MIDAD SG*/1-WP/5
18/01/2012

International Civil Aviation Organization

MID Region AIS Database Study Group

First Meeting (MIDAD SG*/1)
(Cairo, Egypt, 20 – 22 February 2012)

Agenda Item 4: MIDAD Purpose and Scope

USER REQUIREMENTS

(Presented by MIDAD Support Team)

SUMMARY

This working paper provides thoughts about next steps for gathering the MIDAD User Requirements under the Purpose and Scope of MIDAD.

Action by the meeting is at paragraph 3.

REFERENCES

- AIS/MAP TF/6 Report
- ATM/SAR/AIS SG/12 Report
- DGCA-MID/1 Report
- ICAO Aviation Systems Block Upgrades B0-30
- ICAO Strategic objective "Safety (A2)" and "Environment …" (C31)"

1 INTRODUCTION

1.1 The MIDAD Purpose and Scope will need finally to be documented in User Requirements. It is therefore necessary to compile the User and Other Requirements as one document based on the input from:

1. ICAO SARPs;
2. ICAO AIS to AIM Roadmap (AIS-AIMSG);
3. ICAO MID Regional Requirements;
4. AACO[1], IATA[2], etc, as user representatives; and
5. NavData Integrators.

[1] Arab Air Carrier Organisation

[2] International Air Transport Association

1.2 The MIDAD initiative is a very advanced approach to fulfil the airspace user needs in aeronautical data, aeronautical obstacle, and terrain data requirements. It will build, in a large extend, the basis for and assist the implementation and usage of the Global Satellite Navigation System (GNSS) technology in the Middle East Region. Furthermore, it will be an important enabler for Aerodrome CDM (Collaborative Decision Making). Therefore the ICAO ATM Operational Concept (Doc 9854-AN/458) 1st Edition 2005 and ICAO Global Air Navigation Plan (Doc 9750-AN/963) 3rd Edition 2007 should be taken into account.

2 DISCUSSION

2.1 ICAO Baseline

2.1.1 Because of its far reaching influence the MIDAD Requirements need to take into account that the 1st Edition 2005 of the ICAO ATM Operational Concept views Aeronautical Information with its temporality, intelligent information management, with unlimited access, limited bandwidth and optimised transfer of information, with fully electronic and network environment with printouts used only as needed for reference, temporary memorisation and visualisation support to human operators (paragraph 2.9.12 to 2.9.16).

2.1.2 The MIDAD Requirements shall also take into account that the ICAO ATM Operational Concept views seven ATM concept components in paragraph 2.1.6, Figure 2-1:

1. Airspace organisation and management (AOM);
2. Demand/capacity balancing (DCB);
3. Aerodrome operation (AO);
4. Traffic synchronisation (TS);
5. Conflict management (CM);
6. Airspace user operations (AUO); and
7. ATM service delivery management (ATM SDM).

2.1.3 The MIDAD will contribute to all of those new components which show that the aeronautical information in form of aeronautical data, aeronautical obstacle data, terrain data and others (e.g. NOTAM) is a key enabler for the new ATM concept. It should be carefully analysed during the preparation of the Requirements Document that the new requirements stemming from this concept are reflected in the Requirements Document.

2.1.4 The ICAO Global Plan Initiatives (GPI) of the 3rd Edition of the Global Air Navigation Plan shall also be taken into account, namely GPI-18 “Aeronautical Information” and GPI-20 “WGS-84” to ensure that the scope of both GPIs “to make available in real-time quality assured electronic information (aeronautical, terrain and obstacle) and “ to implement WGS-84 by all States”.

2.1.5 These two GPIs address also the quality of aeronautical information as made available by data originators and to be maintained during its process through national AIS in the MID Region and MIDAD to end users. Therefore, the whole electronic uninterrupted aeronautical data chain shall be addressed in the Requirements Document for the MIDAD.

2.1.6 It shall be noted that GPI-18 “Aeronautical Information” is the only GPI[3] which provides input to all seven ATM concept components. This underlines the importance of Aeronautical Information and the set-up of the MIDAD.

[3] See Table 1-1 of ICAO Global Air Navigation Plan (Doc 9750-AN/963) 3rd Edition 2007

2.2 Requirements in General

2.2.1 Further development of the AIS domain has taken place since the EAD went into operation. The ICAO Roadmap from AIS to AIM paves the way from the product driven approach (AIP, MAP, NOTAM, PIB) to the data driven approach. Major new SARPs are introduced in Annex 15 with Amendment 33 and 36. Amendment 37 (date of applicability 2013) and 38 (date of applicability 2016) will define the process drive approach and digital data exchange.

