International Civil Aviation Organization
UNDP/ICAO Regional Project RLA/98/003
Transition to CNS/ATM Systems in the CAR and SAM Regions

Tenth Meeting/Workshop of ATM Authorities and Planners of the CAR/SAM Regions (AP/ATM/10)

(Lima, Peru, from 10 to 14 May 2005)

Agenda Item 5: ATFM implementation in the CAR/SAM Regions

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Summary

This working paper proposes a guide to orient the tasks of the GREPECAS ATM Committee ATFM Working Group.

1. Background

1.1. Flow control originated in the seventies, coinciding with the growth of tourism and progress of the aeronautical industry, which resulted in increased use of air transport and, thus, increased traffic density.

1.2. France, because of its strategic position in the European scenario (the main air routes crossing Europe from North to South and from East to West fly over France), pioneered the establishment of measures aimed at regulating air traffic flow, imposing unilateral criteria to protect operations in its airspace.

1.3. At the beginning, the measures adopted were as simple as separating operations over given points--normally major radio aids or FIR points of entry--, to maximise the number of operations per hour and ensure proper separation between them.

1.4. With time, the ACCs refined the measures applied to address traffic congestion and, thus, extensive use started to be made of quotas (number of aircraft in a given period) by flow, following an assessment of the likely demand on the day of operation, always based on experience, since there was no database to provide information.

2. Initial regional action

2.1. The aforementioned situation created a major distortion in air transport and, of course, in the European economy. Consequently, and since the capacity *versus* demand problem was getting worse, the ICAO European Office developed a European ATFM (Air Traffic Flow Management) service to manage the different traffic flows in that region.

2.2. In June 1980, the “Special European Regional Air Navigation” meeting was held in Paris, setting the foundations for the ATFM.

2.3. This meeting agreed to establish 12 flow management units (FMUs), which should work in a coordinated manner according to a common plan, and with the mission of ensuring an optimum traffic flow through the different areas where the demand might exceed the available ATC capacity in given moments.

2.4. Under these premises, the ATFM was managed in Europe for some years until the Ministers of Transport of the ECAC (European Civil Aviation Conference), in close coordination with ICAO and Eurocontrol, agreed in 1988 on the need to centralise the ATFM in order to improve efficiency and make better use of ATC capacity. Consequently, the European Air Navigation Planning Group (EANPG) developed the CTMO (Centralised Air Traffic Flow Management Organization)

3. ATFM objectives, principles and functions

3.1. The ATFM service had to be provided as a supplement to ATC, and should guarantee an optimum traffic flow to or through areas where traffic demand might exceed the available ATC capacity at some point in time. This optimum flow could be attained by maintaining a balance between traffic demand and capacity, in close coordination with operators and the ATCs involved.

3.2. Thus, the ATFM should meet the following objectives:

- Overload protection for the ATC.
- Integrated use of the existing ATC capacity.
- Maximum flexibility in the management of the different traffic flows.
- Rationalisation of traffic flows.
- Operate at the minimum level required so as not to affect the cost-benefit ratio.

3.3. In order to meet these objectives, the ATFM should be based on the following principles:

- Be at the disposal of all the States in the Region, adjusting to the requirements of Operators, ATC Units in the region and adjacent Units.
- Use traffic demand data obtained from a common and permanently updated database.
- The integrated database (IDB) must provide information based on operator plans (PFDs), constantly updated RPLs, and sporadic traffic and historical data, and be able to incorporate FPLs immediately upon receipt.
- Take measures sufficiently in advance to prevent overloads and minimise their effect on operators.
- Maintain close and continuous coordination with Flow Control Units (FMUs), Operators, and adjacent ATC Units.
- Must be handled by highly qualified and trained personnel.
- Must be available 24 hours a day to ensure proper distribution of ATC capacity.

3.4. The ATFM should be designed to fulfil the following functions:

- Obtain data on ATC infrastructure and the capacity of its systems.
- Obtain and analyse data on all scheduled flights within its area or region of influence.
- Have a consistent picture of traffic demand, compare it with the available capacity, and identify conflicting areas and periods.
- Coordinate capacity upgrades with ATS authorities, when appropriate.
- Define suitable measures for those areas where a capacity upgrade is not feasible.
- Periodically study the results of ATFM measures, for continuous improvement purposes.
- Apply a strict quality assurance control of the service provided.

- Have and secure the best means of communication among the different elements of the ATFM service, in order to ensure an efficient and effective performance of the system in terms of information distribution and reception.

