Australia Indonesia Partnership
Kemitraan Australia Indonesia

AERONAUTICAL INFORMATION SERVICES/METEOROLOGICAL SERVICES FOR AIR NAVIGATION/SEARCH AND RESCUE

WORKING PAPER FOR WORKING GROUP 4




INDONESIA
INFRASTRUCTURE
INITIATIVE

Australia Indonesia Partnership

Kemitraan Australia Indonesia

AERONAUTICAL INFORMATION SERVICES/METEOROLOGICAL SERVICES FOR AIR NAVIGATION/SEARCH AND RESCUE

WORKING PAPER FOR WORKING GROUP 4

INDONESIA INFRASTRUCTURE INITIATIVE

October 2010

INDONESIA INFRASTRUCTURE INITIATIVE

This document has been published by the Indonesia Infrastructure Initiative (IndII), an Australian Government funded project designed to promote economic growth in Indonesia by enhancing the relevance, quality and quantum of infrastructure investment.

The views expressed in this report do not necessarily reflect the views of the Australian Indonesian Partnership or the Australian Government. Please direct any comments or questions to the IndII Director, tel. +62 (21) 230-6063, fax +62 (21) 3190-2994. Website: www.indii.co.id

ACKNOWLEDGEMENTS

This report has been prepared by LFV Aviation Consulting, which was engaged by the AusAID funded Indonesia Infrastructure Initiative (IndII) as part of the activity to contribute to the long term development of Indonesia by assisting the Directorate General Civil Aviation to develop sound, internationally harmonised proposals for future air navigation service delivery in the form of an Air Traffic Management Master Plan

The support provided by working group participants is gratefully acknowledged. Any errors of fact or interpretation are solely those of the authors.

Jakarta, 15 October 2010

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS

AAMA	Australian Airspace Monitoring Agency
A-SMGCS	Advanced Surface Movement Guidance and Control System
ABAS	Aircraft-Based Augmentation System
ACC	Area Control Centre
ACT	Aviation Consulting Team
ADC	Aerodrome Control
ADS	Automatic Dependent Surveillance
ADS-B	Automatic Dependent Surveillance-Broadcast
ADS-C	Automatic Dependent Surveillance-Contract
AFS	Aeronautical Fixed Service
AFTN	Aeronautical Fixed Telecommunication Network
AI	Aeronautical Information
AIC	Aeronautical Information Circular
AIDC	ATS Inter-Facility Data Communications
AIP	Aeronautical Information Publication
AIS	Aeronautical Information Services
ATS	Air Traffic Services
AIM	Aeronautical Information Management
AIRAC	Aeronautical Information Regulation and Control
AMAN	Arrival Manager
AMC	Airspace Management Cell
AMHS	Aeronautical Message Handling System
AMSS	Aeronautical Mobile-Satellite Service
ANS	Air Navigation Services
ANSP	Air Navigation Services Provider
AO	Aerodrome Operations
AOM	Airspace Organisation Management
APAC	Asia Pacific
APANPIRG	Asia/Pacific Air Navigation Planning and Implementation Regional Group
AP1	PT Angkasa Pura 1
AP2	PT Angkasa Pura 2
APP	Approach Centre
ARCC	Aeronautical Rescue Coordination Centre
ASM	Airspace Management
ATC	Air Traffic Control
ATCC	Air Traffic Control Centre
ATCO	Air Traffic Control Operator
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
ATMSDM	ATM Service Delivery Management
ATN	Aeronautical Telecommunication Network
ATS	Air Traffic Services
ATIS	Automatic Terminal Information Service

AUO	Airspace User Operations
AWOS	Acquisition Weather Observation Stations
BASARNAS	Indonesian Search and Rescue Agency
BMKG	Indonesian Meteorology, Climatology and Geophysics Agency
BLU	Public Service Agency
CAA	Civil Aviation Administration
CASR	Civil Aviation Safety Regulations
CBT	Computer Based Training
CDA	Continuous Descent Approach
CDM	Collaborative Decision Making
CDR	Conditional Route
CM	Conflict Management
CNS	Communications, Navigation and Surveillance
CPDLC	Controller-Pilot Data Link Communications
CTR	Control Zone
CVOR	Conventional VHF Omni-directional Range
CWP	Controller Working Positions
D-ATIS	Digital-Automatic Terminal Information Service
DCB	Demand and Capacity Balancing
DG	Director General
DGCA	Directorate General of Civil Aviation
DGAC	Directorate General of Air Communication
D-VOLMET	Digital Meteorological Information for Aircraft in Flight
DMAN	Departure Manager
DME	Distance Measuring Equipment
DVOR	Doppler VHF Omni-directional Range
eAIP	Electronic Aeronautical Information Publication
EUROCONTROL	European Organisation for the Safety of Air Navigation
FANS	Future Air Navigation Services
FDPS	Flight Data Processing System
FIR	Flight Information Region
FL	Flight Level
FMS	Flight Management System
FMP	Flow Management Position
FUA	Flexible Use of Airspace
GANP	Global Air Navigation Plan
GATMOC	Global ATM Operational Concept
GBAS	Ground-Based Augmentation System
GLONASS	Global Orbiting Navigation Satellite System
GNSS	Global Navigation Satellite System
GPI	Global Plan Initiative
GPS	Global Positioning System
GRBS	Ground-Based Augmentation System
HF	High Frequency
IATA	International Air Transport Association
IAVW	International Airways Volcano Watch
ICAO	International Civil Aviation Organisation

ILS	Instrument Landing System
IM	Information Management
IMC	Instrument Meteorological Conditions
ICVM	ICAO Coordinated Validation Mission Report
IndII	Indonesian Infrastructure Initiative
ITU	International Telecommunication Network
ISO	International Standards Organisation
JICA	Japan International Cooperation Agency
JAATS	Jakarta Advanced Air Traffic Control System
KPI	Key Performance Indicators
LoA	Letter of Agreement
LVP	Low Visibility Procedure
MATSC	Makassar Advanced Air Traffic Control System
MET	Meteorological Services for Air Navigation
METAR	Meteorological Report
MLAT	Multilateration
MoT	Ministry of Transport
MSSR	Monopulse Surveillance Radar
MSAW	Minimum Safe Altitude Warning
MTCD	Medium Term Conflict Detection
MRCC	Maritime Rescue Coordination Centre
MWO	Meteorological Weather Office
NOF	International NOTAM Office
NDB	Non Directional Beacon
NOTAM	Notice to Airmen
OPMET	Operational Meteorological Information
PBN	Performance Based Navigation
PSR	Primary Surveillance Radar
PRM	Precision Runway Monitoring
PRNAV	Precision Area Navigation
QM	Quality Management
R&D	Research and Development
RPL	Repetitive Flight Plan
RMA	Regional Monitoring Agencies
RDPS	Radar Data Processing system
RNAV	Area Navigation
RNP	Required Navigation Performance
RNP AR	Required Navigation Performance Authorization Required
RVR	Runway Visual Range
RVSM	Reduced Vertical Separation Minimum
SAR	Search and Rescue
SARPs	Standards and Recommended Practices
SBAS	Satellite-Based Augmentation
SID	Standard Instrument Departure
SIGMET	Significant Meteorological Advisory
SMS	Safety Management System
SSR	Secondary Surveillance Radar

SSP	State Safety Programme
STARs	Standard Instrument Arrival
STCA	Short Term Conflict Alert
SUP	Supplement
SWIM	System Wide Information Management
TLS	Target Level of Safety
TMA	Terminal Control Area
TOC	Table of Contents
TOR	Terms of Reference
TS	Traffic Synchronisation
VDL	VHF Digital Link
VCS	Voice Communication System
VFR	Visual Flight Rules
VHF	Very High Frequency
VHF-ER	Very High Frequency-Extended Range
VMC	Visual Meteorological Conditions
VOR	VHF Omni-directional Range
VSAT	Very Small Aperture Terminal
WG	Working Group
WGS-84	World Geodetic System — 1984
WAFS	World Area Forecast System
WRC	World Radio Communication Conferences
WP	Working Paper
UTA	Upper Control Area

SUMMARY OF RECOMMENDATIONS

The Working Group (WG) 4 Kick-off Meeting was held in August 2010. This was followed by two working group sessions – one in late September and the other in early October 2010 – with participants from the Directorate General of Civil Aviation (DGCA), PT Angkasa Pura 1 (AP 1) and PT Angkasa Pura 2 (AP 2), Civil Aviation Transportation Team (CATT) and Airservices of Australia. Since no representatives from the Meteorological Services for Air Navigation (MET) or Search and Rescue (SAR) were able to attend, this limited the input on these two areas.

The WG4 participants shared a significant amount of valuable information, which is discussed in this working paper. A brief summary of the recommendations emanating from the working group sessions can be found in the bullets below, sorted by timeframe (short, medium or long term). This list is not intended to be comprehensive; rather, it is an initial list of concerns raised during the sessions. The overall objective is to meet international standards for Aeronautical Information Management (AIM) using a holistic approach. However, the recommendations that follow were prepared by the working group as practical guidance to get things moving in the first phase, along with the concrete steps to be taken. The workshop conclusions and long-term holistic needs will be included in the Air Traffic Management (ATM) Master Plan.

