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Agenda Item 3: Global and Regional Air Navigation Developments

NACC REGIONAL PLAN FOR COLLABORATIVE AERONAUTICAL INFORMATION MANAGEMENT (AIM)

(Presented by Secretariat)

EXECUTIVE SUMMARY	
Air Traffic Management (ATM) involves the best integration of real-time, historical and prospective data and information, and the management, sharing and distribution of that data to shareholders. Information Management is based on the strategic and tactical provision of quality assured and timely operational data in support of ATM operations. This AIM Plan addresses the full range of ATM stakeholders, and was developed as part of a suite of NACC air navigation plans, thus, it should not be considered in isolation.	
Action:	The Meeting is invited to review and discus the Plan for Collaborative AIM contained in the **Appendix** to this Working Paper
Strategic Objectives:	• Safety • Air Navigation Capacity and Efficiency
References:	• Annex 15 • Doc 8126 • PANS AIM

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APPENDIX

INTERNATIONAL CIVIL AVIATION ORGANIZATION

D R A F T

NACC REGIONAL PLAN FOR COLLABORATIVE AERONAUTICAL INFORMATION MANAGEMENT (AIM)

DRAFT Version 1.0, May 2019

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1. SCOPE OF THE PLAN

Plan Structure

1.1 Air Traffic Management (ATM) involves the best integration of real-time, historical and prospective ATM data and information, and the management, sharing and distribution of that data to shareholders. Information Management is based on the strategic and tactical provision of quality assured and timely operational data in support of ATM operations.

1.2 The Seamless ATM Plan references different levels. The upper level is from global perspective, which is guided mainly by references to the Global Air Navigation Plan (GANP, Doc 9750), the Global ATM Operational Concept (Doc 9854) and the Global Aviation Safety Plan (GASP). Beneath it is regional planning, primarily provided by the NACC Plan for Collaborative Aeronautical Information Management (hereinafter referred to as the 'Plan') and other guidance materials, to define goals and means of meeting State planning objectives. Aeronautical Information Management (AIM) needs to be framed with an awareness of the ATM system as a whole and its purpose of Information Management within ATM system.

1.3 The Plan addresses the full range of ATM stakeholders, and was developed as part of a suite of NACC air navigation plans, thus, it should not be considered in isolation.

1.4 The word 'States' in the Plan includes Special Administrative Regions and Territories.

Plan Review

1.5 The Seamless ATM performance framework focuses on technological and human performance within Aviation System Block Upgrade (ASBU) elements. ASBU Block 0 modules contain technologies, systems and procedures which are expected to be available from 2013. However, the Plan also has references to ASBU modules in Block 1, 2 and 3, which are expected to be available from 2019, 2025 and 2031 respectively.

1.6 ASBU focuses on the initial introduction of digital processing and management of information. On the process of transition from AIS to AIM, aeronautical information exchange model (AIXM), migration to electronic Aeronautical Information Publication (eAIP), better quality (QMS) and availability of data should be under consideration and in usage. Therefore, the Plan needs to be updated and take into account ASBU modules in Block 0, 1, 2 and 3.

1.7 The Plan requires regular updating to keep current with aviation system changes. It is intended that CAR/SAM Air Navigation Planning and Implementation Regional Group (GREPECAS) and its contributory bodies conduct a complete review every three years (or a shorter period determined by GREPECAS) of the Plan to align with the recent review cycle of the GANP. The Plan and its subsequent revisions should be endorsed by GREPECAS.

2. OBJECTIVES

Plan Objective

2.1 The objective of the Plan is to facilitate NACC Seamless ATM operations, by developing and deploying AIM solutions capable of ensuring safety and efficiency of air transport throughout the NACC Region.

2.2 Noting that more complex and costly challenges of implementing the digitally based AIM environment expected under Amendment 40 to Annex 15, the Plan provides a framework for a transition to a collaborative AIM environment, in order to meet future global and regional performance requirements, including PANS AIM.

Guidance for the Transition from AIS to AIM

2.3 The Plan it is neither isolated, nor conflicts with other plans or strategies, it is well-referenced in conjunction with other previous ones.

3. EXECUTIVE SUMMARY

Driving Force for Collaborative AIM

3.1 AIM is envisaged as one of the most valuable and important enabling services in ATM operational concept. To satisfy new requirements of ATM, which is based on a collaborative decision-making environment, AIS has to transit to a broader concept of AIM, which provides aeronautical data and information in digital and electronic formats and is displayed graphically and geodetically, complies with international standards and formats exchanges, is accessible system-wide by all stakeholders and more real-time, given its data-centric nature as opposed to the product-centric nature of the previous concept of AIS.

3.2 Due to economic and efficiency drivers, GREPECAS has foreseen an increasing need for States and systems to work together, which may develop into joint or shared operations, such as sub-regional Aeronautical Information Publications (AIPs for ECAR States, Netherland Territories and COCESNA for Central American States), AIM training and aeronautical databases. Moreover, it is recognised that collaboration between States inevitably improves the harmonisation and interoperability of systems – it is a key basis of Seamless ATM.

