Australia Indonesia Partnership
Kemitraan Australia Indonesia

AIR TRAFFIC CONTROL

WORKING PAPER FOR WORKING GROUP 2

INDONESIA
INFRASTRUCTURE
INITIATIVE

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GROUP 2 - AIR TRAFFIC CONTROL

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Jakarta, 15 October 2010

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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
AIDC	ATS Inter-Facility Data Communications
AIP	Aeronautical Information Publication
AIS	Aeronautical Information Services
AIM	Aeronautical Information Management
ATS	Air Traffic Services
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
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
AUO	Airspace User Operations
AWOS	Acquisition Weather Observation Stations
BLU	Public Service Agency
CAA	Civil Aviation Administration
CASR	Civil Aviation Safety Regulation

CBT	Computer Based Training
CDA	Continuous Descent Approach
CDM	Collaborative Decision Making
CDR	Conditional Route
CDTI	Cockpit Display of Traffic Information
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
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
IMC	Instrument Meteorological Conditions
ICVM	ICAO Coordinated Validation Mission Report
IndII	Indonesian Infrastructure Initiative
ITU	International Telecommunication Network
JAATS	Jakarta Advanced Air Traffic Control System
KPI	Key Performance Indicators
LoA	Letter of Agreement

LVP	Low Visibility Procedure
MAATS	Makassar Advanced Air Traffic Control System
MET	Meteorological Services for Air Navigation
METAR	Meteorological Report
MLAT	Multilateration
MoT	Ministry of Transport
MRT	Multi Radar Tracking
MSF	Multi Sensor Fusion
MSSR	Monopulse Surveillance Radar
MSAW	Minimum Safe Altitude Warning
MTCD	Medium Term Conflict Detection
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
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
RVR	Runway Visual Range
RVSM	Reduced Vertical Separation Minimum
SARPs	Standards and Recommended Practices
SBAS	Satellite-Based Augmentation
SID	Standard Instrument Departure
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
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
WGS-84	World Geodetic System — 1984
WAFS	World Area Forecast System
WRC	World Radio Communication Conferences
UTA	Upper Control Area

CHAPTER 1: INTRODUCTION

Law no. 1/2009 on Aviation requires that PT Angkasa Pura 1 (AP 1), PT Angkasa Pura 2 (AP 2) and the department of the Directorate General of Civil Aviation (DGCA) that provides Air Navigation Services (ANS) be merged into a single Air Navigation Services Provider (ANSP) and maintain the remaining part of DGCA as a Regulator. According to Law no. 1/2009, this shall be in force not later than January 2012.

This re-organisational work has started and a special taskforce managed by Director General of DGCA has been assigned with this task.

In order not to lose valuable time and resources during the reorganisation process, the following factors should be considered in future Air Traffic Management (ATM) planning and project implementation:

It is of outmost importance that Indonesia caters for undisturbed and safe domestic and international air traffic in the region as well as facilitates international transit traffic over Indonesia.

The Air Traffic Analysis Report (Deliverable 1) shows that there has been a great increase in domestic, international and transit traffic and an implementation of the Association of South East Asian Nations (ASEAN) Open Sky Policy will emphasise the need for ATM development even further.

The mission of supporting DGCA to develop an updated ATM Master Plan is contracted to the LFV Aviation Consulting Team.

The mission includes a transfer of knowledge to DGCA, AP1, and AP2 staff. By establishing working groups (WGs) where this staff can participate actively, this knowledge transfer process will be facilitated. Creating a WG for different domains with participation of in house experts also facilitates the production of a realistic and acceptable ATM Master Plan, which later on can be broken down into specific action plans. The meeting process in the four different WGs will result in four different Working Papers that will form one of the fundaments in the development of the final ATM Master Plan.

The ATM Master Plan will try to answer questions such as “What needs to be done?” and “When does it have to be done?” However, it will not answer the question “How will things be done?”

LFV Aviation Consulting Team is responsible for the WGs.

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

- DGCA/AP1/AP2 experts
- Civil Aviation Transportation Team (CATT) expert(s)
- International Air Transport Association (IATA) expert(s)
- Air services of Australia expert(s)
- Other expert(s)

As an additional task assigned by the Indonesia Infrastructure Initiative (IndII)/SMEC and agreed by the LFV Aviation Consulting, a working paper will be established based on the WGs results, which will be included in the updated ATM Master Plan.

The four WGs that have been established are:

- WG 1 – Air Traffic Flow Management (ATFM)/Airspace Management (ASM)
- WG 2 – Air Traffic Control (ATC)
- WG 3 - Communications, Navigation and Surveillance (CNS)
- WG 4 - Aeronautical Information Services (AIS)/ Meteorological Services for Air Navigation (MET)/Search and Rescue (SAR)

CHAPTER 2: LINKS TO INTERNATIONAL CIVIL AVIATION ORGANISATION (ICAO) AIR NAVIGATION PLAN DOC 9750

The following Global Plan Initiative (GPI) is linked to the domain of ATC: GPI 16

2.1 GPI-16 DECISION SUPPORT SYSTEMS AND ALERTING SYSTEMS

2.1.1 Scope

Implementation of decision support tools to assist air traffic controllers and pilots in detecting and resolving air traffic conflicts and in improving traffic flow.

Tools are available that will enhance safety. Examples are minimum safe altitude warning systems (MSAW), short-term conflict alert (STCA) and runway incursion alerting tools. Tools that can improve efficiency are automated flight data processing systems, medium term conflict prediction (MTCD) and sequencing tools, and online data exchange systems.

Note: Particularly in Jakarta, there is a lot of traffic movement on the ground, and ASDE (Airport Surface Detection Equipment) or SMR (Surface Movement Radar) (comment from Mr Suryadi (AP2) can be considered.

Comments from Consultants: Increase surface surveillance capability at Jakarta Soekarno Hatta Airport (i.e., Advanced Surface Movement Guidance and Control System [A-SMGCS]) to provide enhanced capacity during Instrument Meteorological Conditions (IMC) and use a dedicated ground control position.

Increase manning in Jakarta Tower (WIII TWR) to cope with parallel runway operations (this means also ground control).

Related Operational Concept Components: Demand and Capacity Balancing (DCB), Traffic Synchronisation (TS), Conflict Management (CM), Airspace User Operations (AUO)

2.1.2 Description of strategy

Decision support systems facilitate early resolution of potential conflicts, provide basic levels of explorative probing to optimise strategies, and reduce the need for tactical action. The executive role of controllers is thereby enhanced, giving scope for management of more traffic within acceptable workload limits.

Several tools are available that have the ability to substantially enhance safety. These include MSAW, STCA and runway incursion alerting tools. Tools that can improve efficiency include automated flight data processing systems, longer term conflict prediction and sequencing tools, and online data interchange systems.

Conflict prediction tools span several sectors and permit improved sectoral planning, thereby providing the advantage of more expeditious traffic flow and fewer potential conflicts within established arrival schedules. This will allow sector teams to operate more effectively and will result in more optimum and efficient arrival flows.

The automation of coordination tasks between adjacent sectors improves the quality of information on traffic transiting between sectors and makes it more predictable, thereby allowing reduced separation minima, decreased workload, increased capacity and more efficient flight operations.

2.1.3 Key features of a modern ATC system

A modern ATC system has a number of characteristics such as:

- Interactivity
- Information sharing
- Safety Nets
- Coordination and Automation
- Flexibility
- Conflict Detection
- Monitoring functions

2.1.4 Current situation in Indonesia.

The ATM system for Jakarta Flight Information Region (FIR) - Jakarta Advanced Air Traffic Control System (JAATS) has been operational from 1997 and it is now quite difficult to find spare parts (note: it's difficult to improve the quality (too old) instead of finding spare parts) (comment from Mr Suryadi (AP2)). JAATS is based on an American manufactured ATS system called Guardian. JAATS provides safety nets like STCA and MSAW, but does not provide any tool for conflict detection. The Guardian system is providing paper strips and does not provide for Automatic Dependent Surveillance-Broadcast (ADS-B). There is no ATS Inter-Facility Data Communications (AIDC) data exchange with adjacent FIRs. A replacement project has started and a new system is expected to be operational by 2013. This replacement is of vital interest for development of the ATM capacity in the country. If this will be delayed it will most

likely cause major delay situations also for the airspace user's growing demand for ANS.

Ujung Pandang FIR ATM (Makassar Advanced Air Traffic Control System [MAATS]) system is newer and has been operational since 2005. MAATS is a Thales production named Eurocat X. MAATS provides for safety tools like STCA and MSAW. Monitoring aids, like MTCD (for conflict detection) are operational. The system also can provide Route Adherence Monitoring (RAM) warnings and Cleared Level Adherence Monitoring (CLAM) warnings. MAATS operates with electronic strips and can integrate ADS-B surveillance .The system also provides for AIDC with adjacent FIRs.

The radar data and flight data at Jakarta Area Control Centre (ACC) and Ujung Pandang ACC are not linked to each other, and thus radar hand-off between Jakarta and Ujung Pandang ACCs has not been made yet.

2.1.5 Comments from stakeholders

Comments from CATT: The ATM Master Plan needs to identify enabling actions needed to fully implement the available traffic conflict tools at Makassar and eventually in Jakarta.

Comments from kick-off meeting:

- How do you calculate sector capacity?
- Staff recruitment and training process is not sufficient.
- How do you provide procedural control in Jakarta FIR in case of JAATS failure?

Comments from consultants:

"How" questions will be a continuous task after the ATM Master Plan is finalised.

2.1.6 For WG to elaborate on :

Assess whether or not there is an urgent need to immediately start a short term interim activity for Jakarta ACC/Approach Centre (APP) to implement a back up system (emergency system) in order to grant safe operations awaiting the new JAATS to be commissioned.

Comments from consultants:

Recommendation to investigate whether an interim solution is required for present JAATS from a contingency perspective and assess which solution is needed.

CHAPTER 3: ATM MASTER PLAN OBJECTIVES

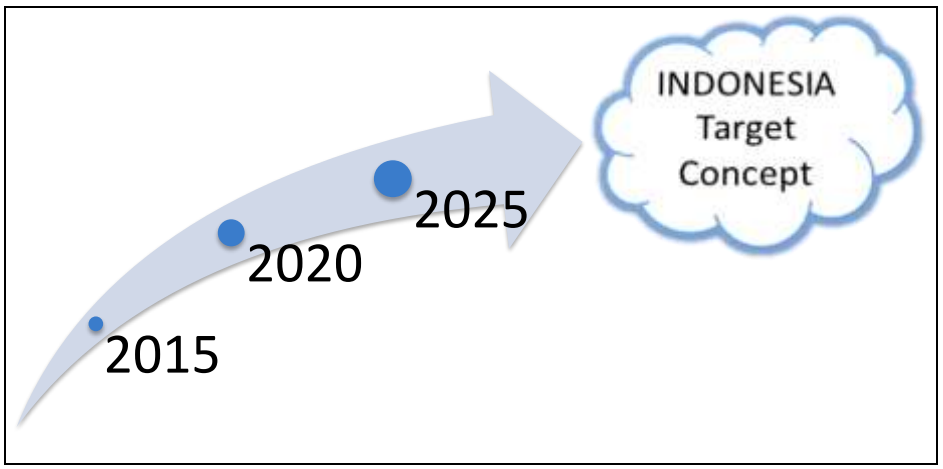
The ATM Master Plan for Indonesia will be a reference document for the development of the ATM over the next 15 years.

