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WORKING PAPER

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**Joint NAM/CAR Air Navigation Implementation Working Group (ANI/WG)/Air Traffic Flow Management (ATFM) Implementation Task Force Meeting (ATFM/TF)/
CANSO Air Traffic Flow Management Data Exchange Network for the Americas (CADENA) Regional Implementation Group Meeting (ATFM/TF/CADENA)
Santo Domingo, Dominican Republic, 22 - 24 January 2019**

Agenda Item 6: ATFM Tools

AIR TRAFFIC FLOW MANAGEMENT TOOLS AND CAPABILITIES

(Presented by CANSO)

EXECUTIVE SUMMARY

The number of flights within and through the NACC Region continues to increase putting more demand on airspace and aerodromes. The capacity limitations along with diverse ATFM operational capabilities of the States that make up the regional ATM system result in significant capacity to demand imbalances. The lack of accurate demand prediction and early constraint identification capabilities, especially under adverse meteorological or CNS availability conditions, results in over-restrictive, ineffective, and often unilateral air traffic flow management actions that impact operational efficiency, increase ATCO workload, and overall throughput throughout the NACC and neighbouring regions.

The growth in aviation demand faced by NACC States provides an opportunity, indeed necessitates, a maturation of ATFM automation capabilities, integrated tools, aligned training, regional KPIs, and supportive processes and procedures.

This Working Paper presents a proposal for common requirements ATFM Tools should provide.

Action:	The suggested actions are presented in Section 5.
<i>Strategic Objectives:</i>	<ul style="list-style-type: none">• Safety• Air Navigation Capacity and Efficiency• Economic Development of Air Transport• Environmental Protection
<i>References:</i>	<ul style="list-style-type: none">• 2016-2030 Global Air Navigation Plan, ICAO Doc 9750-AN/963• Manual on Collaborative Air Traffic Flow Management, ICAO Doc 9971• Caribbean/South American Air Traffic Flow Management Concept of Operation (CAR/SAM ATFM CONOPS)

1. Introduction

1.1 The ANI/WG/4 meeting held 21-24 August 2018 stated in the Final Report that “The meeting expressed a challenge for ATFM implementation due to the limited use of ATFM software and automated tools.”

1.2 Air Traffic Flow Management (ATFM) is one of ICAO Global priorities as explained in the GANP, considering that ATFM contributes to the safety and efficiency of flight operations through balancing demand with available capacity, while meeting the business objectives of the airspace users. Advanced ATFM capabilities increase airport and airspace throughput by predicting traffic densities and flows, translating and integrating weather, and modelling solutions to make optimal use of current and forecast capacities.

1.3 To achieve this goal, air navigation service providers (ANSP) and airports must leverage state-of-the-art technologies to provide a safe, efficient, and equitable flow of air traffic during periods of increased demand or during capacity limiting constraints. These available technologies can reduce delays, avoid unnecessary reroutes, provide more equitable distribution of demand/capacity balancing traffic management measures, and mitigate the environmental impacts resulting from inefficient flight operations and increased air traffic demand.

1.4 Regional ANSPs require the ability to predict demand and capacity, and the impacts of forecasted weather during the Pre-tactical as well as the Tactical phases of flight. This capability is possible through an array of available ATFM and CDM automated tools. These advanced ATFM tools and resulting solutions are essential to ensure that the future global aviation system meets the needs of the ANSPs, airport operator, and aircraft operator.

2. Background

2.1 The CAR Region is experiencing an increase in demand that puts a strain on available capacities resulting in increased delays, operational inefficiency, and reroutes that contribute to reduced throughput in airspace and airports.

2.2 ATFM tools and capabilities available can be implemented and integrated by ANSPs to improve ATFM demand and capacity predictions, practices, solutions, safety, operational analysis, and collaborative decision-making.