4. ATFM activities

4.1. ATFM activities must be addressed to traffic flows or flight series, and to concrete flights and days. To that end, planning, strategy development, and day-to-day monitoring should be provided for.

4.2. Regarding the above, ATFM activities can be developed in three phases:

- Strategic: up to 48 hours before the day of operation
- Pre-tactical: within 48 hours prior to the day of operation
- Tactical: during the day of operation

4.3. Strategic phase

4.4. The strategic planning phase can be broken down into two parts:

- A continuous data collection and interpretation process, and a systematic and regular review of procedures and measures.
- An international coordination process to ensure the compatibility and efficiency of national and international requirements

4.4.1. Strategic planning has two main objectives:

- To identify imbalances between demand and capacity in ATC systems, whether in underutilised or saturated areas.
- To use said information to recommend measures leading to increased capacity or effective use of the existing capacity.

4.4.2. Regarding the above, a method that could be used for identifying imbalances between demand and capacity is comparing available traffic forecasts with known capacity data.

4.4.3. DEMAND data are obtained from different sources:

- Forecasts based on the integrated database (IDB) and adjusted to demand.
- Recent historical traffic data comparable to the one to be analysed (*e.g.*, the same day of the previous week or of some vacation period).
- Traffic trends provided by national authorities, user organisations (*e.g.*, IATA), etc.
- RPLs.
- Other related information (*e.g.*, air shows, major sport events, military manoeuvres, and, in general, extreme events or situations which might generate additional or an extraordinary demand which affects the available ATC capacity.

4.4.4. CAPACITY data are provided by the various ATCs. However, there should be close coordination between the Flow Control Units of each ATC and the centralised ATFM, to ensure that the available capacity is distributed in such a way as to meet the existing demand.

4.4.5. Regarding the above, consideration should be given to factors such as personnel availability forecasts, possible medium-term changes in ATC procedures, installation of new equipment, airport infrastructure works affecting runways or parking stands, etc.

4.5. **Pre-tactical phase**

4.5.1. Basically, the pre-tactical phase comprises the study of the demand for the day of operation (starting 48 hours before), and its comparison with the capacity available on that day, adjusting the Strategic Plan or adopting different measures when necessary.

4.5.2. At the end of the process, the agreed measures should be disseminated in a bulletin (ATFM Reporting Message) containing the restrictions, and which can be distributed through the AFTN, SITA, etc.

4.5.3. The tasks in this phase may include the following:

- Determining ATC capacity of the different areas, based on the particular situation that day.
- Estimating the existing demand.
- Preparing a demand/capacity comparative study.
- Studying those sectors where saturation is expected and the flows affected, estimating acceptance quotas to be applied according to the capacity of the system.
- Preparing a summary of the ATFM measures to be proposed.
- Making a last review on the day before the operation, and, in consultation with the affected ACCs, determining definitive AFTM measures, which will be published in the bulletin 12 hours before the affected operations take place.

4.5.4. Acceptance quotas may be established bearing in mind the following:

- They should be expressed as the number of flights over a given point, on a given period of time.
- At the points of entry of a given area, they should be in proportion to the demand foreseen for those same points during the period in question.
- Quotas established for long periods of time must be estimated periodically, preferably every day.
- It is advisable to conduct a study afterwards, to assess the impact of the measures and to adjust them inasmuch as possible, according to the information received by the different units making up the system, and to make the necessary tactical adjustments.

4.6. Tactical phase

4.6.1. The tactical activity is aimed at ensuring that the measures taken during the strategic and pre-tactical phases resolve the demand/capacity problems in the flows or areas of application, that the measures imposed are the minimum required and that the unnecessary measures have been eliminated, that ATC resources are used properly, and that maximum use is made of the existing capacity, without compromising safety.

4.6.2. It should also be noted that the existing delays are equitably distributed among operators.

4.6.3. In order to meet these objectives and comply with the above, the ATFM plan should be monitored in real time, in close contact with the ATC operation underway, where real-time access to data is critical.

4.6.4. At present, the main ATFM measures being applied in this tactical phase are the use of SLOTS and REROUTINGS, trying to avoid significant penalties to operators.

5. Conclusion

5.1. The basic guidelines presented in this Working Paper can serve as a guide for the work of the ATFM Task Force, it if deems so advisable, to contribute to their general review of concepts that could help in the formulation of a possible proposal for national FMUs and a regional centralised ATFM.

5.2. In this sense, it is proposed to the meeting that the material contained in this Working Paper be used, if deemed appropriate, as a basic guide for the work of the ATFM Task Force.