The document is based on and developed from the Master Plan issued in 1994 with considerations from the Japan International Cooperation Agency (JICA) study from 2002-2008 and the new law no. 1/2009 on aviation. The result from this WG will be an integrated part of the ATM Master Plan.

It will be composed of three stages:

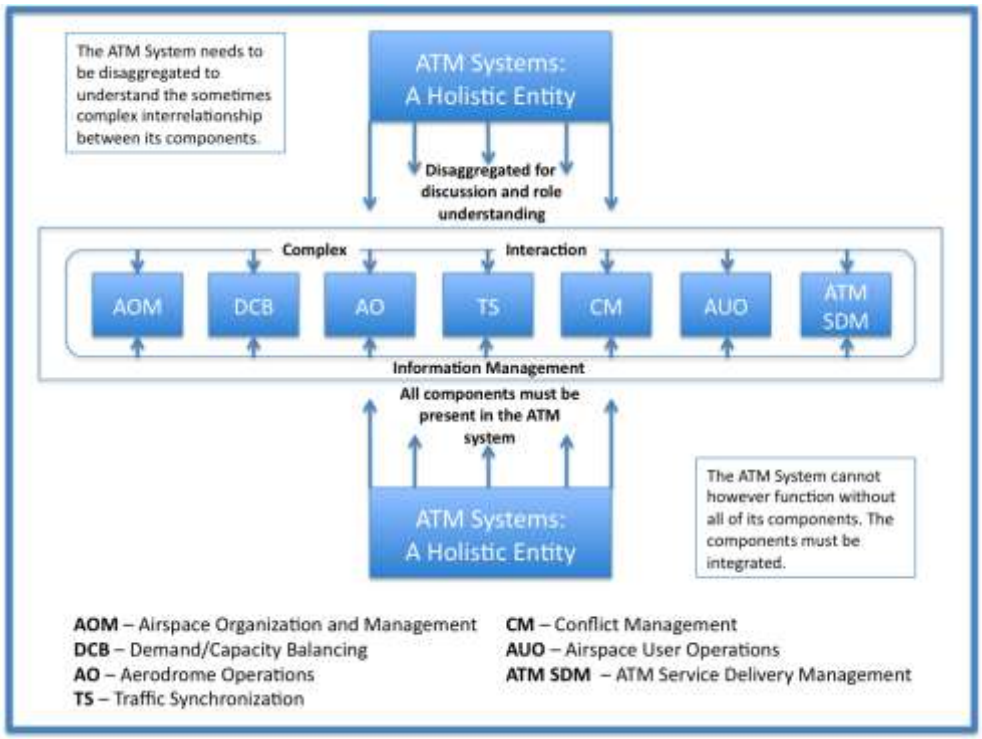
- Short term: up to 2015
- Medium term: from 2016 to 2020
- Long term: from 2021-2025 and beyond

Figure 1: ATM Master Plan Milestones



To ensure that 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 9.

Figure 2: ICAO concept components



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.

CHAPTER 4: DEMAND/CAPACITY BALANCING – DCB

4.1 DESCRIPTION OF CONCEPT

DCB will strategically evaluate system-wide traffic flows and aerodrome capacities to allow airspace users to determine when, where and how they operate, while mitigating conflicting needs for airspace and aerodrome capacity. This collaborative process will allow for the efficient management of the air traffic flow through the use of information on system-wide air traffic flows, weather and assets.

Key conceptual changes include:

- through collaborative decision making (CDM) at the strategic stage, assets will be optimised in order to maximise throughput, thus providing a basis for predictable allocation and scheduling;
- through CDM at the pre-tactical stage, when possible, adjustments will be made to assets, resource allocations, projected trajectories, airspace organisation, and allocation of entry/exit times for aerodromes and airspace volumes to mitigate any imbalance; and
- at the tactical stage, actions will include dynamic adjustments to the organisation of airspace to balance capacity, dynamic changes to the entry/exit times for aerodromes and airspace volumes, and adjustments to the schedule by the users.

4.2 SHORT TERM ACTION

In the new JAATS, a Flow Management Position (FMP)/Airspace Management Cell (AMC) work station should be planned. The tasks for the FMP could be extended further. DGCA could take the initiative to play a coordinating role in ATFM measures in the region for the benefit of all airspace users.

Note from Mr Budiarso Maskon (AP 1): DGCA should as soon as possible coordinate the input of traffic flow arrangements, which come from various parties. Current time slot problem becomes messier problem, because each has his own formula, so that the most representative statement was never clear. Taskforce on ATFM should be promptly formulated and implemented.

A new ATM system should support the presentation of expected sector demand derived from FPL information and/or other sources.

The introduction of ATFM measures including establishment of a FMP in Jakarta and Ujung Pandang should start as soon as possible in a first phase using “manual” working methods and computer assisted by normal office equipment.

As a part of this action, following activities will facilitate the future introduction of ATFM in Indonesia:

4.2.1 Sector load prediction

The new JAATS should be able to present predicted sector loads based on flight plan information and possibly other parameters. Ideally the system support should be able to reflect not only volumes of traffic but also expected complexity. Complexity factors could be expected conflicts, military activity or weather. The function would support planning of sectorisation and staffing of ACC/APP centres and give benefits in efficiency and safety.

Note from Mr Budiarso Maskon (AP1): Can the consultant show that there is ATC center that has been equipped with such software? Software that can automatically calculate the load based on the volume of flight plan at the sector, as well as calculate the level of complexity?

Comments from consultants:

Modern ATC systems can predict traffic load based on FPLs. Capacity value assessments have to be performed either manually or via some capacity analysis program, where airspace complexity is one among several criteria.

4.2.2 For the WG to elaborate on:

Is the Eurocat X system in U-P ACC capable of providing sector loads based on FPLs?

Note from Mr Budiarso Maskon (AP1): Basically Eurocat X is not equipped with software that calculates the loads based on flight plan in the sector, but our staff (AP1) can create such software. In fact, as long as there are formulae, we can also create software that calculates the level of complexity in a sector.

4.3 MEDIUM TERM ACTION

See WP for WG 1

4.4 LONG TERM

See WP for WG 1

ATM systems including sector load and capacity criteria needs to be compliant to future requirement according to ICAOs Global ATM Operational Concept (GATMOC).

CHAPTER 5: TRAFFIC SYNCHRONICATION – TS

TS refers to the tactical establishment and maintenance of a safe, efficient and orderly flow of air traffic. TS, CM and DCB are interrelated and will become fully integrated, leading to a continuous and organised flow of traffic.

TS encompasses both the ground and airborne part of ATM and will constitute a flexible mechanism for capacity management by allowing reductions in traffic density and adjustments to capacity in response to variations in demand.

TS will make use of integrated and automated assistance to arrival and en-route management (AMAN) to ensure an optimum traffic flow. The objective will be to eliminate choke points and, ultimately, to optimise traffic sequencing to achieve maximisation of runway throughput.

TS, together with the other ATM components, will contribute to the efficient handling of traffic. There will be dynamic 4-D trajectory control and negotiated conflict-free trajectories. These techniques will reduce the need for traditional path stretching in high traffic density areas and will reduce the adverse impact this has on economy and efficiency.

TS will be applicable and tailored to all airspace and aerodromes where the optimised ordering and sequencing of traffic are critical to accommodate demand.

TS principles include the following:

- the ability to tactically and collaboratively modify sequences to optimise AO, including gate management and/or AUO;
- evolution into 4-D control where a flight is given a time profile to follow to optimize throughput;
- delegation of maintenance of spacing to the flight deck to increase traffic throughput while reducing ground system workload; and
- The activities above should be seen as visionary and therefore considered in the Long Term.

Development and Implementation

A well-organised Arrival Management is important for efficient operations. This is becoming increasingly important with the development of fuel prices and also due to increased environmental awareness. For Soekarno-Hatta Airport an efficient flow of traffic is important for the airspace users and for the airport. The airport will have more predictable arrival times, an important element for gate planning.

Arrival Management should not only meet the demand from ATC to sequence traffic, but also help to facilitate more efficient descent operations. The goal should be to gradually offer continuous descent operations (CDA).

Note from Mr Budiarso Maskon (AP1): AMAN, basically very helpful in terms of organising the traffic. But this requires also a change such as the runway configuration. Since, in Indonesia there were only airport with two runways (Jakarta and Makassar) then it is quite difficult to put into practice in a single runway airport premises. In addition, given the use of the runway to depart and arrive was the same, then the operation will be strongly associated with AMAN management to the departure gate.

Comment from consultants:

Sequencing of traffic using an AMAN tool is facilitated and has no relation to number of runways on the airport. Of course more traffic can be sequenced if less separation is needed for arriving traffic due to more runway capacity.

5.1 SHORT TERM ACTIONS

The information from the arrival management tool (AMAN) should be integrated with the normal display system to provide efficient advisories for the controllers in relevant ACC sectors adjacent to APP sectors and for the APP sectors for traffic to Soekarno-Hatta Airport.

5.2 MEDIUM TERM ACTIONS

Pending on expected traffic development, AMAN should be considered also for the airports in Surabaya, Bali, Medan and Makassar.

5.3 LONG TERM ACTIONS

See introduction text to TS above.

CHAPTER 6: CONFLICT MANAGEMENT – CM

CM consists of three layers:

- Strategic
- Separation provision
- Collision avoidance

6.1 STRATEGIC

The strategic CM consists of organising and managing airspace to reduce conflicts in traffic flows to the extent possible. The capacity of the ATM system should be organised to meet the expected traffic demand. In the rare instances when this is not possible restrictions should be published, to avoid overload of the ATM system. TS, being one component of CM, aims at organising and optimising traffic to avoid bunching. The overall aim of the strategic CM is to reduce tactical conflicts and indirectly unlock controller workload.

6.2 SEPARATION PROVISION

The second layer of CM is separation provision. It is used to detect deficiencies in the strategic planning and where the evolving tactical events have not been possible to plan conflict free. There are four possible stages of a separation provision:

- Conflict detection
- Solution selection[1]
- Implementation
- Monitoring

The ATC system should include support for these stages. Medium Term Conflict Detection (MTCD) provides a means for system identified conflicts. The MTCD function provides additional support to the planning function in the detection and analysis of conflicts. The function is highly dependent on accuracy of data, trajectory predictions and conflict parameters. Experience from past implementations indicates an acceptable degree of usability during stable flight conditions. In dynamic environment, e.g. Terminal Control Area (TMA) operations, the function is expected to improve in the future from a usability perspective. MTCD should also check for Segregated Airspace and provide an improved means to tactical flight planning and for re-routing.

[1] The controller will not necessarily select and implement a measure for all conflicts. It is also possible it will just be monitored. If it does not deteriorate action it may not be necessary.

The aim of MTCD is to facilitate a move from the current largely reactive form of ATC to more pro-active control, thereby balancing more evenly the workload of tactical and planning tasks, enhancing sector team efficiency and providing an even safer and better service to airspace users. By maximising the opportunity of pro-actively solving problems during sector planning, it is hoped to reduce tactical workload.

6.3 COLLISION AVOIDANCE

The third layer of CM is collision avoidance. The ground system shall have a Short Term Conflict Alert (STCA) to inform the controller of the immanent risk of separation infringement.

An STCA is a safety net to warn the controller of any situation where the minimum separation distances between any pair of surveillance tracks is, or is predicted to be violated within a short time (usually two minutes). By providing a visual alert on the Air Situation Display the controller can retrieve the alerts in a timely manner to resolve the potential hazardous situation that has occurred. Potentially, the system should also support audible alerting.

