The need for ATFM/CDM

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Outline

- Global Traffic Growth
- Traffic Growth in the MID Region
- What is ATFM/CDM
- ATFM Main Objectives
- ICAO Guidance Material
- Link to ASBU
- Regional developments
Traffic Growth
Middle East Aircraft Movements & Growth

Million Departures

- Million Departures: 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0
What is ATFM?
ATFM is an enabler of air traffic management efficiency and effectiveness in a way that minimizes delays and maximizes/optimizes the use of the available airspace.

- It contributes to the safety and environmental sustainability of an ATM system.
- Managing traffic flows means more than simply applying ATFM measures. ATFM solution is the combination of capacity optimization and ATFM measures.
Global ATFM

Is a Long Term Objective

- Over time, local ATFM implementations conducted worldwide are going to shape a global ATFM
- Standardized ATFM processes will be implemented globally
ATFM is demand/capacity balancing

If demand exceeds the capacity, “flow” management is required
The objectives of ATFM/CDM

- Enhance safety
- Reduce workload
- Optimize the use of available airspace
- Improve operational benefits, predictability and efficiency
- Effective management of capacity and demand
- Increased situational awareness among stakeholders
- Provide for coordinated, collaborative development and execution of operational plans
- Reduce fuel burn and operating costs
- Support effective traffic management of irregular operations, Contingency, Emergency, and the recovery of such situation
Keys to successful implementation

- The CDM process is a key enabler of an ATFM
- Achieving a robust coordination among aviation stakeholders
  - All the stakeholders work together to improve the overall performance of the ATM system
  - Such coordination will take place within a FIR, between FIRs, and ultimately, between regions
Keys to successful implementation

ATFM and its applications should **NOT** be restricted to one State or FIR

- Due to their far-reaching effects on the flow of traffic elsewhere
- PANS-ATM, Doc 4444 states that ATFM should be implemented on the basis of a regional air navigation agreement or, when appropriate, as a multilateral agreement
Drivers for the ATFM Guidance material

Traffic pressure

ATFM systems Interdependencies

Hub operations
Doc 9971: Manual on...

Doc 9971 was published in 2012 (3rd Edition in 2018)

Part 1 – Collaborative Decision Making (CDM)

Part 2 – Air Traffic Flow Management (ATFM)

Part 3 – Airport CDM (A-CDM)
PART I. COLLABORATIVE DECISION-MAKING (CDM)
Chapter 1. Introduction
Chapter 2. Description of collaborative decision-making (CDM)
Chapter 3. Role of information exchange
Chapter 4. Articulating a CDM process

PART II. AIR TRAFFIC FLOW MANAGEMENT (ATFM)
Chapter 1. Introduction
Chapter 2. The ATFM service
Chapter 3. Capacity determination
Chapter 4. ATFM phases and solutions
Chapter 5. ATFM service interfaces
Chapter 6. ATFM communication
Chapter 7. ATFM structure and organization
Chapter 8. ATFM implementation
• Appendix II-A. Sample contingency plan
• Appendix II-B. Determining airport arrival rate
• Appendix II-C. Determining sector capacity
• Appendix II-D. Capacity planning and assessment process
• Appendix II-E. Sample letter ATM exchange agreements
• Appendix II-F. Sample international ATFM operations planning telephone conference format plan
• Appendix II-G. Sample LOA between FMU and ACC
• Appendix II-H. Template letter of agreement between ANSP on flow management
PART III. AIRPORT COLLABORATIVE DECISION-MAKING
Chapter 1. What is A-CDM?
Chapter 2. Airport-CDM partners and stakeholders
Chapter 3. A-CDM methods and tools
Chapter 4. A-CDM implementation

Appendix III-A. Generic MOU between A-CDM partners and stakeholders
Appendix III-B. Template of generic aeronautical information publication (AIP) provided to EUROCONTROL States implementing A-CDM
Appendix III-C. Example of an MOU: FAA membership agreement for collaborative decision making (CDM) exchange of data
Appendix III-D. Examples of A-CDM KPI
Doc 9971 Stakeholders

