Name] when planning to procure the AIXM database based on services to be provided.

7.1.2 The below specifications are not an exhaustive list as the main focus of the ICAO RBIS for AIXM implementation is the AIXM database, however it covers the functional specifications for the following subsystems:

i) ELECTRONIC AERONAUTICAL INFORMATION PUBLICATION (eAIP) APPLICATION
ii) AERONAUTICAL CHARTS APPLICATION
iii) ELLECTRONIC TERRAIN AND OBSTACLE DATA (eTOD) APPLICATION
iv) NOTAM MANAGEMENT APPLICATION
v) FLIGHT PLANNING
vi) PRE-FLIGHT INFORMATION BULLETIN (PIB)
vii) INSTRUMENT FLIGHT PROCEDURE DESIGN (IFPD)

7.1.3 The functional specifications can be used by [State and/or Service provider Name] and included into the functional specifications of the AIXM database to ensure an integrated systems is procured or can be defined as separate functional specifications

to procure these subsystems at a later stage, based on operational functions, cost benefit analysis and regulatory requirements within [State and/or Service provider Name].

7.2   ELECTRONIC AERONAUTICAL INFORMATION PUBLICATION (eAIP) APPLICATION

7.2.1   General Requirements

7.2.1.1   The eAIP application shall comply with ICAO Annex 15 and PANS-AIM requirements and eAIP specifications.

7.2.1.2   A system to systems application shall be integrated with publication module to derive Static data from the AICM/AIXM 5.x Database as applicable.

7.2.1.3   The application shall have easy to use/learn editing Interface.

7.2.1.4   System provision should be in English language.

7.2.1.5   The software documentation shall be provided to include user and maintenance documentation in English language.

7.2.1.6   The eAIP publication module shall enable production of eAIP that meets ICAO Annex 15 and PANS-AIM specifications.

7.2.2   Remote Access

7.2.2.1   The software shall allow all users to work remotely without local software installation. This includes access to published (draft and final) versions of the documents and access to source files for edition IHM, as well as access to files by system operators.

7.2.3   Editing and Styling

7.2.3.1   All documents shall be edited in a structured way and use XML file formats.

7.2.3.2   The editing environment shall support all Unicode characters.

7.2.3.3   Document content shall be clearly separated from styling in the source file format.

7.2.3.4   The system shall provide the capability to define custom style classes and assign them to any content items in the document structure.

7.2.3.5   The system shall provide different possibilities (even/odd odd, even, void) of the pagination

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7.2.4 eAIP/eSUP/eAIC Requirements

7.2.4.1 The software shall support edition of AIP, Supplements and Circulars with connexion to database features and the possibility to enter temporarily validity of features. These documents shall be compliant with ICAO Annex 15 eAIP Specification.

7.2.4.2 The software shall be able to import and export documents compliant with the eAIP specification. No information shall be lost when importing and exporting a valid eAIP of the respective version.

7.2.4.3 The editing environment shall be able to validate the eAIP set of documents following the eAIP Specification (DTD and additional rules).

7.2.5 Mark-up of Changes

7.2.5.1 Changes made in an AIP as part of an amendment, shall be automatically detected and marked up.

7.2.5.2 This mark-up shall be compliant with the ICAO Annex 15 eAIP Specification.

7.2.5.3 The system shall withdraw automatically from valid html and pdf products (AIC, AIP SUP) , once the end of validity of occurs.

7.2.5.4 The system shall ensure that expired AIP SUP do not appear in the AIP SUP checklist.

7.2.5.5 The system shall ensure that expired AIC do not appear in the AIC checklist.

7.2.6 References to Aeronautical Data

7.2.6.1 The AIP production system shall support a mechanism to insert references from AIP, SUP and AIC documents to the database.

7.2.6.2 An AIP document shall be able to contain multiple references, in the same document, including to the same data item and in multiple formats, where relevant.

7.2.6.3 The edition software shall assist the editor in creating such references in a document.

7.2.6.4 These different formats of the same data shall be generated automatically by the software, so that when data is modified in the database, the various formats of modified data are automatically updated the next time an editor accesses the reference creation tool.