Note: STCA is mandatory in Europe, and EUROCONTROL have recommended the following principles to be placed at the centre of policy making for use of STCA:

- STCA is a safety net; its sole purpose is to enhance safety and its presence is ignored when calculating sector capacity.
- STCA is designed, configured and used to make a significant positive contribution to the effectiveness of separation provision and collision avoidance.

STCA should not be used as a separation tool, an important issue for training.

6.4 MONITORING

Monitoring is an important part of the controller's tasks and a modern system can support the controller in this area through:

- Route Adherence Monitoring – RAM provides support in detecting that an aircraft is no longer following the trajectory as expected by the system.
- Clearance Adherence Monitoring – CLAM provides support in detecting that an aircraft is not following the assigned clearance issued by ATC.
- Area Proximity Warning - APW provides support in detecting that the aircraft is about to enter a segregated area.
- MSAW – This provides support in detecting that the aircraft is too low in altitude.

- Presentations of Flight Management System (FMS) data; pilot operations.

6.5 SHORT TERM ACTIONS

STCA and MTCD should be implemented and approved for operational use as soon as practicable in both ACCs

6.6 MEDIUM TERM ACTIONS

RAM, CLAM, APW and MSAW should be implemented in Jakarta ACC. Safety nets in Ujung Pandang considered to be approved for operational use.

6.7 LONG TERM ACTIONS

To be decided.

CHAPTER 7: AIRSPACE USER OPERATION – AUO

7.1 DESCRIPTION OF CONCEPT

AUO refers to the ATM-related aspect of flight operations.

Key conceptual changes include:

- the accommodation of mixed capabilities and worldwide implementation needs will be addressed to enhance safety and efficiency;
- relevant ATM data will be fused for an airspace user's general, tactical and strategic situational awareness and CM;
- relevant airspace user operational information will be made available to the ATM system;
- individual aircraft performance, flight conditions, and available ATM resources will allow dynamically-optimised 4-D trajectory planning;
- CDM will ensure that aircraft and airspace user system design impacts on ATM are taken into account in a timely manner; and
- aircraft should be designed with the ATM system as a key consideration.

The ATM system shall accommodate different types of services for diverse user needs. Air transport, military missions, business, private flights and aerial work all have different requirements and planning horizons. The system needs information from the airspace users to be efficient and ATM data is also needed for the users, to maintain situation awareness.

Individual aircraft performance parameters are important for the optimisation of the 4-D trajectory management. In transition to the target ATM concept of 2025 there will be an increased importance of providing user preferred trajectories. Business oriented operations with a growing demand for economical gains is driving expectations for a more clear ownership of the predicted trajectory from the airspace users. This will require support for planning and execution of user preferred trajectories and most importantly predictable operations.

7.2 SHORT TERM ACTIONS

To be elaborated by the WG

Recommendations from WG: Establish a CDM between ATC/Airport/Airspace Users.

7.3 MEDIUM TERM ACTIONS

To be elaborated by the WG

Recommendations from WG: Develop the CDM concept described above further.

7.4 LONG TERM ACTIONS

Recommendations from consultants: Implement ATC systems that can cater for 4D trajectories.

Consider implementation pending the result of the global development in this area.

CHAPTER 8: ATM SERVICE DELIVERY MANAGEMENT – ATM SDM

8.1 DESCRIPTION OF CONCEPT

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 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.

8.2 SHORT TERM ACTIONS

To be elaborated by the WG. See also WP from WG3 CNS

- Implement AIDC between Ujung Pandang ACC and Brisbane (not in operation due to software problem in Brisbane according to AP1 info.)
- Comment from Consultants:

  Establish a system integration to increase ATC Capacity (AIDC) between available neighbours as well as between Indonesians ACC and between ACC and relevant APP units.

8.2.1 ATC automation systems (System coordination) (see also WP from WG 3 CNS)

The new JAATS should from the planned start 2013 enable the support of the features given below and with evolutionary development envisaged. Necessary updates of the

MATSC and relevant APP systems for enabling support of these features should also be considered.

- Automatic coordination support between internal ACC sectors and between ACC sectors and APP sectors.
- Automatic coordination support between ACC and Jakarta APP.
- Automatic coordination support between ACC and adjacent ACC centres.
- Limited coordination support between ACC and local TWR/APP.

The AIDC standard provides definitions for message exchange between different units in order to exchange flight plan data information. For sector to sector coordination the entry and exit conditions for flights should be exchanged and late changes could trigger an update or dialogue about entry/exit conditions. For ATMC to APP coordination entry and exit conditions together with expected departure time could be exchanged in order to reduce verbal communication.

Recommendation: The messages defined in the AIDC standard should be available for definitions of data exchange between the system and adjacent centres and units.

8.2.2 Communications (VCS, CPDLC) (See also WP from WG 3 CNS)

A flexible modern voice communication system (VCS) is a prerequisite for a user-friendly work situation where reliable communication is essential not only for safety reasons but also for the efficiency and flexibility for sector manning. The VCS must be able to support air-ground and ground-ground communication and ground-to-air and ground-to-ground digital and analogue communication in the Very High Frequency (VHF) and Ultra High Frequency (UHF) bands. It is vital that a VCS consists of features that will facilitate redundancy.

The VCS should support functions such as short-term recording and playback and provide features such as a telephone book. All information should be well integrated into the Controller Working Positions (CWP) using e.g. touch screens tailored with quick access for the most critical commands. The VCS functions and layout should support the controller in stressful situations by minimising the operation time and workload.

Since the ATC system shall be role based it is important that the VCS also supports a merge and split of roles (i.e. sectors) depending on workload.

8.2.3 Navigation (See WP for WG 3 CNS)

8.2.4 Surveillance

The surveillance function of the new ATC System will have an important role since it will feed accurate position data to the Safety Net, Monitoring Aids (MONA), 4D Trajectory Prediction etc. Improved position accuracy will lead to better tracking of targets resulting in less nuisance alerts or low quality predictions.

The Radar and ADS-B infrastructure will feed surveillance information to the ATC system via a Multi Radar Tracker (MRT - for Radar based data) and Multi Sensor Fusion (MSF) process (merging radar information with ADS-B). The aim of the MRT (part of Radar Data Processing System [RDPS]) and MSF (part of Sensor Data Processing System [SDPS]) is to ensure one system track with the best available position accuracy for the controller to work with.

The surveillance infrastructure is considered to be sufficient to meet the operational needs according to coverage graphs. However ADS-B surveillance is not in operational use and no regulations concerning the use is developed. No operational separation criteria for future operations is yet developed, which shall be a part of the ATM Master Plan. A future expansion step to consider is building a data link infrastructure so that efficient use of 4D-trajectory information (i.e. intent) can be achieved. With 4D-trajectory information the controller and the ground system would get access to the information calculated by the aircraft FMS. This information enables advanced flow management and increased predictability whilst reducing the dependency of Trajectory Prediction calculations. With the introduction of ADS-B and on-board systems such as Cockpit Display of Traffic Information (CDTI) it is important for the controller to understand the aircraft capabilities. Radar information from external sources (neighbouring countries or military) can be used to ensure redundancy or extend the coverage around Indonesia.

When planning for a non-paper strip system the issue of fall-back level(s) becomes critical. The paper-strips represent a part of the presentation of flight information that remains even if serious break-downs occur. To gain confidence and also to respect safety operators should be provided with a fall-back system with air situation display presentations. The fall-back level represents a last level of presentations if resilient system architecture is penetrated.

Recommendation: The fall-back level should allow for the safe management of flights at the time of problems or system failure(s) but does not need to provide a means of maintaining high or normal traffic volumes. (See 8.2.6)

The MAATS and JAATS technical system shall support surveillance, Flight Data including predicted sector demand, Operational planning, Communication, support Alerting Services and Flight information.

The systems shall also enable automatic coordination with neighbouring FIR's starting 2011 in Ujung Pandang and following an evolutionary process to be commissioned depending adjacent unit capability.

The systems should enable automatic transmission of ATS-messages to other ADC/APP in the respective Indonesian FIRs.

The layout and capabilities for the new or updated ATM-system should enable a future expansion of up to at least 8-10 ACC-sectors and at least 4-6 APP sectors for the respective ATM-center. This expansion capability is essential in order to be able to split the sectors into smaller volumes of airspace to accommodate future traffic growth. Additional sectors are necessary to be established in order to have sufficient ATC capacity to balance the growing demand. The route structure, whether it is fixed or not is a factor that concerns the evaluation of sector capacity values.

Note from Mr Budiarso Maskon (AP1): Paper strip has been implemented in MATSC

8.2.5 Flight Data Function

Expected functions for the management of Flight plan data processing are elaborated in design system. This includes three major functional blocks containing several functional elements:

- Flight Plan Data Acquisition
- Flight Plan Data Management
- Flight Progress Control

8.2.6 Contingency

“ATS authorities shall develop and promulgate contingency plans” according to ICAO requirements (Annex 11, Ch 2.30 (Amendment 46).

Exactly what such a plan shall contain is not specified. Normally in this context there are:

a) Short-term contingency that encompasses safety related emergency situations when services are interrupted due to outage or malfunctions of system(s) needed for normal operations. A plan covering these aspects shall prove that if something goes wrong, uninterrupted service can be provided without a negative impact on the safety. This means plans to reduce the amount of traffic handled if there are malfunctions in the systems and can this reduced traffic be handled in a safe way with this malfunction(s) still in force, i.e. how to reduce the traffic or “clear the sky” in a safe way.

b) Long-term contingency - Normally referred to as Service Continuity (or Business Continuity) - if a unit due to outage or malfunction of system(s) after A. no longer can provide any services an alternate site from where services can be provided should be identified.

For the WG to elaborate on;

1	Are there contingency plans based on A and B above?
2	On internet there is contingency plan for transit traffic over Jakarta AoR. Are those plans updated and approved by DGCA?
3	Are there similar plans published for overflying Ujung Pandang AoR?

Note from Mr Budiarso Maskon (AP1): We need contingency plans. JATSC can take over operations if MATSC fail, and vice versa.

Comments from consultants:

Recommendation for the short term:

Establish a task force prior to the establishment of a single ANSP, with the objective to create a harmonised integrated future ATM system for the whole of the Indonesian airspace including ACCs and major APP units. (experts from DGCA/AP1/AP2, and external experts if deemed necessary)- (also for contingency reasons)

8.2.7 Safety Management System

There is an ICAO requirement to implement a Safety Management System (SMS) within ATM services. There is also an ICAO requirement to implement Quality Management (QM) within Aeronautical Information Services (AIS).

In an organisation with a developed safe culture an SMS is integrated in all operational activities. Foremost a safety policy is established stating the aim of the safety work for the organisation. SMS can be seen as four different parts integrated in a process.

1. Organisation and safety culture
2. Proactive safety work
3. Reactive safety work
4. Surveillance

Note from Mr Suryadi (AP1): If possible, it is also important when safety audit is in a place.

Comments from consultants:

Safety audits are part of the surveillance in the SMS process and are of course an essential part of the total SMS.

1. Organisation and safety culture

- The Accountable Manager has the overall responsibility for safety within the organisation but all employees have a responsibility to ensure that all activities are conducted according to the safety policy.
- It is every manager's responsibility that employees are encompassed by a high level of safety culture, enough HR staff with adequate competence for safe work is available, lessons learned are shared, and the safety level is always monitored.