Short-term recommendations

- Explore practical ways of assuring quality of Aeronautical Information Services (AIS) data. This is the top priority.
- Adopt a quality assurance perspective when receiving and evaluating data from various sources.
- Provide staff training regarding data quality and integrity.
- Develop a certification system for companies and professionals approved to do aeronautical surveys.
- Do obstacle surveys and produce Aerodrome Obstacle Charts on all airports with commercial air traffic.
- Establish a procedure that forces aerodrome operators or contractors to issue revised data such as THR-location when changes take place (e.g., construction works).
- Negotiate agreements with data originators to assure quality and availability of data received.
- Provide Aeronautical Information Publication (AIP) in PDF (printable document) format on DGCA website.
- Make improvements to the existing draft AIS training manual and send personnel to attend related trainings in the AIS field in order to increase their knowledge and competence.

- Review current process for submitting, distributing and modifying flight plans. The time for submitting should probably be extended to two or three hours before Estimated Off-Block Time (EOBT).
- Enable discussions regarding Flight Plan (FPL) between stakeholders (i.e., airlines, DGCA, briefing offices, AP 1 and AP 2)
- FPL. Small airports without briefing offices and Aeronautical Fixed Telecommunication Network (AFTN) require special attention. How should pilots send FPL – by email, telephone or SMS, or via a web-based application?
- Develop a plan for integrating FPL between Area Control Centres (ACCs) and Approach Centres (APPs) (single point of entry).
- Initiate an International Civil Aviation Organisation (ICAO) Flight plan implementation plan.
- Make improvements to and develop systems that are built to be accessible to all users of aeronautical information around the world, making documentation and an operations manual for the system and its procedures.

Medium-term recommendations

- Establish a Quality Management (QM) System for AIS (AIM) in accordance with ISO 9001.
- Establish a quality function within the organisation to be responsible for QM, including audits.
- Provide QM training.
- Make improvements to the existing draft of the QM manual.
- Establish a procedure for collating, implementing and storing aeronautical data in a central database (see European Aeronautical Information Database).
- Establish a solid follow-up methodology for SAR alerting to ensure that all aircraft in distress and suffering accidents are detected without delay, and that the National Search and Rescue Agency (BASARNAS) is alerted immediately.
- Provide AIP in a fully web-based form (i.e., viewable on web browsers) on the AIS (AIM) website (note: need to create website), and upload Notice to Airmen (NOTAM), Aeronautical Information Circulars (AIC) and AIP Supplements.
- Establish a data quality monitoring system
- Perform planning, cost analysis and needs analysis for the full implementation of digital NOTAM. Create a master plan for digital NOTAM implementation in NOTAM office and on readiness of Briefing Officer (BOF) in Indonesia for integration with this system.
- Review and evaluate Repetitive Flight Plan (RPL) system.

Long–term recommendations

The long-term recommendations are clear goals derived from the ICAO road map for transition from AIS to AIM. The working group sessions fully supported these goals and confirmed their validity for Indonesia. Details can be found in this Working Paper and the ATM master plan document.

VISION FOR AIS/MET/SAR

Aeronautical Information Services

AIS of Indonesia will use Information Management (IM) to provide accredited, quality-assured and timely information to support ATM operations, including facilitating the optimum use of available aerodrome capacity. IM will also monitor and control the quality of the shared information and provide information-sharing mechanisms that support the ATM community.

IM will assemble the best possible integrated picture of the historical, real-time and planned or foreseen future state of the ATM situation. IM will provide the basis for improved decision-making by all ATM community members. The key to this concept will be the management of an information-rich environment.

AIS of Indonesia will ensure that the seven concept components in ICAO Doc 9854 are cohesive and linked, and will apply globally harmonised information attributes.

The direct contributions to improvements in the ATM system will be as follows:

- The quality of the information will provide significant additional benefits.
- Pertinent information will be available when and where required.
- The system will recognise and accommodate temporality of data.
- Information can be personalised, filtered and accessed as needed.
- The system will allow all participants to adjust information sharing to mitigate any proprietary concerns.
- IM will achieve a seamless transfer of relevant information between parties in a flexible, adaptable and scalable information environment.

Meteorological information

The provision of meteorological information in Indonesia will be an integrated function of the ATM system. The information will be tailored to meet ATM requirements in terms of content, format and timeliness.

The main benefits for the ATM system of meteorological information will relate to the following:

- improved accuracy and timeliness of meteorological information,
- increased availability of shared meteorological information on-board the aircraft,
- better identification, prediction and presentation of adverse weather,
- improved aerodrome reports and forecasts,

- increased availability of meteorological information (air-reports) from on-board meteorological sensors,
- meteorological information will contribute to minimising the environmental impact of air traffic.

Alerting services for Search and Rescue organisations (BASARNAS)

A follow-up methodology will ensure that all aircraft in distress and experiencing accidents are detected without delay and that BASARNAS is alerted immediately.

The information to BASARNAS organisations will be based on timely and accurate SAR information on aircraft in distress and accidents.

CHAPTER 1: INTRODUCTION

1.1 GENERAL

Law no. 1 of 2009 on Aviation requires AP 1, AP 2, and those parts of DGCA that provide Air Navigation Services (ANS) to merge into a single Air Navigation Services Provider (ANSP) by January 2012, with the remaining part of DGCA being maintained as a regulator.

This re-organisational work has already begun through a special taskforce being managed by the Director General (DG) of DGCA.

In order to save valuable time and resources during the reorganisation process, the following issues could be considered in future ATM Planning and Project implementation:

- It is of utmost importance that the State of Indonesia supports undisturbed and safe domestic and international air traffic in the region, and facilitates international transit traffic over Indonesia.
- The Traffic Analysis Report (Deliverable 1) shows rapid growth in domestic, international and transit traffic, and implementation of the Asean Open Sky Policy emphasises the need for further ATM development.

The mission of producing a new ATM Master Plan has been contracted to the LFV Aviation Consulting Team (ACT).

The mission includes a transfer of knowledge to DGCA, AP 1 and AP 2 staff. This transfer is being facilitated by establishing working groups (WGs) in which these staff can actively participate. Creating a WG for different domains with participation of in-house experts also facilitates the production of a realistic and acceptable ATM Master Plan that can later be broken down into specific action plans. The meetings of the four WGs will result in four Working Papers that are fundamental to the final ATM Master Plan.

The ATM Master Plan will try to answer questions like what needs to be done, and when. However, it will not answer the question of how things will be done.

Responsible for the Working Groups: LFV ACT

Experts from the following organisations, enterprises, agencies and associations have been invited to participate:

- DGCA, AP1, and AP2
- CATT
- IATA

- Airservices of Australia expert
- Others

An additional task decided by IndII/SMEC and agreed by LFV ACT is for each of the WGs to prepare a Working Paper (WP)on their findings, for inclusion in the updated ATM Master Plan.

The four WGs established are:

- WG1 - Air Traffic Flow Management (ATFM)/ Airspace Management (ASM)
- WG2 - Air Traffic Control (ATC)
- WG3 - Communications, Navigation and Surveillance (CNS)
- WG4 - AIS/MET/SAR

CHAPTER 2: WORKING GROUP 4 AIS/MET/SAR

WG4-AIS/MET/SAR was established to provide valuable information for the ATM Master Plan.

The linked GPIs according to ICAO´s Global Air Navigation Plan (GANP), Doc 9750, are GPI no. 18, 19, and 20.

This WP elaborates on the following work areas:

- Present status of AIS and future requirements for AIM in Indonesia
- Quality assurance program
- Staff situation and recruitment/training processes
- Present and future alerting system
- Future meteorological information for aviation community

The WG was managed by Johann Rollén of LFV ACT.

The WG coordinator was Dinni Noerdiani.

WG4 participants are listed in Annex 1.

CHAPTER 3: PRESENT STATUS OF AIS

Law No. 1 of 2009 on Aviation

Indonesia enacted an aviation law in 2009 that stipulates the framework for AIS. Relevant extracts are provided below:

Chapter 7

Aeronautical Information Services

Article 284

Aeronautical Information Services as meant in article 270 point c are intended to provide adequate, accurate, current and timely information needed for aviation regularity/order and efficiency.

Article 285

(1) Aeronautical Information Services as meant in article 284 shall contain information on the facilities, procedures, and services at airports and in airspace.

(2) The aeronautical information as meant in point (1) shall consist of integrated aeronautical information packages and flight navigation maps.

(3) Aeronautical information package as meant in point (2) shall consist of:

a. Aeronautical Information Publications;

b. Notice to airmen (pilot and air traffic personnel);

c. Aeronautical information circulars; and

d. Bulletins containing information needed prior to the flight.

Article 286

Further provisions regarding aeronautical information service mechanisms and procedures shall be stipulated in a ministerial regulation.