7.2.6.5 These references shall be resolved automatically before producing the documents in eAIP (export), PDF and HTML formats and when previewing the document.

7.2.6.6   A change in the data being referenced shall automatically be detected as an amendment in the document and shall be presented like manual amendments.

7.2.7   Automatic Page Information in PDF

7.2.7.1   AIP/SUP/AIC pages shall be generated in PDF format with the following information:

  i)   Page number or name
  ii)   Page date (for an AIP)
  iii)   Amendment number and year (for an AIP)
  iv)   Other static content for headers and footer customised for editors

7.2.8   Automatic Production of eAIP Web site (HTML)

7.2.8.1   The production software shall automatically generate the set of HTML files composing the AIP, in compliance with the ICAO Annex 15 eAIP Specification.

7.2.9   Automatic Production of the PDF Checklist of Pages

7.2.9.1   The production software shall automatically generate the AIP checklist of pages in PDF, in compliance with the ICAO Annex 15. A specific style class shall exist to specify how to format entries in the checklist referring to amended pages.

7.2.10   Automatic Production of the PDF Paper Amendment

7.2.10.1   The production software shall automatically generate a single PDF file containing the paper Amendment, ready to be printed.

7.2.10.2   The production software shall at least provide the mechanism to extract eAIP pages and assemble these pages in a single PDF file containing the paper Amendment, ready to be printed.

7.2.10.3   This PDF AIP shall be based on ICAO Annex 15 AIP Format

7.2.11   AIRAC Support

7.2.11.1   The eAIP publication application software shall allow publishing following AIRAC cycle requirements.

7.2.12   Central Documents Repository

7.2.12.1   The system shall include a server-based central repository where all documents are stored.

7.2.12.2   Access to documents shall be possible for all users at all time, and simultaneously, based on the assigned access rights.

7.2.12.3   Documents shall be protected from unauthorised access based on the defined and assigned user roles.

7.2.12.4   The system shall allow one user to take more than one role, and one role to be taken by more than one user.

7.2.12.5   The system shall allow administrators to customise the roles which are allowed to perform each action on each type of document repository object.

7.2.13   Collaborative Editing

7.2.13.1   The system shall allow several editors to work at the same time on different documents in the repository and equally allow several editors to work at the same time on the same document.

7.2.13.2   The system shall allow several editors to work at the same time on the same file.

7.2.13.3   The system shall manage concurrent changes and merge them together, as long as there is no conflict. In case of conflicts the system shall alert users and provide an interface for solving conflicts.

7.2.14   Repository Organisation

7.2.14.1   The system shall allow authorised users to organise documents in the repository in directories.

7.2.14.2   Directories shall be able to contain directories as well as documents.

7.2.14.3   The system shall allow authorised users to browse the repository structure and access past and current documents, versions of documents and other repository items.

7.2.15   Version Management

7.2.15.1   The system shall allow authorised users to create and manage different versions of the documents.

7.2.15.2   The system shall allow authorised users to create parallel versions. For example, (the regular and the AIRAC AMDT both based on the same previous version.

7.2.15.3   The system shall allow authorised users to create in advance different planification per year to insert in database planned changes.

7.2.15.4   The system shall allow authorised users to query and assemble database per aerodrome/state or per group of aerodromes/states.

7.2.16   Review

7.2.16.1   The system shall offer review functionality, accessible to users with quality control roles.

7.2.16.2   This will enable the users with quality control role to access and review published draft versions of the documents.

7.3   AERONAUTICAL CHARTS APPLICATION

7.3.1   General Requirements

7.3.1.1   The charting application shall achieve automatic database-driven generation of chart types specified in ICAO Annex 4 as applicable.

7.3.1.2   The application shall integrated to a Geographical Information System (GIS) that meets aeronautical data requirements for geographic features and information.

7.3.1.3   The Charting system shall be compliant with AIXM 5.x specification and AICM for data modelling.

7.3.1.4   The charting system shall adequately support management of electronic charts as defined in ICAO Annex 4.

7.3.1.5   The System shall provide drawing tools for chart creation, modification and production.

7.3.1.6   The System shall provide a default configuration with map templates for automatic production of the ICAO compliant charts.