2. Proactive safety work

- A proactive safety culture is established among all staff and encompasses all ATM/CNS activities (staff, procedures and equipment)
- Introduction of new systems or changes in current systems shall not take place without a risk assessment been made prior to implementation
- Trends and identified problem areas should be analysed and necessary actions should be taken.
- Cooperation and bench marking with international/national organisations with the aim to develop and use of best practices.

3. Reactive safety work

- Safety related deviations and identified risks in the current system are reported immediately, analysed and corrective measures are taken to prevent a reoccurrence.

4. Surveillance

- Safety audits and regular follow-ups are conducted to monitor the safety level in order to identify possible risks and take action before the risk develops into a problem.

For the WG to elaborate on:

1	Comment on p 1-4 above, where Indonesian ATM is currently.
2	Is it likely that many of the above short term actions will also be medium (long) term actions?

Comments from consultants:

a) No safety policy is established and the safety culture not yet developed.

b) No proactive safety work is documented, where safety assessments prior to changes have been identified.

c) Reactive safety work has only reached an immature safety level with very few reports. AP 1 reports that a non punitive reporting culture has been established. However, this concept is still at a very immature level.

d) Safety audits from DGCA are conducted in some aerodrome controls. The consultants have not been able to identify a structured schedule or check-lists for safety audits. These audits are not carried out at the two ACCs. No internal safety audits are performed in the different organisations.

8.3 MEDIUM TERM ACTIONS

To be elaborated by the WG

Comments from consultants: Develop all 4 steps of SMS

8.4 LONG TERM ACTIONS

To be decided

CHAPTER 9: TENTATIVE IMPLEMENTATION SCHEDULE

9.1 SHORT TERM:

1. Increase manning in WIII TWR to cope with parallel runway operations
2. Provide regulated data exchange according to Doc 4444. FPL/DEL/CHANGE/DEP etc.
3. Review the ATS procedures for landing/arriving traffic at Jakarta SH Aerodrome (a team has just started with initial review)
4. Finalise specification requirement for the new JAATS (this year)
5. Establish a task force prior to the establishment of a single ANSP, with objective to create a harmonised integrated future ATM system for the whole of Indonesian airspace including ACCs and major APP units. (experts from DGCA/AP1/AP2, and external experts if deemed necessary)- (also from contingency reason)
6. Requirement for replacement of MAATS should be considered in point 5.
7. ATC/CNS training/reporting system/analyses etc. Establish more standardised ATS procedures and working methods between ACC/ACC sectors and between ACC/APP sectors
8. Increase surface surveillance capability at Jakarta SH Airport (i.e. A-SMGCS) to provide enhanced capacity during IMC
9. Implement ground control functions as a capacity enhancement for required aerodromes
10. Investigate whether an interim solution is required for present JAATS from a contingency perspective
11. STCA and MTCD approved for op use in both ACCs (new JAATS)
12. Establishment of a strategical HR process (HRM)
13. Further development of SMS (SMS-training/reporting/trend analyses

9.2 MEDIUM TERM

1. Review Standard Instrument Departure (SID)/Standard Instrument Arrival (STAR) requirements for major airports and make necessary new procedures based on Performance Based Navigation (PBN) (horizontally separated) as a compliment that can cater for CDA approaches (See WP1)
2. Establish PBN routes according to user requirements (one way where traffic load is high) as a compliment to conventional ATS routes (See WP1)
3. Establish system integration to increase ATC capacity (AIDC) between available neighbours as well as between Indonesians ACC and between ACC and relevant APP units.

4. Increase ATC capacity by increased automation between ACCs and between ACC and relevant APP units.
5. ACC systems should include RAM, CLAM, APW, MSAW capabilities as well as a flexible VCS with role based capability
6. Implement surface surveillance capability at relevant major airports (i.e. A-SMGCS) to provide enhanced capacity during IMC (consultant will check if there are any criteria requirement)
7. Implement sequencing tool for traffic inbound Jakarta
8. Development of HRM processes
9. Development of SMS process (SMS-training/reporting/trend analyses)

9.3 LONG TERM

1. ATC systems that can cater for 4D trajectories
2. ROT- Remotely Operated Towers as an option
3. ATC systems that are integrated and harmonised with neighbouring systems to fulfill ICAO vision according to the GATMOC

CHAPTER 10: VISION ACCORDING TO ICAO

10.1 DEMAND AND CAPACITY BALANCING

The function of DCB will be to minimise the effects of ATM system constraints. DCB will be capable of evaluating system-wide traffic flows and capacities in order to implement necessary actions in a timely manner.

DCB will allow airspace users to optimise their participation in the ATM system while mitigating conflicting needs for airspace and aerodrome capacity. Collaborative usage of decision-support tools will ensure the most efficient use of airspace resources, provide the greatest possible access to airspace resources, provide equitable access for all airspace users, accommodate user preferences and ensure that demand on an airspace resource will not exceed its capacity.

DCB will be integrated within the ATM system and will be undertaken at the strategic, pre-tactical and tactical stages.

DCB principles include the following:

a) the difference between user-requested trajectories and actual trajectories will be optimised

b) recognition of deficiencies and optimisation of assets will ensure maximum capacity through the balancing of operations against available assets

c) balancing techniques will generally be based on system predictability; however, systems must be able to accommodate unplanned situations

d) DCB will be performed from gate to gate;

e) system-wide balancing techniques will also be used to resolve local DCB problems;

f) strategic initiatives will require tactical flexibility to provide optimal airspace availability;

g) DCB will take into account information about current and predicted airspace conditions, projected demand as well as past performance. Tools to strategically identify areas and times of higher density will also be available.

LFV Aviation Consulting remark

“Indonesian ATFM has been developed during the last 10 years, now being a part of a centralised Flow Management Unit. DCB is made on a strategical, pretactical and tactical stage for the whole southeastern Asia using all airspace according to the AOM concept.

All sectors (airspace volumes) have declared their capacity values, which may differ during each 24 hour period depending on usage of airspace from military units, weather conditions etc. All traffic movements from gate-to-gate (G2G) are part in this

assessment concerning available capacity versus the demand. Technical support tools have been developed for this mission so the airspace can be used equitable for all users at an optimum level. Traffic can in a large extend fly their user preferred trajectories and be provided different alternatives in a tactical and flexible way".

10.2 TS

TS refers to the tactical establishment and maintenance of a safe, orderly and efficient flow of air traffic. TS, CM and DCB are interrelated and will become fully integrated, leading to a continuous and organised flow of traffic.

TS encompasses both the ground and airborne part of ATM and will constitute a flexible mechanism for capacity management by allowing reductions in traffic density and adjustments to capacity in response to variations in demand.

TS will make use of integrated and automated assistance to surface, departure, arrival and en-route management to ensure an optimum traffic flow. The objective will be to eliminate choke points and, ultimately, to optimise traffic sequencing to achieve maximisation of runway throughput.

TS, together with the other ATM components, will contribute to the efficient handling of traffic from gate to gate. There will be dynamic 4-D trajectory control and negotiated conflict-free trajectories. These techniques will reduce the need for traditional path stretching in high traffic density areas and will reduce the adverse impact this has on economy and efficiency.

TS will be applicable and tailored to all airspace and aerodromes where the optimised ordering and sequencing of traffic are critical to accommodate demand.

TS principles include the following:

a) the ability to tactically and collaboratively modify sequences to optimise AO, including gate management and/or AUO;

b) evolution into 4-D control where a flight is given a time profile to follow to optimise throughput;

c) delegation of maintenance of spacing to the flight deck to increase traffic throughput while reducing ground system workload; and

d) wake vortex, which will continue to be a determinant of minimum spacing. Flight parameters will be available to the ATM system, allowing for dynamic spacing and sequencing of arriving and departing aircraft.

LFV Aviation Consulting remark

TS is made on a tactical base, which is the day of operation. The technical support tool for managing all phases of flights including airports movements will assist in finding the

optimum traffic flow. The TS is fully integrated with the DCB tools as well as the support tools for the CM, ensuring a conflict free trajectory for the individual flight. This support tool for TS will accommodate even traffic flows and sequence the traffic based on an arrival time over a defined navigational point. The arriving traffic for e.g. Jakarta will be sequenced and spaced by issuance of very narrow timeslots being part of the dynamic trajectory. By the use of this TS tool, traffic bunching at airports, arriving/departing and en route will be mitigated. Sequencing between flights will be delegated to flight deck to optimise runway throughput, where wake vortex problems will be taken into account.

10.3 AIRSPACE USER OPERATIONS

AUO refers to the ATM-related aspect of flight operations.

The ATM system will accommodate diverse types of airspace user missions. These are expected to encompass, but are not limited to, air transport, military missions, business, aerial work and recreation. These missions will have differences in planning horizons, from those scheduled well in advance to just prior to flight.

The ATM system will accommodate diverse types of vehicle characteristics and capabilities.

Both manned and unmanned aerial vehicles will form part of the ATM system. The ATM system will accommodate the limited ability of some vehicles to dynamically change trajectory.

The evolution of ATM services will provide operational benefits and incentives commensurate with aircraft capabilities. It will have to be recognised, however, that the degree to which benefits and incentives can be realised may continue to differ with respect to the types of users. The development of the ATM system and aircraft capabilities, based on global standards, will ensure global interoperability of ATM systems and AUO.

Aircraft design, including avionics, and operational characteristics have an influence on ATM performance (wake vortex, environmental considerations, aerodrome requirements, etc.). The interrelationship and interdependence of aircraft design and ATM performance are key considerations in aircraft and ATM system design.

AUO principles include the following:

a) relevant ATM data will be fused for an airspace user’s general, tactical and strategic situational awareness and CM;

b) relevant airspace user operational information will be made available to the ATM system;

c) individual aircraft performance, flight conditions and available ATM resources will allow dynamically optimised 4-D trajectory management.

Mission planning

Mission planning is performed by airspace users as a collaborative exercise with airspace organisation and management, AO, and DCB, as appropriate, to ensure that the ATM system will be able to accommodate their mission.

Operational control

Operational control is a function exercised by airspace users with respect to an individual mission and means the exercise of authority over the initiation, conduct and termination of a mission.

Operational control is extended over the diverse types of airspace user missions and incorporates a number of elements including management of the mission, management of the individual flights, and collaboration with ATM.

Flight operations

Aircraft capabilities consistent with the applicable airspace management requirements will allow airspace users to fly user-preferred trajectories.

“Aircraft operations will be an integrated part of the ATM system were actual real time data concerning airspace constrains, weather status etc. are always available. Aircraft capabilities allow user preferred 4 D trajectories, which the majority of the Indonesian domestic and international fleet is able to fly. Airline companies are part of the CDM with ATM and airport”.

10.4 CONFLICT MANAGEMENT

Function

The function of CM will be to limit, to an acceptable level, the risk of collision between aircraft and hazards.

Relevant terms

Conflict is any situation involving aircraft and hazards in which the applicable separation minima may be compromised.

Conflict horizon is the extent to which hazards along the future trajectory of an aircraft are considered for separation provision.

Hazards that an aircraft will be separated from are: other aircraft, terrain, weather, wake turbulence, incompatible airspace activity and, when an aircraft is on the ground, surface vehicles and other obstructions on the apron and maneuvering area.

Separation minima are the minimum displacements between an aircraft and a hazard that maintain the risk of collision at an acceptable level of safety.

Separation mode is an approved set of rules, procedures and conditions of application associated with separation minima.