Current documentation in Indonesia

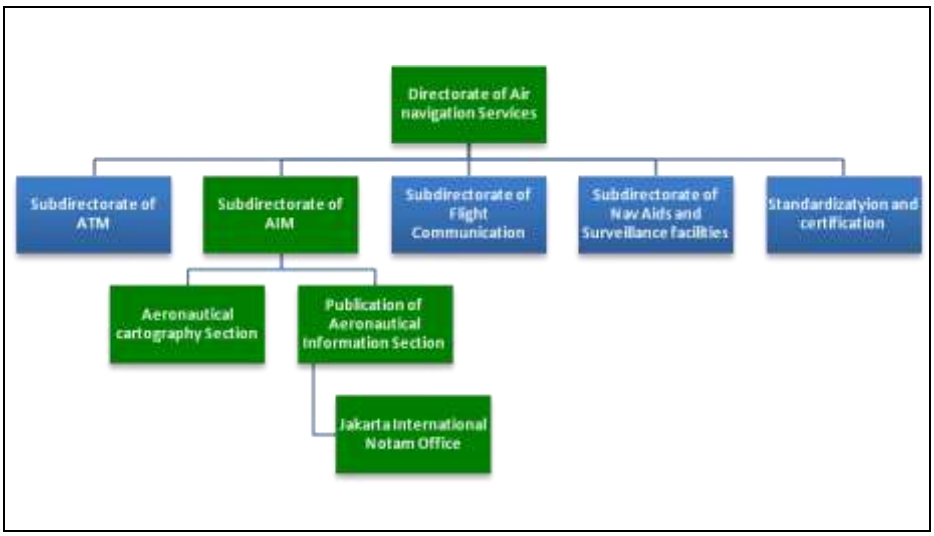
- Civil Aviation Safety Regulation 175, AIS (Ministerial Decree no. 22/2009);
- SI 175- 01, AIS Operation Manual (Draft);
- SI 175- 02, NOTAM Office Operation Manual (Draft);
- SI 175- 03, AIP Data Verification Manual (Draft);

- SI 175- 04, Aeronautical Chart;
- SI 175- 05, AIS Quality System Manual (Draft);
- SI 175- 05, AIS Licensing and Rating (Draft);
- SI HRD REV.01, Appendix on AISO (Draft);
- AC 175- 01, Aerodrome AIS Unit Opr. Proc. (Draft);
- AC 175- 02, AIS Licensing and Rating (Draft).

Current organisational structure, roles and responsibilities

Figure 1 shows the AIM sub directorate's organisational structure.

Figure 1: Organisational structure of AIM sub directorate



The AIM sub directorate is tasked with preparing materials on policies, standardisation, manuals, criteria, systems, procedures, oversight, control, law enforcement/corrective action, evaluating and reporting on aeronautical cartography, publishing of aeronautical and meteorological information, personnel, and organising AIS and other training. The role of each section is explained in Table 1.

Table 1: AIM sub directorate roles and responsibilities

Section	Number of Employees	Roles and responsibilities
Aeronautical Information Publications	10	To prepare materials for policy, standardisation, manuals, criteria, systems, procedures for publication of aeronautical information, aeronautical meteorological information, personnel, and organisation of training and aeronautical information service training; To prepare system and procedures for aeronautical information publications, consisting of Aeronautical Information Publication (AIP), AIP Amendment, AIP Supplement, AIC, NOTAM, ASHTAM, and Monthly NOTAM Summary; To validate and certificate personnel and organisation of training and aeronautical information service training; To undertake oversight, control, law enforcement, evaluation, and reporting of aeronautical information publishing activity. Note: The Jakarta International NOTAM office is part of the AIS section, and is staffed with personnel from other sections (in total 16 staff).
Aeronautical Cartography	8	To prepare material for policies, standardisation, manuals, criteria, system, procedures of aeronautical cartography; To analyse aeronautical data; To produce aeronautical maps; To undertake oversight, control, law enforcement, evaluation and reporting of aeronautical cartography activity.

CHAPTER 4: LINKS TO ICAO AIR NAVIGATION PLAN DOC 9750

The Global Plan Initiatives (GPIs) linked to the AIS/MET/SAR domain are GPI no. 18, 19, and 20.

4.1 GPI-18 AERONAUTICAL INFORMATION

4.1.1 Scope

To make quality-assured electronic information (aeronautical, terrain and obstacle) available in real-time.

Related Operational Concept Components: Airspace Organisation Management (AOM), Demand and Capacity Balancing (DCB), Aerodrome Operations (AO), Traffic Synchronisation (TS), Conflict Management (CM), Airspace User Operations (AUO), ATM Service Delivery Management (ATMSDM).

4.1.2 Description of strategy

Area Navigation (RNAV), Required Navigation Performance (RNP), computer-based navigation systems and ATM requirements introduced a need for corresponding AIS requirements on information quality and timeliness. In order to effectively handle and manage information provision and satisfy these new requirements, AIS should change from its traditional role into a system-wide IM service with revised duties and responsibilities.

Electronic information

To facilitate coordination, improve efficiency and safety, and ensure that the ATM community has access to the same information when collaborating on decisions, it is essential that quality assured electronic information (aeronautical, terrain and obstacle) be available real-time. Electronic information will enhance pilots' situational awareness during en-route, terminal and AO by loading on-board equipment with geo-referenced data sets containing en-route, terminal and aerodrome information. The same information may be made available at different ATC positions and pre-flight planning units and be accessed by the airlines' flight planning departments and by private/general aviation users. The electronic information can be tailored and formatted to meet ATM user requirements and applications. Standardised data formats will be used in creating the information databases, which will then be populated with quality assured data sets.

4.1.3 Current situation in Indonesia

In the new CNS/ATM environment where the majority of commercial aircraft flying in or over Indonesia are equipped with Global Positioning System (GPS) and equipment reliant on a database for navigation, it is essential to have accurate and reliable data created and supplied by AIS.

There have been considerable errors in the information materials published by DGCA in the past, according to reports such as the Japan International Cooperation Agency (JICA) report.

Currently, AIS in Indonesia (DGCA) follows ICAO Standards and Recommended Practices (SARPS) but there have been product deficiencies and complaints have been filed by airlines, pilots and the chart industry. Quality assurance programs must therefore continue in order to restore and maintain stakeholder confidence (see also GPI-20 World Geodetic System-1984 (WGS-84).

The International NOTAM Office (NOF) is located at DGCA headquarters and has 24-hour operations.

There are several AIS units (offices) located at airports in Indonesia.

The future role of AIM in assuring that the ATM community shares the same real-time information for decision-making will be addressed in the updated ATM Master Plan.

According to Aeronautical Information Regulation and Control (AIRAC) circles, Indonesia is promulgating AIPs and amendments, but currently the updated information is not available on the web site.

4.1.4 Comments from stakeholders

Comments from CATT:

The ATM Master Plan needs to identify actions needed to move from AIS to AIM, including all enabling activities such as data cleansing, data quality, data management, distribution, and data custodianship.

Comments from IATA:

Within CNS/ATM, the concept of AIS/AIM broadens the current scope of Aeronautical Information (AI). It ensures AI quality, integrity and timelines through the use of fully digital interoperable systems and enables dynamic context-based retrieval and delivery of AI. In the report, the consultant is focusing on the publication side of AI. However, the transmission of accurate and error-free flight data information is paramount for planning, forecasting and controlling air traffic. We recommend that the Consultant

identify the implementation of a transitional roadmap for a nationwide AIM concept to enable AI distribution.

Comments from DGCA:

DGCA confirms and accepts that the future role of AIS will be substantially changed with the transformation to an IM era.

DGCA believes that the regulator should be the unit responsible for the management and provision of AI in the future.

Today, there are problems with missing flight plans and with processing flight plans. Therefore DGCA notes the following areas for improvement:

- **Process improvement:** processing and mechanism.
- Attention is needed for small airports without briefing offices and AFTN. How should pilots send FPL: by email, telephone or SMS, or via a web-based application?
- **Local flights** now sometimes depart without FPL; this needs correcting.
- **Information** should be strengthened for stakeholders, i.e., airlines and airports.
- **Regulations** on mandatory FPL should be clarified.
- **Messages** associated with FPL: DEP, CHG, CNL, DELAY, ARR, etc., are an integrated and vital part of a functioning system.
- **Time for FPL submittal** – should this be one hour, or three hours prior to departure? A longer time would be preferable, as this permits a longer planning period.
- **RPL** is widely used in Indonesia, but puts load on the system due to many changes regarding time, routing, aircraft type, etc. We need to prevent the system being overloaded.

4.2 GPI-19 METEOROLOGICAL SYSTEMS

4.2.1 Scope

To improve the availability of meteorological information in support of a seamless global ATM system.

Related Operational Concept Components: AOM, DCB, AO, AUO.

4.2.2 Description of strategy

Immediate access to real-time, global operational meteorological information (OPMET) is required to assist ATM in tactical decision-making for aircraft surveillance, ATFM and flexible/dynamic aircraft routing which will contribute to the optimisation of the use of airspace. Such stringent requirements imply that most meteorological systems should be automated and that meteorological services for international air navigation should be integrated and made comprehensive through global systems such as the world area forecast system (WAFS), the international airways volcano watch (IAVW) and the ICAO tropical cyclone warning system.

Enhancements to WAFS, IAVW and the ICAO tropical cyclone warning system to improve the accuracy, timeliness and usefulness of the forecasts issued will be required to facilitate the optimisation of airspace use.

Increasing use of data-links to downlink and uplink meteorological information – through such systems as Digital-Automatic Terminal Information Service (D-ATIS) and Digital Meteorological Information for Aircraft in Flight (D-VOLMET) – will support automatic sequencing of aircraft on approach and contribute to maximising capacity. The development of automated ground-based meteorological systems in support of operations in the terminal area will provide OPMET (such as automated low-level wind shear alerts) and automated runway wake vortex reports. OPMET from the automated systems will also assist in the timely provision of forecasts and warnings of hazardous weather phenomena. These forecasts and warnings, together with automated OPMET, will contribute to maximising runway capacity.

