ATFM Workshop
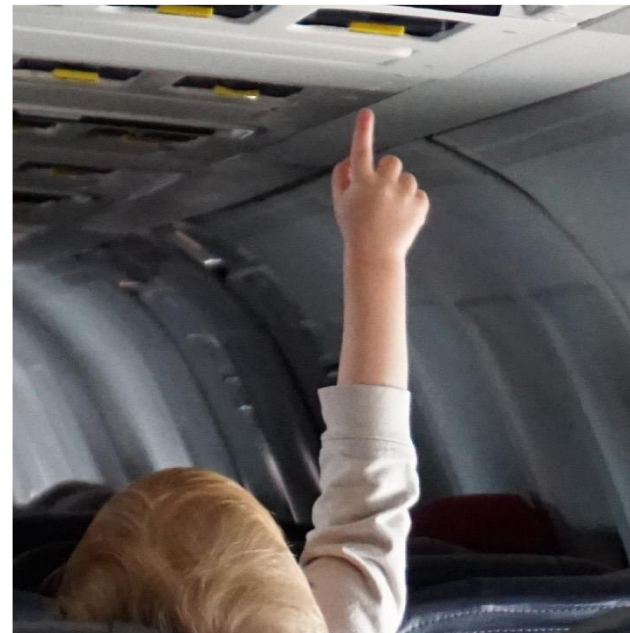
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ACAO/ICAO

ATFM Workshop

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Definitions

Collaborative decision-making (CDM)
CDM is defined as a process focused on how to decide on a course of action articulated between two or more community members. Through this process, ATM community members share information related to that decision and agree on and apply the decision-making approach and principles. The overall objective of the process is to improve the performance of the ATM system as a whole while balancing the needs of individual ATM community members." – ICAO

Air Traffic Flow Management (ATFM)
ATFM is an Air traffic Management service established with the objective of contributing to a safe, orderly and expeditious flow of air traffic by ensuring that an Air Traffic Control (ATC) service is provided in an environment where system capacity (airports and airspace) is optimized and the demand is balanced against that system capacity.

Airport CDM (A-CDM)
A process which aims to improve the operational efficiency of all airport operators by reducing delays, increasing the predictability of events during the progress of a flight and optimizing the utilization of resources.

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Snapshot

ATFM Implementation

Globally, there are numerous places where ATFM is either fully implemented or where structures and procedures are in place that follow the ATFM concepts.

What does a full ATFM module look like?

A full ATFM module should include a very robust usage of CDM principles. Whereby, all stakeholders are involved in resolving and mitigating airspace and airport capacity constraints. Restrictions are not placed arbitrarily, users are informed in advance of constraints, and decisions on how best to mitigate congestion of routes and airports is coordinated.

How is information shared?

- Airlines file their Flight Plan
- Weather and AIS data is provided via AFTN, direct from source, or third party subscription

How do we respond?

- Airlines attempt to adjust their flight times and routes
- ANSPs attempt to balance sector workloads
- Airports attempt to manage gate and support activities.

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ATFM Tools in Use and Under Development

Tool Name	Brief Description	Comment
Air Traffic Flow Management (ATFM) Platform (USA Metron Harmony, EUROCONTROL)	Manages airspace and aerodrome loading and provides fuel efficient absorption of necessary delay	Monitors demand on resources and balances demand against capacity in the pre-tactical and tactical timeframes – network management center based.
Airport – Collaborative Decision Making (A-CDM)	Concept and system focused on Airport efficiency	Aims at improving the overall efficiency of airport operations by optimising the use of resources and improving the predictability
Surface Manager (SMAN)	Manages aerodrome surface queues	Enables more efficient and cost-effective management and measure airport operations.
Departure Manager (DMAN)	Provides efficient flow over congested departure fixes	Coordinates departure flows taking multiple constraints and preferences into account
Arrival Manager (AMAN)	Delivers a smoothed and optimized traffic flow to the TMA	Sequences arrivals and generates advice for controllers to optimize airspace and runway usage.
Related Systems (Tactical ATC)		
Tower Automation	Integrates displays and controls for efficient tower functioning	Tower centric system – tower interface to GDP/AFP/SMAN/DMAN function.
TMA ATM Platform	Provides terminal area control automation	TMA facility-based – AFPs
ACC ATM Platform	Provides ACC tactical control automation	ACC-based – AFPs and AMAN advisories.