Separation provision is the tactical process of keeping aircraft away from hazards by at least the appropriate separation minima.

LFV Aviation Consulting remark

“Separation provision, a major task currently for ATC, will in most cases be transferred to flight deck to handle. This support tool that will make the CM with the defined three layers possible be integrated with the tools/procedures necessary for AOM, DCB and TS. The ultimate goal of the CM function is of course to prevent the risk (to an acceptable level) of collision between aircraft and hazard. When a flight has received an agreement, a contract (former Flight Plan) to fly a 4D user preferred trajectory, the strategical layer in the CM tool have defined the planned trajectory conflict free and no hazards should emerge along its trajectory”.

Conflict management layers

CM is applied in three layers, comprising:

a) strategic CM;

b) separation provision; and

c) collision avoidance.

The CM process can be applied at any point along the conflict horizon, from the flight formulation stage or schedule preparation well in advance of flight, to actual flight in real time.

Strategic CM

Strategic CM is the first layer of CM and is achieved through the AOM, DCB and TS components.

The term “strategic” is used here to mean “in advance of tactical”. This recognises that a continuum exists from the earliest planning of the user activity through to the latest avoidance of the hazard. Strategic actions will normally occur prior to departure;

however, they are not limited to pre-departure, particularly in the case of longer duration flights. Changes to the trajectory (whether at the request of the user or by the service provider) will result in the selection of the best means of CM, which may be strategic.

Strategic CM measures aim to reduce the need to apply the second layer —separation provision — to an appropriate level as determined by the ATM system design and operation.

Separation provision

Separation provision is the second layer of CM and is the tactical process of keeping aircraft away from hazards by at least the appropriate separation minima. Separation provision will only be used when strategic CM (i.e. AOM, DCB and TS) cannot be used efficiently.

Separation provision is an iterative process, applied to the conflict horizon. It consists of:

a) the detection of conflict, which is based on the current position of the aircraft involved and their predicted trajectories in relation to known hazards;

b) the formulation of a solution, including selection of the separation modes, to maintain separation of aircraft from all known hazards within the appropriate conflict horizon;

c) the implementation of the solution by communicating the solution and initiating any required trajectory modification; and

d) the monitoring of the execution of the solution to ensure that the hazards are avoided by the appropriate separation minima.

New trajectories should be checked to ensure that they are free from conflicts within a considered conflict horizon. In order to minimise changes to aircraft trajectories, the conflict horizon will be extended as far as procedures and information permit. It is recognised that the conflict horizon may be reduced to solve near-term conflicts when required.

Separation mode

Separation mode is an approved set of rules, procedures and conditions of application associated with separation minima.

The separation mode will take in account, inter alia, the safety level required, the nature of the activity and hazard, the qualifications and roles of the actors, and other conditions of application, if applicable, such as weather conditions and traffic density.

Separator

The separator is the agent responsible for separation provision for a conflict and can be either the airspace user or a separation provision service provider.

The separator must be defined (that is predetermined) prior to the commencement of separation provision; however, the role of separator may be delegated.

Predetermined separator

Before the commencement of separation provision, it is essential that there is no ambiguity as to the agent responsible for keeping an aircraft separated from hazards. This agent will be called the predetermined separator because this role is determined prior to any need for separation provision. For any airspace user activity, the predetermined separator must be defined for all hazards; however, different predetermined separators may be defined for different hazards. For example, in some cases, the airspace user may be the predetermined separator in respect of weather and terrain, and the separation service provider will be the predetermined separator in respect of other hazards.

The role of separator may be delegated. When delegation occurs, the term separator applies to the agent currently responsible for separating aircraft from delegated hazards (the agent that has accepted the delegation). The term predetermined separator refers to the agent that the responsibility will ultimately transfer back to after the condition that terminates all delegations.

The ATM system will be designed to minimise restrictions on user operations and, in particular, will be designed to avoid, where possible, tactical changes to trajectories; therefore, the predetermined separator will be the airspace user, unless safety or ATM system design requires a separation provision service.

Self-separation

Self-separation is the situation where the airspace user is the separator for its activity in respect of one or more hazards.

Full self-separation is the situation where the airspace user is the separator for its activity in respect of all hazards. In this case, no separation provision service will be involved; however, other ATM services, including strategic CM services, may be used.

Distributed separation

Distributed separation occurs when, for an airspace user's activity, there are different separators for different hazards. This can be because different predetermined separators have been defined or because delegation of separation has occurred.

Cooperative separation

Cooperative separation occurs when the role of separator is delegated. This delegation is considered temporary, and the condition that will terminate the delegation is known. The delegation can be for types of hazards or from specified hazards. If the delegation is accepted, then the accepting agent is responsible for compliance with the delegation, using appropriate separation modes.

Note: Participation in separation provision does not necessarily mean cooperative separation.

Cooperative separation refers to the delegation of the role of separator, not simply compliance with instructions or suggestions.

Separation provision service

A separation provision service will be available when safety or ATM design requires.

Full separation provision service occurs when the service provider is the separator for airspace user's activity from all hazards.

Separation provision intervention capability

In the development of separation modes (including determination of separators and minima), separation provision intervention capability must be considered. This capability is expected to have different values depending on whether intervention is from a separation provision service, a user or an automated system. This capability will take into consideration human factors principles. Humans may rationalise complex separation minima to a particular value for application.

Separation provision intervention capability refers to the quality of humans and/or systems to detect and solve a conflict and to implement and monitor the solution. The CNS systems' performance, as well as their situation assessment and problem-solving capabilities, are factors in determining the intervention capability.

Collision avoidance

Collision avoidance is the third layer of CM and must activate when the separation mode has been compromised. Collision avoidance is not part of separation provision, and collision avoidance systems are not included in determining the calculated level of safety required for separation provision. Collision avoidance systems will, however, be considered as part of ATM safety management. The collision avoidance functions and the applicable separation mode, although independent, must be compatible.

10.5 ATM SERVICE DELIVERY MANAGEMENT

Process

The ATM SDM function will manage 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. Services to be delivered by the ATM service delivery system will be established on an on-request basis subject to ATM system design. ATM system design will be determined by CDM and system-wide safety and business cases.

When there is a request for ATM services, the process will consist of building an agreement on the flight trajectory based on user wishes and preferences, the constraints and opportunities related to the other services, and the information available on the operational situation. The agreement will then be the subject of monitoring. A significant deviation from the agreement, as observed or inferred from information available, will trigger a revision to the agreement or a warning to draw attention to the need to revert to the agreement.

ATM SDM will manage the distribution of the responsibilities for the various services and their seamless performance, including the designation of a predetermined separator for separation provision. This function will be important to ensure that the services delivered by the ATM service delivery system will, through CDM, balance and optimise user-requested trajectories to achieve the ATM community's expectations.

To maintain situational awareness, ATM SDM will monitor a wide range of non-flight-specific infrastructure and traffic demand information.

ATM SDM principles include:

a) trajectory, profile, and aircraft or flight intent;

b) management by trajectory; and

c) clearance.

Trajectory, profile, and aircraft or flight intent

The future ATM system, based on this concept, will rely on explicit and unambiguous information and on wide information exchange within the system. Key information relates to the future position of aircraft, and to the meaning and status of that information.

System-delivered trajectories will take into account aircraft performance characteristics.

The notification of intent will be a means for airspace users to specify their request for services and the nominal capabilities available during the flight.

The notification of intent will satisfy the gate-to-gate, CDM and network management requirements.

Management by trajectory

Management by trajectory will involve the development of an agreement that extends through all the physical phases of flight. The trajectory will never be allowed to have an open-ended vector, which means every maneuver will be reflected as an update to the agreement. Management by trajectory does not mean that every aspect of a flight, including arrival profile, runway, taxi path and gate needs to be predetermined and captured in detail in the agreement at the time of departure. The agreement and the management of that agreement will have the detail required by the traffic management phases that the flight is subject to at the time the initial agreement and subsequent updates are made.

Clearance

Clearances will allow the incremental delivery of the trajectory by the ATM system based on the assignment of traffic. Therefore, although the flight deck and the ATM system will have entered into a “gate-to-gate” agreement that agreement will be actively affirmed by the delivery of each portion of the trajectory as a clearance.

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ICAO Doc 9854 - Global Air Traffic Management Operational Concept

Indonesian AIP

The feasibility study for the strategic implementation of CNS/ATM systems in the republic of Indonesia - By JICA 2008

ICAO Global Operational Data Link Document Edition 1 - 14 June 2010

ICAO APAC Regional Report 2008

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

Report on Traffic Analysis – LFV Aviation Consulting July 2010

APAC Regional performance-based navigation implementation plan –September 2009

The Master Plan Study on the Strategic Policy for the Air Transport Sector in the Republic of Indonesia 2004 (JICA)

Strategic Plan of The Ministry of Transportation year 2010 – 2014

Airspace and Air Route Review- July 2010

ANNEXES

ANNEX 1 WORKING GROUP 2 ATC

WG 2 ATC was established with focus areas on ATC issues included technical ATC System.

Linked GPI´s according to ICAO´s Global Air Navigation Plan, Doc 9750 is GPI # 16

The WG shall elaborate on the following work areas:

- Operational procedures at Jakarta/Ujung Pandang ACC
- Capacity enhancing actions
- Status of JAATS/MAATS and future updates
- Staff situation and recruitment/training processes
- SMS
- Contingency (Emergency phase and long term)
- Short term budget
- Other relevant issues

This WG will be managed by Peder Albèr, the LFV Aviation Consulting team

Participants according to annex 1

Kick-off Meeting

A kick-off meeting was held on 19 Aug 2010 at the DGCA premises. The members of the WG were assigned with the following tasks:

1. Make a list of items to be considered and included in the update of the ATM Master Plan in the respective Short, Medium and Long term.
2. Try also to make a priority of proposed activities within the respected time period.

The WG results should be presented in a Working Paper (WP), answering the questions in the points above.

Following issues were on the table:

These items were discussed as necessary future actions for ATM in Indonesia:

- Increased ATC capacity in Jakarta ACC/APP
- Increased ATC capacity in U-P ACC

- Implementation of a SMS
- Contingency plans for ACC and some APP-units
- Installation of A-SMGCS
- List in priority order: WIII first
- Replacement of JAATS
- Doc 4444 changed format for FPL Nov 2012
- Remote TWR (Long term)
- GPI 16 supporting tools needed in new JAATS (Long term ?)
- AIDC operations; first Makassar-Brisbane 2011 followed by Malaysia, Manila
- Methods and equipment needs to implement Gate to Gate flight profiles
- Implement AMAN in WIII
- Increased ATC capacity for Surabaya TMA- Which activities are needed for this?
- How to cater for green approaches- What activities are needed for this?
- CPDLC and ADS-C is planned to be implemented in September 2010 in Ujung-Pandang FIR
- CPDLC is planned to be implemented as a temporary measure end of 2010 in Jakarta ACC 1)

2If approved for operational use during 2010 it will not be included in the ATM Master Plan. If it will not be approved during 2010 the item is suggested to be included in the ATM Master Plan for 2011.

Issues for the WG to consider on the following meetings

During the implementation period of new items, it must be stated that the existing essential and important service level must remain or even be 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. (1-8 below)
- Comment on questions/statements in boxes in the different chapters ahead.

2

1. Make a safety assessment of procedures for landing/departing traffic at Jakarta SH airport (SID and STAR procedures should be established as soon as possible). (Comment from Mr Suryadi (AP1) - Recently there was an incident between arriving and departing traffic.)