4.2.3 Current situation in Indonesia

ATC receives Meteorological Report (METAR) information every 30 minutes for the main airports in Indonesia. This is similar to the procedures in other ICAO states.

MET and airport information for some of the main airports is automatically transmitted to the pilot via Automatic Terminal Information Service (ATIS).

Specific weather data presentation from weather radars is not found in the existing radar presentation system for the controller.

Exchange of reported significant weather conditions between controller and meteorological office appears limited and is not formalised. This shortcoming might be overcome at a low or no cost for the benefit of safety. This is especially valuable in this tropical area, and will have an impact on both en-route and airport operations.

4.2.4 Comments from stakeholders

Comments from CATT:

We support improved delivery of weather information to pilots and operators.

The ATM Master Plan needs to identify all enabling actions required to deliver accurate, reliable and timely weather information to all users.

Comments from DGCA:

Closer cooperation with ATM is needed, since the trend is moving from pre-flight briefing materials to continuous provision of MET data throughout the flight.

4.3 GPI-20 WGS-84

4.3.1 Scope

All States to implement WGS-84.

Related Operational Concept Components: AO, CM, AUO.

4.3.2 Description of strategy

The geographical coordinates used across various States in the world to determine the position of runways, obstacles, aerodromes, navigation aids and Air Traffic Services (ATS) routes are based on a wide variety of local geodetic reference systems.

With the introduction of RNAV, the problem of having geographical coordinates referenced to local geodetic datum is more evident, and has clearly shown the need for a universal geodetic reference system. To address this issue, in 1994 ICAO adopted the World Geodetic System - 1984 (WGS-84) as a common horizontal geodetic reference system for air navigation, to be applied from 1 January 1998.

Fundamental to the implementation of the Global Navigation Satellite System (GNSS) is the use of a common geographical reference system. lCAO adopted the WGS-84 Geodetic Reference System as that datum, and many States have implemented or are implementing the system. Failure to implement, or a decision to use an alternative reference system, will create a seam in ATM service and will delay the full realisation of GNSS benefits. Completion of the implementation of the WGS-84 Geodetic Reference System is a prerequisite for a number of ATM enhancements, including GNSS.

4.3.3 Current situation in Indonesia

WGS-84 is expected to be implemented in Indonesia soon. However, data quality is highly uncertain and most airport data still need to be verified, whereas coordinates for terminal areas and en-route navigation are quality assured.

4.3.4 Comments from stakeholders

Comments from CATT:

The ATM Master Plan needs to identify all actions to fully implement and validate WGS-84.

Comments from DGCA:

A survey of obstacles is being performed for some airports. However, the quality of the data has not been verified, and incoming coordinates are sometimes strange and clearly not valid.

Proposal:

1. Develop a certification system for companies and professionals that are approved to perform aeronautical surveys.
2. Perform obstacle surveys and produce Aerodrome Obstacle Charts for all airports with commercial air traffic.
3. Establish a procedure for collating and implementing aeronautical data in a central database (see European Aeronautical Information Database).
4. Establish a procedure that forces aerodrome operators or contractors to issue revised data (e.g. THR-location) when changes occur.
5. Adopt a quality assurance perspective when receiving data from various sources.

CHAPTER 5: ATM MASTER PLAN OBJECTIVES

The ATM Master Plan for Indonesia will be a reference document for ATM development over the next 15 years.

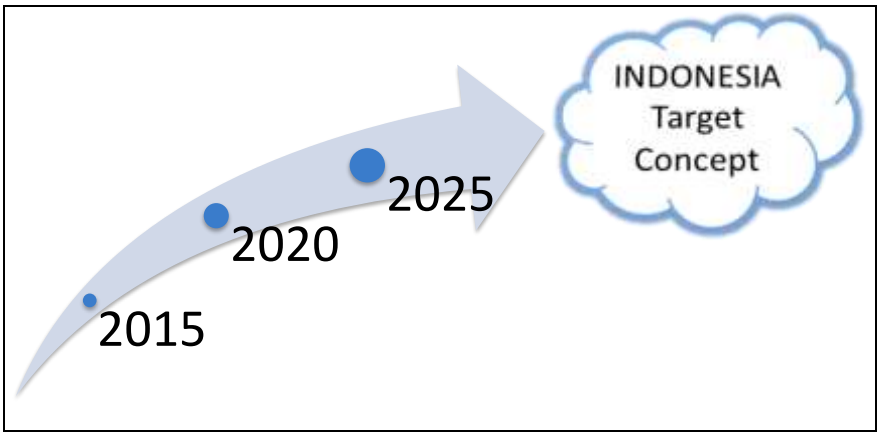
The document is based on and developed from the Master Plan issued in 1994 with considerations from the JICA study from 2002-2008 and the new aviation law (Law no. 1/2009 on aviation). The results of this WG will be integrated into the ATM Master Plan.

5.1 ATM MASTER PLAN STAGES

The ATM Master Plan will be composed of three stages:

- Short term: up to 2015
- Medium term: from 2016 to 2020
- Long term: from 2021 to 2025 and beyond

Figure 2: ATM Master Plan milestones



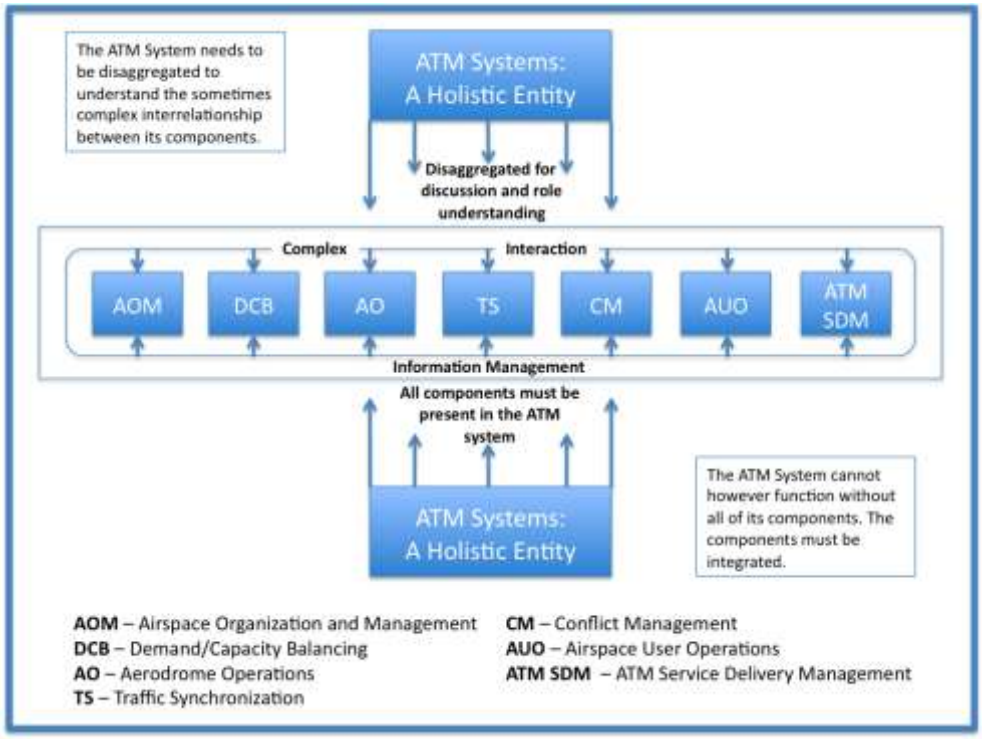
5.2 ATM MASTER PLAN OBJECTIVES

To ensure a logical approach is applied to the various programs, a number of operational objectives have been defined. Classified according to ICAO doc 9854, there are seven key concept components, as depicted in Figure 3.

For each of these key components, relevant high level tasks have been defined. These tasks must be achieved in order to reach the Operational ATM Objectives.

The three programs (short, medium and long term) have been defined by decomposing the high level tasks into several sub-level tasks that are to be implemented in a timely fashion in order to achieve the global high level objectives.

Figure 3: ICAO concept components



5.3 ATM SERVICE DELIVERY MANAGEMENT

ATM SDM will operate seamlessly from gate to gate for all phases of flight and across all service providers. The ATM SDM component will address the balance and consolidation of the decisions of the various other processes/services, as well as the time horizon at which, and the conditions under which, these decisions are made. Flight trajectories, intent and agreements will be important components to delivering a balance of decisions.

Key conceptual changes include:

- Services to be delivered by the ATM SDM component will be established on an as-required basis subject to ATM system design. Once established, they will be provided on an on-request basis;

- ATM system design will be determined by collaborative decision- making (CDM) and system-wide safety and business cases;
- Services delivered by the ATM SDM component will, through CDM, balance and optimise user-requested trajectories to achieve the ATM community's expectations; and
- Management by trajectory will involve the development of an agreement that extends through all the physical phases of the flight.

CHAPTER 6: ROADMAP FOR THE TRANSITION FROM AIS TO AIM

WG 4's primary focus was on what and when to transit from AIS to AIM, based on the ICAO Roadmap for transition from AIS to AIM.