3.3 Collaboration is especially important for small, less resourced States and Territories as the technical challenges increase and the maintenance of technical competency and systems becomes more difficult. In this way, Collaborative AIM is expected to benefit all States and Territories, from the most vulnerable to the better resourced, as the latter will have assurance that increasingly interconnected smaller States will also be able to fulfil their international obligations.

3.4 AIM is one of the foundation elements that supports other aspects of the current and future aviation systems dependent of data in electronic and digital formats, and as such requires a high priority. GREPECAS agreed that the transition from AIS to AIM should receive the highest priority, yet many States are lagging in their implementation of this key element.

4. BACKGROUND INFORMATION

Principles

4.1 There are considered to be three major areas of AIM Principles:

a) People (human performance, ensure complete understanding of AIM concepts including training of relevant staff, common procedures based on a Regional Operational Concept, etc.)

b) Facilities (physical equipment, Data-sharing), Technology

c) Aeronautical Information and Data sets

Aviation System Block Upgrades (ASBU)

4.2 At the Global level, ICAO started the ASBU initiative as a programme framework that developed a set of aviation system solutions or upgrades intended to exploit current aircraft equipage, establish a transition plan and enable global interoperability. ASBU comprises a suite of modules organised into flexible and scalable building blocks, where each module represents a specific, well bounded improvement. The

building blocks could be introduced and implemented in a State or a Region depending on the need and level of readiness, while recognizing that all the modules are not required in all airspaces. ASBU describes a way to apply the concepts defined in the Doc 9854, with the goal of implementing regional performance improvements, and is used in the new edition of the GANP to guide implementation. Since the Air Navigation Conferences (AN-Conf. /12 and 13) it was agreed that ASBU and the associated technology roadmaps are integral parts of the GANP new 6th. Ed and a valuable implementation tool kit.

4.3 ASBU is heavily dependent on AIM, as AIM is a critical prerequisite for the implementation of many current or future ATM or Air Navigation concepts that relies on the accuracy, integrity and timeliness of data.

4.4 In the AIM field domain, the main ASBU blocks which are relevant with Seamless ATM are as follows:

- B0-DAIM Service Improvement through Digital Aeronautical Information Management (AIM). A key strategy activity during Block 0 from 2013 until 2019 may include the initial introduction of digital processing and management of information/data, through AIS/AIM implementation, use of aeronautical information exchange model (AIXM), migration to electronic aeronautical information/data publication (AIP) and better quality (QMS) and availability of data.

- B1-DAIM Service Improvement through Integration of all Digital AIM Information (2019-2025): ATM information reference model (AIRM) integrates all ATM information/data and other Information/data Users (using UML, GML/XML), and implements information/data management with exchange data models: common formats are AIXM, FIXM, WIXM and internet protocols.

- B1-SWIM Performance Improvement through the application of SWIM applications and infrastructure (2019-2025): standard data models, internet-based protocols to maximize interoperability. Most of the air ground data exchanges will remain based on point-to-point communication.

- B2-SWIM Enabling Airborne Participation in Collaborative ATM through SWIM (2025-2031): aircraft as a fully connected information node in SWIM and collaborative ATM processes – exchange of data.

5. AIS-AIM Roadmap Phases and Steps

5.1 According to AIS-AIM Roadmap, there are three phases and 21 steps. Failure to take action on any of these steps would increase the duration of the transition and negatively affect the enabling role of AIM. The three phases, according to the AIS-AIM Transition Roadmap, are as follows.

- Phase 1 – **Consolidation**. Quality Management System (QMS), is a prerequisite for commencement of the transition from AIS to AIM. In this phase, States were expected to enhance the quality of their existing AIS products, attach great importance to AIRAC adherence and WGS84 implementation and publish their Differences related to ICAO Annexes (AIP and/or electronically).

- Phase 2 – **Going Digital**, In this phase, States were expected to create national or regional database to produce existing products and services with better quality and availability, such as the delivery of eAIP, eTOD, etc.

- Phase 3 – **Information Management**. This is the final phase in the evolution to AIM, is also known as SWIM. Keywords of this phase are integration, collaboration and self-

regulation. For all of the information domains, a range of supporting information applications will be discoverable and made available to all authorized users on the SWIM network.

5.2 **Phase 1** - Consolidation and **Phase 2 –** Going digital, are important preparatory phases of the final transition to AIM. Consolidation is the main theme of Phase 1, whereas Phase 2 is the step to going digital, when information is increasingly being managed and exchanged digitally. Phase 2 can be characterized as being the most critical in the transition, and should be kept as short as possible.

The 21 steps and deadline for implementation are shown below.