Comment from Consultants:

Recommendation short term: Review the ATS procedures for landing/arriving traffic at Jakarta SH Aerodrome (a team has just started with initial review), which includes SID/STAR.

2. Increased manning in the Jakarta SH ADC should be considered to facilitate for safe monitoring and operations on the two parallel runways, followed as soon as practicable by installation of Surface Movement Radar (A-SMGCS) for increased safety and capacity in low visibility situations. This requirement will also be assessed for other major airports.
3. Realistic traffic capacity figures for sectors to be declared in Jakarta and Ujung Pandang ACC should be assessed as a prerequisite for further ATFM measures.
4. Development of data communication between Ujung Pandang ACC and other units (AIDC) is a major contribution for increased ATC capacity. This must however be an evolutionary process pending the capabilities of adjacent units.
5. The procedure to replace the present JAATS is urgent and should have a top priority in order to cope with the future growth of traffic.
6. Investigate the possibility of an interim solution in order to secure a safe and reliable ATM production in Jakarta FIR.
7. In order to increase capacity before new technology is being introduced, more standardised procedures and working methods should be implemented. Implementation and increased use of segregated SID/STAR with separated entry and exit points to/from major TMA in order to enhance safety and environmental outcomes.
8. Increased automation of data exchange for coordination including “silent transfer” of radar service between some sectors/units to be considered in an update of Letter of Agreement (LoA).
9. Some experts in airspace capacity are immensely required in order to be able calculate and determine Indonesia airspace capacity. (comment from Mr S (AP 1)

Comment from consultants:

Determine maximum sector capacities in ACC/APP sectors in Jakarta and Ujung Pandang ACC.

Implement tools to provide forecasted demand in order to balance demand versus available ATC capacity.

How to determine sector capacities will not be part of the ATM Master Plan, but will be a necessary activity in the very short term.

More to be added by the WG based on their own experience and expectations.

Written comments have been received from Mr Budiarso Maskon and Mr Suryadi.

Their comments are incorporated in the text as notes.

See Minutes from Kick-off meeting WG 2 in Annex 2

ANNEX 2: PARTICIPANTS ON KICK-OFF MEETING

Activity number and title : 180, Air Navigation Blue Print

Title of meeting : Working Group 2 Kick Off Meeting

Date and place : 19 August 2010; Meeting Room of Air Navigation Directorate

Moderator : Bert-Ake Wahlgren

No	Name	Position	Agency
1	Batara Nainggolan	Deputy GM of ATS Operation	PT AP 2 (PERSERO)
2	Budiono Richwan	AIS & Communication & Information Manager	PT AP 2 (PERSERO)
3	Ulul Azmi	Flight Procedure Designer	DGCA
4	Bambang Purnomo Sigit	ACC Manager	PT AP 2 (PERSERO)
5	Bayu Sekti Aji	Staff Directorate of Air Navigation	DGCA
6	Sentot Susetiyo	MLLP	DGCA
7	Maskom Humawan	Assistant Deputy Director of ATS	PT AP 1 (PERSERO)
8	Suryadi	ATS	PT AP 2 (PERSERO)
9	Veranty	SubDirectorate ATM	DGCA
10	Tian Kusdinar	ATM MLLP	DGCA
11	Budi Hendro S	ATS STD Manager	PT AP 2 (PERSERO)
12	Emil Ardiaman	PAU Staff	IndII
13	Zainal Arifin Harahap	ATM Division Staff	DGCA
14	Lars-Gunnar Adolfsson	ATM Expert	LFV
15	Bert-Ake Wahlgren	Project Manager	LFV
16	Arlini Dewi Hadiyanti	Secretary	IndII

Activity number and title : 180, Air Navigation Blue Print

Title of meeting : Working Group 2 Meeting 1

Date and place : 22 September 2010; Meeting Room of Sesditjend of Civil Aviation

Moderator :

No	Name	Position	Agency
1	Bambang Purnomo Sigit	ACC Manager	PT. AP 2 (PERSERO)
2	Suhartato	AIS SISFOR Manager	PT. AP 2 (PERSERO)
3	Sentot Susetiyo	MLLP	DGCA
4	Colin Tuckerman	Advisor	CATT
5	Suryadi	Asst. Manager of ATS STD	PT. AP 2 (PERSERO)
6	Novaro M	ATC Advisor	CATT
7	Ulul Azmi	Flight Procedure Designer	DGCA
8	Emil Ardiaman	Transport Specialist	IndII
9	Akhmad Zaenuri	Staff Subdit of AIS	AP I
10	Riza Fahmi	Asst. Deputy Dir. For AIS QA	AP I
11	Tian Kusdinar	ATM Division	DGCA

Activity number and title : 180, Air Navigation Blue Print

Title of meeting : Working Group 2 Meeting 2

Date and place : DGCA 28 Sept 2010

Moderator :

No	Name	Position	Agency
1	Tian Kusdinar	ATM Division	DGCA
2	Veranty	ATM Division	DGCA
3	Sentot Susetiyo	MLLP	DGCA
4	Akhmad Zaenuri	Staff Subdit of ATS	AP I
5	Ulul Azmi	Flight Procedure Designer	DGCA
6	Katrin Hewitt	Corporate & Int. Affairs	Air Services Australia

ANNEX 3: MINUTES FROM KICK-OFF MEETING

August 19th, 2010

Location: DGCA Meeting Room, 23rd Floor

Briefing points:

1. Mr. Lars explained about the purpose of the master plan and WG activities in general.
2. Consultant needs input from WG about a realistic time in the ATM development for each airport and stated it in the Master Plan.

Input from participants:

1. Consultant asks more about or to confirm on matters related to the latest condition of ATC system in AP1 and AP2 and its development plans.
2. Consultant asks about the latest action for JAATS and its possibility to build a backup system or temporary system. DGCA explained that there has been activity to replace the JAATS and they have made some specifications and procedures. The problem is in budgeting process because financing has to be done in multiyear. Consultant offers to provide economic analysis including possibility to use loan funding.
3. AP 2 explained that their system is very old (more than 13 years). In 2008, internally they built a backup system called JAS which is separated from the existing system. Currently they have a problem with a technician skill because young technician is not familiar with the existing technology. Forum asks suggestion of transition.
4. Forum agrees that approach unit is necessary stated in Master Plan. Consultant asks whether it is possible to form the centralised APP where four to six airports are controlled in one ACC. AP 2 explained that at present centralised APP has been done for Medan, Palembang, Pekanbaru, Pontianak, and Jakarta airport.
5. Forum also agrees that ADS necessity should be stated in Master Plan in order to support a “green approach”.
6. Forum asks how to define airspace capacity. Currently they only refer capacity to airport or runway capacity.
7. AP 2 requests opinion from the consultant concerning “Non Radar Procedure” in case of JAATS system failure. Forum agrees that the priority of short term goal is JAATS replacement.
8. Forum agrees that staff recruitment system and training should be stated in Master Plan. AP 2 informed that currently 43 ATC engineers are unemployed due to problem on bureaucratic system.

Next Step:

1. WG participants will give comments of ATC materials which are provided by the consultant.
2. Comments and any information from participants will be collected through the coordinator of WG (Pak Ulul Azmi) via email.
3. The next meeting will be held on September 22nd with agenda being the discussion of incoming comments.
4. WG participants (DGCA, AP 1 & 2) will have internal meeting before September 22nd in order to consolidate their comments.

ANNEX 4 : COMMENTS FROM MR BUDIARSO MASKON AP1

Thanks for your reply and plans to include additional issues in subsequent WG meetings. I think we really have more to discuss many things related to plan major changes in the scope of ATS Indonesia. If we intend to compare with the more advanced countries in the fields of ATS, the approach must be comprehensive. That is, do not just technology and management, but also a fundamental approach. When you recommend to my government about ATS international standard, so please recommend a working environment is also an international standard of ATS, including the quality and welfare of employees. This is just a few examples would be many more that you discover in the later discussion, especially with employee associations of ATS.

First of all I would like to thank Mr Budiarso Maskon from AP 1 for his three very interesting proposals concerning additional items for the WG 2.

Concerning point 1: Human Resource Management plays a major role in ATM as it does in all organisations. In ATM we all know that specific qualifications are needed to become a certified staff to handle all safety related tasks. HRM will of course be a part of the ATM Master Plan and the draft HRM chapter is already prepared. I will be happy to discuss HRM during our next meetings (see chapter 2.in WP - items to elaborate on). This item was also discussed with DGCA during initial preparation concerning WGs and they expressed their opinion that staffing issues could be handled in each WG and not have a specific one. Our team had at that time a proposal for a HRM team as well. With the remaining time before submission of our draft ATM Master Plan the HRM issues have to be dealt with in each WG. (except in WG1) Whether or not this should hold a specific chapter in each WG could be discussed. However HRM will definitely be a part of the ATM Master Plan where recommendations for further activities will be stated if found necessary.

Concerning point 2 : The formation and organisation of the new single ANSP will not be a part of the ATM Master Plan. This plan reflects what ATM must do and when it has to be done in order to cope with the forecasted traffic growth and the Global Plan and Operational concept described by ICAO. How the single ANSP is organised is of course a vital and major issue, but not part of the ATM Master Plan.

Concerning point 3: Relations between ATM stakeholders and expectations will be a part of ATM Master Plan (CDM (airport/ATM/Airspace users, LoA between ANSPs, between ANSP and military authorities etc.) New rolls with new mandates for DGCA ,the new single ANSP and airports have to be settled, but not within the ATM Master Plan

LFV Aviation Consulting

Dear Ulul Azmi

Submitted several proposals related to ATC Master Plan for submission to the consultants and the subject of further discussion.

There are several proposals that I want to tell you, is associated with the ATM Master Plan.

1. If possible, we should make one more WG, namely WG on Human Resource Management. This is important considering the large number of human resources that could be joined in the ANSP. In addition, HR in the ANSP also largely be defended her qualifications in terms of license and rating requirements. Some things related to HR are:

   a) Calculation of minimum number of operational human resources or ideal. This has been frequently discussed, and always end up with decisions that are not clear. Also related to human resources costs (costs of routine and development).

   b) Requirements about qualifications. This has been stated in the CASR 39, but may need refinement.

   c) Plan or career path HR

   d) Level of welfare (Salaries, allowances, bonuses etc.)

   e) Others who need to be discussed.

   If this cannot be included in the new WG, then I suggest to be included in a separate chapter in WG 2 (ATC).

2. Organisational and business framework ANSP.

   This needs to be formulated and expressed before the organisation ANSP formed. Until we know clearly about the Goal, Objectives, Key Performance Management and other matters relating to the organisation. In it also includes provisions on investment policy of high value, such as cost benefit analysis, etc., associated with the budget policy.

3. The pattern of relations between stakeholder

   As we know that ATS activities associated with many institutions, such as Regulators, Airlines, Military, supporting industries, airports, etc.. The pattern of relations between these institutions must be clearly documented in the form of LOA gripped or MOU, so avoid the overlapping of authority .

