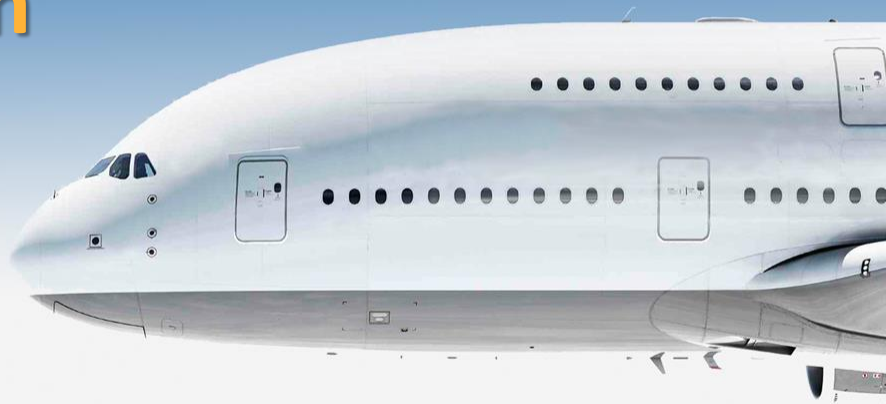
ICAO APAC Webinars – Fundamentals of ANS

Aeronautical Information Management - AIM



Mr. Shane Sumner
Regional Officer - ATM/AIM

Mr. Erdenebaatar Davaasuren
Associate Regional Officer - AIM

Objectives

- To improve understanding:
  - Fundamental knowledge of AIM
  - ICAO requirements
  - Regional planning
  - Implementation activities
- For all stakeholders including who would not normally be able to attend ICAO's regular meetings and events.

- Basics of AIM
- Regional requirements
- What ICAO can offer
- Q&A session

BASICS OF AIM

Definition

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

- **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.

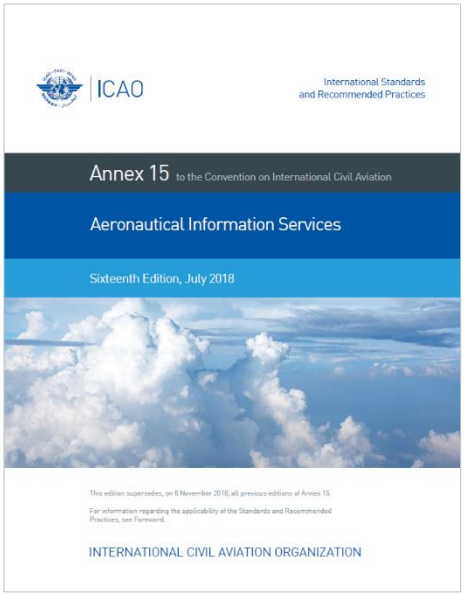
Objective of AIS

Ensure the flow of aeronautical data and aeronautical information necessary for global ATM system safety, regularity, economy and efficiency in an environmentally sustainable manner

The role and importance changed significantly with the implementation of:

- RNAV
- PBN, PBC, PBS
- SATVOICE
- data link systems
- airborne computer-based navigation systems

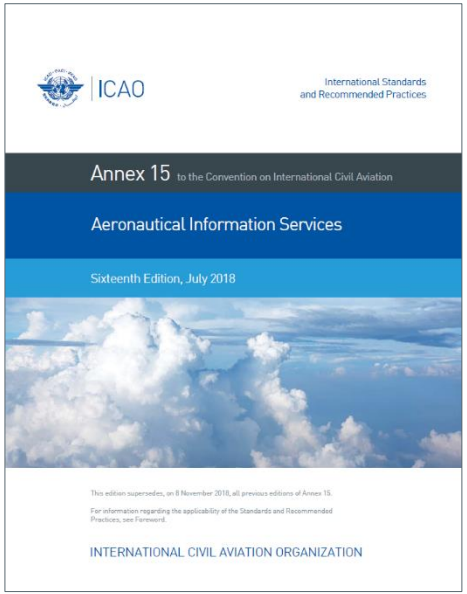
International Standards and Recommended Practices for AIS



Annex 15, Aeronautical Information Services is used in conjunction with the:

- PANS-AIM, Doc 10066
- PANS-ABC, Doc 8400
- AIS Manual, Doc 8126
- AIM Training Manual (Under development)
- Quality Manual (Under development)

Content of Annex 15, Aeronautical Information Services:



Current version:
16th edition, Amendment 40

General
- Common reference systems for air navigation

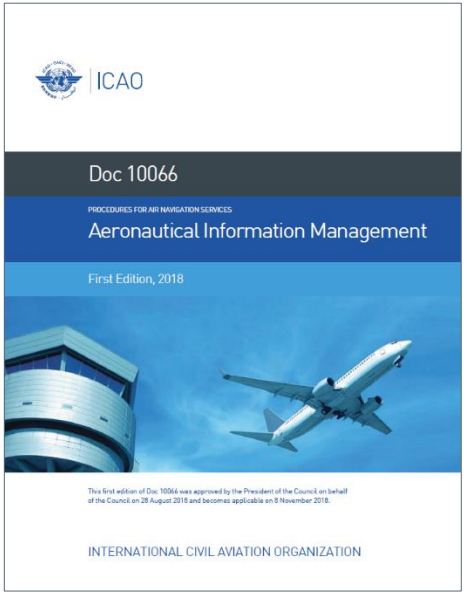
Responsibilities and functions
- State responsibilities
- AIS responsibilities and functions