- Air navigation service providers
- Airspace users
- Airline operation centers
- Airport operators
- Airport ground handlers
- Airport slot coordinators
- Regulators
- Military authorities
- Meteorological agencies
- Others
Doc 9971 shows:

- What is the starting point regarding the development of an ATFM service?
- What are the foundational objectives and principles of ATFM?
- What are the benefits of implementing an ATFM service?
- How does an ATFM service operate?
- How is an ATFM service structured and organized?
- What are the roles and responsibilities of the stakeholders in the ATFM service?
- How is the capacity of an airspace sector and airport determined?
- How are ATFM processed applied in order to balance the demand and capacity within its area of responsibility?
- How is an ATFM service implemented?
- What are ATFM Measures and how are they established and applied?
- What data and information are exchanged in an ATFM service?
- What terminology/phraseology is used in ATFM?
- What resources are available to States regarding the various aspects of ATFM?
ATM planning and ATFM phases

**Demand**

- Performance targets
- Traffic forecast

**Strategic**

- Initial traffic demand
- Updated traffic demand
- Dynamic traffic situation

**Tactical**

- ATFM daily plan (ADP)
- Tactical ATFM
- Optimized operations

**Post-operations**

- Post-operations analysis and performance monitoring

**Capacity**

- Airspace design
- Technical infrastructure
- Procedures
- Staffing and training
- Performance prediction

- Weather
- Airspace use plan
- Staffing roster
- Capacity constraints
- Dynamic weather
- Special use airspace status
- Actual staffing
- Revised capacity
- Capacity management

**Capacity analysis**
Factors Affecting Airport Capacity

- **Environment**
  - Emission reduction
  - Noise abatement
  - Curfew
  - Airport altitude (impact on ROT)
  - Airport slots
  - Runway allocation scheme

- **Separation**
  - Arrival interval
  - Departure interval

- **Weather**
  - Headwind
  - IMC
  - De-icing
  - Sand storms

- **Airspace complexity**
  - ILS
  - Nav Aid availability
  - CNS

- **Aerodrome design**
  - Rapid exit taxiway (RET)
  - Taxiways configuration
  - Multiple active runways
  - Single active runway
  - Mixed mode

- **Demand**
  - Average ground speed on final
  - Pilot reaction time
  - Runway occupancy time
  - Fleet mix

- **Runways**
  - Runway condition

- **Runway slots**
  - Dependent runways

- **Airport capacity**
## ATFM Measures

<table>
<thead>
<tr>
<th>ATFM Measure</th>
<th>Airport Arrivals</th>
<th>Airport Departures</th>
<th>Airspace</th>
<th>Control Mechanism</th>
<th>Time Frame</th>
<th>Requirements to be Effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>CTOT</td>
<td>Pre-tactical and tactical</td>
<td>Participation in percentage and distance</td>
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<tr>
<td>Re-route</td>
<td></td>
<td>X</td>
<td></td>
<td>Flight path change to avoid constraint</td>
<td>Pre-tactical and tactical</td>
<td>Access to airspace and published routes</td>
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<tr>
<td>Ground stop</td>
<td>X</td>
<td></td>
<td></td>
<td>Prevent departures from specific aerodromes to address existing tactical load on an arrival aerodrome</td>
<td>Tactical</td>
<td></td>
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<tr>
<td>MIT/MINT</td>
<td>X</td>
<td></td>
<td>X</td>
<td>Time- or distance-based separation on a single stream of traffic</td>
<td>Tactical</td>
<td></td>
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<tr>
<td>MDI</td>
<td>X</td>
<td></td>
<td>X</td>
<td>Time-based separation from departures from the same aerodrome</td>
<td>Tactical</td>
<td></td>
</tr>
<tr>
<td>Fix balancing</td>
<td>X</td>
<td></td>
<td></td>
<td>Flight path change to avoid</td>
<td>Tactical</td>
<td></td>
</tr>
<tr>
<td>Level capping</td>
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<td>X</td>
<td></td>
<td>Flight path change to avoid</td>
<td>Tactical</td>
<td></td>
</tr>
</tbody>
</table>
ATFM Measures (cont’d)