Thank you for your attention and cooperation

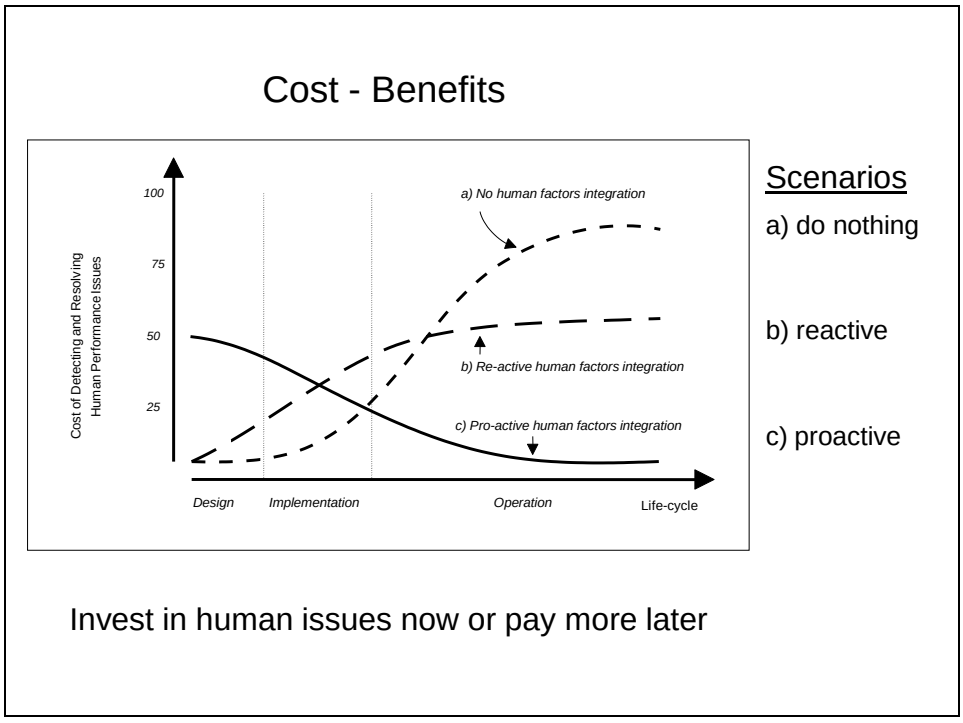
Best Regards

Maskon Humawan / AP I

ANNEX 5: HUMAN RESOURCE MANAGEMENT SYSTEM

Like all organisations dependent on professionals the human element is the most critical one. Although having high technology equipment the staff remains the main capital which should be dealt with in accordance with modern principles of Human Resources Management (HRM). That includes establishing of structures, policies, regulations, methods, guidelines etc concerning HRM. Implementing a HRM system demands resources in terms of staff with appropriate competence and would also need training of managers.

It is a general accepted understanding that the most efficient way of working with the human capital (staff) is to act pro-actively instead of acting re-actively or not act at all, ref below picture.



It has not been possible to find any specific description of an HRM system within DGMAN. There are components related to an HRM system such as a salary system, a rostering system and manpower planning actions. However no integrated system with uniform standards has been possible to identify. Moreover no specific competence or knowledge within this field was possible to identify.

Staffing/Recruitment/Training

Strategic HR Planning is essential to have the right amount of professionals well qualified for the current work but also for new tasks being developed by new technical equipment and new procedures.

This involves a :

a) Staffing plan,

b) Recruitment program,

c) Training program

Motivation – work environment

The motivation factor is based on commitment from the employer to the employee. It covers staff – management but also management – management. Motivated employees produce more than not motivated. Factors influencing the motivation factor are (among others):

- Working conditions (salary, rostering etc.)
- Work culture (relation to others colleagues/bosses)
- Work load and variety of tasks
- Support from management.

Comments from consultants:

Issues raised during meeting sessions and received written comments concerning HRM will be further elaborated and developed in the ATM Master Plan.

ANNEX 6: DGCA COMMENTS ON DRAFT WP FOR WG2 ATC (MR WISNU)

It is recommended that the consultants consider the defining "busy" airports and routes/airspace rather than naming particular airports or city pairs (which is particularly important given current discussions regarding relocation of Indonesia's capital city away from Jakarta). There could perhaps be three tiers, with the tiers based on:

- Movement levels during peak hours
- Proximity to commercial/financial/tourism centres
- Runway/taxiway configuration (complexity)
- Passenger movements
- International versus domestic traffic

Defining airspace users that may require different services could also be useful (scheduled transport, airwork, state aircraft, military operations, etc).

Chapter 2: Working Group 2 ATC

Kick-Off Meeting

- The use of "ATC capacity" seems to mean a number of different things and should probably be defined. Is this capacity in times of number of staff; staff ability; traffic volume; technology? In terms of "increased ATC capacity" for Jakarta and Ujung Pandang ACC: why; how much; from what level to what level?
- In consideration of JAATS replacement, it should be emphasised that this will be a multi-year project that will also require careful consideration of: a life extension plan for JAATS; possibility of using MATSC for a level of back-up capability; what common functionality/backup capability is required between new JAATS and MATSC; how will the transition be managed (ghosting etc). The new system needs:
    - Back up capability for Ujung Pandang
    - Automated coordination / handover
    - Multi surveillance processing
    - ADS-C / CPDLC
    - Database management
    - Spares / through life support (not single year contracts)
    - Agreed reliability, maintainability and integrity parameters
    - Configurable sectors
    - Simulator / training capability
    - Bypass / backup

- Uninterruptible power
- Recording / replay / investigation capability
- Configurable communications switching

- AIDC capability within Indonesia (between FIRs and between Denpasar and Makassar for example) should be a very high priority (possibly higher than with Manila, which is not AIDC capable at the moment).
- Consideration of gate-to-gate profiles is a very long way off for Indonesia.
- Implementation of slot management could be done in the short term (well in advance of AMAN).
- ADS-C/CPDLC implementation in Ujung Pandang needs to be reviewed against the Global Operational Data Link Document (GOLD)

There are a number of other issues that should be considered:

- Route structure
- Aeronautical data
- Weather input to JAATS and MATSC
- Standard procedures for ATC
- Management of surface vehicles
- Improved rostering to consider fatigue management and traffic levels
- Full use of surveillance (radar and ADS-B) ; possible implementation of 5 or 10 NM separation
- Regulatory control of new entrants to busy routes
- Traffic prediction capability (both strategic and tactical)
- ATC training
- RVSM implementation
- Introduction of feeder fixes for busy airports
- Airspace modelling capability

Issues for the WG

- A number of these issues are very specific (based on one airport or one observation) rather than applicable to the Indonesian system as a whole.

Chapter 2: Links to ICAO Air Navigation Plan

(Note there are two Chapter 2s.)

Decision Support and Alerting System

It is recommended that the ATM Master Plan sets out a strategy to fully implement the Eurocat tools available at MATSC (including calibration of radars and addressing multisensor tracking to make sure that the tools function as expected).

Chapter 4: Demand Capacity Balancing

- Concepts like FMP or AMC need to be properly defined: what service will be offered; what problems are being resolved; what are the steps for implementation; what information is required? It is likely that there are many more short term fixes that will alleviate current traffic problems prior to FMP/AMC establishment (which would be a good medium term objective).
- Significantly more detail than "AFTM measures" is required to assist DGCA in decision making.

Chapter 5: Traffic Synchronisation

All discussions on possible ATM objectives for this appear to be related to AMAN. A number of questions need to be addressed first, including:

- What problems will be addressed with highest priority?
- What are the simplest ways to address these problems?
- Are any potential traffic synchronisation techniques applicable for Indonesia at this stage or for the next 15 years?
- What is the role of flight planning / scheduling / slot management?

Chapter 8: ATM Service Delivery Management

This section appears to be missing the kinds of services that are required to be provided in the short – medium – long term.

- The consultants state that "the surveillance infrastructure is considered sufficient to meet the operational needs." If that is the case, why are accepted radar / ADS-B separation standards not in place? What monitoring and maintenance is done? How is the system replacement program managed?
- Addressing current infrastructure needs are more important than considering 4D trajectory applications at this stage. There is some potential that international carriers will use on board systems like CDTI to get around some of the deficiencies of the Indonesian ATM system which will reduce incentives to address them.
- Australia and Indonesia have spent close to two years negotiating to share ADS-B data. Agreements to share radar data may take much longer and will need very careful consideration.
- The ATC environment in MATSC could be entirely paperless. Suggest this transition is completed prior to establishment of a paperless environment in Jakarta (sharing lessons between ACCs / ANSPs should be emphasised).

- Are the discussions of “fall-back levels” related to radar bypass/ the discussion needs to consider procedures and training (for controllers and technicians).
- Where does the requirement for 8-10 ACC sectors and 4-6 APP sectors come from? Is it based on current traffic or future traffic? What route structure is it based on? Fixed or flexible?

Automatic coordination and sharing flight plan and surveillance data between all ATS units should be a medium term priority (coincident with JAATS replacement)

ANNEX 7: GENERAL CONSIDERATIONS REGARDING ATC TRAINING (MR AKHMAD ZAENURI)

Link between ICAI (Indonesia Civil Aviation Institute) Curug and Operational Units.

It should be brought to the attention of ATC administrations that there is a requirement for close co-operation between ATC training schools and ATC units for which training is performed. ATC school instructors should be given the opportunity to update their knowledge regularly in operational units. An exchange of information on the performance of students should be maintained between ATC School and ATC unit.

Automation Controller Training

Controllers required to operate in an automated air traffic control system should receive relevant instruction in automatic data processing for ATC. Controllers should be involved in the specification, evaluation and implementation of an automated ATC system. Formal training should be established for all ATC personnel in the theoretical and practical procedures associated with the automated ATC system. The above training should be carefully integrated with the implementation of each stage of the automated ATC system. Whatever the ATC environment, controllers should receive suitable, regular training on the published back-up procedures which would be put into operation in the event of a system failure. The implementation of automated systems shall include sufficient training, including the Human Factors aspects of automation, prior to using new equipment. The level of training is a major factor in determining the level of traffic that can be

EXAMINATIONS AND VALIDITY OF CONTROLLER LICENCE

A System Combining Assessments with Examinations

During school training regular progress tests should be given on all theoretical subjects. Results should be analyzed and discussed with the students. The students should be regularly assessed and debriefed throughout the period of simulation training. A written report should be made by the instructor on a regular basis and should reflect the level attained by the student plus his overall course performance. Both the assessment and the final practical examination should contribute to the total marks. Examination on local procedures, local area, letters of agreement etc. should be made.

During OJT regular assessments by OJT instructors should be provided. Reports on student progress should be forwarded to training section. At all times the student should be kept informed and permitted to see his report.

A student that has failed an examination should, provided he has shown some signs of success and it can be determined that he has controller potential, after a suitable period of further training, be permitted a re-examination.

(note from Ucok: examination on local procedures, local area, letters of agreement should be the part of taking a ratings and OJT material at an aerodrome rather than the ab-initio controllers**)**

Air Traffic Flow Management (ATFM)

ATFM staff not performing clerical or administrative functions, so called ATFM controllers, must be qualified controllers with recent experience on control duties on entry to ATFM services. The responsibility for aircraft in flight remains solely with ATC and any subsequent , ATFM involvement shall be at the request of ATC only.

An ATFM controller must hold an ATFM rating. Such a rating will require the ATFM controller to demonstrate a comprehensive knowledge, skill and experience of all relevant ATC procedures and ATFM duties. ATFM controllers should be obliged to familiarize themselves with major changes. In ATC procedures and maintain their acquaintance with problem areas with relation to ATFM within their region.