ROADMAP PHASE	ROADMAP STEPS	DEADLINE
PHASE 1	P-03 — AIRAC adherence monitoring	Initial date November 2010 -------- Adjusted December 2020
	P-04 — Monitoring of States' differences to Annex 4 & 15	
	P-05 — WGS-84 implementation	
	P-17 — Quality	
PHASE 2	P-01 — Data quality monitoring	Initial date November 2013 -------- Adjusted December 2022
	P-02 — Data integrity monitoring	
	P-06 — Integrated aeronautical information database	
	P-07 — Unique identifiers	
	P-08 — Aeronautical information conceptual model (AICM)*	
	P-11 — Electronic AIP	
	P-13 — Terrain	
	P-14 — Obstacles	
	P-15 — Aerodrome mapping	
PHASE 3	P-09 — Aeronautical data exchange	Initial date November 2016 -------- Adjusted December 2025
	P-10 — Communication networks	
	P-12 — Aeronautical information briefing	
	P-16 — Training	
	P-18 — Agreements with data originators	
	P-19 — Interoperability with meteorological products	
	P-20 — Electronic aeronautical charts	
	P-21 — Digital NOTAM	

Figure 1: The 21 steps of the roadmap in the three phases

6. The Interim AIM Transition Guidance

6.1 The latest Meeting of the AIM Task Force (AIM TF, Miami, United States, August 2018), recognized that the lack of AIM transition guidance plan material was a matter of significant concern to State Administrations. There had been delays in the production of global ICAO guidance documents, those of

most immediate significance being the PANS AIM (Doc 10066), AIS Manual updated Doc 8126 (four Volumes), the new Doc 9839 Quality Manual (unedited) and Doc 9991 AIS Training Manual (unedited). That Meeting agreed to continue to work on Regional AIM transition guidance material for key AIM transition steps from the ICAO Roadmap for Transition from AIS to AIM.

6.2 The AIM TF will contributed to update the Status for Aeronautical Information Services (AIS) in the NACC Region by adding a new information on a website, Interim AIM Transition Guidance from EUROCONTROL, which emphasizes four priority steps from AIM transition roadmap, they are:

- P-17 – Quality
- P-16 – Training
- P-18 – Agreements with data originators
- P-11 – Electronic AIP

7. Emphasis of the four priority AIM transition steps

7.1 The transition **Step P-17** – Quality is one of the four steps in AIM Transition Phase 1 – Consolidation. Along with the other Phase 1 transition steps, P-17 – Quality is a prerequisite for commencement of the transition from AIS to AIM. In this phase, States were expected to enhance the quality of their existing AIS/AIM products.

7.2 The transition **Step P-16** – Training is one of the eight steps in AIM Transition Phase 3 - Information Management. The training of personnel will be adapted to the new requirements on skill and competencies introduced by the transition to AIM; the successful Quality Management System (QMS) also deeply relies on the motivation of personnel. Training Needs Analysis (TNA) and TNA developing process are important. For transition from AIS to AIM, both tailored training based on each Contracting States and systematic and collaborative training among Contracting States in NACC region are all necessary.

7.3 The transition **Step P-18** – Agreements with Data Originators is one of the eight steps in AIM Transition Phase 3 – Information Management. While the NACC Region's current focus is on implementation of Phases 1 and 2, it is recognized that formal agreements between stakeholders in the aeronautical information chain are a critical component of robust end-to-end quality management. Step P-18 is one of four complementary Roadmap steps related to the quality management of aeronautical data: P-17 – Quality, P-01 – Data Quality Monitoring, P-02 – Data Integrity Monitoring, and P-18 – Agreements with Data Originators. Data of high quality can only be maintained if the source material is of good quality. States will be required to better control relationships along the whole data chain from the producer to the distributor. This may take the form of template service level agreements with data originators, neighboring States, information service providers or others.

7.4 The transition **Step P-11** – eAIP is one of the nine steps in AIM Transition Phase 2 - Going Digital. The electronic version of the AIP is defined in two forms: a printable document and one that can be viewed by web browsers.

7.5 The eAIP is due to completed by November 2013. Many States in NACC Region have achieved Aeronautical Information Conceptual Model (AICM), shared their AIP hyperlink addresses, the webpages can be browsed successfully. But some countries still have problems of incorrect or inactive hyperlinks, login requirement, link functional, but no AIP (AIP SUPP and AIC provided), site accessible, but "TEST, NOT FOR OPERATIONAL USE", etc.

8. Report of AIM Task Force (AIM TF)

AIM Transition Information Sharing Website

8.1 In discussing Regional AIM transition progress, is important to consider the need to design an AIM implementation tracking website. While the AIM Transition Table provides information on progress within the Phases, it does not provide information on the current status and challenges being faced by States, but the proposal for an AIM tracking website will share experience among States.

8.2 That, AIM TF agrees to facilitate a project by [Administration/s] to develop a website for the sharing of information related to the implementation of Aeronautical Information Management steps defined in the ICAO Roadmap for Transition from AIS to AIM.

Facilitation includes:

a) Providing a coordination point for the contact details of the **AIM TRACKING** website administrator. Assisting in the development of a list of items for inclusion in the AIM TRACKING website
b) Promoting the AIM TRACKING website as a valuable resource for NACC States Administrations undertaking or planning to undertake AIM transition and implementation projects
c) Encouraging discussion of issues raised in the AIM TRACKING website and lessons learned at AIM TF meetings
d) Providing a summary of information shared through the AIM TRACKING website, and providing hyperlink (s) to the AIM TRACKING website, in AIM TF meeting reports

Cooperation on AIM Training

8.3 Information was provided by a State highlighting the need for cooperation among Contracting States in NACC region regarding AIM implementation, in particular training for static and dynamic data management in AIXM environment, eAIP and quality management system.