2.3 The CAR Region is comprised of many ANSPs with different demand characteristics and ATFM capabilities. ATFM and its applications cannot be limited to a single ANSP. When adverse weather conditions or CNS capability result in capacity reductions, non-automated flow restrictions are applied, such as large longitudinal separation at transfer of control points between adjacent ANSPs. This frequently generates the need for the restriction to be passed back to upstream ANSPs to ensure the required separation. These large restrictions are based on a demand profile that is not known to the ANSPs and therefore may often be over-restrictive resulting in excess and unnecessary delays, reduced overflights due to reroutes around an entire ANSP, or may be under-restrictive resulting in a potential compromise to safety.

3. Discussion

3.1 The objectives of AFTM tools and capabilities are to provide the best possible information to the right stakeholders at the right time. Accurate and timely demand and capacity predictions improve ATFM decision-making to provide appropriate flow solutions that meet operational requirements, utilize airspace and aerodrome capacity effectively and efficiently, and cause the least operational impact to the stakeholders as well as neighbouring ANSPs.

3.2 ATFM tools provide a platform for common situational awareness, improved decision support, reduced ground and in-flight delays, improved fuel efficiency resulting in reduced CO₂ emissions, analysis of performance, and transparent and robust collaborative decision-making processes. The digital exchange of all relevant data between neighbouring ANSPs and stakeholders is an essential element of ATFM to ensure a common understanding of demand and capacity between the service providers and airspace users.

3.3 Automated ATFM systems consist of an advanced set of capabilities that enable the ANSP, airport operator, and aircraft operator to enhance operational efficiency in the Strategic, Pre-tactical, and Tactical phases of flight. These capabilities include decision support, simulation, creation, and collaboration of traffic management strategies based on accurate trajectory information and a clear picture of demand. ANSPs and airspace users need to understand airspace impacts, traffic management measure strategies, and alternative solutions.

3.4 The CANSO ATFM Data Exchange Network for the Americas (CADENA) weekly operational conference and the Operational Information System (OIS) highlight the benefit of sharing information and operations planning with neighbouring ANSPs and interested stakeholders. However, without the aid of accurate automated demand prediction and decision support capabilities operational benefit is necessarily limited.

3.6 In support of the Members, CADENA issued a Request for Information regarding the capability to exchange Traffic Flow Management (TFM) data between the Federal Aviation Administration (FAA) and air navigation service providers (ANSPs) located in the Caribbean and Central America. CADENA acknowledges that ATFM requires a wide range of capabilities and information and encourages regional ANSPs to exchange TFM flight data to assess the regional airports and airspace demand accurately. The purpose of the RFI was to obtain information to assist in regional strategy development.

4. Conclusions

4.1 AFTM tools should at least provide the following features:

- a. The capacity to predict and monitor demand;
- b. The capacity to translate and integrate weather prediction information for convective weather, ceilings, and visibility to provide en-route sector and airport capacity estimation;
- c. Automated ATFM capabilities for determining demand and capacity imbalances for both airports and airspace, and modelling and implementation of collaborative ATFM solutions;

- d. Simulation and human-in-the-loop exercise capabilities to allow ANSPs and stakeholders to model and assess ATFM operational scenarios and solutions to develop improved operational concepts and procedures to reach the best possible operational outcome during periods of demand/capacity imbalance; and
- e. Operation performance reports to support analysis and alignment with agreed key performance indicators (KPIs) for post-operational reviews to promote continuous improvement.

5. Suggested actions.

5.1 The Meeting is invited to:

- a) request the ANI/WG/ATFM Task Force actions to include AFTM tools minimum requirements of Section 4.1 in the CAR/SAM ATFM CONOPS;
- b) request States to consider implementing automated ATFM tools to predict demand and balance that demand with available capacity;
- c) request States to model ATFM solutions to ensure the use of the least restrictive TMM necessary to achieve desired result so as to minimize impact on stakeholders and to utilize all available capacity to maximize airspace and airport throughput; and
- d) recommend any other action deemed appropriate.