

# Chapter 6

## The Adoption of Network– Centric Data Sharing in Air Traffic Management

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### ABSTRACT

*Network-centric sharing of data between all Air Traffic Management (ATM) stakeholders can improve the aviation network substantially. The System Wide Information Management (SWIM) platform is a platform for the open sharing of all information between aircraft operators, airports, air navigation services providers (ANSPs), and meteorology services, but has struggled to find a following. This article aims to identify the potential reasons for the slow adoption of the SWIM platform, and to investigate how to better communicate its potential. To gain insight into the drivers for each of the stakeholders, a series of semi-structured interviews was conducted with airlines, airports and ANSPs. Moreover, an Airport Collaborative Decision Making (A-CDM) initiative at the airport in Dublin was included as a case study. Recommendations are provided on how to address the results from a governance point of view.*

### 1. INTRODUCTION

Aviation systems are generating an increasing amount of data, with estimates of annual global aircraft data production reaching 98 million terabytes by the year 2026 (Maire et al., 2017). The proliferation of data gathering devices, sensors and the vastly improved data storage and communication technology is a major opportunity for improving aviation's performance. The emerging technology of Internet of Things (IoT) has led to more intelligent transportation. One example is the flight operational improvements developed in Air Traffic Flow Management (ATFM), which interlink airlines, airports and relevant

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Air Navigation Service Providers (ANSPs). Much of the data, however remain within the control and possession of the individual stakeholders.

Some of the evident possibilities include optimized aircraft separation and elimination of “highways in the sky”; real-time airborne fleet adjustment in the eventuality of weather phenomena; congestion prediction and holding pattern elimination through optimized flight regimes and/or departure slot modulation to deliver aircraft at the real-time landing capacity of the arrival airport (Ayhan et al., 2013). Sharing of weather data across the network, sourced from the traditional weather data providers; from real-time airborne aircraft-sourced data, or taken from crowd-sourced ground installations can improve the accuracy of weather models integrated in the Air Traffic Management ecosystem. Such an open sourced approach to data sharing can allow third parties to tap into this information and provide performance-optimized solutions like those developed by SHIFT Aviation Consultants or tools like SkyFusion developed by Harris Corporation in collaboration with the International Air Transport Association (IATA) to close the communication gap between the main stakeholders in the ATM industry.

The Federal Aviation Administration (FAA), in collaboration with the International Civil Aviation Organization (ICAO) have developed the System Wide Information Management concept (SWIM) which is being incorporated into both the Next Generation Air Transportation System (NextGen) and Single European Sky ATM Research (SESAR). The goal of the concept is to provide a platform for open sharing of all information between operators, airports, ANSPs and meteorology services. The SWIM protocol provides a framework by which any actor can develop solutions using a standardized database of parameters commonly understandable to all subscribers.

Despite its 20 years of existence, the implementation of this concept is only slowly gathering pace. Two main factors are expected to be the major drivers of this development: Availability and penetration of the required level of technology within the airborne fleet and ground infrastructure; and the willingness and possibility of actors to share their operational data with potential competitors.

A number of scholars have researched the sharing of information. Gal-Or (1985) researched information sharing in oligopolies, Li (2002) focused on horizontal completion, whereas Lee, So and Tang (2000) focused on data sharing two-level supply chain. There area of transportation and especially Air Traffic Management (ATM) remains under-researched.

The study aims to assess the adoption of SWIM by airlines, airports and air traffic management in Ireland, and to identify their drivers to invest in more streamlined communication as well as to identify any reasons why adoption is slower than expected. The potential of real-time data exchange in the aviation industry reaches all aspects and stakeholders, from optimisation of the entire passenger experience from booking through arrival, to improvement of the global weather model and the overall carbon footprint of aviation. This study focuses on the ATM benefits drawn from advances in digital communication between the various stakeholders, an area that is under researched.

## **2. SYSTEM WIDE INFORMATION MANAGEMENT (SWIM)**

Researchers identified the need for more robust data communication for the industry to be able to follow the ever-increasing need for managing the airborne fleet (Smith, 1999). IATA (2017) supports the assertion that air traffic management “needs urgent reform to cut delays, costs and emissions”. The slow evolution in ATM systems is mainly justified by the regulator’s inclination towards safety over innovation (Kelvey, 2018). The current infrastructure, and its capabilities and limitations, are well understood and

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