8.4 Some States informed that they were developing a Standard AIS Training Package, and was open to opportunities for collaboration and technical assistance in AIM transition, and they had provided assistance to other States in AIS training, and AIM automation system and quality management system implementation, in cooperative activities through the other organizations including industry partners, and the International Federation of Aeronautical Information Management Associations (IFAIMA).

8.5 Regional cooperation in AIM training was important to ensure harmonized implementation throughout the region.

Establishment of a separate AIS unit or department

8.6 AIM TF reported that based on observations from visits to different States' AIS services and AIM meetings, it appeared that in some States the AIS was not established as a separate unit but as part of Air Traffic Services or Communication, Navigation and Surveillance organizations. In many cases ATC staff worked as AIS officers, working for both AIS and ATS. The view of the meeting AIM TF was that it was more appropriate that AIS should be established as a separate unit or department within its organization, with its personnel and management focused wholly on AIS/AIM as mentioned on Annex 15 and Doc 8126.

Delayed delivery of guidance documents

8.7 The following guidance material supporting the ICAO Roadmap for Transition from AIS to AIM was being developed by the ICAO AIS-AIM Study Group (AIS-AIM/SG):

- PANS AIM – Doc 10066 (new)
- Doc 8126 – AIS Manual (updated on four volumes);
- Doc 9839 – Quality Manual (unedited);
- Doc 9991 – AIM Training Development Manual (unedited);
- Doc 9881 – eTOD/AMDB Manual (require final validation and editing);
- Doc 9674 – WGS-84 Manual (require update - accuracy & heighting);
- Doc 8697 – Charting Manual (require update);
- Doc 9855 – Guidelines on the use of the Public Internet for Aeronautical Applications (require update);
- Doc 8400 – ICAO Abbreviations and Codes (PANS-ABC – update) and
- AIM Concept (unedited);

8.8 Delivery of the above documents had been further delayed beyond the latest advised timeframe (Q2/3 2014). The latest information from ICAO Headquarters was that most of these documents were undergoing final drafting and/or editing, but publication dates had not yet been finalized.

8.9 Other documents under development were the updated Annex 15 – Aeronautical Information Services, and the new Procedures for Air Navigation Services – Aeronautical Information Management (PANS-AIM).

9. CURRENT SITUATION

Implementation analysis for States' transition from AIS to AIM

9.1 The performance objectives of the NACC Seamless ATM Plan included the expectation that Phases 1 and 2 of the Roadmap for Transition from AIS – AIM would be completed by November 2015. As on 01 January 2016, regional implementation of Phase 1- Consolidation of the Roadmap is summarized as follows: 15 Administrations (36%) had completed implementation, 16 Administrations (≈ 38%) had partly implemented, 11Administrations (≈ 26%) had not implemented any Phase 1 step, overall regional implementation of Phase 1 ≈ 60%. Regional implementation of Phase 1 and 2 were summarized as follows:

- Under development

9.2 **Figure 2** below indicates that many States are lagging in their implementation for transition from AIS to AIM. (Date last amended in May 2019)

Under development

Figure 2: Regional AIM Implementation Status - Phase 1 and 2 Implementation in Progress

10. Implementation situation of regional ICARD.

10.1 Traffic growth in the NACC Region has resulted in traffic demand exceeding airspace cCARity in many cases. The most effective initial response to this situation was to increase cCARity, which often

involved ATS route re-design and implementation of new routes, requiring the efficient and Annex 11-compliant allocation of waypoint names.

10.2 The ICAO Codes and Routes Database (ICARD) system has been successfully transferred to ICAO Headquarters from EUROCONTROL where it had been developed and managed. The system, which is now available for global use, allows States to dynamically manage the allocation of five-letter name-codes (5LNCs) as well as analyze like-sounding and duplicate 5LNCs. CAR Regional Offices of ICAO coordinates States' requirements for ATS Route Designators in CAR region.

10.3 Many Contracting States in CAR region recognized the purpose of ICARD and the user registration process, updated their regional participations in ICARD, corrected common errors, known proximity checks and the process flow for requesting 5LNC, ATS route designator allocation, and ICARD_5LNC_Manager actions. With the utilization of ICARD system, 5LNCs are allocated collaboratively; avoid the occurrence of letter duplication and like-sounding problems to a large extent:

- But till now, some states cannot avoid sound-like pronunciation and/or visual confusion of 5LNC.
- ICARD Registrations of NACC

11. A Framework for AIM Quality Management System (QMS).

11.1 Annex 15 provides that States must establish a quality system and put in place quality management procedures at all stages (receiving and/or originating, collating or assembling, editing, formatting, publishing, storing and distributing) of the aeronautical information/data process. The quality system must be documented and demonstrable for each function stage, ensuring that the organizational structure, procedures, processes and resources are in place in order to detect and remedy any information/data anomalies during the phases of production, maintenance and operational use. Explicit in such a quality management regime is the ability to trace all information/data from any point, back through the proceeding processes, to its origin.