6.1 INTRODUCTION (TAKEN FROM ICAO ROADMAP FOR TRANSITION FROM AIS TO AIM):

The GANP (Doc 9750) was developed as a strategic document to guide the implementation of CNS/ATM systems with respect to the Global Air Traffic Management Operational Concept (GATMOC) Doc 9854 and the Strategic Objectives of ICAO. The GANP (Doc 9750) contains near- and medium-term guidance on air navigation system improvements necessary to support a uniform transition to the ATM system envisioned in the GATMOC (Doc 9854). Doc 9750, Chapter 1, Table 1-1, sets out 23 GPIs; two are directly related to AI (GPI-18 – AI and GPI-20 – WGS-84) and many of the others have an indirect impact on the way AI will be exchanged in the future.

This roadmap has been developed to expand upon the direction given in Doc 9750 for the future development of AI. The changes foreseen are such that this development is being referred to as the transition from AIS to AIM.

6.1.1 Why aeronautical information matters

The Eleventh Air Navigation Conference (AN-Conf/11) held in Montréal in September 2003 endorsed the operational concept and recognised that, in the global ATM system environment envisioned by the operational concept, AIS would become one of the most valuable and important enabling services. As the global ATM system foreseen in the operational concept was based on a CDM environment, the timely availability of high-quality and reliable electronic aeronautical, meteorological, airspace and flow management information would be necessary. Some recommendations of AN-Conf/11 addressed the importance of AI in particular.

In June 2006, a Global AIS Congress was held in Madrid, Spain. The event was facilitated by the European Organisation for the Safety of Air Navigation (EUROCONTROL) in partnership with ICAO. The Congress considered the essential role of AIS in the evolving world of ATM. It noted that computer-based navigation systems, and RNAV, RNP and ATM requirements introduced a need for new corresponding AIS requirements for quality and timeliness of information. The role of AIS would therefore need to transition to an IM service, changing duties, responsibilities and scope to satisfy these new requirements and to cope with and manage the provision of information.

The 2006 AIS Congress supported the recommendations of AN-Conf/11 dealing with AI and began to define a future high-level view as to the shape, nature and content of a strategy for the evolution from traditional product-centric AIS to the enlarged scope of data-centric AIM.

Realising the safety-critical nature of AI and in order to prevent diverging developments in the future, the Congress agreed that ICAO should take the lead at the global level with regard to the transition from AIS to AIM. Accordingly, the Congress developed ten recommendations calling for ICAO action or support from States and international organisations.

In September 2007, the 36th Session of the Assembly recognised the need to support the recommendations of the Congress and called for further coordination with States and international organisations.

Today, high-quality AI is often cited in research programs as a prerequisite for the development of the many new interoperable tools that future aircraft will carry to improve their effectiveness in navigating safely and efficiently. These new tools will also be used by ATM systems to improve efficiency while maintaining safety. This will result in the provision of more services to more aircraft in the same airspace at the same time.

6.1.2 How information is distributed today

We are in the age of the Internet, satellite navigation and computer networks, yet our approach to AI distribution is still based on paper charts, paper documentation and telex-based text messages. Systems exist in isolation. Much of the data is entered more than once in different computers using a keyboard rather than by file transfer or database transactions.

Better AI is essential if we are to have an integrated and interoperable ATM system that enables ANSPs to safely handle more traffic in the same amount of space during the same amount of time. Such a system would effectively link the full range of services from airspace design to flight planning, airport operations planning and flight separation assurance while continuing to maintain the safety and security of passengers and lessening the environmental impact on the planet and its population.

Better AI is essential if we are to have a flexible ATM system that reduces costs and environmental impacts while improving access to congested airspace and remote airports in developing countries. Such a system would allow planners and decision makers to make the right decisions for the development of new tools and techniques based on accurate information available on time and in the right place.

Better AI is essential if we are to have a system that empowers airspace users by giving them a greater role in shaping the ATM system, and by helping them understand their

options and make informed decisions while maintaining public safety and minimising the impact on the environment. Such a system would be focused on users' needs.

Corrupt or erroneous AI has the potential to adversely affect the safety of satellite navigation, just as corrupt or malfunctioning navigation aids adversely affect the safety of ground-based navigation.

These improvements are central to the GATMOC and justify by themselves the name change from AIS to AIM that identifies the new focus on all aspects related to proper IM as opposed to the traditional way of focusing on the provision of standard products to the pilot only.

6.1.3 Objective of transition to AIM

Recommendation 1/8 of AN-Conf/11 clearly stated the objective for global AI as follows:

> *That ICAO, when developing ATM requirements, define corresponding requirements for safe and efficient global aeronautical information management that would support a digital, real-time, accredited and secure aeronautical information environment.*

The GATMOC, which had been developed to be visionary in scope and not constrained by the level of technology available at the time, was also endorsed by AN-Conf/11.

Much has been done in the community, and the technology has become more mature and more widely deployed. However, some regions are more advanced than others and the need for the adoption of global standards is more evident now than it was in 2003. Present and future navigation systems and other ATM systems are data-dependent. All require access to global, broad-based AI of a considerably higher quality and in a more timely manner than is generally available today. The provision of AI is a core element of ANS.

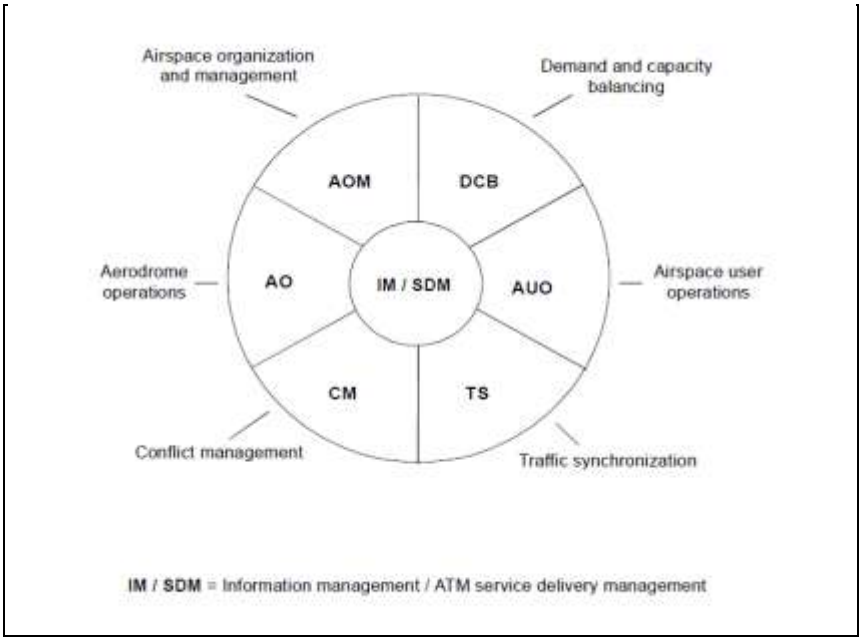
To satisfy new requirements arising from the GATMOC, AIS must transition to a broader concept of AIM, with a different method of information provision and management given its data-centric nature as opposed to the product-centric nature of AIS. Roles and responsibilities may need to be adapted as the transition progresses.

6.1.4 What will change

The GATMOC defines seven interdependent concept components that will be integrated to form the future ATM system. They comprise AOM, AO, DCB, TS, CM, AUO and ATMSDM.

The management, utilisation and transmission of data and information are vital to the proper functioning of these components. The exchange and management of information used by the different processes and services must ensure the cohesion and linkage between these seven concept components. Figure 4 illustrates how IM is at the core of ANS.

Figure 4: Information Management as component of future ATM Operational Concept



6.1.5 Users

Today, the provision of AI is mainly focused on pre-flight briefing requirements. In the future, the provision of AI will address the requirements of all components of the ATM system for all phases of flight.

6.2 ROADMAP STEPS (ICAO)

This roadmap provides the strategic direction and major principles for the transition to AIM. The three phases introduced in ICAO Roadmap for Transition from AIS to AIM Part I need not be followed in a waterfall approach; for example, steps may be taken to introduce the digital elements even though the consolidation steps have not all been finalised. Similarly, it is not necessary that all steps for going digital be achieved before introducing new measures related to IM. The phases, however, give an indication of how to address the transition.

A list of major steps to achieve the transition to AIM is provided in Part II. A broad positioning of the steps in relation to the three phases is also provided in Figure 5. The transition to AIM will be effective at the global level when these steps have been achieved. Most steps in Phases 2 and 3 of the transition require new SARPS to be adopted at the global level; an indication of the time required for these new texts to be available is provided in Part III.

6.2.1 Steps

The steps listed in Part II constitute a minimum list of areas of activities for States to coordinate the transition to AIM between themselves and with ICAO. The steps are to be taken as a checklist of high-level actions. Failure to take action on any of these steps would increase the length of the transition and negatively affect the enabling role of AIM in the future ATM concept of operation.

The list may evolve during the transition, especially when we approach Phase 3. This roadmap will be updated with the further evolution of the overall ATM concepts and system requirements.