(Note from Ucok: in my point of view the terminology of ATFM and Flow Control Unit is slightly different, the distinction between them are only for strategic level and tactical level, where ATFM are usually suitable for long range and Flow Control is to manage the arriving aircraft)

Proficiency Checking

The results of proficiency checks should be treated confidentially and management involvement should only be necessary in cases of negligence or on the recommendation of the appointed check controller. The standards to be achieved and the check list of items to be evaluated should be made available to all those concerned.

A suitable period of evaluation should take place before a system of proficiency checks is implemented. Before a proficiency checking system is implemented, adequate training facilities should exist to enable further training to take place where necessary.

Where a proficiency checking system has been implemented, a controller who is selected to act in the Check Controller role should undergo a specialist course of training that will prepare him/her for the task, and provide guidance on achieving a fair, objective, and valid assessment. This training course should achieve consistency between check controllers.

Additionally, a controller considered for the Check Controller role should have the following minimum experience:

- 4 years operational experience;
- 1 year experience on the position being assessed;
- 2 years OJTI experience;
- having a high standard of credibility and com skills in the OJTI/coaching role, and

- currency on the position being assessed.

Check Controllers should undergo the same periodic proficiency assessments as other controllers. This Assessor qualification should be the subject of periodic refresher training, at periods not exceeding 3 years, to ensure that skills are maintained and new techniques and procedures are incorporated.

(Comment from Ucok: sometimes there are several airport with new controllers without any of them are experienced, I would rather suggest that the appointment of check controllers are through the proper test by DGCA since the check controllers are representing the government body to perform the test to all controllers at certain airport. The government ensure that all procedures are suitably met the ICAO Provisions.)

Automatic Dependant Surveillance (ADS) Control Rating

Control of aircraft via ADS and Controllers/Pilot Data Link Communication (CPDLC) is sufficiently different to other forms of ATC rating to warrant comprehensive training and a separate rating. The training syllabus should inter alia contain instruction in:

- Aircraft Situational Displays and Degraded Operational Modes;
- the CPDLC equipment and protocols including failure modes and procedures;
- ADS separation standards and, where applicable, ADS/Radar/Flight Data

TRAINING AFTER LICENSING

Refresher Courses

As a means of maintaining a world-wide air traffic control service of the highest standards, controllers should participate in a refresher course, which should not have a bearing on the test of the proficiency of the controller, (training and simulation designed to ensure a maintenance of knowledge and abilities with respect to all standards, procedures, equipment and technique currently in use) every year while actively engaged in control duties. Team Resource Management as a concept should be considered in the continuation training of ATCOs.

(Comment from Ucok: all these issues are promulgated in the national regulations CASR part 69 including the Advisory Circulars and Staff Instructions)

As well as programmed refresher courses, adequate courses of instruction should be provided prior to the introduction into the ATC system of new or modified equipment and changes to standards or procedures which may require additional skills or changes in operating techniques. Emergency training, including In Flight Emergency Response (IFER) and coordination training and handling of Unlawful Interference situations should be part of the refresher training.

English Language Training

Sufficient training must be available for current ATCOs of all English language abilities so as to be able to meet the required ICAO level and subsequently to retain (or improve) that competency. Staff who are unable to achieve and maintain the English language requirements must have their positions protected and given opportunities to reach the required ICAO level.

Supervisory and Management Courses

Controllers who are charged with responsibility for indoctrination or on-the-job training of ATS personnel should be provided with adequate courses of instruction in order to discharge these additional responsibilities. Prior to appointment to a supervisory or management position, controllers should be provided with suitable supervisory and management courses which meet the requirements of the new position.

Team Resource Management as a concept should be considered in the training of controllers prior to an appointment as supervisor or management position Controllers should be provided the opportunity to take courses which will prepare them for employment on other duties, including management positions.

Flight Experience for Air Traffic Controllers

Indonesia CASR 69 recommends ANSP responsible for the operation of Air Traffic Services:

a) To provide for familiarization flights in the cockpits of aircraft for Air Traffic controllers, with combined facilities to visit adjacent and distant Air Traffic Control units.

b) Licensed and trainee controllers should participate in familiarization flights each year annually.

c) To exploit the use of link trainers for the familiarization of air traffic controllers with specific in-flight problems.

   Note: Familiarization flights (also known as "duty flights" or "route experience flights") are granted by national air carriers on government request in accordance with IATA Traffic Resolution No. 200.

Working Conditions

Duty Rosters

The duty roster should be based on at least 2 consecutive days off in every 6 days (“In a turn of shifts, at least half the amount of working day should be granted at the end of the shift as “day off” according Advisory Circular 69-01) and Duty rosters should be agreed with the air traffic controllers involved.

An optimal roster should be promulgated, based on the maximum allowed number of working hours per week and per shift, a minimum number of break periods of an agreed minimum length, both during a shift and between shifts and on an optimal night/day switch number per week or per month as appropriate. This roster requires definition of personnel strength based on the number of sectors and traffic density. It must allow for attribution of a minimum number of days paid leave, sick leave, extraordinary leave and unpaid leave. It must be such that a minimum number of weekends per month and of public holidays per year can be taken as they occur and not later. Conditions for overtime and night work (e.g. rest facilities) must be defined and the regulations governing the various kinds of leave be clearly stated.

Duty rosters including night shifts should be of a rapidly rotating shift system in a morning, evening, night cycle. Consecutive night shifts are not recommended. After a night shift, an off-duty period of a minimum of 30 hours is recommended.

Work load and variety of tasks

Work and Rest Scheme

Rosters should be constructed following a simple pattern, with shifts of the same or very similar lengths and adequate breaks between shifts and shift cycles. The average time of operational duty and breaks should not exceed 32 hours per week, Each shift should not exceed 7 hours 30 minutes including breaks, minimum rest period of 11 consecutive hours per day should be provided The continuous operational duty for a controller should be 2 hours maximum and should be reduced to 90 minutes for controllers working with visual terminals and/or radar displays; after which a minimum 45 minutes break, away from the working environment should be given to controllers. At least one break of a minimum of 1 hour duration, on both day and afternoon shift, shall be given to controllers for the purpose of eating at regular times and to prevent gastrointestinal dysfunctions . Extra rest hours shall be provided when requested by a pregnant controller. By night the total operational duty time should not exceed 5 hours.

Vacation Scheme

The annual leave for a controller should be not less than 34 working days (this is the equivalent of 6 weeks), excluding public holidays, Advisory Circular 69-01

Extra Duty

Extra duty is defined as any operational or non-operational duty or a combination of both performed outside of the scheduled hours of work which will result in an increased total duty time for the controller.

Non-operational duties are other duties for which the controller is not required to exercise the privileges of the controller license which, from time to time, are assigned to a controller (Theoretical controller training, investigation, etc.).

Extra duty should be voluntary and used only in exceptional situations. In the interest of aviation safety and the well being of the controller population, extra duty control should be considered as an undesirable method of staffing Air Traffic Control positions and should be avoided.

The allocation of overtime should be carried out with limitations in human performance in mind. The combination of overtime and night shifts clearly increase the risk of fatigue among controllers, because resting periods are reduced, and the possibility for sleep-loss recovery may be reduced accordingly.

REMUNERATION / SALARY

Remuneration for the profession of air traffic controller is justified commensurate with the requirements and responsibilities of the profession, not limited by the practices of other organizations. Equal remuneration for equal work is justified with relation to duties and responsibilities.

Remuneration Principle

Remuneration for air traffic controllers should recognize the uniqueness of the Air Traffic Control profession and the associated responsibilities.

Remuneration of air traffic controllers should reflect their "employment status" in accordance with ILO Publication ISCO*-88, in which air traffic controllers have been put in a category that includes Aircraft pilots, ships' officers and other related "associate professionals". * International Standard Classification of Occupations.

Remuneration should be commensurate with acquired levels of skill and experience.

The remuneration of controllers should therefore reflect their skills and also have relation to the acquired amount/type of ratings.

When a controller is assigned additional tasks, such as instruction or system development, this should also be reflected by a higher remuneration level.

Regards

AKHMAD ZAENURI

Ucok commented on this document, thanks

ANNEX 8 : DGCA COMMENTS ON WP FOR WG 2 ATC(MR AZMI):

- JICA's CNS/ATM master plan study had been undertaken in 2008 and the result is used as one of the basis for this study. While this study is aiming to produce a new ATM master plan as a reference document for the next fifteen years, it is preferable that the data on resources and capacity mentioned within JICA's study to be updated, or even enriched, as well.

  LFV Aviation Consulting: The new ATM Master Plan is an update of the "Master Plan and Feasibility Studies in the Area of Air Traffic Control" done by the French company Soufréavia , 1994.

  JICA studies from 2008 are a reference study, used by our team. We do not intend to update this study, but we intend to use relevant updated data necessary for the production of our proposed ATM Master Plan.

- The solution offered in this study seems to be technology heavy, which, based on experience, deemed to be costly and vulnerable to maintenance breakdown. LFV is requested to present other forms of solution that can be used as a fall back methodology when the first solution is not available or expired.

  LFV Aviation Consulting: The ATM Master Plan being produced will focus on necessary measures for Indonesian ATM to consider being able to handle future traffic growth. Measures are a mix of actions involving regulatory activities, new procedures etc as well as a roadmap for future adaptation to new ATM technology, deemed necessary for future Indonesian ATM.

- LFV will recommend some activities to be undertaken in the next fifteen years for the development of air traffic management in Indonesia. However, it is essential to identify which organization will be in charge for each of those activities, taking into account the major changes on ATM organizations in a foreseeable future. This is to make sure that the organizations possess appropriate authority and willing to commit and spend resources to conduct the respective activities in timely manner. It'd be hardly fair to hold an organization accountable for certain activity without having equivalent authority and resources.

  LFV Aviation Consulting: The ATM Master Plan will have validity regardless of the future organization of ATM in Indonesia. However the future development of ATM we believe will be facilitated by the present plans of creating one single ANSP organization, which will implement future changes in the provision of air navigation services in Indonesia and where DGCA will have the regulator roll. It is important that it will be clear how this single ANSP will fund all its future investments. (Cost-recovery principle).

- Transfer of knowledge is one of LFV's missions in developing the ATM master plan. Questions arose during the meetings and correspondence need to be addressed, (by LFV experts, not the master plan), in a level of details so that people could get a mental picture of how to do things in relation with the activities mentioned in the master plan. 'How to determine airspace capacity' is the million-dollar-

question that will be asked over and over again in many forums, even if the answer is highly conditional.

LFV Aviation Consulting: The ATM Master Plan gives answers what is needed and when in time is it needed. Questions concerning how things are done are not really part of the ATM Master Plan as is mentioned above). Transfer of knowledge is as stated above part of the mission, but not on this level of detail. Transfer of knowledge is to provide information of how different ATM domains are provided in developed ATM nations/organizations.

- The regulation development is beyond the scope of this study. However, since no dedicated WG is established, it is important that currently available regulatory resources are assessed within related WG in order to enable DGCA and other related stakeholder to strengthen the regulatory foundation to carry out all of the aviation programs.

  LFV Aviation Consulting: We agree that a regulatory framework is essential to have prior to implementing activities that require new/changed regulations recommended in the future ATM Master Plan

- There's necessity to invite the airspace users (the airlines and military authority, beside IATA) and airworthiness people to gain information regarding current fleet capabilities and commitment to improve them as the basis in planning the ATM system that is capable of accommodating various user needs within its service volume in time. This is also considered as a good collaborative decision making practice.

  LFV Aviation Consulting: We agree this is a necessary dialogue and it is also important that regulator sets future performance requirements for aircrafts in Indonesia to operate the years to come.