11.2 The transition step P-17 – Quality is one of the four steps in AIM Transition Phase 1 – Consolidation. Along with the other transition steps, P-17 – Quality is a prerequisite for commencement of the transition from AIS to AIM. In this phase, States were expected to enhance the quality of their existing AIS products.

11.3 However, there had been delays in the production of new global ICAO Doc 9839 *Quality Manual*. AIM TF noted that any independently developed Quality Manual could risk encouraging States to implement AIM in ways that may be divergent from anticipated global guidance.

11.4 The Plan provides a Sample Quality Manual in the NACC Region. Framework of AIM Quality Management of CAR Region (Sample) is shown in this document.

12. Knowledge and skills need to be trained and improved for AIS staff.

12.1 There are many new kinds of knowledge concerned with AIM transition process, inter alia, AICM/AIXM, data quality/originators, DNOTAM, eAIP, eTOD, Aeronautical Mapping Database (AMDM), Weather eXchange Model (WXXM) Aeronautical Information (AI) briefing, eCharts. Besides, skills and competencies also need to be improved for AIS staff members.

12.2 States have finished many tasks during the transition process from. However, AIS staff training is to some extent lagging.

13. PERFORMANCE IMPROVEMENT PLAN

13.1 ICAO's No Country Left Behind (NCLB) Initiatives determined that ICAO itself should provide more direct assistance to developing countries by playing a more active coordination role between States and by helping to generate the political will needed for States to pool resources, participate in regional efforts, earmark voluntary funds and build capacity. The NCLB campaign was endorsed to help coordinate and publicize any Organization-wide activities consistent with these priorities.

13.2 Sharing of information on ATM system resources and constraints across regions on a real time basis is a long term requirement. In the process of AIS-AIM transition, communication, collaboration, and co-operation are very important. AIS shall work in partnership, even with its users, other AIM actors, regulators, etc.

Performance Improvement Plan

Note: prior to implementation, the applicability of Performance Improvement Plan should be verified by analysis of safety, current and forecast traffic demand, efficiency, predictability, cost effectiveness and environment to meet expectations of stakeholders.

- Performance Improvement Plan Phase I – expected implementation by November 2020; and
- Performance Improvement Plan Phase II – expected implementation by November 2025.

Performance Improvement Plan Phase I

13.3 All States should make relevant regulations and specifications. The Plan is on the basis of JAP, each State should make regulations and specifications, which have close interfaces with global guidance material, especially on the following issues:

- data or raw material originators
- quality management system
- digital NOTAM filing and submitting

To improve human performance

13.4 The following should be established to support human performance in the delivery of Collaborative AIM.

- Human performance training, including assessment and management of risk, the effective safety reporting culture, etc.
- Technical training, including AICM/AIXM, Data quality/originators, digital NOTAM, eAIP, eTOD, AMDM, WXXM AI briefing, eCharts, etc.
- Qualification requirements, including personnel licences, knowledge and capability, English proficiency requirement for staffs concerning ICARD, to avoid sound-like pronunciation and/or visual confusion of 5LNC.

To establish a separate unit focused wholly on AIS/AIM.

13.5 Considering the following-up work of the transition to AIM, it should be appropriate to establish separate unit or department within AIS organization, with its personnel and management focused wholly on AIS/AIM.

13.6 To develop AIM Transition Information Sharing Website, to help States get access to ICAO Portal Website.

13.7 In order to provide information on progress within the 3 phases of AIS to AIM, encourage discussion of issues concerned with the transition and lessons learned at AIMTF meetings, as well as the current status and challenges being faced by States, a regional AIM implementation tracking website is needed and is under development. Its scope would be limited to sharing of information on AIM transition activities and experiences. Registered users, being the nominated point-of-contact from each State or Administration, would have write-access permissions for sharing information, posting questions and providing answers or suggestions. The information shared in the website would be publicly available. After the fully construction of AIM transition information sharing website for States in CAR region, States should be able to utilise the website.

13.8 Furthermore, in the process of transition from AIS to AIM, many documents are released by ICAO, CAR/SAM Air Navigation Planning and Implementation Regional Group (GREPECAS), AIM Task Force (AIM TF), International Federation of AIM Associations (IFAIMA), etc. In order to have a convenient access to acquire all related documents concerned with AIS-AIM transition, designated point-of-contact of States should be registered and qualified to access ICAO Portal Website.

To achieve Quality Management System (QMS) in CAR region

13.9 According to Annex 15, the information management resources and processes established by an aeronautical information service shall be adequate to ensure the timely collection, processing, storing, integration, exchange and delivery of quality-assured aeronautical data and aeronautical information within the ATM system.