7.3.1.7   The system shall provide the version control for defined effective date, which may be an AIRAC cycle date or any other date specified by the user.

7.3.1.8   The System shall be able to check the effective date of chart elements against the validity of data objects registered in the AIXM 5.x database so that a list of pending changes for a selected chart can be displayed.

7.3.1.9   The application shall be linked with the AIP publication application to allow inclusion of published charts as part of eAIP as applicable.

7.3.1.10   The application must have the possibility to upload just changed data from any reference date, specified by the user.

7.3.1.11   The application shall support visualization in a graphical view, the data changes that impact a selected chart.

7.3.1.12   The system must allow interactive data selection to add relevant Static Data.

7.3.1.13   The system must automatically update database versions when another version is selected by user.

7.3.1.14   The system must keep unchanged data labels once validated by the user with charts administrator profile.

7.3.1.15   The system must support geo-referenced raster and vector data in various GIS/CAD formats.

7.3.1.16   The system shall have coordinate transformation tools of geographical data from local coordinate system to WGS84.

7.3.1.17   The system must ensure flexible control of charting projection upon creation and design of charts.

7.3.2   Symbology

7.3.2.1   The System shall provide user editable symbolization rules defining what symbols and labels are to be used on the selected chart type and shall be preloaded with the symbolization rules for all ICAO chart types and allow addition of symbols if need be.

7.3.2.2   The system shall provide display priority of symbols.

7.3.2.3   The system shall provide the zoom scale in relation with reference chart scale.

7.4   ELECTRONIC TERRAIN AND OBSTACLE DATA (eTOD) APPLICATION

7.4.1   General Requirements

7.4.1.1   The system shall implement an application to manage Electronic terrain and obstacle data with a link to the central AIXM 5.x database.

7.4.1.2   The application shall mark-up any change on two consecutive versions of eTOD datasets.

7.4.1.3   Terrain and Obstacle Data representation and data sets delivery shall meet ICAO Annex 15 requirements.

7.4.1.4   The application shall enable management of electronic terrain and obstacle data that meets requirements of ICAO Annex 15 Chapter 10

7.5   NOTAM MANAGEMENT APPLICATION

7.5.1   General Requirements

7.5.1.1   The application shall be integrated with the AIXM 5.x central database

7.5.1.2   The application shall insure automatic update of NOTAM database from AIXM5.X database.

7.5.1.3   The application shall enable the manual upload of foreign database into NOTAM database without destroying the existed database.

7.5.1.4   The application shall specify the format of data used and their compatibility with others.

7.5.1.5   The application shall include functionalities that among others:

   i)   Provide for the submission of aeronautical information for NOTAM promulgation via internet, AFTN and/or AMHS.

   ii)   Provide for the reception, automatic validation, and submission of electronic NOTAM promulgation requests from local aerodrome AIS units, foreign International NOTAM Offices (NOFs) or other authorized agencies or organizations via internet, AFTN and/or AMHS

   iii)   The NOTAM system shall support management of NOTAM in various series.

   iv)   Implement a web-based client/user interface software that is compatible with both mobile and desktop browsers

7.5.1.6   The application shall have flexibility and expandability to cope with future changes such as the adaptation of Digital NOTAM

7.5.1.7   The application shall have the capability to create NOTAMs in both traditional (text NOTAM) and digital format (AIXM 5.x or higher)

7.5.1.8   The system shall support all the relevant message types as per the ICAO Doc 8126 and Annex 15 requirements.

7.5.1.9   The application shall include technical and operational tools to enable management of the following:

   i)   The NOTAM database;

   ii)   Raw Data needed for NOTAM processing;

   iii)   The user and role management;

7.5.1.10   The NOTAM application shall implement the latest NOTAM selection criteria as published in ICAO Annex 15 and Doc 8126, allowing for future modification when the NOTAM criteria changes.

7.5.1.11   Incoming foreign NOTAM and National (local) NOTAM that have expired or that have been cancelled shall remain in an offline store for an adaptable period before final deletion from the system

7.5.1.12   The application shall ensure that all NOTAM (N, R and Trigger) with a defined end of Validity time shall automatically cease to be valid at that time.