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How it Works Today (cont'd)

Pre-Departure

- Airports manage operations on the ground, negotiating directly with airlines and ANSPs

- Flights are monitored for time accuracy, capacity, constraints and demand at airports, is coordinated

- Airport and airspace capacity is monitored, but information is not widely shared

- ATFM measures are implemented to protect the ANSP and airport against over saturation

- Airspace users attempt to optimize operations through ATFM processes, exchanging slot times when available

How is information shared?

- If A-CDM is available, stakeholders are able to collaborate and contribute to decision making processes

- Through coordination, a manageable flow of traffic is maintained into airspaces and a

After Departure

- Users coordinate with destination airport to ensure gate space is available

- ANSPs manage traffic volume with ATFM initiatives (MIT, MINIT, Re-Route, Holding)

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How it Works Today (cont'd)

Enroute

- ANSPs share information on location of aircraft by tracking the progress of the flight

- Airports provide common situational awareness to keep pilots and operators informed.

- Aircraft routes and speeds are managed, while taking into account operator preferences and operational constraints.

- During periods of predicted or unpredicted reductions of capacity, ANSPs increase or reduce ATFM initiatives.

Prior to Arrival

- ANSPs and Airport operators coordinate on arrival rates and configurations.

- Aircraft operators coordinate with Airports to ensure gate spaces are available, and are informed about any possible delays

- ANPS work to provide efficient flows and arrival sequences

- These activities are made easier with A-CDM

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ATFM Benefits - Predictability

- Allows us to build achievable schedules

- Allows us to load the appropriate fuel weight

  - Every kilo of extra fuel offsets cargo and passenger capacity

  - We may have to offload passengers and cargo to carry extra fuel

  - It costs fuel to carry fuel

  - Predictable direct sectors are 4-6% more efficient than tactical direct sectors

- Collaborative approach allows us to help the system

Global Application – Airline Benefits

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European

The European system has been designed to manage the capacity constraints, and to allow airports to manage airport activities. Out of necessity, A-CDM was developed in order to allow airports to begin proactively coordinating the arrivals and departures with the CFMU NM

Eurocontrol CFMU

The CFMU, has developed a number of tools and procedures to manage traffic within the EU area. It has focused on utilizing the tools to manage the data associated with flights, and to coordinate with the airports and airlines. The basic structure develops a network plan in advance of the operational day, and then works with ANSPs to mitigate unexpected disruptions. The CFMU does not have the authority to unilaterally modify the network plan.

Performance?

▪The level of performance, is based on the number of delays and preference approvals.

▪Weather and other issues have reduced the overall performance. In particular, the lack of flexibility in the airspace, staffing and workforce actions, and lack of harmonized equipage, have contributed to delays.

Main Challenges?

- Airspace needs to be more accessible. The amount of OAT airspace over Europe limits ANSP flexibilities.
- Airlines may need to adjust flight times in order to take advantage of preferred routes
- Airports need to improve management of gates and support activities.

Global Application – Airline Benefits

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United States/FAA

▪The FAA has a very robust ATFM system . The CDM structure utilized by the FAA provides a venue for stakeholders to commonly agree on issues related to real-time operations. Via a suite of tools, ATC, airlines and airports are able to reduce delays by optimizing resources and improving predictability of events.

FAA Air Traffic Command Center

▪The FAA ATCSCC is active in managing and coordinating aspects related to the flow of all traffic within US delegated airspace and works directly with airport operators to lessen capacity constraints and restrictions, by determining how best to mitigate enroute and airport delays. The FAA's ATFM module is interconnected with ACCs and adjacent FIRs.