- ATFM measures are important initiatives for managing the flow of air traffic.
- They are very efficient when used to manage traffic demand.
- They can have a significant impact on Airspace Users, 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 OPS.
- Mitigation action could be taken by Airspace Users to minimize impact:
  - Re-routing
  - Slot Swapping
  - Airborne Holding
Selection process of ATFM Measures

Resource DCB need (ATFM)

Airport
- Arrivals
  - Minor: No ATFM action
    - Long lead times: GDP, MIT/MINIT fix balancing
  - Major: No ATFM action
    - Short lead time: GS/GDP, MDI fix balancing

Airport
- Departures
  - Minor: No ATFM action
    - Long lead times: GDP
  - Major: No ATFM action
    - Short lead time: GDP

Airspace
- Sector / Ad Hoc Volumes
  - Minor: No ATFM action
    - Long lead times: GDP, playbook re-route
  - Major: No ATFM action
    - Short lead time: Level capping MIT/MINIT MDI fix balancing re-route GDP

Minor/Major: Determination based on extent of over demand and/or duration of imbalance. GDPs require sufficient participation for effectiveness.
State should ensure that an ATFM organizational structure which meets the needs of the aviation community is developed.

This structure should, at a minimum, allow the management and oversight of the ATFM service and the coordination and exchange of information, both internally and externally.

The structure should also ensure the existence of a line of authority for the implementation of decisions and compliance with the mission requirements assigned to the ATFM services.

A line of authority to support the ATFM service should include the following:
- an ATFM service manager;
- the flow management unit (FMU) that provides ATFM service for a specific set of ATS units; and
- flow management positions (FMPs) at specific ATS units responsible for the day-to-day ATFM activities.
ATFM SERVICE AND ORGANIZATION STRUCTURE

Manager ATFM

Supervisor FMU1
- Traffic management supervision ACC
- Traffic management supervision APP
- Traffic management supervision TWR

Supervisor FMU2, 3 ...
- Traffic management supervision ACC
- Traffic management supervision APP
- Traffic management supervision TWR
ATFM TRAINING REQUIREMENTS (Chap 7.5)

• An ATFM service should be staffed by personnel with sufficient knowledge and understanding of the ATM system they are supporting and the potential effects that their work may have on the safety and efficiency of air navigation.

• To ensure this and in line with their training policies, States and ANSPs should establish core training plans to educate the ATFM service staff in the importance of the availability, continuity, accuracy and integrity levels required for the services provided.

In addition to the staff of the ATFM unit itself, other units/areas/entities where staff should be aware of and understand the ATFM services provided and the specific roles and responsibilities they carry in this process. Units where ATFM is exercised or directly experienced and where staff therefore need training include:

a) ATC;
b) aircraft operators;
c) pilots;
d) airport operators;
e) military, both service providers and users; and
f) regulatory bodies (CAAs and equivalent).
The MID Region Air Navigation Strategy was endorsed by MSG/4 meeting (Cairo, 24-26 November 2014), based on the outcome of the relevant MIDANPIRG subsidiary bodies and inputs received from stakeholders.

The Strategy was further reviewed and updated by MIDANPIRG/15 (Bahrain, 8-11 June 2015), and endorsed as ICAO MID Doc 002, which is available on the MID Office website.

Some additional amendments to the Strategy were approved by MIDANPIRG/16 (Kuwait, 13-16 February 2017).

Latest version approved by MSG/6 meeting (Cairo, 3-5 December 2018)
## MID ASBU Block 0 Modules Prioritization