2.2.2 Also the emerging version of AIXM 5.1, AMDB, and eTOD need to be considered. Studies for the MIDAD should not only look for a copy of the EAD solution for MIDAD. Such studies should consider the full new picture as outlined by the 11th Air Navigation Conference held Montreal in 2003 concerning Operational Concepts and data models (AN-Conf/11-WP/190) and also consider the outcome of the AN-Conf/12, planned for end of 2012.

2.3 User and Real User Requirements

2.3.1 The users and the real user requirements for the MID Region aeronautical data which shall be made available by MIDAD need to be agreed upon, and will probably need a phased implementation plan.

2.3.2 It should be recalled who are the users of MIDAD:

1. AIS Offices, NOTAM Offices, ARO Units;
2. AIP Production Departments, MAP Production Departments;
3. Procedures Design Departments;
4. NavData Integrator companies like Lido, Jeppesen, Navtech/EAG, Honeywell etc;
5. ATM Systems (TWR, APP, ACC, FIC, FIS);
6. Airline Systems (Briefing, AOC);
7. Military Authorities (AIS, ARO, AIP/MAP, TWR, APP, FIS);
8. General Aviation (Briefing);
9. Aerodrome operators;
10. Metrology offices; and
11. Others.

2.3.3 So the question to be answered will be how far the MIDAD will respond to the different requirements of all those users and which services shall be made available.

2.4 Data

2.4.1 Based on the users and the real user requirements the data to be stored in MIDAD can be defined. Very likely they are chosen from the following list:

1. Aeronautical Static Data (AIXM 4.5, 5.1 scope, extensions).
2. Aeronautical Obstacle Data.
3. Aerodrome Mapping Data.
4. Digital Terrain Data.
5. Digital Service Models (man made, grown).
6. Topographic Data (rivers, cities, road, etc.).
7. NOTAM, SNOWTAM, ASHTAM, BIRDTAM.
8. OPMET Data, WAFS Data (later BUFR).
9. AIP according to ICAO Annex 15 and AIS Manual (Doc 8126).
10. MAPs and Charts according to ICAO Annex 4 and Aeronautical Chart Manual (Doc 8697).

2.4.2 Figure 2-1 shows a none complete overview of candidate applications, candidate data and candidate interface which form the basis for the requirements.

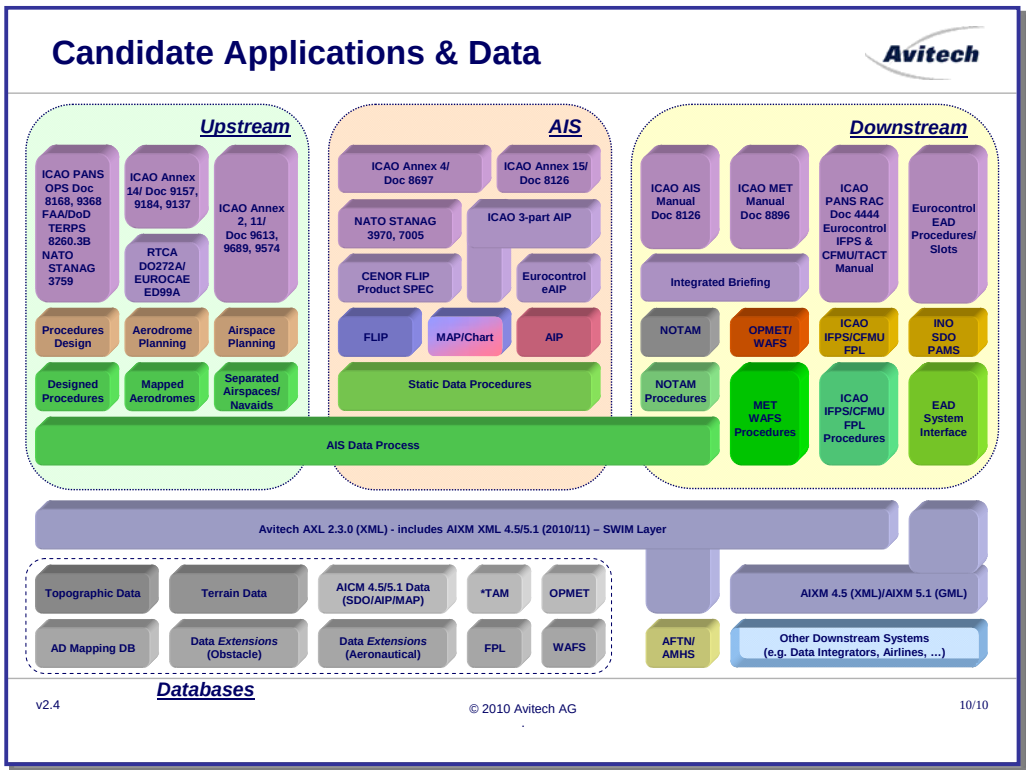

Figure 2-1: Candidate Applications & Candidate Data (Courtesy of Avitech)

2.4.3 A phased implementation plan based on an agreed schedule with the users can reduce the complexity and risk of implementation and gives some time for the finalisation of the standardisation for those data which are not included in common models at the moment.