Performance?

▪The FAA reports on both airport and FAA ATC performance.

▪Delays and other performance measures are tracked.

▪Airlines are provided opportunities and encouraged to comment and daily performance.

Main Challenges?

▪ Weather is a huge factor impacting the US.

▪ New entrants such as commercial space activities, and RPAS operations will have an impact on specific areas.

▪ Further development of technologies will assist the FAA in improving their operation, but may make it difficult to harmonize systems with Global

Global Application – Airline Benefits

Asia-Pacific

▪There is no centralized provider of ATFM services within the region, however, there are a number of States with Domestic ATFM programs. What Asia has realized is that they will not have a centralized Unit for the region, therefore alternative options must be explored to provide **Cross Border ATFM, that would** link the various domestic ATFM initiatives - hence Multi Nodal and NARAHG (Korea, Japan, Eastern China). In addition, to the above a number of ANSPs and airport operators manage activities utilizing A-CDM principles.

Demonstrations

▪The region will undergo a demonstration of SWIM capabilities later in 2019. As the region moves forward, SWIM will be a key enabler in building a multi-modal LR-ATFM system. In this regard, Australia is currently embarking on a LR-ATFM project which will look at planning of their arrival sequence much further out than today and integrate it with their AMAN and GDP.

Performance?

▪The region currently experiences a varying degree of delays. Quite often, they are attributable to weather and capacity constraints.

▪In addition, the amount of available airspace is limited due to reserved military areas.

Main Challenges?

- Available airspace, Civil & Military sharing, i.e., FUA
- Development of automated interoperable systems
- Established links with adjacent FIRs will enable the sharing information
- Improved use of weather forecasting and opening of alternative routes.

Global Application – Airline Benefits

Middle East

▪There is no centralized provider of ATFM services in the region. The lack of available airspace, and areas where military operations restrict the use of established route structures, only adds to congestion and reductions in capacity.

ATFM Development

▪ICAO has formed a Task Force to consider the subject.

▪There are a number of events upcoming that will increase the demand on available airspace.

▪ANSPs in the region, although largely equipped with new systems, have not implemented interoperable systems that enable automated sharing and collaboration.

Performance?

▪Capacity demand has resulted in delays at a number of airports

▪Although not a significant factor, weather has the potential to disrupt operations.

▪AIS and Flight Plan data is provided via AFTN.

▪The use of AIDC is increasing, but inconsistent.

Main Challenges?

▪ The lack of interoperability between systems, inhibits advancement.

▪ Implementation of SWIM will improve the ability of systems to communicate, but progress is slow.

▪ Lack of available airspace and routes will continue to restrict capacity.

▪ Political situation results in difficulties for ANSPs

Global Application – Airline Benefits

Americas

- Although the region benefits from having a number of advanced ANPS who are implementing advanced systems, there are challenges related to system interoperability with surrounding regions. This disconnect is not sustainable.

ATFM Development

- Here to, the America's region is open to advancing robust methods for managing operations, however they have challenges with airspace restrictions, and weather avoidance

- There is a need to implement interoperable systems, thus allowing harmonized procedures.

Performance?

- Weather accounts for the majority of delays.

- Airport capacity constraints, due to size and configuration are also key factors affecting the performance.

Main Challenges?

- Lack of automation improvements.

- SWIM technology would assist the ANSPs in being able to share information.

- Airport infrastructure and management of gates and support activities, could also improve predictability, and increase efficiencies.

- Inter-regional coordination and the use of alternative routings during weather events would improve overall operations.