Aeronautical information management
- Aeronautical data and aeronautical information verification and validation
- Data quality specifications
- Quality Management System

Scope of aeronautical data and aeronautical information

Aeronautical information products and services
- Aeronautical information in a standardized presentation
- Digital data sets

Aeronautical information updates



Content of PANS AIM, Doc 10066:

Chapters:

- Definitions
- Aeronautical information management
- Quality management
- Aeronautical data requirements
- Aeronautical information products and services
- Aeronautical information updates

Appendices:

- Appendix 1. Aeronautical Data Catalogue
- Appendix 2. Contents of the Aeronautical Information Publication (AIP)
- Appendix 3. NOTAM Format
- Appendix 4. SNOWTAM Format

- - -

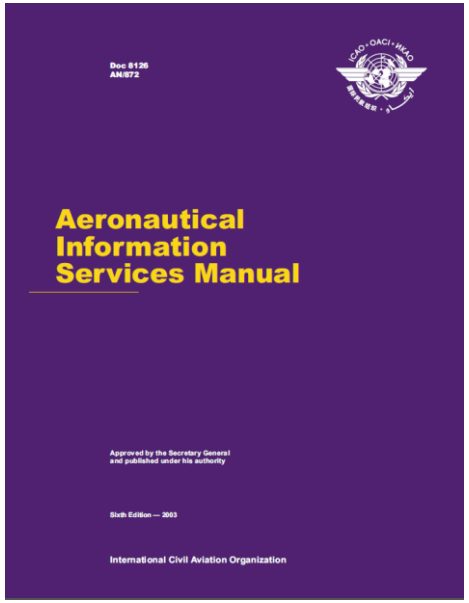
- Appendix 8. Terrain and obstacle data requirements

Amendment 1, Applicable:
04 November 2021
28 November 2024

a) ATS route classification, GBAS Cat II and Cat III Criteria and visual segment surface (VSS) and folding wing tips; and
b) pavement classification rating

New Edition of AIS Manual, Doc 8126

(Under Development)



Current version:
6th edition, Amendment 2

- VOL 01 — Regulatory Framework for Aeronautical Information Services
- VOL 02 — Processing Aeronautical Data
- VOL 03 — Aeronautical Information in a Standardized Presentation and Services
- VOL 04 — Digital Products and Services

Common reference systems (Annex 15, Chapter 1)

Reference systems used for international air navigation:

- **Temporal:** Gregorian calendar and Coordinated Universal Time (UTC)
- **Horizontal:** World Geodetic System-1984 (WGS-84)
- **Vertical:** Mean sea level (MSL) datum

  Earth Gravitational Model-1996 (EGM-96) shall be used as the global gravity model

PANS AIM Doc 10066,
Appendix 2, Contents of the AIP

GEN 2.1.4 Vertical reference system

Brief description of the vertical reference system used, including:

1) name/designation of the reference system;

2) description of the geoid model used including the parameters required for height transformation between the model used and EGM-96; and

3) an explanation, if applicable, of the asterisk used to identify those elevations/geoid undulations that do not meet the accuracy requirements.

State Responsibilities (Annex 15, Chapter 2)

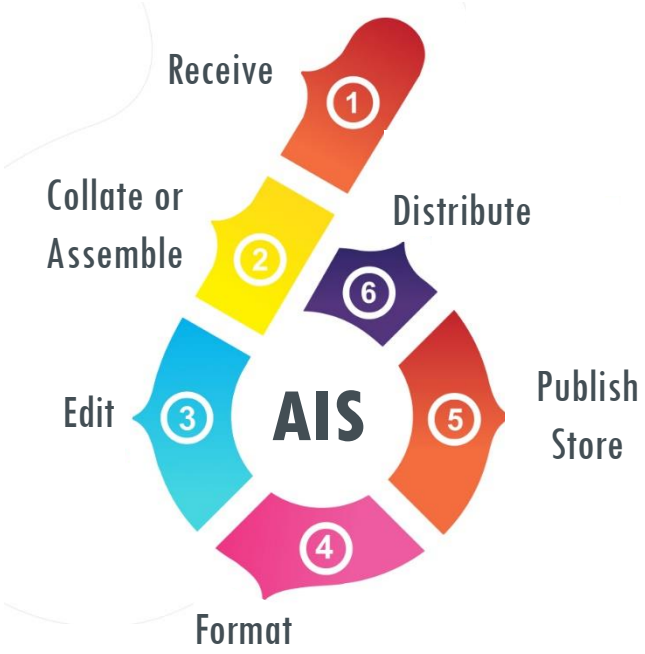
Each Contracting State shall ensure that:

- the provision of aeronautical data and aeronautical information covers its own territory and those areas over the high seas for which it is responsible for the provision of ATS
- the aeronautical data and aeronautical information provided are of required quality
- formal arrangements are established between originators of aeronautical data and aeronautical information and the AIS in relation to the timely and complete provision of aeronautical data and aeronautical information

AIS Responsibilities and Functions (Annex 15, Chapter 2)

AIS shall ensure that aeronautical data and aeronautical information necessary for the safety, regularity and efficiency of air navigation are made available in a form suitable for the operational requirements of the ATM community.

Aeronautical data and aeronautical information shall be provided in the form of aeronautical information products and associated services.