2.5 Drafting Methodology, Process and Management

2.5.1 It is suggested to compile the Requirements Document based on the input as mentioned in 1.1 above.

2.5.2 Questionnaires and Interviews shall be used to gather requirements by user organizations like AACO, IATA, and NavData Integrators.

2.5.3 The development of the Requirements Document is the responsibility of the ICAO MIDAD Study Group, which might need assistance to fulfil this task.

2.6 Drafting Team

2.6.1 A Drafting Team might be formed on a voluntary basis taking into account:

1. The two Management Groups Bahrain and Jordan.
2. The state of experience in AIS/AIM automation.
3. Regional activities like the Gulf Coordination Council (GCC).

2.6.2 The drafting team will work over phone and e-mail and it is intended to get quick feedback in the process of drafting, if necessary.

2.6.3 The drafting team shall provide the Final Requirements Document to the MIDADSG.

2.7 Requirements Document Outline

2.7.1 All requirements need to be gathered, and user requirements are only one part of requirements.

2.7.2 A suggested structured can be found in a separate Annex 1 to this Working Paper.

3 ACTION BY THE MEETING

3.1 The MIDADSG is invited to:

a) note the contents of this paper; and

b) agree on the way forward for the development of the MIDAD User Requirements Document.

APPENDIX A

- Requirements and Analyses: Requirements Specification Overall Project -

ICAO MID Region AIS Database

Version: 0.1

Name of Project	MIDAD	
Project Leader	<Project Leader>	
Responsible	<Responsible Person>	Requirements Engineer (Acquirer)
Created on	<Creation Date>	
Last changed	19.01.2012 10:30	
Processing status	X	in Process
		submitted
		completed
Document File	H:\1_Document_Management\3_External_Issues\4_Committees-Organisations\ICAO\00-Regional-Offices\MID-Cairo\000_MIDAD\120220-22-MIDADSG-1-Cairo\01-WPs-PRU\MIDAD-SG-1-WP-5-Annex-1-PRU.rtf	
V-Modell Version	Version 1.2.1 English	

Further Product Information

Participating	[not involved] [not involved] [not involved]	User Executive Project Leader
Creation		

Change Listing

Change			Changed Chapters	Description of the Change	Author	State
No	Date	Version				
1		1.1	All	Initial Product creation		

Test Listing

The following table shows an overview of all tests – both self-tests as well as tests by independed quality assurance – for the present document.

Date	Tested Version	Notes	Inspector	New Product Status

Content

1. Introduction

The Product Requirements Specification Overall Project includes all mandatory requirements posed on the system to be developed, which describe the overall project in a complete and consistent manner. It is basis for the subdivision into sub-projects.

All relevant system requirements will be determined and documented by the supplier. The core of the Requirements Specification Overall Project comprises the functional and non-functional system requirements and an outline of the overall system design. The design considers the future environment and infrastructure for the system and provides guidelines for technological decisions. The outline of the overall system architecture is the decisive basis for subdividing the overall project into sub-projects.

In addition, the system life cycle phases to be supported will be identified and incorporated as logistic requirements. The delivery terms and acceptance criteria are also part of the requirements.

The functional and non-functional requirements are not only intended as development specifications, but also as basis for the tracing of requirements and the change management. The requirements should be prepared in such a way that traceability and a suitable change management are possible for the entire system life cycle.

The acquirer alone is responsible for the preparation and quality of the Requirements Specification. If required, he may task a third party with the preparation. Generally, the Requirements Specification should not specify technical solutions in order to ensure that architects and developers are not restricted in their search for optimum technical solutions.

…insert text here…

2. Initial Situation and Objectives

This subject illustrates the initial situation and the reasons for executing the project. It describes which deficiencies or problems of existing systems or the current situation have lead to the decision to execute the project and which advantages are expected from the use of the new system.

In addition, all relevant stakeholders of the projects will be appointed and the technical and professional integration of the system to be developed will be outlined. Moreover, the first framework conditions for the development will be identified and decribed. Framework conditions may include, e.g., technical specifications or safety and security specifications.

…insert text here …

3. Functional Requirements

Functional requirements describe the system capabilities required by a user for solving a functional problem. The requirements will be derived from the supported business processes and the flow description for using the system.

The functional requirements are defined, e.g., by use cases. A use case describes a concrete, functionally self-contained sub-process. The entirety of the use cases defines the system behaviour. A use case may be described in a simple text format. However, organization-specific patterns for the description are frequently available. In order to determine the functional requirements of data-centred systems, a first functional Data Model will be developed, which is the basis for the later Database Design. The functional data model of the system will be derived from the entities of the domain model.

