TALLER PARA LA OPTIMIZACION DE LA SEPARACION LONGITUDINAL

LIMA, OFICINA SAM OACI

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MEDIDAS ATFM

- El proceso ATFM
- Optimización de capacidad
- Medidas ATFM

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4.3 DESCRIPTION OF THE ATFM PROCESS

4.3.1 The following example provides a general outline of the steps involved in the actions/analyses for ATM system optimization (see Figure II-4-2 for a simplified representation of the interactions involved):

a) *determine capacity*: review/assess airport/airspace sector capacity for accuracy;

b) *assess demand*: determine forecasted demand for a specific time frame, 15-minute period(s), hour(s), etc.;

c) *analyse and compare demand and capacity levels*: focus more specifically on the periods in which demand exceeds available capacity. Automated tools greatly enhance the ATFM analytical process;

d) *apply the CDM model*: communicate the situation to the facilities and stakeholders involved through the means available, using the CDM processes;

e) *determine, using CDM, the action required for mitigating a demand/capacity imbalance*: after requesting and collecting information, determine the most appropriate ATFM solutions (e.g., capacity optimization, ATFM measure) for the situation;

f) *disseminate information*: using the means of communication established to that end, inform, in a timely manner, the parties involved about the ATFM solutions to be applied or of the cancellation thereof;

g) *monitor the situation*: examine the situation periodically, as necessary, to ensure that the ATFM solutions mitigate the consequences of the imbalance. If necessary, re-assess and adjust accordingly; and

h) *conduct a post event analysis*: evaluate the effectiveness of the ATFM solution, and catalogue the best work practices. This analysis may be conducted by reviewing the weekly or monthly report of the FMU/flow management position (FMP).