13.10 Quality management systems shall be implemented and maintained encompassing all functions of an aeronautical information service. The established quality management system shall provide users with the necessary assurance and confidence that distributed aeronautical data and aeronautical information satisfy the aeronautical data quality requirements for accuracy, resolution and integrity and that the data traceability requirements are met through the provision of appropriate metadata. The system shall also provide assurance of the applicability period of intended use of aeronautical data as well as that the agreed distribution dates will be met.

13.11 A Structure of Agreement on data provision will be important to provide guidance on Data Quality and Data Integrity Monitoring.

13.12 Moving to a data-centric system, as distinct from product-centric, requires assurance of quality and integrity of data before and when it gets to the end-users. A key part of the information management system might be to manage non-certified aeronautical information/data that can potentially affect the safety of air navigation. For each Contracting State, management review is more difficult than annual internal audit; it is also hard to locate training organizations qualified to train AIM staff in quality management.

13.13 Regional collaborative quality assurance is needed, main task should be to review and update the quality management guidance and sample quality manual provided in the Guidance Manual for AIS in the NACC Region, data protection, automation, human factors considerations, etc.

14 Performance Improvement Plan Phase II

14.1 Utilize Aeronautical Information Exchange Model version 5.1 or later, through implementation of Phase 1 and 2 of the AIS-AIM Roadmap in adherence with ICAO and regional AIM planning and guidance material (ASBU Priority 1), support ATM operations by digitally-based AIM.

14.2 Meteorological information clearly has and will continue to have great operational impact and importance for the safety and efficiency of the air transportation system. The derived meteorological

products and services directly support the operational aspects of all phases of flight. To implement appropriate meteorological information reporting systems, providing observations, forecasts, warnings and alerts, and also providing information to meteorological authorities or offices where required.

To implement collaborative training in CAR region regarding AIM implementation

14.3 For most States, AIS is still paper based, desktop publishing, with limited digital data and quality assurance. On the process of AIS to AIM, the provision of aeronautical information should be data centric, quality assured, with single data source. State policies, regulatory oversight mechanisms, service level agreements, roles and responsibilities, data management tools, knowledge and skills, etc., need to be modified. Evolution from paper-based systems to computerised data-based systems will occur over an extended period, with present and future styles of operation proceeding in parallel. Changing the presentation and source of information will bring its own challenges, and will necessitate new skill development for all groups of users, from pilots to air traffic controllers to staff involved in producing the information.

14.4 The role of the human is especially important in delivering high quality and consistent services supporting collaborative AIM. Therefore, systematic and regional cooperation in AIM training will be highlighted among Contracting States in CAR region to ensure harmonized AIM implementation. States in CAR region should establish a working panel to analyses training demands for going to AIM collaboratively, design and develop training plans, courses and curriculum, implement training, evaluate staff competency, training courses, plans and programs, etc. Deliver collaborative training for part of AIS staffs, improve the skills and competence, this part of AIS staffs may in turn train other AIS staffs and contribute to AIM implementation.

14.5 Collaborative training should be delivered, in particular, on static and dynamic data management in AIXM environment, eAIP, digital NOTAM and quality management system. Other knowledge, skills and competencies are suggest be delivered by each Contracting State.

Further implementation of eTOD

14.6 The eTOD is safe for air navigation, efficient for PBN and ATM operations, useful for airport planning, and supports automation.

14.7 It was essential for Sates to establish a system to provide data that was compliant with the ICAO SARPs for all areas, although it would take some time. Obstacles for Area 1 shall meet the accuracy requirement provided by ICAO SARPs. For the time being, the data for Area 2 and Area 4 would be provided by prioritizing airports, firstly for the airports that were regularly used for international civil aviation and then for other airports. Furthermore, in order to achieve global eTOD exchange, States should create national or regional database to produce existing products and services with better quality and availability.

14.8 Main challenges for eTOD are costs, no or few training or supporting material, no clear allocation of responsibilities. For the matter of costs, States in CAR region should apply incremental approach, split/share the costs between stakeholders per area of responsibility and adopt competitive procurement process and negotiation. For the problem of no or few training or supporting material, regional workshops are expected to be delivered, experts (including from other regions) make presentations on eTOD, participants exchange experience and data providers present their offers. For no clear allocation of responsibilities, States in CAR region may provoke discussion; specific Task Force between regulators should address this point. Besides, qualification standards for data providers are necessary, national regulation may engage into its implementation.

15. RESEARCH AND FUTURE DEVELOPMENT

Co-operation on AIM Improvement

15.1 To develop the tools and systems required to meet foreseeable long-term requirements, there is a need for States to undertake and co-operate on AIM Improvement. This includes major efforts to define concepts, to extend knowledge and invent new solutions to future AIM challenges, so these new concepts are selected and applied in an appropriate timely manner. Such efforts could be forged through collaborative partnerships between States, ANSPs, International Organizations, institutes of higher learning and specialized technical agencies. This concept is consistent with Seamless ATM Principle (Inter-regional cooperation ('clustering') for the research, development and implementation of ATM projects).

Consideration of future AIM development

15.2 The following are possible areas that should be considered for future AIM development, in order to continue pursuance of Seamless ATM beyond ASBU Block 0 implementations and global interoperability.