7.5.1.13   The application shall also ensure that all NOTAM (N, R and Trigger) with an estimated end of Validity time shall not automatically cease to be valid at that time.

7.5.1.14   The application shall ensure that NOTAMC and NOTAMR shall be automatically replaced or cancelled immediately at reception of RQNTMC of RQNTMR respectively.

7.5.1.15   The system shall ensure that the system support user entry of geographical coordinates format as per in ICAO Doc 8126.

7.5.2   NOTAM Creation and Promulgation

7.5.2.1   The NOTAM application shall provide various ways to create and promulgate NOTAM:-

   i)   Creating a new NOTAM

   ii)   Creating a NOTAM Request

   iii)   Creating a NOTAM on behalf of another state/NOF.

iv)   Creating a NOTAM Replacing and or Cancelling

7.5.2.2   The application shall allow the operator to manually add/or remove one or more addressees from the AFTN predetermined addresses section, if need be.

7.5.2.3   The application shall support distribution of NOTAM based on a pre-determined distribution list.

7.5.2.4   The NOTAM Creation and NOTAM Request forms shall contain a GIS viewer to allow visual verification of the specified areas of influence detailed in the Q-line and/or in item E. For airspace NOTAM, the geographical area shall be displayed.

7.5.3   User Access Rights

7.5.3.1   Access to the system shall be controlled by a username and password combination. Each user shall be allowed to change his/her password.

7.5.3.2   It shall be possible to assign one or more roles to each user. These roles shall control the contents and presentation of the HMI by showing only those parts of the application that the user is configured to have access to.

7.5.3.3   It shall be possible to have different roles for Operators, Supervisors, On-Job-Trainees and System Administrators.

7.5.4   Foreign NOTAM Processing Filters

7.5.4.1   Upon reception of foreign NOTAM, the system shall perform the relevant syntax and semantic checks in accordance with ICAO Standards and Recommended Practices.

7.5.4.2   Erroneous foreign NOTAM shall be put to the attention of a NOTAM Operator for correction.

7.5.4.3   The system shall detect and alert the users in case of conflict between two valid foreign NOTAM on same subject.

7.5.5   NOTAM Visualization

7.5.5.1   The application shall be integrated with a GIS viewer that is capable of visualizing information that includes and not limited to:

i)   The area of influence for NOTAM;

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ii) Geographically referenced Static Data like aerodromes, waypoints, Navaids, FIRs, UIRs

7.5.5.2 The system shall integrate geo-referenced background maps as base layers into the system.

7.5.6 NOTAM Database Interrogation

7.5.6.1 The application shall allow for retrieval and display of current and archived NOTAM.

7.5.7 NOTAM Database Maintenance

7.5.7.1 The application shall ensure that the system automatically alert operators about National (local) NOTAM without defined End of Validity (item C contains "EST") that are about to expire soon.

7.5.7.2 The system shall ensure that cancelled, replaced and expired NOTAM do not appear in the NOTAM checklist, and shall be excluded from services like PIB.

7.5.8 NOTAM Request Messages

7.5.8.1 The system shall automatically process selected incoming NOTAM request messages, including RQNTMN, RQNTMC and RQNTMR from authorized originators.

7.5.8.2 The system shall automatically submit and receive NOTAM requests messages from and to other NOFs for NOTAM missing from the database.

7.5.9 NOTAM Checklists

7.5.9.1 The system shall support automatic production and reception of NOTAM checklists.

7.5.9.2 The system shall provide for correction of Checklist in error either syntax or as a result of database inconsistencies and clearly reflect the error results to the operator to initiate corrective measures.

7.5.10 NOTAM Summary and Bulletins

7.5.10.1 The system shall automatically produce and submit Daily NOTAM Bulletins and Monthly List of Valid NOTAM (NOTAM Summary).

7.5.10.2 The system shall enable publication of the Daily NOTAM Bulletin via FTP

7.5.11 NOTAM Archiving and Backup

7.5.11.1 The application shall ensure all invalid or expired NOTAM and related messages (i.e. through replacement, cancellation, expiry or explicit invalidation) shall be archived in the system for a configurable duration.