P-01 — Data quality monitoring

P-02 — Data integrity monitoring

P-03 — AIRAC adherence monitoring

P-04 — Monitoring of States' differences to Annex 4 and Annex 15

P-05 — WGS-84 implementation

P-06 — Integrated aeronautical information database

P-07 — Unique identifiers

P-08 — Aeronautical information conceptual model

P-09 — Aeronautical data exchange

P-10 — Communication networks

P-11 — Electronic AIP

P-12 — Aeronautical information briefing

P-13 — Terrain

P-14 — Obstacles

P-15 — Aerodrome mapping

P-16 — Training

P-17 — Quality

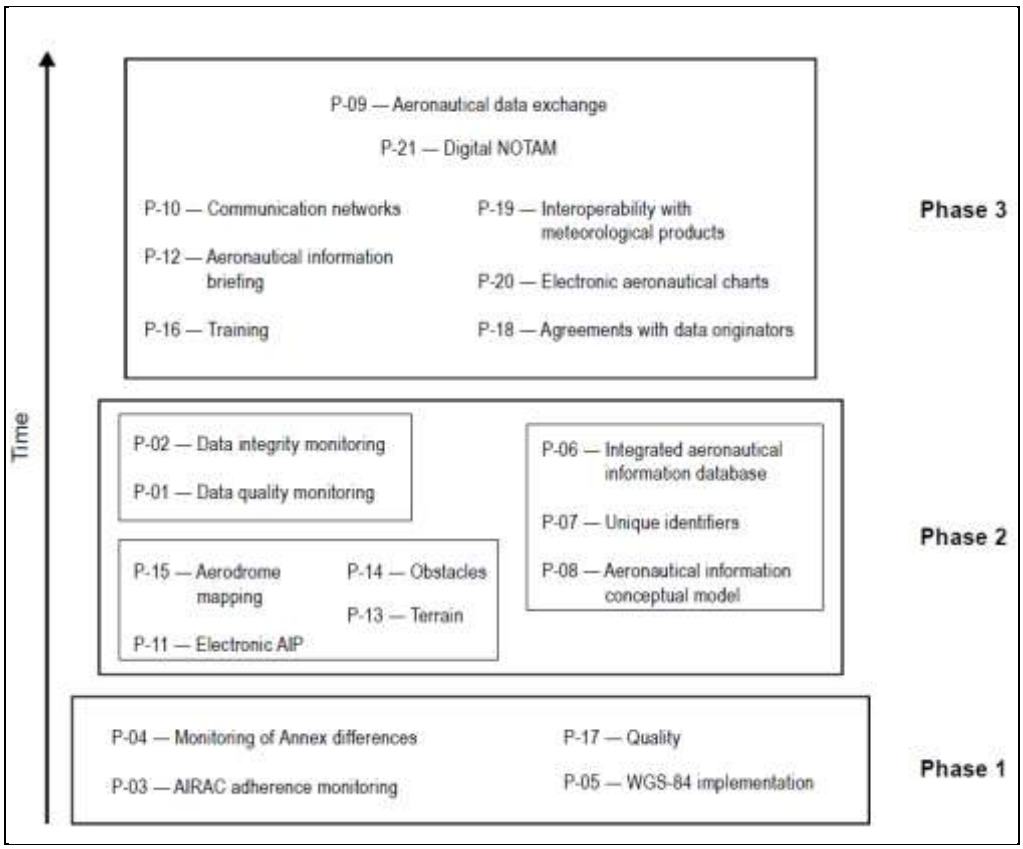
P-18 — Agreements with data originators

P-19 — Interoperability with meteorological products

P-20 — Electronic aeronautical charts

P-21 — Digital NOTAM

Figure 5: Positioning of the 21 steps of the roadmap in the three phases



6.2.2 Working group comments on the ICAO Roadmap

P-01 — Data quality monitoring

An ongoing challenge for organisations producing information is to ensure that the quality of the information suits its intended uses and that data users are provided with the appropriate information about data quality.

Status in Indonesia:

The quality of data varies greatly. No structured monitoring system is available.

Actions needed to comply:

Short/medium term:

- Quality-assured electronic information (aeronautical, terrain and obstacle) will require the following steps in the short to medium term. Develop a certification system for companies/professionals that are approved to perform aeronautical surveys.
- Perform aeronautical surveys on all airports with commercial air traffic.
- Establish a procedure that forces aerodrome operators or contractors to issue revised data such as THR-location when changes occur.
- Adopt a quality assurance perspective when receiving data from various sources.

Establish a data quality monitoring system.

Long term:

No long-term activities were found by the WG.

P-02 — Data integrity monitoring

Data integrity requirements introduced by safety objectives must be measurable and adequate.

Status in Indonesia:

Different sources have different databases, i.e., airport directorates, while DGCA has no access. Data is provided by letters (non-digital).

Actions needed to comply:

Short term:

Provide data to AIS directorate in digital form.

Medium term:

Process crosschecking of data from different sources. Databases need to be integrated and accessible to AIS.

P-03 — AIRAC adherence monitoring

The standard regulation and control mechanisms for the distribution of AI is an essential element ensuring that each person involved makes decisions based on the same information.

Status in Indonesia:

Follows the AIRAC dates. When changes arise between AIRAC dates, waits until next AIRAC date.

Actions needed to comply:

No major changes with respect to adherence.

Short term:

Issue a circular to airport operators/developers/contractors about the AIRAC regulation and the urgent need for quality data. For example, RWY extension means that new THR coordinates must be published. Monitoring (part of QM-function?).

Medium/Long term:

Need to be integrated as part of aerodrome certification process.

P-04 — Monitoring of States' differences to Annex 4 and Annex 15

Adherence to standards is an ongoing effort. The transition to AIM offers an opportunity to increase the focus on implementation and on reviewing differences in the application of the standards by States.

Status in Indonesia:

Differences in procedures and standards in Indonesia with Annex 4 and Annex 15 have been noted in Indonesian AIP GEN 1.7 volume I.

Actions needed to comply:

Short term:

Along with development for areas where there are differences in procedures and standards, careful attention is needed to revising AIP GEN 1.7.

Medium term:

No medium-term activities were identified by the WG.

Long term:

No long-term activities were identified by the WG.

P-05 — WGS-84 implementation

The target of expressing 100 per cent of coordinates in the WGS-84 reference system is achievable. This is one of the first steps to achieve in the transition to AIM.

Status in Indonesia:

WG-84 work is in progress, but data are not always quality-assured.

Actions needed to comply:

Short term:

Develop a certification system for companies/professionals that are approved to perform aeronautical surveys (see P-01).

Develop a plan for validation of WGS-84 data at and around airports.

Medium term:

No medium-term activities were identified by the WG.

Long term:

No long-term activities were identified by the WG.

P-06 — Integrated aeronautical information database

The establishment and maintenance of a database where digital aeronautical data from a State are integrated and used to produce current and future AIM products and services is the main step in Phase 2 of the transition to AIM.

A database may be operated by States or by regional initiatives under delegation from States. The design of such a database will not be identical in all States or regions because local technical or functional requirements must be considered. However, the material that will be provided under Step P-08 will provide guidance that may be used to validate the design for facilitating the future data exchange.

Status in Indonesia:

No common AIS database currently exists.

Actions needed to comply:

Short term:

Give AIS sub directorate direct access to data in digital form.

Medium term:

Establish a procedure for collating and implementing aeronautical data in a central database(see European Aeronautical Information Database).

Long term:

No long-term activities were identified by the WG

P-07 — Unique identifiers

Improvements to the existing mechanisms for the unique identification of aeronautical features are required to increase the effectiveness of information exchange without the need for human intervention.

Status in Indonesia:

Actions needed to comply:

No activities were identified by the WG.

P-08 — Aeronautical information conceptual model

Defining the semantics of the AI to be managed in terms of digital data structures is essential for introducing interoperability.

The existing documentation developed by States and international organisations and considered mature enough for global applicability will be used to produce common guidance material. This may serve as a reference for the database design needed in P-06 for States that do not yet have a database. New information requirements coming from the GATMOC will be analysed and modeled if needed (e.g., airspace sectors or information related to airspace and route traffic restrictions; generic information related to aircraft performance; information related to airline operators' call signs).

Status in Indonesia:

System developed at the DGCA still stands alone and is not yet integrated into a unified system. Integration of systems between units is in process. Guidelines are needed on the development of aviation technology in Indonesia.

Actions needed to comply:

Short term:

Develop and improve existing systems in line with the guidelines and modeling systems developed by countries with more advanced systems.

Medium term:

No medium-term activities were identified by the WG.

Long term:

No long-term activities were identified by the WG.

P-09 — Aeronautical data exchange

Defining the syntax of the aeronautical data to be exchanged in terms of field names and types is essential for introducing interoperability.

The exchange of data and the mechanisms to exchange or access the new digital products or services will be defined by an exchange model. The content of the model will be driven by the AI conceptual model (top-down) and by requirements coming from technological choices (bottom-up); the evolution of the model will be coordinated in order to balance the need for innovation with the need for protecting investments. The use of the Internet as a communication media is, for example, one important bottom-up driver in the definition of the model. The use of well-established, geographic information standards also applied in non-aeronautical domains is another important technological choice.

Status in Indonesia:

To be included in the ATM Master Plan.

Actions needed to comply:

No activities were identified by the WG.

P-10 — Communication networks

More data will be exchanged on ground networks and the current data will be exchanged in a form that requires more bandwidth. It is envisaged that a transition of the network to one based on Internet Protocol (IP) will be required to cope with these future needs. For the transition to AIM to be effective, future AIM needs will have to be declared in terms useable for network specification. Which data network will be used to distribute the new data products and services; what information can be exchanged via the Internet; and what information requires a secured network reserved for aviation are open questions that will need to be answered for the transition to be effective.