- While the migration of text-based AIP information, eTOD and other static data into digital databases was relatively straightforward, the migration of conventional instrument approach and landing charts to a digital form presented a significant challenge. There was no current capability available for the automatic generation of conventional charts from digital data.

- Due to technical limitations, SIGMETs and NOTAMs are transmitted in a format that is not considered, by some, to be user-friendly (CAPTIAL LETTERS, MISSING STRUCTURE, etc). When the transmitted information includes long list of coordinates defining the affected area, it becomes a nightmare for aircrews to gain situational awareness on the position of the hazard.

- SIGMETs, NOTAMs and ASHTAMs are traditionally transmitted via alpha-numeric communication means which do not allow user-friendly presentation. It is recognized that these systems will have to be maintained for years to allow information flow to the low-end users, including aircraft in flight that do not have reception capability for graphical information, although advanced airspace users (e.g. large airlines) require the information in data formats that can be used in automated systems.

- Human factors are of key importance for Seamless ATM implementation. AIS Certification/Rating, AIS training documentation & facilitations, all need to be established and standardize.

- In order to provide quality assured data, safe and quick AIS service, effectively reduce AIS cost, we need to have Collaborative AIM Services in CAR region. Each Contracting State might be facing the same problems: cross-border AIS service lack consistency and compatibility, data quality is not consistent in CAR region, different data model and data exchange methods lead to the lack of system interoperability, too much manpower and material resources increase AIS service costs, etc.

- The establishment of an CAR AIS Database (CAD) is under consideration. This aeronautical information database will base on SARPS, AICM/AIXM, it may process static and dynamic data automatically, with system interoperation and in a centralized manner. The establishment of CAD may greatly enhance data availability, provide real-time, quality assured AIS service, and improve the effectiveness of AIS operations.

16. MILESTONES, PRIORITIES AND ACTIONS

Milestones

16.1 Section 7 (Performance Improvement Plan) provides milestones and timelines for a number of elements in Performance Improvement Plan Phase I, being effective in November 2020.

16.2 States should commence planning for AIM specifications detailed in the Performance Improvement Plan at the earliest opportunity before 2020 to facilitate a smooth transition by the onset of Phase I.

16.3 Subject to future agreement by concerned parties, Section 8 (Research and Future Development Possibilities) provides possible AIM improvements beyond 2020 until 2025.

Priorities

16.4 It is a matter for each State to determine priorities in accordance with its own economic, environmental, safety and administrative drivers.

Actions

16.5 This Plan necessitates a number of implementation actions. It is expected that each NACC State and Special Administrative Region and Territory develop AIM material as part of their Seamless ATM Implementation Planning based on applicable parts of the Implementation Guidance Material, and implementation progress be reported to APANPIRG.

16.6 APANPIRG and its contributory bodies, such as the ATM Sub-group and the CNS Sub-group are responsible for the oversight of air navigation issues within the NACC, so these bodies needed to be made aware of State implementation progress of Seamless ATM initiatives. APANPIRG and its contributory bodies need to manage the implementation of Seamless ATM through the ASBU framework and this Plan.

APPENDICES

Appendix 1: AIS-AIM Transition Table

Reference on WP 12 Appendix C (ANI WG 05)

Under preparation

Electronic AIP generated from a digital database of aeronautical information

State Name = No reports since AIM TF -- xxx

= progress reported

= amended progress reported

Appendix 2: e-AIP

Under preparation

Appendix 3: Proposal structure of AIM Quality Management Manual of NACC Region

The proposal structure of AIM Quality Management Manual may include the following contents:

1. Introduction. It is an authorization statement.

2. Change summary. Version, date, details of changes, etc. should be included in this part.

3. Purpose of the AIM Quality Manual

4. Scope. This part should include vision and priorities of AIM.

5. Corporate overview. This part should include corporate culture, organization structure, etc.

6. AIM Quality Management System (QMS). This part should cover operating framework, regulatory and statutory, quality standards and framework, notification requirements and documentation (control of documents and control of records).

7. Management responsibilities. This part should cover management commitment, customer focus, quality policy, planning, responsibilities, authority and communication, management review, etc.

8. Resource management. The following contents should be covered in this part, provision of resources, human resources, infrastructure, work environment, etc.

9. Product realisation. This part should include planning of product and service delivery, AIM process, customer communication, designed development, control of design, purchasing, customer property.

10. Measurement. Customer satisfaction, internal audit/review, corrective action, preventive action and control of nonconforming product should be included in this part.

11. Improvement. This part should include business improvement and performance, leadership model implementation strategy, management review, new staff induction and training, risk management, system enhancements, embracing new technology, etc.

12. Abbreviation and definition. Terms and definitions used throughout this document.

13. Appendices. Documents, for example, the contrast for ISO Clause and How the ISO standard has been met, should be covered in Appendixes.