AIS Responsibilities and Functions (Annex 15, Chapter 2)

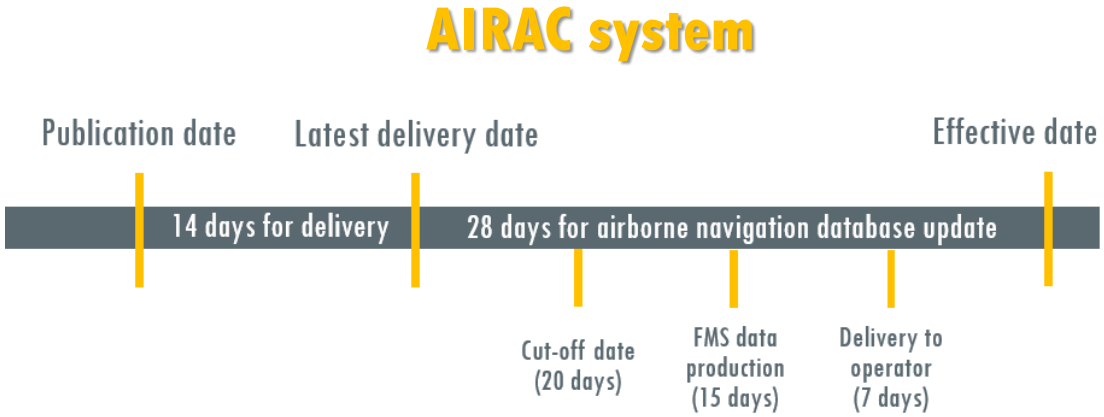
AIS shall, in addition, obtain aeronautical data and aeronautical information to enable it to provide pre-flight information service and to meet the need for in-flight information:

- from the AIS of other States
- from other sources that may be available

AIS shall promptly make available to the AIS of other States any aeronautical data and aeronautical information necessary for the safety, regularity or efficiency of air navigation required by them

Aeronautical Information Management (Annex 15, Chapter 3)

Material to be issued as part of an aeronautical information product shall be thoroughly checked before it is submitted to the AIS in order to ensure that all necessary information has been included and that it is correct in detail.



Aeronautical Information Management (Annex 15, Chapter 3)

Data Quality Specification

- Accuracy
- Resolution
- Integrity
- Traceability
- Timelines
- Completeness
- Format

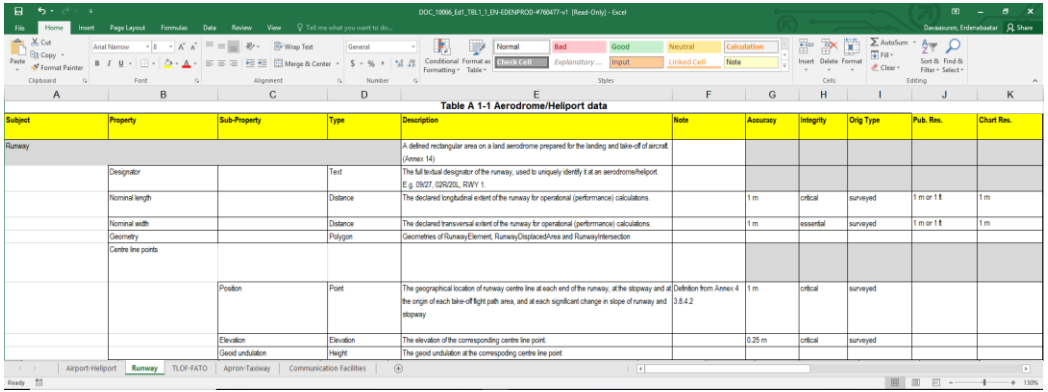


Table A 1-1 Aerodrome/Heliport data

Subject	Property	Sub-Property	Type	Description	Note	Accuracy	Integrity	Orig Type	Pub. Res.	Chart Res.
Runway				A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft. (Annex 14)						
	Designator		Text	The full textual designator of the runway, used to uniquely identify it at an aerodrome/heliport. E.g. 09/27, 02R/20L, RWY 1.						
	Nominal length		Distance	The declared longitudinal extent of the runway for operational (performance) calculations.		1 m	critical	surveyed	1 m or 1 ft	1 m
	Nominal width		Distance	The declared transversal extent of the runway for operational (performance) calculations.		1 m	essential	surveyed	1 m or 1 ft	1 m
	Geometry		Polygon	Geometries of RunwayElement, RunwayDisplacedArea and RunwayIntersection						
	Centre line points									
		Position	Point	The geographical location of runway centre line at each end of the runway, at the stopway and at the origin of each take-off flight path area, and at each significant change in slope of runway and stopway	Definition from Annex 4 3.8.4.2	1 m	critical	surveyed		
		Elevation	Elevation	The elevation of the corresponding centre line point.		0.25 m	critical	surveyed		
		Geoid undulation	Height	The geoid undulation at the corresponding centre line point						

Aeronautical Data Catalogue

AIS shall establish verification and validation procedures which ensure that upon receipt of aeronautical data and aeronautical information, quality requirements are met

Aeronautical Information Management (Annex 15, Chapter 3)

QMS shall be implemented and maintained encompassing all functions of an AIS

3.6.3 **Recommendation.**— *The quality management system established in accordance with 3.6.1 should follow the ISO 9000 series of quality assurance standards and be certified by an accredited certification body.*

3.6.4 Within the context of the established quality management system, the competencies and the associated knowledge, skills and abilities required for each function shall be identified, and personnel assigned to perform those functions shall be appropriately trained.

Processes shall be in place to ensure that personnel possess the competencies required to perform specific assigned functions.

Appropriate records shall be maintained so that the qualifications of personnel can be confirmed.