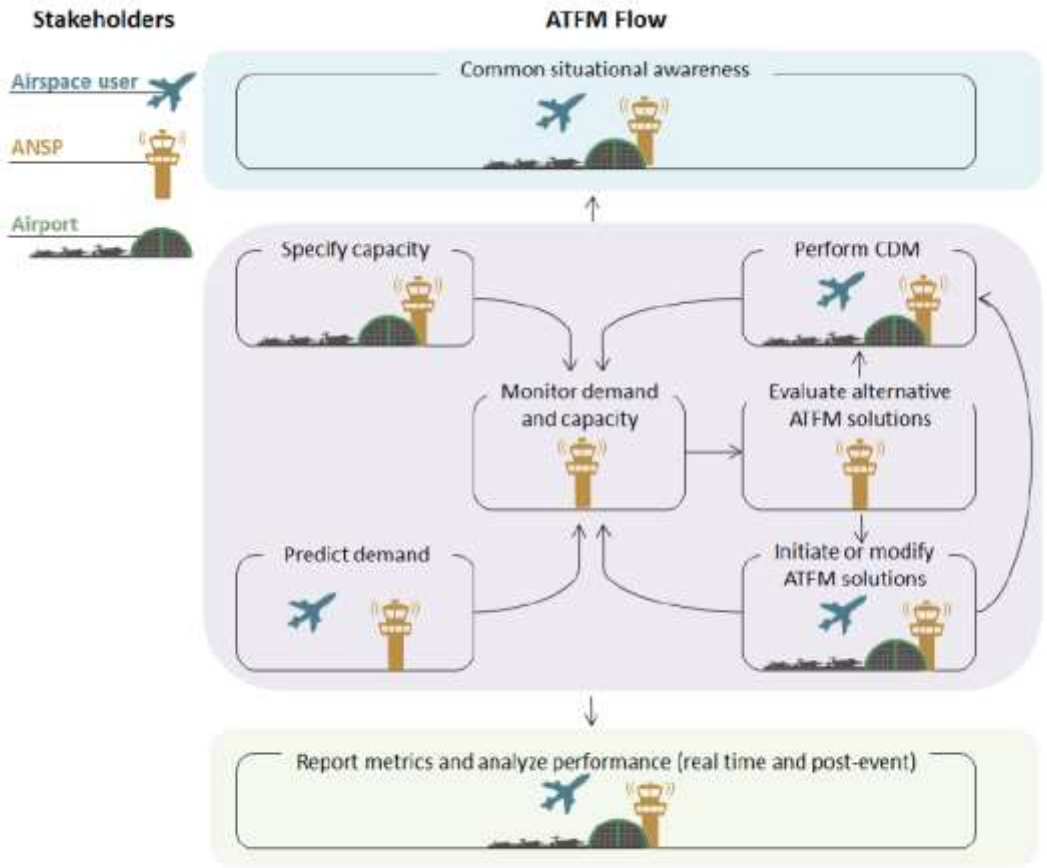

Figure II-4-2 ATFM Process Description

4.4 CAPACITY OPTIMIZATION

4.4.1 ATFM is based on continuous and anticipated considerations of all possible air traffic flow management solutions through an iterative process that spans from strategic planning through to post-operations analysis. Any new element of information can therefore be immediately integrated. Anticipating events minimizes their impact on the ATM system and it also provides the opportunity to refine the plan further, or, in other words, to optimize capacities.

4.4.2 Optimization aims to match capacity with demand and to select the most appropriate set of measures if it is not possible to adjust the ATM system to meet the demand.

4.4.3 Capacity optimization is the part of an ATFM solution that identifies additional capacity to address a demand/capacity imbalance. The following capacity optimizations are commonly used in ATFM:

…follows

4.4.4. **Sectorization and associated configuration.** The capacity of an airspace can be optimized by the sectorization associated with the specific airspace and surrounding airspace(s). When faced with a specific capacity shortfall, a new airspace configuration (e.g., number of sectors, sector configuration, controller staffing positions) can increase the overall capacity through a more appropriate distribution of ATC workload.

4.4.5. **FUA**. Through the use of FUA, and with coordination between airspace users such as the military and/or recreational airspace users, opportunities to increase civil airspace capacity in specific conditions can be identified. When an airspace capacity shortfall exists and access to restricted, prohibited, or danger airspaces can improve capacity, ATFM units should identify if a previous arrangement is applicable in order to address the demand capacity imbalance.

4.4.6 **Balancing arrival and departure capacity**. In short periods of operation, the configuration of an airport (e.g. runway usage by operations including mixed mode operations) can impact the available capacity. When a demand capacity imbalance is identified, ATFM units should identify if a change to the operational airport configuration can provide additional capacity to mitigate the imbalance.

4.5 ATFM MEASURES

4.5.1 General considerations

4.5.1.1 ATFM measures are techniques used to manage air traffic demand according to system capacity. Some air traffic control instructions or procedures (such as radar vectors or speed control instructions) can be considered as ATFM measures.

4.5.1.2 ATFM measures are important initiatives for managing the flow of air traffic. They are very efficient when used to manage traffic demand, however, they can have a significant impact on AU, and should only be implemented and used when necessary to maintain the safety and efficiency of the ATM system, minimizing as much as possible the impact on flight operations.

4.5.1.4 ATFM measures should generally only apply during periods when demand exceeds capacity and should not apply on a routine basis. The frequent application of ATFM measures suggests an imbalance between ATM capacity and traffic demand, which should be addressed in a more strategic fashion.

4.5.1.5 As ATFM systems grow in maturity, they evolve, tending to use variations of ATFM measures, or to combine different measures. It is important, however, that ATFM measures are clearly understood and accepted by the ATM community (ATC and AU). It is therefore strongly recommended that initial solutions are comprised of a basic set of ATFM measures and that more refined solutions, based on more complex measures, are implemented only when the ATFM system has reached a good level of maturity.