Global Application – Airline Benefits

Overall Benefits

✓ Enhanced ATM system safety

✓ Increased **predictability**

✓ Increased situational awareness

✓ Reduced fuel burn and operating costs

✓ Effective management of irregular operations and unforeseen events

NOTE: An ATM system which has no plans regarding capacity, i.e., no systems in place to manage flows, ultimately may become a hindrance to maintaining a steady flow of traffic and result in increased costs

Next Step - Tools Development

- Long Range ATFM

- Trajectory Based Operations

- Gate-to-Gate System Integration

- Advanced Weather Prediction and Interpretation Tools

- Cloud Based Applications

Moving Forward - What can we do?

ATFM will:

- Allow operators to balance demand and capacity at airports, and ANSPs to better manage airspace in all phases of flight

CDM will:

- Manage traffic on the ground
- Manage and improve the turn around process

ATFM and A-CDM together will:

- Increase situational awareness
- Include all stakeholders in the CDM process
- Contribute to operational efficiency for all stakeholders

What does this mean?

- ATFM does not require A-CDM to achieve its objectives
- A-CDM does not require ATFM to achieve its objectives
- Both can be implemented without the other
- However, if one would like to take advantage of the benefits associated with ATFM and A-CDM, they should be implemented in an integrated manner.

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Moving Forward

What will we need to be able to benefit from a robust ATFM?

Let's take it step by step:

- The implementation of SWIM capabilities will provide the community with the method necessary to share ATFM data.

- Implement a full ATFM module that includes a very robust usage of CDM principles, and includes the usage of A-CDM as an integral part of the larger CDM.

- Stakeholders share in resolving and mitigating airspace and airport capacity constraints.

- ATFM initiatives that are not placed arbitrarily,
- Users that are informed in advance of constraints, and through CDM, decisions are made on how best to mitigate congestion of routes and airports.
- Airlines file Flight Plans through the FF-ICE service
- Weather and AIS data is provided via SWIM enabled services (AIXM and WXXM)
- Flight trajectories are adjusted as needed
- ANSPs are able to balance sector workloads
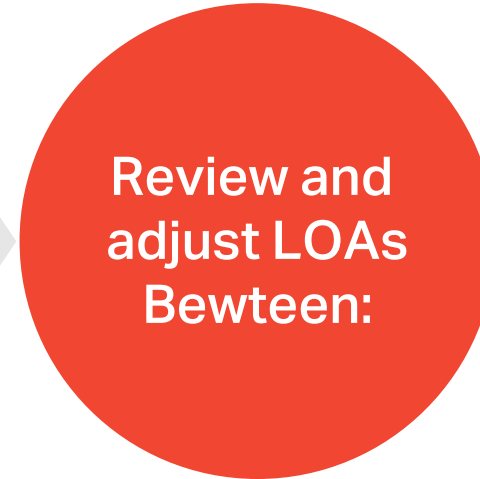- Airports have more predictability to manage gate and support activities.

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Next Steps!

Implement SWIM
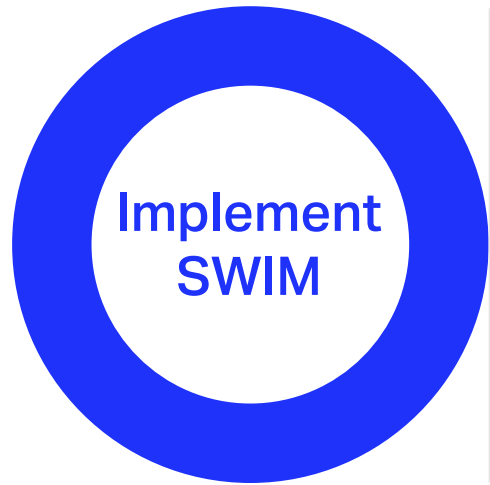
- Connect with Global Protected System
- Register for Services
- Share Data
- Share Information

Implement CDM To Include:

- ATC
- Airports
- Airlines
- Other Stakeholders

Review and adjust LOAs Bewteen:

- CAA's
- ANSPs
- Airports

Increase Availability Of:

- Data
- Airspace
- Trajectories

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Thank you