<table>
<thead>
<tr>
<th>Performance Improvement Areas (PIA)</th>
<th>Module</th>
<th>Priority</th>
<th>Module Name</th>
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</thead>
<tbody>
<tr>
<td><strong>PIA 1: Airport Operations</strong></td>
<td>APTA</td>
<td>1</td>
<td>Optimization of Approach Procedures including vertical guidance</td>
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<tr>
<td></td>
<td>WAKE</td>
<td>2</td>
<td>Increased Runway Throughput through Optimized Wake Turbulence Separation</td>
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<td>RSEQ</td>
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<td>Improved Traffic Flow through Sequencing (AMAN/DMAN)</td>
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<td>SURF</td>
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<td>Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)</td>
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<td>ACDM</td>
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<td>Improved Airport Operations through Airport-CDM</td>
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<tr>
<td><strong>PIA 2: Globally Interoperable Systems and Data - Through Globally Interoperable System Wide Information Management</strong></td>
<td>FICE</td>
<td>1</td>
<td>Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration</td>
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<tr>
<td></td>
<td>DATM</td>
<td>1</td>
<td>Service Improvement through Digital Aeronautical Information Management</td>
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<td></td>
<td>AMET</td>
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<td>Meteorological information supporting enhanced operational efficiency and safety</td>
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<td><strong>PIA 3: Optimum Capacity and Flexible Flights – Through Global Collaborative ATM</strong></td>
<td>FRT0</td>
<td>1</td>
<td>Improved Operations through Enhanced En-Route Trajectories</td>
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<td>NOPS</td>
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<td>Improved Flow Performance through Planning based on a Network-Wide view</td>
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<td></td>
<td>ASUR</td>
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<td>Initial Capability for Ground Surveillance</td>
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<td>ASEP</td>
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<td>Air Traffic Situational Awareness (ATSA)</td>
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<td>OPFL</td>
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<td>Improved access to Optimum Flight Levels through Climb/Descent Procedures using ADS-B</td>
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<td>ACAS</td>
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<td>ACAS Improvements</td>
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<td>SNET</td>
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<td>Increased Effectiveness of Ground-based Safety Nets</td>
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<td></td>
<td>CDO</td>
<td>1</td>
<td>Improved Flexibility and Efficiency in Descent Profiles (CDO)</td>
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<tr>
<td><strong>PIA 4: Efficient Flight Path – Through Trajectory-based Operations</strong></td>
<td>TBO</td>
<td>2</td>
<td>Improved Safety and Efficiency through the initial application of Data Link En-Route</td>
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<td>CCO</td>
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<td>Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO)</td>
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</table>
### Air Navigation Performance Targets

#### B0 – ACDM: Improved Airport Operations through Airport-CDM

<table>
<thead>
<tr>
<th>Elements</th>
<th>Applicability</th>
<th>Performance Indicators/Supporting Metrics</th>
<th>Targets</th>
</tr>
</thead>
</table>
| A-CDM    | OBBI, HECA, OIII, OKBK, OOMS, OTBD, OTHH, OEJN, OERK, OMDB, OMAA, OMDW | Indicator: % of applicable international aerodromes having implemented improved airport operations through airport-CDM  
Supporting metric: Number of applicable international aerodromes having implemented improved airport operations through airport-CDM | 50% by Dec. 2018 |
### B0 – NOPS: Improved Flow Performance through Planning based on a Network-Wide view

<table>
<thead>
<tr>
<th>Elements</th>
<th>Applicability</th>
<th>Performance Indicators/Supporting Metrics</th>
<th>Targets</th>
<th>Timelines</th>
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<tbody>
<tr>
<td>ATFM Measures implemented in collaborative manner</td>
<td>All States</td>
<td>Indicator: % of States that have established a mechanism for the implementation of ATFM Measures based on collaborative decision</td>
<td>100%</td>
<td>Dec. 2018</td>
</tr>
<tr>
<td>ATFM Structure</td>
<td>All States</td>
<td>Indicator: % of States that have established an ATFM Structure</td>
<td>100 %</td>
<td>Dec. 2019</td>
</tr>
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</table>
Regional developments related to ATFM

- It was agreed to the implementation of Regional/sub-regional ATFM project under the framework of the MAEP in 2015, which was supported by MIDANPIRG, DGCA-MID, etc.
- ICAO ATFM Seminar was be held in Dubai, UAE, 13-15 December 2016
- ATFM Task Force was established by MIDANPIRG to develop a CONOPS for ATFM implementation in the MID Region
- ATFM TF/1 meeting was held in Muscat, Amman, 23-25 September 2018.
- ATFM Core Team meeting was held in Abu Dhabi, UAE, 22-24 January 2019