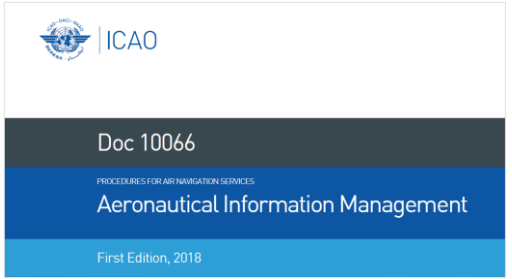
Initial and periodic assessments shall be established that require personnel to demonstrate the required competencies.

Periodic assessments of personnel shall be used as a means to detect and correct shortfalls in knowledge, skills and abilities.

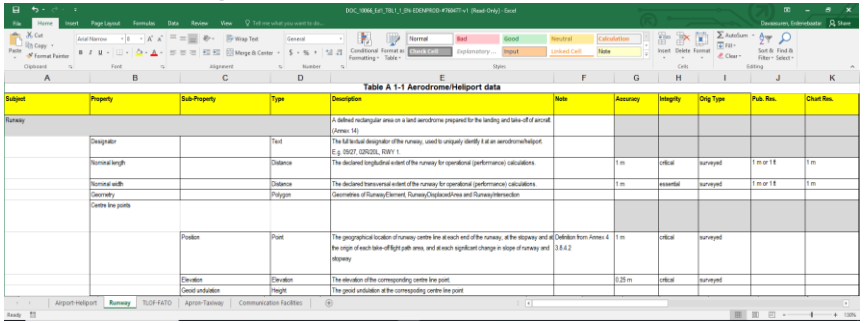
Scope of aeronautical data and aeronautical information (Annex 15, Chapter 4)

The aeronautical data and aeronautical information to be received and managed by AIS shall include at least the following sub-domains:

- national regulations, rules and procedures;
- aerodromes and heliports;
- airspace;
- air traffic services (ATS) routes;
- instrument flight procedures;
- radio navigation aids/systems;
- obstacles;
- terrain; and
- geographic information.



Aeronautical Data Catalogue



Aeronautical Information Products and Services

(Annex 15, Chapter 5)

Aeronautical information in a standardized presentation:

- AIP, AIP Amendments, AIP Supplements, AIC
- NOTAM (including SNOWTAM and ASHTAM)
- Aeronautical charts

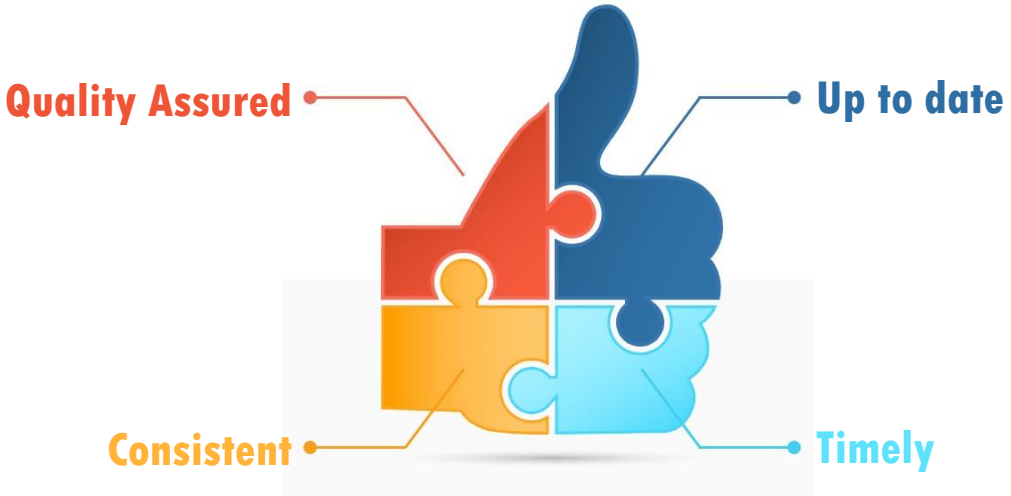
Digital data sets

- AIP data sets
- Terrain data sets
- Obstacle data sets
- Aerodrome mapping data sets
- Instrument flight procedure data sets

Distribution Service

Pre-flight Information Service

Post-flight Information Service



Aeronautical Information Updates (Annex 15, Chapter 6)

Aeronautical Information Regulation and Control (AIRAC):

- The information notified under the AIRAC system shall not be changed further for at least another 28 days after the effective date
- Information provided under the AIRAC system shall be made available by AIS so as to reach recipients at least 28 days in advance of the effective date
- When information has not been submitted by the AIRAC date, a NIL notification shall be distributed not later than one cycle before the AIRAC effective date concerned
- Implementation dates other than AIRAC effective dates shall not be used for pre-planned operationally significant changes requiring cartographic work and/or for updating of navigation databases

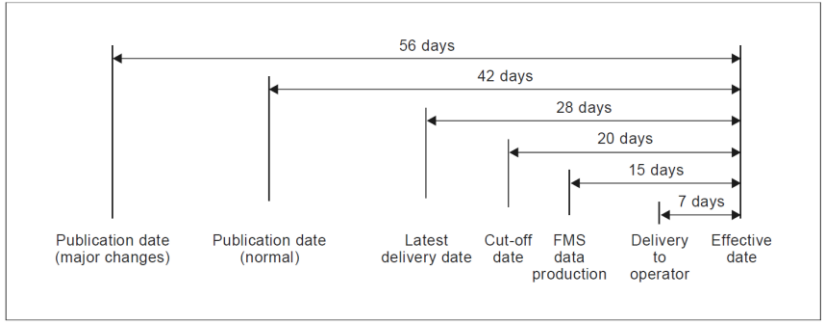


Figure 2-2. Processing cycle for airborne navigation databases

Aeronautical Information Updates (Annex 15, Chapter 6)