7.5.11.2 The system shall be configured to automatically backup all valid data at pre-determined intervals.

7.5.12 NOTAM Statistics

7.5.12.1 The system shall enable creation of statistics based on activities of the system.

7.6 FLIGHT PLANNING

7.6.1 General requirements

7.6.1.1 The application shall implement automated Flight Planning that complies with ICAO Doc 4444 ATM / 501 Appendix 2 - Flight Plan and Appendix 3 - Air Traffic Services Mes-sages in handling the preparation, validation, storage and distribution of flight plan messages, including Filed Flight Plan (FPL) and Repetitive Flight Plan (RPL), and ATS update messages.

7.6.1.2 The system shall be able to send and receive FPL messages in the latest ICAO format.

7.6.1.3 The Flight Planning System shall provide but not be limited to the following:

i) Exchange of relevant ATS messages with other ATC centres through the Air Traffic Services (ATS) Message Handling Services (AFTN/AMHS) System;

ii) Submission, validation and storage of RPL;

iii) Query and Reporting facilities.

7.6.1.4 The Flight Planning System shall be able to generate statistical and other reports in fixed and ad-hoc formats. It shall also allow the export of data in MS Word and MS Excel formats.

7.6.1.5 The type of ATS messages to be processed automatically by the Flight Planning System shall include but not be limited to the following:

i) Filed Flight Plan (FPL) ;

      ii)   Departure (DEP);

      iii)   Arrival (ARR);

      iv)   Delay (DLA);

      v)   Modification (CHG);

      vi)   Cancellation (CNL);

      vii)   Request Flight Plan (RQP);

      viii)   Supplementary Flight Plan (SPL);

      ix)   Request supplementary flight plan message (RQS);

      x)   Estimate message (EST);

      xi)   Current Flight Plan (CPL);

      xii)   Co-ordination (CDN);

      xiii)   Acceptance (ACP);

      xiv)   Alert (ALR); and

      xv)   Radio Communication Failure (RCF).

7.6.1.6   When FPLs are processed, support for associated flight related data display shall be available such as aircraft types, aerodromes, restricted areas, preferential route database, etc . This support makes the users (briefing officers or pilots) interface as user-friendly as possible for operation by people who may have only infrequent access to the system.

7.6.1.7   Help shall be provided on request with information displayed on pop-up windows depending on the keyed data element while the input screen shall be retained in the background.

7.6.1.8   The Flight Planning System shall automatically determine the relevant ATC centres based on analysis of filed route. FPL messages shall be sent automatically based on the addresses of the identified ATC centres via AFTN/AMHS. The function shall allow for the inclusion of additional addresses when required.

7.6.1.9   The Flight Planning System shall support the IFPS Workflow for FPL submission.

7.6.1.10   The system shall implement an interface for the functions Flight-Plan-Validation and Route Generation and enable the retrieval of route assistance data when filing a flight plan.

7.6.2   FPL Submission Template

7.6.2.1   The Flight Planning System shall provide FPL submission template to allow authorised and/or registered users to complete and submit their FPLs via the Internet.

7.6.2.2   The FPL submission template displayed shall be of similar format as the ICAO flight plan form and in compliance with ICAO recommendations expressed in ICAO Doc 4444 ATM / 501. The input fields shall be sized accordingly to indicate the maximum length allowed.

7.6.2.3   The input forms shall provide graphical input assistance for the new FPL 2012 format (items 10a,b and item 18) with syntactic and semantic checks.

7.6.2.4   The FPL submission template shall be presented with appropriate field mnemonics to guide the users on the appropriate flight information to be filled in the related input field.

7.6.2.5   The field mnemonics shall include but not be limited to the following:

    i)   Flight Rule;
    ii)   Type of Flight;
    iii)   SSR Equipment;
    iv)   Type of Aircraft and its Wake Turbulence Category;
    v)   Aircraft Operator;
    vi)   ICAO location indicators for aerodromes.