Appendix 4: Structure of Agreement on data provision

AGREEMENT ON DATA PROVISION

between

***[the name of the entity receiving the aeronautical data and/or aeronautical information]*;**
(hereinafter "The Data Receiver")

and

[the name of the entity providing the aeronautical data and/or aeronautical information]
(hereinafter "The Data Provider")

1. Introduction

1.1 Scope

1.2 Parties to the Agreement

1.3 Legal and Regulatory Basis

1.4 A number of documents specify the legal and regulatory requirements for the origination, production, storage, handling, processing, transfer and distribution of aeronautical data and/or aeronautical information, they shall include but not exclusive the following Annexes:

a. Annex 4 – Aeronautical Charts
b. Annex 5 – Units of Measurement to be Used in Air and Ground Operations
c. Annex 11 – Air Traffic Services
d. Annex 15 – Aeronautical Information Services
e. Annex 14 – Aerodromes

2. Services and Service Levels Required by Data Receiver

3. Requirements for Data Provider

3.1 Data Changes Management

Data Provider should follow the recommendations laid down in Chapter 6 of ICAO Annex 15 concerning the advance notice of major changes to the Data.

3.2 Data Compliance Requirement

3.3 Data Errors and/or Inconsistencies

4. Coordination, Training, Data Compliance Checking

When require, the above should be implemented between Data Provider and Data Receiver.

5 Entry into Force and Termination

5.1 This Agreement is valid from [enter validity from date] to [enter term date]

5.2 This Agreement entries into force on the date of the later signature of the Parties and shall remain in force for an indefinite period unless explicitly terminated by a signed agreement between the Parties.

For the Data Receiver	For the Data Receiver
Name	Name
Title	Title
Date	Date
Signature	Signature

Appendix – 5 Abbreviations and Acronyms

ABBREVIATIONS AND ACRONYMS

To facilitate readability, abbreviations have been largely omitted throughout the document. Most abbreviations were defined when introduced. The following provides an alphabetic listing of all abbreviations.

AAITF	AIS-AIM Implementation Task Force
AATIP	ASEAN Air Transport Integration Project
A-CDM	Airport Collaborative Decision Making
ADS-B	Automatic Dependent Surveillance - Broadcast
AI	Aeronautical Information
AIC	Aeronautical Information Circular
AICM	Aeronautical Information Conceptual Model
AIM	Aeronautical Information Management
AIP	Aeronautical Information Publication
AIXM	Aeronautical Information eXchange Model
AIP	Aeronautical Information Publication
AIS	Aeronautical Information Service
AIM	Aeronautical Information Management
AFTN	Aeronautical Fixed Telecommunication Network
AIXM	Aeronautical Information eXchange Model
AIRAC	Aeronautical Information Regulation and Circular
AMDB	Aeronautical Mapping Database
ANSP	Air Navigation Service Provider
AOC	Airline Operations Centre
APANPIRG	Asia Pacific Air Navigation Planning and Implementation Regional Group
ASBU	Aviation system Block Upgrades
ASEAN	Association of Southeast Asian Nations
ATFM	Air Traffic Flow Management
ATIS	Automatic Terminal Information Service

ATC	Air Traffic Control
ATM	Air Traffic Management
ATMRPP	Air Traffic Management Requirements and Performance Panel
ATSA-SURF	Enhanced Traffic Situational Awareness on the Airport Surface
CANSO	Civil Air Navigation Services Organization
CARATS	Collaborative Action for Renovation of Air Transport Systems
CCO	Continuous Climb Operations
CDM	Collaborative Decision Making
CDO	Continuous Descent Operations
CNS	Communication, Navigation, Surveillance
CRC	Cyclic redundancy check
DBMS	Database Management System
DSS	Decision Support System
eAIP	Electronic Aeronautical Information Publication
EFF	Electronic Flight Folder
EFOD	Electronic Filing of Differences
EUROCAE	European Council of Aerospace Engineering
ERAM	En-Route Automation Modernization
eTOD	Electronic Terrain and Obstacle Data
FMS	Flight Management System
GANP	Global Air Navigation Plan
GASP	Global Aviation Safety Plan
IATA	International Air Transportation Association
ICAO	International Civil Aviation Organization
IFATCA	International Federation of Air Traffic Control Association
IFAIMA	International Federation of AIM Associations

IFR	Instrument Flight Rules
IM	Information Management
IP	Internet Protocol
ISO	International Standards Organization
JAP	Joint Acceptance Plan
KPI	Key Performance Indicator
MET	Meteorological Services
METAR	Aerodrome Routine Meteorological Report
NAS	National Airspace System
NCLB	No Country Left Behind
NOTAM	Notice To Airmen
PAIMS	Preferred Aeronautical Information Management Specifications
PIB	Pre-flight Information Bulletin
QA	Quality Assurance
QMS	Quality Management System
SARP	Standards And Recommended Practices
SESAR	Single European Sky Air Traffic Management Research
SIGMET	Significant meteorological weather phenomena
SWIM	System Wide Information Management
TIS-B	Traffic Information Services – Broadcast
TBO	Trajectory Based Operations
WXXM	Weather eXchange Model
XML	eXtensible Markup Language