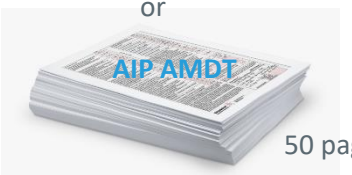
Aeronautical information product updates

- AIP updates
  - ❑ Permanent changes to the AIP shall be published as AIP Amendments.
  - ❑ Temporary changes of long duration (three months or longer) and information of short duration which contains extensive text and/or graphics shall be published as AIP Supplements

RAW DATA

5 pages

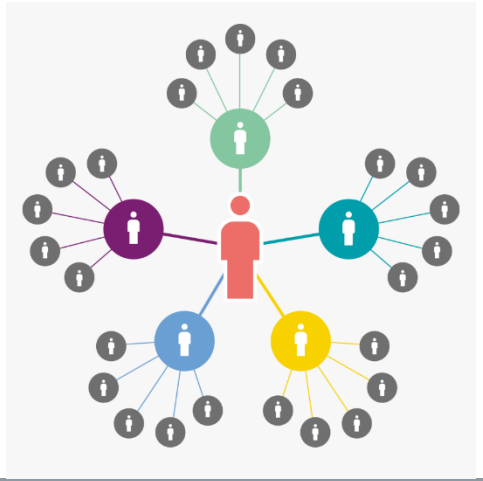
or



50 pages

You may spend short time, but your users will spend long time

You may spend long time, but your users will spend short time



Aeronautical Information Updates (Annex 15, Chapter 6)

Aeronautical information product updates

- NOTAM
  - ❑ Information issued by NOTAM
  - ❑ Information shall not be notified by NOTAM
- Data set updates
  - ❑ Permanent changes and temporary changes of long duration (three months or longer) made available as digital data shall be issued in the form of a complete data set or a subset that includes only the differences from the previously issued complete data set.
  - ❑ Updates to AIP and digital data sets shall be synchronized

REGIONAL REQUIREMENTS

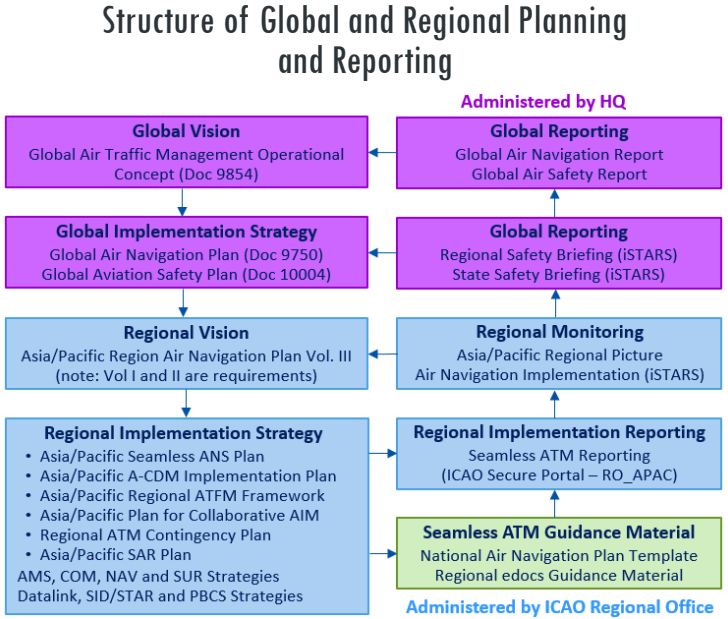
Asia/Pacific Regional Plan for Collaborative AIM

(Version 2.0)

Developed by AAITF/14, approved by ATM SG/7 in 2019

Includes:

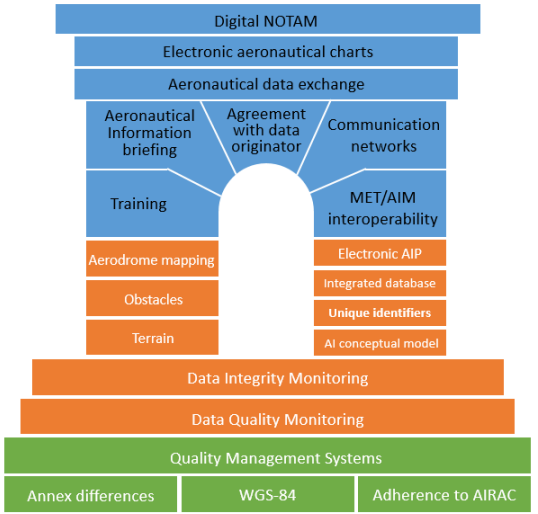
- Background information
- Current situation
- Performance improvement plan
- **Appx A:** *APAC Regional AIM Principles*
- **Appx B:** *Template SLA between Data Originators and AIS*
- **Appx C:** *ICARD Procedures*
- **Appx D:** *Implementation Status Reporting Form*



Asia/Pacific Regional Plan for Collaborative AIM
(Version 2.0)

Performance Improvement Plan

- Regional collaborative AIM performance objectives are arranged in Regional AIM Capability phases:
  - ❑ Phase I, expected to be implemented immediately
  - ❑ Phase II, expected to be implemented by 7 November 2019
  - ❑ Phase III, expected to be implemented by 27 November 2025
- Performance expectations are presented under the following general structure for each Regional AIM Capability phase, where relevant:
  - ❑ Legislation, Policy and Regulation;
  - ❑ Human Performance;
  - ❑ Quality Management;
  - ❑ AIM Systems and Processes;