7.6.2.6   Upon submission and reception of FPL, the Flight Planning System shall perform the relevant syntactic and semantic checks in accordance with ICAO recommendations, in particular ICAO Doc 4444 ATM / 501. Erroneous FPL entry shall be rejected with appropriate error messages.

7.6.2.7   The responded error messages shall capture detailed error information and should be appropriate and easy to comprehend to facilitate correction by the user performing the input or the AIS operators. Records on submission errors shall be logged.

7.6.2.8   Checks performed as standard are:

    i)   Field Aircraft ID: 7 characters maximum which may be possibly followed by "/" and one letter and four figures as SSR mode and code,
    ii)   Field Flight rules: One letter among I, V, Y or Z,
    iii)   Field Type of flight: One letter among S, N, G, M, or X,

iv)   Field Number: One or two figures,

v)   Field Type of aircraft: Two to four characters according to ICAO Document 8643,

vi)   Field Wake Turbulence Category: One letter among H, M or L,

vii)   Field Departure Aerodrome and time: Four letters and four figures,

viii)   Field Route, Composed of:

ix)   Cruising Speed: One letter (K, N or M), followed by four figures (if K or N) or three figures (if letter M),

x)   Flight Level: One letter (F, S, A or M) followed by three or four figures (or the Flight Level can be VFR),

xi)   Standard Departure Route (Manual Control)

xii)   Field Destination Aerodrome: Four letters,

xiii)   Field Total EET: Four figures,

xiv)   Field Alternate Aerodrome: Four letters,

xv)   Fields Second Alternate Aerodromes: Four letters in each fields (optional fields)

(Note: State should not include any future requirements for Repetitive Flight Plan (RPL) into the flight planning and ATC system specifictaions as it is being phased out globally in support

7.6.3   Flight Plan Retrieval, Query and Reporting Facilities

7.6.3.1   All history logs of Flight Plan changes and transactions shall be maintained and made available on demand by AIS Operators for display or printout on the printer for recording and investigation purposes.

7.6.4   Active Flight Database

7.6.4.1   All FPLs and related messages shall be added into a database. Related messages shall update the relevant database entry to the signature (callsign, departure aerodrome, destination aerodrome).

7.6.4.2   Special views on the active flight database shall allow to show entries focused on the departure/arrival on a specific aerodrome.

7.6.4.3   It shall be possible to track the history of a flight plan including all related messages.

7.6.4.4   Based on the current information in an active flight database entry it shall be possible to create a FPL (or related) message. The availability of ATS update messages shall be limited according to the current state of the flight. (e.g. no DLA message possible after DEP has been issued)

7.6.4.5   The flight plan system shall manage the handling of duplicate FPLs.

7.6.4.6   It shall be possible to add/edit/remove remarks to entries in the active flight database.

7.6.4.7   It shall be possible to link free text messages to active flight database entries.

7.6.4.8   The user shall be able to add/edit/remove remarks to individual entries in the active flight database.

7.7   PRE-FLIGHT INFORMATION BULLETIN (PIB)

7.7.1   General Requirements

7.7.1.1   The PIB system shall enable authorized users to create the following types of PIB. The search criteria shall include, but not be limited to the following:

   i)   Aerodrome;
   ii)   Area (FIR);
   iii) Route (Destination - Arrival Aerodrome, Alternate Aerodromes);
   iv)   Narrow Route (an area determined by a strip defined geographically around the route).

7.7.1.2   Users shall be able to recall a previously requested PIB.

7.7.1.3   The system shall generate PIB updates that will give the user clear and complete information. This means that either all changes are included in the PIB update, or the information that no changes could be found is clearly indicated in the PIB update.

7.7.1.4   The system shall enable the user to create a briefing based on an active flight entry.

7.7.1.5   The system shall be able to display the PIB on the screen or to print it.

7.7.1.6   The system shall provide interactive, graphical information to supplement the text based PIB.

7.7.1.7   The system shall have an interface to facilitate web based briefing using standard browsers for desktops and mobile devices.