4.5.1.6 **Ground delay programme (GDP)**. GDP is a pre-tactical or tactical ATFM measure in an air traffic management process where aircraft are held on the ground in order to manage capacity and demand in a specific volume of airspace or at a specific airport. In the process, departure times are assigned to corresponding available entry slots into the constrained airspace or arrival/departure slots into/from the constrained airport. A GDP aims to, among other things, minimize airborne delays. It is a flexible programme, and its form may therefore vary depending on the needs of the air traffic management system. GDPs are best developed in a collaborative manner even though they are typically administered and managed by a FMU or a national/international ATFM centre. When a GDP is scheduled to last for several hours, the likelihood of slots having to be revised increases, as conditions could change. There should therefore be a system in place to advise AU and/or pilots of departure slots as well as of any changes to the GDP.

4.5.1.7 **Ground stop (GSt)**. GSt is a tactical ATFM measure taken in reaction to an unpredicted adverse situation. Some selected aircraft remain on the ground. Due to the heavy impact of ground stops on AUs (mostly due to of the absence of notice), alternative ATFM measures should be explored and implemented prior to a GSt, time and circumstances permitting. GSt is also sometimes known as a "zero rate ATFM measure". The GSt is typically used:

a) in cases where capacity has been severely reduced at airports due to significant meteorological events or due to runway closures, for example, as a result of aircraft accidents/incidents;

b) to preclude extended periods of in-flight holding; to preclude sector/centre reaching near saturation levels or airport gridlock;

c) in the event a facility is unable or partially unable to provide air traffic services due to unforeseen circumstances; and

d) when routings are unavailable due to severe meteorological or catastrophic events.

4.5.1.8 **Minutes-in-trail (MINIT) and miles-in-trail (MIT).** These items are tactical ATFM measures and are expressed as the number of minutes or miles between each successive aircraft at an airspace boundary point. The workload associated with its compliance falls on the air traffic controller because of potential upstream network effects. As such, regular usage of MINIT or MIT may indicate that more appropriate ATFM measures should be used in their places.

4.5.1.9 **Minimum departure intervals (MDIs).** MDIs are tactical ATFM measures and are applied by setting a rate of departure flow of, for example: three minutes between successive departures from a single airport. MDIs are typically applied for short periods when a departure sector becomes excessively busy, when sector capacity is suddenly reduced (e.g., equipment failure, meteorological conditions, etc.), or to support demand smoothing at an arrival airport with a short term demand capacity imbalance.

4.5.1.10 **Re-routing**. Route-based ATFM measures (horizontal or vertical) aim to remove a number of flights scheduled to arrive at a constrained ATM resource. Re-routings are usually organized in scenarios and can be mandatory or advisory.

4.5.1.15 **Level capping scenarios**. These scenarios are carried out by means of flight level restrictions limiting climb or descent.

4.5.1.16 **Fix balancing**. This tactical ATFM measure, usually applied during flight, aims to distribute demand and avoid delays. The aircraft is assigned a different arrival or departure fix than the one indicated in the flight plan. This can also be used, for example, during periods of convective meteorological conditions where a standard instrument arrival (STAR) or a standard instrument departure (SID) is unusable.

ATFM measure	Constraint			Control mechanism	Time frame	Requirements to be effective
	Airport arrivals	Airport departures	Airspace			
GDP	X	X	X	CTOT	Pre-tactical and tactical	Participation in % and distance
Re-route			X	Flight path change to avoid constraint	Pre-tactical and tactical	Access to airspace and published routes
Ground stop	X			Prevent departures from specific airports to address existing tactical load on an arrival airport	Tactical	
MIT/MINT	X		X	Time or distance based separation on a single stream of traffic	Tactical	
MDI	X		X	Time based separation from departures from the same airport	Tactical	
Fix balancing	X		X	Flight path change to avoid	Tactical	
Level capping			X	Flight path change to avoid	Tactical	

Table II-4-1 Summary of ATFM measures

- Conclusiones


North American Central American and Caribbean (NACC) Office Mexico City
South American (SAM) Office Lima
ICAO Headquarters Montréal
Western and Central African (WACAF) Office Dakar
European and North Atlantic (EUR/NAT) Office Paris
Middle East (MID) Office Cairo
Eastern and Southern African (ESAF) Office Nairobi
Asia and Pacific (APAC) Sub-office Beijing
Asia and Pacific (APAC) Office Bangkok

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