The functional requirements are the central system development specifications. They will be integrated into the Overall System Specification and concretized as required.

…insert text here …

4. Non-Functional Requirements

Non-functional requirements are system requirements which are not of a functional nature, but contribute decisively to the applicability of the system. They define, e.g., quality requirements, safety and security requirements or performance requirements.

Non-functional requirements define fundamental characteristics of a system which must be taken into account in the architecture design. They may be used for estimating the development costs and should be described as measurably as possible.

In order to structurize the requirements as simply as possible, requirements which are not clearly defined as functional requirements will be assigned to the non-functional requirements.

…insert text here …

5. Outline of the Life Cycle and the Overall System Architecture

The specification of user requirements without consideration of possible solutions entails the great risk of defining unrealistic user requirements. It is useful to specify a coordination frame for the integration, systematization, categorization and prioritization of user requirements, in order to facilitate their visualization.

This may be achieved by an overall system architecture which represents the point of view of the user and not the technical point of view of the system analyst or System Architect. This means a functional system architecture embedded in the functional flow of adjacent systems should be prepared. At this early stage, it is hardly possible to develop a technical system architecture.

In case of an Evaluation of Off-the-Shelf Products, the future system components should be identified and specified in the overall system architecture when the Requirements Specification are revised.

In addition, the particular characteristics of the operational environment of the new system shall be described in order to be able to consider primarily the system safety and security requirements. The developer of user requirements should prepare a concept showing which life cycle sections should be covered by the project.

…insert text here …

6. Data

Data to be stored and data formats or principles (like AICM) need to be described here.

7. Interfaces

Interfaces between the centres of the MIDAD, and between the MIDAD and other systems (like AIXM) need to be described here. Also the interfaces between humans and the MIDAD need to be described here.

8. Data and Messages

Message related data like NOTAM, SNOWTAM etc. need to be described here.

9. Scope of Delivery Overall Project

All items and services to be delivered by the supplier to the acquirer during the project or at its completion shall be listed. Every Delivery requires an acceptance evaluation. The scope of delivery may include the system, system components, an Enabling System, enabling system components, documents, and agreed services.

…insert text here …

10. Acceptance Criteria

Acceptance criteria specify the criteria to be fulfilled by the Delivery in order to meet the requirements. They should be specified in a measurable way. From a contractual point of view, the acceptance criteria describe the conditions for the decision as to whether the final product fulfills the requirements or not. Acceptance criteria refer to functional and non-functional requirements.

Until the contract is awarded, the acceptance criteria can only be indicated in a general form, e.g., as KO criteria. These criteria define, e.g., that at least 90 % of all evaluation cases must be completed successfully in order to achieve a successful acceptance. These general acceptance criteria should also include the requirement that the supplier must prepare acceptance criteria, the structure and number of which shall be outlined by the acquirer. The acceptance criteria should be structured in accordance with their three decisive components - initial situation, action(s) and expected result. In any case, the expected results of the acceptance must be specified for each acceptance criterion.

The acceptance test is based on the acceptance criteria which are included as requirements in the Evaluation Specification Delivery.

…insert text here …

11. List of Abbreviations

Abbreviation	Explanation

12. List of Literature

13. List of Figures

End of document

Guidelines for checking the documents

Contentwise and formal directives to the project are to be taken from part 5: V-Modell reference products of the V-Modell-XT and if necessary from an associated evaluation specification document. For checking the product regarding its contentwise consistency related to the already finished products, the following product depencies are to be checked.

Consistency between Sub-Project Requirements and the Requirements Specification Overall Project

Affected Products:

- Requirements Specification Overall Project
- Requirements Specification

Description:

The Requirements Specifications of sub-projects shall be consistent with the requirements of the Requirements Specification Overall Project.

Project Proposal and Requirements Specification

Affected Products:

- Requirements Specification Overall Project
- Requirements Specification
- Project Proposal

Description:

In the product Requirements Specification or Requirements Specification Overall Project, the information from the Project Proposal concerning framework conditions, system idea and realization plan have to be taken into account.

Project proposal and requirements

Affected Products:

- Requirements Specification Overall Project
- Requirements Specification
- Project Proposal

Description:

The product Requirements Specification or Requirements Specification Overall Project shall take into account the information on general conditions, system idea and realization plan, which is included in the Project Proposal.

Evaulation of the Overall Project Requirements Specification

Affected Products:

- Requirements Specification Overall Project
- Evaluation of the Overall Project Requirements Specification

Description:

The Assessment of the Overall Project Requirements Specification will be based on the requirements (see Overall Project Requirements Specification). Its result will be integrated into an updated version of the requirements. The Assessment of the Overall Project Requirements Specification examines the affordability, economic efficiency and necessity of all requirements.

-END-