7.7.2 Interoperability with Meteorological Products

7.7.2.1 The Pre-flight Bulletin module shall support integration of the AIS products with Meteorological data products for briefing purposes

7.8   INSTRUMENT FLIGHT PROCEDURE DESIGN (IFPD)

7.8.1   General Requirements

7.8.1.1   The system shall implement an application to manage instrument flight procedures linked to the central AIXM 5.x database.

7.8.1.2   The system shall insure the bilateral conversion from AIXM5.X to IFP design tool format with capability to enable: the Design, visualization, validation, and maintenance of instrument, visual, RNAV, GBAS, SBAS, PBN and conventional flight procedures (Terminal, Landing, Approach, STAR, SIDs).

7.8.1.3   The system shall mark-up any change on two consecutive versions of IFP datasets.

7.8.1.4   The FPD module shall be highly automated design process in 3D GIS environment including:

i)   Compliance to the ICAO PANS-OPS criteria with capability to evolve to allow future updates for changes in PANS-OPS Criteria.

ii)   Obstacle assessment, OCA/H, DA/DH or MDA/H, DA/DH// LNAV/VNAV, LPV and PDG/CG calculator.

iii)   Generates required data to support development of procedure charts

7.8.1.5   The system shall include the Collision Risk Model and ILS obstacle assessment surfaces.

7.8.1.6   The system shall support automatic generation of procedure design report.

8.   REFERENCES/STANDARDS

ICAO Annex 3 - Meteorological Service for International Air Navigation

ICAO Annex 4 – Aeronautical Charts ICAO Annex 5 – Units of Measurements

ICAO Annex 10 - Aeronautical Communications Volume II (Communication Procedures including those with PANS status)

Aeronautical Telecommunications - Volume III (Part I — Digital Data Communication)

ICAO Annex 11 - Air Traffic Services

ICAO Annex 14 - Aerodromes

ICAO Annex 15 - Aeronautical Information Services

ICAO Doc 4444 – Procedure for air navigation services — Air Traffic Management

ICAO Doc 7910 - Location Indicators, latest Edition

ICAO Doc 8126 - Aeronautical Information Services Manual

ICAO Doc 8259 - Manual of the Planning and Engineering of the Aeronautical Fixed Tele-communication Network

ICAO Doc 8400- ICAO Abbreviations and Codes

ICAO Doc 9750- Global Air Navigation Plan

ICAO Doc 9855-Guidelines on use of public internet to aeronautical publications

ICAO Doc 9674-WGS 1984

ICAO Doc 9854- Global Air Traffic Management Operational Concept

ICAO Doc 9881-eTOD manual

ICAO DOC 9705 – Manual of Technical Provisions for the Aeronautical Telecommunication Network (ATN)

- Sub-Volume I: Introduction and System Level Requirements
- Sub-Volume III: Ground/Ground Applications
- Sub-Volume V: Internet Communications Service
- Sub-Volume VII: Directory Service
- Sub-Volume VIII: Security Services
- Sub-Volume IX: Registration Service
- PDRs (Proposed Defect Reports) applicable to all sub-volumes

ICAO Doc 9739 - Comprehensive Aeronautical Telecommunication Network (ATN) Manual,

ICAO Doc 9880 - Manual on detailed technical specifications for the Aeronautical Telecommunication Network using ISO/OSI Standards

ICAO Doc 9896 - Manual for the ATN using IPS Standards and Protocols

ICAO Doc 10039 - Manual on System Wide Information Management (SWIM) Concept

ICAO Doc 10066 – Procedure for air navigation services — Aeronautical information management

ICAO Roadmap for the transition from AIS to AIM

9.   APPENDIX 1

9.1   This form provides for entries of client system architecture and interfaces description.

Item		Details	Date	Captured By
Property	Sub-property			
Architecture				
Platform	Server			
	Client			
Communication Network	LAN			
	Closed network			
	Internet			
Organization-In-Charge	Name			
	Phone number			
	Email			

10.

	Postal address			
	Section			
Available interface with other applications	Interface			
	Data format			
	Standard structured data			
Vendor	Name			
	Phone number			
	Email address			

	Postal address			
	Contract status			
Available support	Documentation			
	Guide			
	Technical support			