ICAO Roadmap for the Transition from AIS to AIM

Regional AIM Capability - Phase I

Legislation, Policy and Regulation

- States should develop policy, and enact primary legislation and supporting regulations for Annex 4/15 SARPs and PANS-AIM Procedures including:
  - ❑ establishment of an organizational structure for the safety oversight of aeronautical information service
  - ❑ requirements for monitoring of differences from Annex 4 and Annex 15 SARPs
  - ❑ Requirements for aeronautical information/data originators
  - ❑ Requirement for AIS quality management systems and processes to be established by all entities in the end-to-end AIS data chain
- National Air Navigation Plans should include the implementation planning for each of the performance expectations of the Regional Plan for Collaborative AIM
- AIS should be established either as a separate entity within or, ideally, separated from the civil aviation administration

Regional AIM Capability - Phase I

Human Performance

- Competency requirements for AIS personnel should be developed, including English language proficiency requirements, supported by a program of regular performance assessment
- Regular programs of engagement with all stakeholders should be established

Quality Management

- Quality management processes for aeronautical information services should be established
  - ❑ Data quality monitoring
  - ❑ AIRAC adherence monitoring
  - ❑ Quality checking
- Formal agreements should be established between AIS providers and Data originators

Regional AIM Capability - Phase I

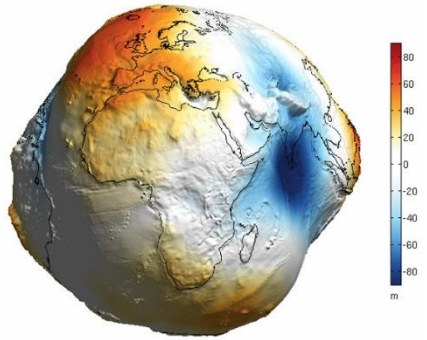
AIM Systems and Processes

- Full access to relevant ICAO Annexes and Documents should be provided to all personnel
- States should ensure full compliance of all aeronautical information products with the following common reference systems:
  - ❑ Horizontal – World Geodetic System 1984 (WGS-84)
  - ❑ Vertical – Mean Sea Level (MSL) datum and Earth Gravitational Model – 1996 (EGM-96)
  - ❑ Temporal – UTC

– GEN 2.1.4 Vertical Reference System

- **5** of **26** Administration's AIP are compliant with PANS-AIM

Source: AAITF/15



Regional AIM Capability - Phase II

Legislation, Policy and Regulation

- Policy, primary legislation and supporting regulations for Annex 4, Annex 15 SARPS and PANS AIM should be adapted as necessary to support transition to AIM, including:
  - ❑ Requirements for the implementation of digital databases of aeronautical information, from which digital data sets may be generated;
  - ❑ Requirements for production of eAIP and other Aeronautical Information Products derived from digital databases of aeronautical information

Human Performance

- Training, competency development and performance assessment of AIS personnel should be adapted as necessary to the needs of transition to AIM, including the establishment and maintenance of digital databases and generation of data sets, QMS, and eAIP.

Regional AIM Capability - Phase II

Quality Management

- QMS should be implemented and maintained encompassing all functions of an aeronautical information service

AIM Systems and Processes

- All Administrations should establish and maintain digital databases
- Terrain, Obstacle and Aerodrome Mapping Data should be managed through the establishment of:
  - ❑ terrain database, from which terrain data sets may be generated;
  - ❑ obstacle database, from which obstacle data sets may be generated;
  - ❑ aerodrome mapping database, from which aerodrome mapping data sets may be generated.
- All Administrations should implement internet-accessible eAIP generated from a digital database

Regional AIM Capability - Phase III

Legislation, Policy and Regulation

- Policy, primary legislation and supporting regulations for Annex 4 and Annex 15 SARPs, and PANS AIM procedures, should be adapted as necessary to support the automated exchange of aeronautical data in a SWIM environment, including requirements for:
  - ❑ Interoperability with meteorological products;
  - ❑ Communications networks for the exchange of aeronautical data;
  - ❑ Electronic aeronautical charts.

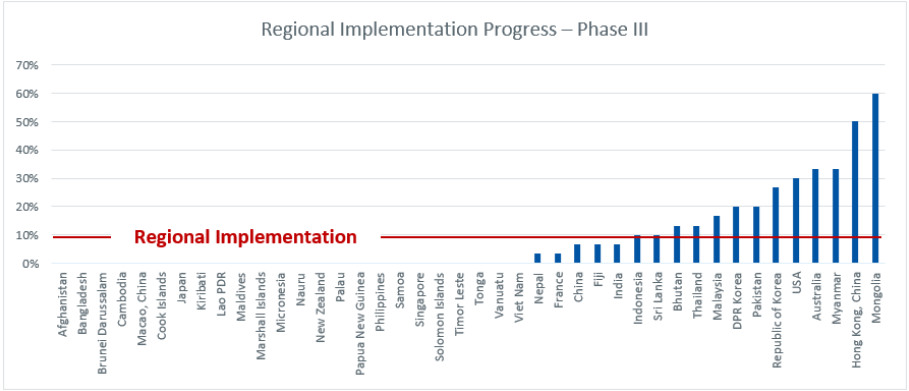
Human Performance

- Training, competency development and performance assessment of AIS personnel should be adapted as necessary to support the automated exchange of aeronautical data in a SWIM environment, and the generation of electronic aeronautical charts.