Status in Indonesia:

See the response under P-07.

Actions needed to comply:

No activities were identified by the WG.

P-11 — Electronic AIP (eAIP)

The integrated AIP will not be phased out. On the contrary, it will be adapted to include the new data products needed during the transition to AIM.

The electronic version of the AIP (eAIP) will be in two forms: a printable document, and one that can be viewed by web browsers.

Guidance material will be required to help States implementing the web browser form of the eAIP in order to avoid the proliferation of different presentations of AIP information over the Internet.

Status in Indonesia:

AIP is not currently in electronic format.

General information such as airport data, NOTAM summaries, and AIP Supplements are available online on the Ministry of Transport (MoT) website. For specific data such as those contained in the AIP books, a web-based system for exchanging information is being developed, and is already used internally at the AIS sub directorate.

Actions needed to comply:

Short term:

PDF version (printable document) on DGCA website.

Medium term:

Completely web-based (viewable by web browsers) on AIS (AIM) website (need to create website). Also NOTAM, AIC and AIP Supplements.

Long term:

Improve and develop systems that have been built to be accessible by all users of AI around the world, making documentation and a system operation manual and procedural manual for users of the system.

P-12 — Aeronautical information briefing

Fine-tuning of the current NOTAM format by introducing new selection criteria is needed to improve the selectivity of the information presented to pilots in the pre-flight information bulletin. (This can be done in Phase 1.) The combination of graphical and textual information in a digital net-centric environment will be used to better respond to airspace users' need for AI in all phases of flight once the new digital data products are specified and made available (in Phase 3).

Status in Indonesia:

To be included in the ATM Master Plan.

Actions needed to comply:

No activities were identified by the WG.

P-13 — Terrain

The compilation and provision of terrain data sets is an integral part of the transition to AIM.

Status in Indonesia:

There is a significant need to obtain quality-assured data.

Actions needed to comply:

Short term:

Develop a plan for WGS-84 validated data collection.

Medium term:

No medium-term activities were identified by the WG.

Long term:

No long-term activities were identified by the WG.

P-14 — Obstacles

The compilation and provision of obstacle data sets is an integral part of the transition to AIM.

Status in Indonesia:

Less than half of the airports have performed updated obstacle surveys. There is a significant need to obtain quality-assured data.

Actions needed to comply:

Short term:

Perform obstacle surveys and produce Aerodrome Obstacle Charts on all airports with commercial air traffic.

Medium term:

No medium-term activities were identified by the WG.

Long term:

No long-term activities were identified by the WG.

P-15 — Aerodrome mapping

There is a new requirement emerging from industry for traditional aerodrome charts to be complemented by structured aerodrome mapping data that can be imported into electronic displays.

Status in Indonesia:

There is an urgent need for aerodrome mapping.

Actions needed to comply:

No activities were identified by the WG.

P-16 — Training

The training of personnel will be adapted to the new skill and competency requirements introduced with the transition to AIM. A new training manual will be developed to reflect the new competencies required.

Status in Indonesia:

A draft training manual has been prepared. To meet the qualifications and increased knowledge required for implementation readiness of AIM personnel in Indonesia, AIS has sent personnel to attend the AIM Congress, AIS AIM Implementation Task Force (AAITF), AIM training , AIS training management and other training courses, such as

Safety Management System, CNS/ATM, AIS Refreshers, Cartography , Pans Ops, AIS Basic and Advanced.

Visits by AIS staff to several countries, including Australia, Japan and New Zealand, to understand the developments in technologies and procedures for AIM implementation in these countries, will be used as study materials for the development of AIS in Indonesia.

Actions needed to comply:

Short term:

Make improvements to the existing draft and send AIS personnel to attend AIS-related training to improve their knowledge and competence.

Make improvements to the existing draft and submit the draft to be ratified.

Medium term:

Continuously make improvements in line with changes and developments both in Indonesia and internationally.

Long term:

No long-term activities were identified by the WG.

P-17 — Quality

Quality management measures will be re-enforced to ensure the required level of quality of AI. In order to assist States in the implementation of an efficient quality management system, guidance material for the development of a quality manual will be developed.

Status in Indonesia:

A draft Quality Systems Manual has been developed.

Actions needed to comply:

Short term:

Make improvements to the existing draft and submit the final draft for ratification.

Medium term:

Continuously make improvements in line with changes and developments both in Indonesia and internationally.

Long term:

No long-term activities were identified by the WG.

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, neighbouring States, information service providers or others.

Status in Indonesia:

Data currently come from various sources and are of variable quality.

Actions needed to comply:

Short term:

1. Adopt a quality assurance perspective when receiving data from various sources.
2. Negotiate agreements with data originators.

Medium term:

No medium-term activities were identified by the WG.

Long term:

No long-term activities were identified by the WG.

P-19 — Interoperability with meteorological products

The meteorological data products of the future will be combined with AIM data products to form the future flight briefings and the new services provided to all ATM components.

This will require that meteorological data be made available in a similar format to the other aeronautical data that are clearly focusing on the use of open standards (such as XML and GML) for the implementation of table-driven data validation built into the data exchange mechanism, whereas current meteorological data products for aviation are based on simple alphanumeric codes.

Now that the bandwidth of telecommunication links and space for digital storage devices are no longer limiting factors, the move towards net-centric and system-wide

IM is becoming feasible for the wider distribution of meteorological forecast data from the world area forecast centres in a format that will not require considerable effort for the learning and configuration of decoding software, thereby ensuring true interoperability.

Meteorological information is essential in the compilation of pilot briefings. The transition to AIM will include activities at both the standardisation and implementation levels to find solutions for the interoperability of meteorological data products with the new AIM data products.

Status in Indonesia:

There were no MET participants in the WG.

To be included in the ATM Master Plan

Actions needed to comply:

No activities were identified by the WG.

P-20 — Electronic aeronautical charts

New electronic aeronautical charts, based on digital databases and the use of geographic information systems, will be defined to complement some paper charts and to replace others that have become obsolete and need to be improved to satisfy user needs. The possibility of deploying these new products over the Internet will be explored.

Status in Indonesia:

Indonesia has been using the electronic chart for drawing using AUTOCAD software. Each chart is stored in a separate file, so they are not yet integrated in a database. The data charts and data text contained in the AIP books are also not yet integrated in a single database.

Actions needed to comply:

Short term:

Airport chart data in Indonesia to be collated; ICAO mandatory charts to be put in electronic form using AUTOCAD. Arrange organisational chart data files.

Medium term:

Create a master plan of the systems, procedures, and technology to be applied in making charts. Improve knowledge and competency of personnel in preparing electronic charts.

Long term:

Implement the appropriate steps in the master plan.

P-21 — Digital NOTAM

One of the most innovative data products that will be based on the standard for an aeronautical data exchange model is a digital NOTAM that provides dynamic AI to all stakeholders with an accurate and up-to-date common representation of the aeronautical environment in which flights are operated. The digital NOTAM will be defined as a data set that contains information included in a NOTAM in a structured format that can be fully interpreted by a computer system for accurate and reliable updates of the aeronautical environment representation, for both automated information equipment and aviation personnel.

Status in Indonesia:

Indonesia has trialed a digital NOTAM using ATALIS version 2.0, but there were flaws in item E, which is still a free text field.

Actions needed to comply:

Short term:

Upgrade software to later versions and upgrade hardware. Monitor the latest developments in digital NOTAM to create a digital NOTAM development plan for Indonesia. Perform routine maintenance and repair in case of damage to software and/or hardware.

Medium term:

Perform planning, cost analysis and needs analysis for the full implementation of digital NOTAM. Create a master plan for implementation of digital NOTAM in the NOTAM Office and ensure the readiness of BOF in Indonesia to integrate with the system at the NOTAM Office.

Long term:

Implement the appropriate steps in the master plan.

6.3 ROADMAP TIMELINE (ICAO)

This roadmap provides a general indication of what the air transport industry may be expecting from States in their implementation of the transition to AIM. The timeline

below indicates to States the major milestones that ICAO envisages to support the transition to AIM and the GATMOC initiatives related to the management of AI.

December 2008	**Phase 1** — Consolidation began with the establishment of the AIS-AIM Study Group. More information on the work and planned actions of the Group may be found on the ICAO website at www.icao.int/anb/aim. The consultation process for Amendment 36 to Annex 15 and Amendment 56 to Annex 4 was initiated in the first quarter of 2009. The development of Amendment 2 to the AIS Manual (Doc 8126) and Amendment 30 to the PANS-ABC (Doc 8400) introduced guidance material on best practices already available.
November 2009	**Phase 2** — Going digital will begin with the development of new, related guidance material (electronic AIP, AI conceptual model, training, quality) with support from AIS-AIM sub-group, which will hold its second meeting at the end of 2009.
November 2010	Amendment 36 to Annex 15 and Amendment 56 to Annex 4 will become applicable. The preparation of Amendment 37 to Annex 15 and Amendment 57 to Annex 4 and any consequential amendments required in other annexes will progress with the help of - AIS-AIMSG.
October 2011	**Phase 3** — IM will begin with the fourth meeting of AIS-AIMSG, which will finalise the proposals for Amendment 37 to Annex 15 and Amendment 57 to Annex 4. These amendments will set the scene for the future requirements for States to produce data sets. It is not envisaged that new data products will be required for mandatory provision by the future ATM systems by this date, but if States choose to provide the data identified in scope at that time, they will be able to base their development on recommendations, ensuring global harmonisation. The consultation process of Amendment 37 to Annex 15 and Amendment 57 to Annex 4 will be initiated in the first quarter of 2012.
November 2013	Amendment 37 to Annex 15 and Amendment 57 to Annex 4 will become applicable. A divisional-type meeting may be held, should a substantial number of subjects of worldwide scope involving meteorological, AI and supporting communication network fields need to be agreed upon in order to finalise the

	transition to AIM. This could include a substantial enlargement of the scope of AI required by ATM and an obligation to provide the information in the form of digital data.
November 2016	Amendment 38 to Annex 15 and Amendment 58 to Annex 4 will become applicable, including the recommendations of the divisional meeting.