Regional AIM Capability - Phase III

AIM Systems and Processes

- All Administrations should
  - ❑ exchange digital data sets of aeronautical information in a SWIM environment, aligned with ASBU DAIM-B2/1.
  - ❑ provide Aeronautical Information briefing with integrated meteorological information;
  - ❑ provide Electronic aeronautical charts.



Regional AIM Implementation Status

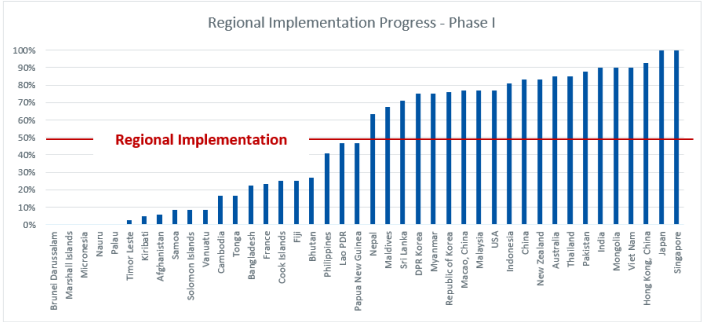
Regional AIM Plan Monitoring and Reporting Form

- Report at least once annually, by no later than 30 April
- Available in ICAO APAC RO website (http://www.icao.int/APAC/Pages/edocs.aspx)

Regional AIM Implementation Status presented:

- AIS – AIM Implementation Task Force (AAITF)
- ATM Sub Group (ATM SG)
- APANPIRG

	Phase 1											
	1				2	3	4	5	6	7	8	9
	1a	1b	1c	1d								
Afghanistan	0%	0%	0%	0%	0%	0%	40%	0%	30%	0%	0%	0%
Australia	100%	100%	100%	100%	0%	100%	100%	40%	100%	80%	100%	100%
Bangladesh	50%	0%	0%	0%	0%	50%	0%	0%	0%	30%	50%	90%
Bhutan	0%	50%	0%	0%	0%	0%	40%	0%	60%	70%	0%	100%
Brunei Darussalam	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Cambodia	0%	0%	0%	0%	0%	50%	40%	0%	30%	10%	0%	70%
China	100%	100%	100%	100%	0%	100%	100%	100%	30%	100%	100%	70%
Hong Kong, China	100%	100%	100%	80%	100%	100%	100%	100%	100%	50%	100%	80%
Macao, China	100%	100%	100%	100%	0%	100%	100%	100%				
Cook Islands	0%	100%	0%	0%	0%							
	100%	100%										



Regional Documents/Guidelines

Guidance Manual for Aeronautical Information Services (AIS) in the Asia/Pacific Region

- Chapter 1 - AIS Quality Systems
- Chapter 2 - Selection and Training Guidelines for AIS
- Chapter 3 - Operating Procedures for AIS Dynamic Data
- Appendix A - Interim AIM Transition Guidance

Guidance on the issuance of SNOWTAM

https://www.icao.int/APAC/Pages/eDocs.aspx

ICAO Docs Under development

Doc 8126 – AIS Manual (new edition)
Doc 9839 – Quality Manual (new)
Doc 9991 – AIM Training Manual (new)

WHAT ICAO CAN OFFER

Workshops, Seminars, Webinars

In conjunction with AIS-AIM Implementation Task Force Meetings (AAITF)

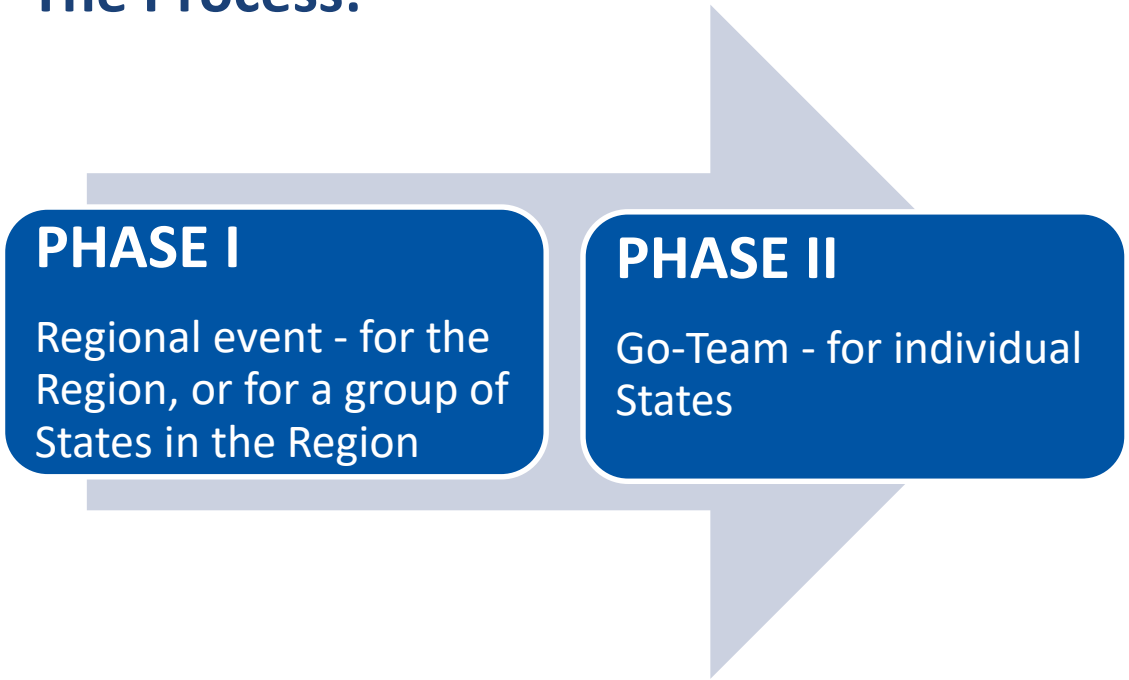
In collaboration with States, International Organizations, e.g.:

- EASA Arise Plus AIS-AIM Workshop (ASEAN), June 2019
- EU SA-APP AIS-AIM Workshop, June 2019
- Workshop on Building Effective Safety Oversight of AIS and AIM (FAA)

RESULTS-BASED IMPLEMENTATION (RBI) SUPPORT

RBI Process

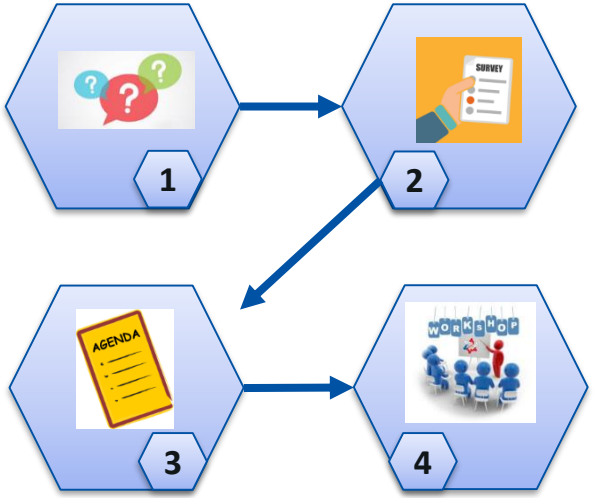
- **The Process:**



RBI Phases

Phase I – Regional (or sub-Regional) Event

PQs Analysis
- Identification of Regional/sub-regional challenges
- Identification of supporting experts



Questionnaires
- Deeper analysis of the challenges in the Region/sub-region

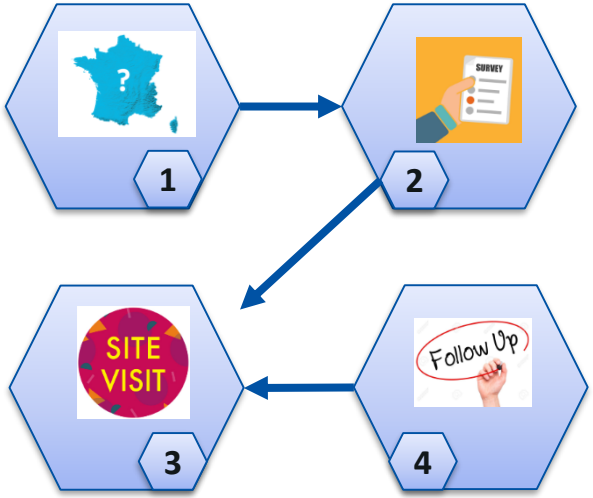
Preparation for the regional event:
- Preparation of the Agenda
- Preparation of the real case scenarios for the event

Regional Event:
- Introductory session (potentially with executives)
- Specific workshop sessions
- **Identification of candidates for Phase 2**

RBI Phases

Phase 2 – Go-Team

Selection of candidate State/s
- Based on the input gathered during Phase 1
- Prioritization strategy



Data collection
- Gap-analysis
- KPIs identified
- Identification of additional supporting experts

Coordination and on site visit:
- Preparation of the agenda
- Logistics of the event

Follow-up activities:
- After 6 months: AIM Implementation Project Plan for the next 3 years
- Go-team to assist and monitor implementation

What next?

Phase 2 – Go-Team

Selection of candidate State/s

- Based on the input gathered during Phase 1
- Prioritization strategy

Funding Support Necessary

- **State Interest**
  - Receive Go-Team Assistance
    or
  - Provide Go-Team Experts
- **Prioritization**
  - ICAO Asia/Pacific AIM Implementation Monitoring
  - USOAP audit results
  - Workshop Questionnaires
  - ICAO Regional Office input
    - Traffic volumes, airports, airspace complexity, terrain and other significant challenges, APANPIRG ANS Deficiencies

ICAO AIS-AIM Technical Missions

States may request an ICAO mission to provide technical advice

Scope of the mission determined by the State and ICAO Regional Office consultation

- May be in conjunction with other ANS technical

ICAO Regional Officer/s, with other external experts

Normally subject to State funding.

Preliminary enquiries: email, apac@icao.int

Formal request: write to ICAO APAC RD

Other Advice and Support

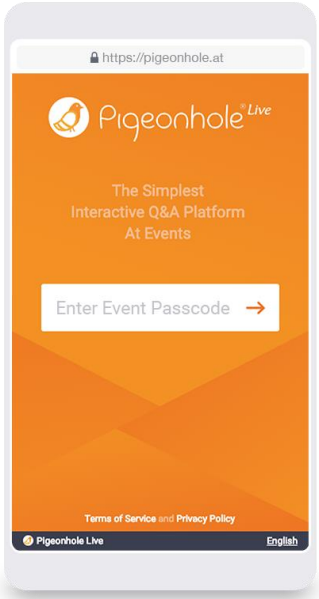
Routine enquiries on matters of:

- SARPS, Procedures (PANS) implementation;
- ICAO Guidance Material;
- Regional Guidance Material and planning

Enquiries by authorized representatives of APAC Administrations, Regulators, AIS, ANSPs, etc.

Q&A SESSION

Q&A session



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