6.4 WEATHER INFORMATION - GENERAL ISSUES

Close coordination should be established (or continue) between the Meteorological Weather Office (MWO) in Indonesia and the corresponding ATS unit. This is a requirement set by the Asia/Pacific Regional Significant Meteorological Advisory (SIGMET) Guide. The controllers require access to up-to-date weather information in order to have a clear information source to make tactical or strategic decisions. The system should have access to the weather information (e.g., SIGMET) sources available in Indonesia and relevant neighbouring states in order to present high quality information to the controller and, when relevant, to be transmitted to pilots concerned.

It is also vital that the controller be able to transmit special air-reports received through voice communication to the associated MWO without delay.

6.5 SEARCH AND RESCUE SUPPORT

A delegated position within ATS should be able to detect if flight plans are not terminated. This may highlight either a failure to terminate a flight or, in a worse scenario, a potential accident.

In case of a potential accident, the operator should be able to view both passive and active recordings. With an active recording, the ATS staff can replay an event and actively make inputs, such as changing parameter settings, etc., during the replay.

SAR explained that currently the emergency beacons system for aircraft has not been fully updated with the SAR office. For example, SAR still lists the beacons of Adam Air even though the airline no longer operates.

REFERENCES

Law No. 1 of 2009 on Aviation

ICAO Doc 9750 - Global Air Navigation Plan

ICAO Doc 9854 - Global Air Traffic Management Operational Concept

ICAO Doc, Roadmap for the Transition of AIS to AIM, First Edition 2009

Indonesian AIP

National Strategy for the Implementation of ASEAN Open Sky Policy – May 2010

Report on Traffic Analysis – LFV Aviation Consulting, July 2010

Ministry of Transport Strategic Plan, 2010-2014

ANNEXES

ANNEX 1: KICK-OFF MEETING PARTICIPANTS

Activity number and title:	180, Air Navigation Blueprint		
Title of meeting:	Working Group 4 Kick-off Meeting	LFV Coordinator:	Johann Rollén
Date and place:	20 August 2010; Meeting Room of Air Navigation Directorate	WG4 Coordinator:	Dinni Noerdiani

No	Name	Position	Agency	Email	Phone
1	Djonny Sitorus	Kasi Pengendali Operasi	BASARNAS	djonny.sitorus@basarnas.go.id	
2	Ristowati	Staff	PT AP 1	marmunaristowati@yahoo.com	081399923362
3	Lely Munajah	PTS ADD BAN OPS	PT AP 1	leilmoon64@yahoo.co.id	08164859967
4	Tri Samyo R	KaBid Met Per	BMKG (Meteorology)	meteo.penerbangan@bmg.go.id	081284257747
5	Dinni Noerdiani	Dep Dir for AIS	Dit Nav Pen	dinni_n@yahoo.com	0818766982
6	Budiono R	AIS & Comm Manager	PT AP 2	budiono_richwan@angkasapura2.co.id	
7	Tati SF		PT AP 2	tsriwulan@yahoo.co.id	
8	Obing Toto		PT AP 2		081213744379
9	Jonni Firdaus	Ks Kartografi	Dit Nav Pen	Jonni.firdaus@gmail.com	08129942586
10	Agustono	AIS	Dit Nav Pen	agustono@yahoo.com	085215774437
11	Emil Ardiaman	PAU	IndII	emil.ardiaman@indii.co.id	
12	Lars-Gunnar Adolfsson	expert	LFV	larsgunnar.adolfsson@gmail.com	
13	Bert-Ake Wahlgren	Project Manager	LFV	bertake.wahlgren@lfv.se	
14	Arlini Dewi H	Secretary	IndII	arlini.dewi@indii.co.id	08122941592

ANNEX 2: KICK-OFF MEETING

A kick-off meeting was held on 20 August 2010 at the DGCA premises. The members of the WG were tasked with the following assignments:

1. Make a list of items to be considered and included in the update of the ATM Master Plan in the short, medium and long term.
2. Try to prioritise activities proposed for each time period.

The team results should be presented in a Working Paper (WP), answering the questions in the ToR listed above.

During the implementation period of new items, it must be stated that existing essential and important service levels must be maintained or improved. Before any decision is taken, a budget consideration must of course take place.

- Comments on the statements extracted from the report on Indonesian ATM planning review.
- Comment on questions/statements in boxes in the various chapters.

The following issues were tabled (see Appendix 2):

- AIS/MET/SAR issues had a limited influence in the 1994 Master Plan (Area of ATC). LFV ACT's opinion is that those issues must also be included in the Master Plan update in order to become part of the ATM Master Plan.
- Our plan is to follow ICAO's 7 key components concept (ICAO Doc 9854).
- AIS/AIM has increased in importance in the new "digital" world.
- An excellent document was presented by Dinni N. This can be attached to the WP as an appendix.
- SAR: Combined Aeronautical Rescue Coordination Centre (ARCC) and Maritime Rescue Coordination Centre (MRCC) belong to a separate organisation outside DGCA.
- MET: Separate organisation

For the WG to elaborate on:

1. What is the WG's opinion of the need for organisational changes at AIS and NOF in the short, medium and long term?
2. How shall we present the WG's opinion and time schedule in the updated Master Plan?

It is of utmost importance for the state of Indonesia to cater for undisturbed and safe domestic and international air traffic in the region as well as facilitating international transit traffic over Indonesia. This service includes AIS, MET and SAR activities.

The Traffic Analysis Report (Deliverable 1) shows rapid growth in domestic, international and transit traffic, and implementation of the Asean Open Sky Policy will further emphasise the need for ATM development.

Points considered:

- Implementation of new ICAO FPL format according to DOC 4444 year 2012.
- Implementation of an integrated AIS/AIM capability for Indonesian airspace enabling the distribution of AI.
- Date when all coordinates must be verified and clarified according to WGS-84.
- Tentative need for improvement of AIP and other presentations if any.
- Tentative plan for web-based presentation of AIP (as in Australia and Singapore).
- Correct FPL will play a major role in the future ATM system and the Flight Data Processing System (FDPS) will be the heart or brain of the future ATM system, with automatic data exchange with adjacent units. Updates of submitted FPL will be of paramount importance. Ujung Pandang and Jakarta ACCs will most probably play that role in the short term, but the team should consider if a national Flight Data Section or similar entity should take over that role in the medium or long term.
- Ref ICAO Road Map for the Transition from AIS to AIM:
    - Amendment 36 to Annex 4 will be applicable in 2011.
    - Amendment 37 to Annex 15 and Amendment 57 to Annex 4 will become applicable in November 2013.
    - Amendment 38 to Annex 15 and Amendment 58 to Annex 4 will become applicable November 2016.

See also Annex 3: Minutes of WG4 Kick-off Meeting.

ANNEX 3: MINUTES OF WG4 KICK-OFF MEETING

Location: DGCA building, 23rd floor

Date: 20 August 2010

Briefing points:

1. Mr. Lars explained the purpose of the master plan and WG activities in general.
2. Pak Emil explained the purpose of the WG activities in Indonesian in order to avoid misunderstanding.

Input from participants:

1. Mr. Lars asked about the current condition of coordination between AP 1/2, BMKG, and SAR regarding weather information and emergency response.
2. SAR explained that the emergency beacons system for aircraft was not fully updated at the SAR office. For example, SAR still listed the beacons of Adam Air even though this airline no longer operates.
3. Currently, BASARNAS is preparing its Master Plan. Some issues and plans can be adopted as input for the ATM Master Plan.
4. BMKG explained that it would face a dilemma in providing input into the ATM Master Plan. So far, BMKG has not yet revised its Master Plan, and will revise it sometime in the future. There were concerns that the meteorological input will not reflect the future needs of BMKG, being based only on personal views.
5. Mr. Lars asked about the possibility of information exchange on weather data from aircraft pilot to BMKG and whether this needed to be stated in the Master Plan. The forum believed that this will be possible in the future, but at present it has not been regulated and so cannot be done.
6. The forum believed that WGS-84 activities no longer need to be stated in the Master Plan because they are already routine activities at DGCA.

Next steps:

1. WG participants will comment on the AIS/MET/SAR materials provided by the consultant.
2. Comments and any information from participants will be collected by the WG coordinator (Dinni Noerdiani) via email.
3. Next meeting to be held on 29 September 2010, with discussion of incoming comments as its agenda.