# Information Technology in Air Traffic Management

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**Airspace & Operational Efficiency**

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# Abstract

Boeing is dedicated to continuously increasing the efficiency of aircraft and air traffic management systems. One of Boeing's major focuses in this area has been the use of information technology. Over the years, Boeing has pursued numerous projects focused on using automated information transfer for all phases of flight and providing the aircraft with the most up to date data available. These projects reduce the possibility for miscommunication between the controllers and cockpit crew, and provide dynamic in-flight reroutes to improve flight safety, save fuel, time and other airline costs. These and other projects will be discussed including the possible benefits they will provide. The aim of all of these projects is to improve the safety, efficiency and economy of air travel.

# Information Technology in ATM

- Boeing InFlight Optimization Services
- Service Oriented Aviation Information Management
- System Wide Information Management (SWIM)
- FAA Mini-Global
- Boeing OCEANS
- TDX

# Boeing InFlight Optimization Services

A suite of applications that continuously checks an array of real-time air traffic, weather, and airplane data to uncover post departure opportunities for individual flights to save fuel and improve operational performance.

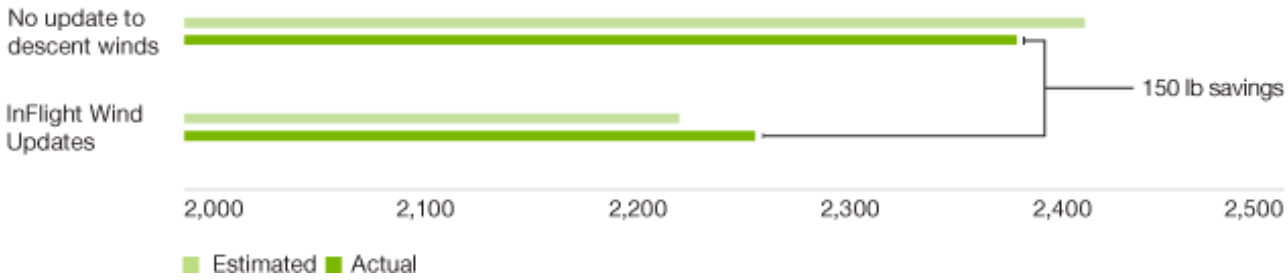
- InFlight Direct Routes provides, ATC conflict-checked, wind-optimal reroute which will save time.
- InFlight Wind Updates provides the best wind and temperature input to the FMC for the flight trajectory optimized for the specific FMC on that airplane.

http://www.boeing.com/commercial/aeromagazine/articles/2011_q2/4/

# Boeing InFlight Optimization Services Example

## InFlight Direct Routes


## InFlight Wind Updates

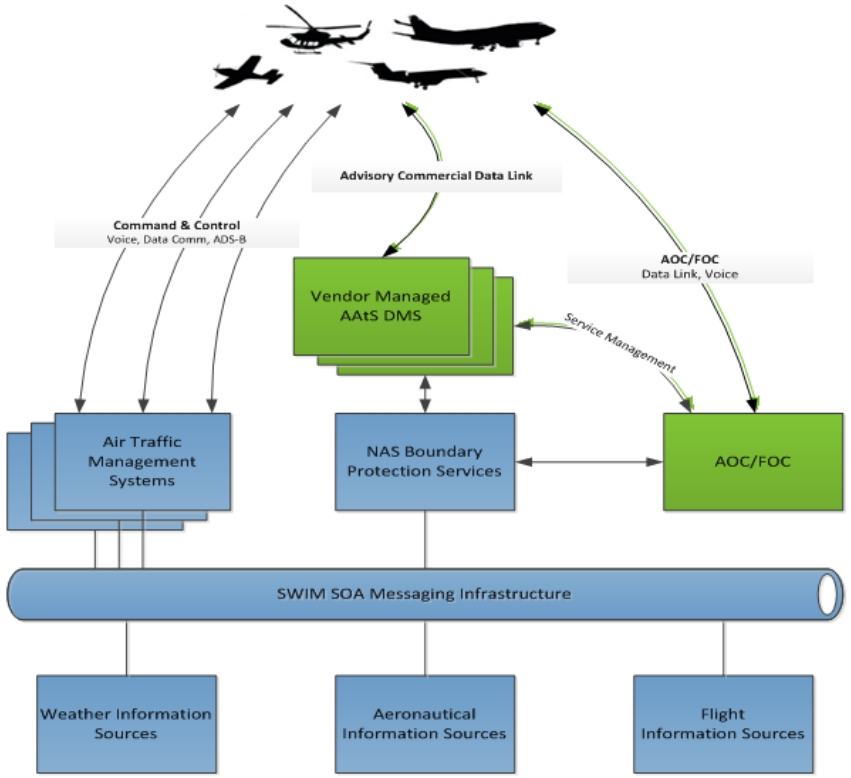



http://www.boeing.com/commercial/aeromagazine/articles/2011_q2/4/

# Service Oriented Aviation Information Management

- Enhance information service with an increased focus on information security in a service oriented environment.

- Benefits:
  - Analytics capabilities including descriptive, predictive and potentially prescriptive. Pertinent aviation data is streamed and stored in a warehouse for efficient retrieval.
  - Data Management System as one-stop-shop, providing a number of services for air-ground-air communication, including SWIM



# System Wide Information Management (SWIM)

The SWIM Program is a US National Airspace System (NAS)-wide information system that supports Next Generation Air Transportation System (NextGen) goals.

SWIM:

Facilitates NextGen by providing the digital data-sharing backbone

Enables increased common situational awareness and improved NAS agility

Provides a single point of access for aviation data

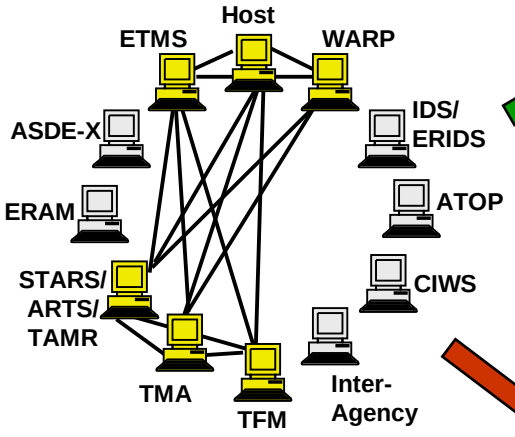
- producers of data publish it once
- users access the information they need through a single connection

SWIM is a technology enabler that provides the IT standards, infrastructure and governance necessary for NAS systems to share information and improve interoperability.

https://www.faa.gov/nextgen/programs/swim/overview/

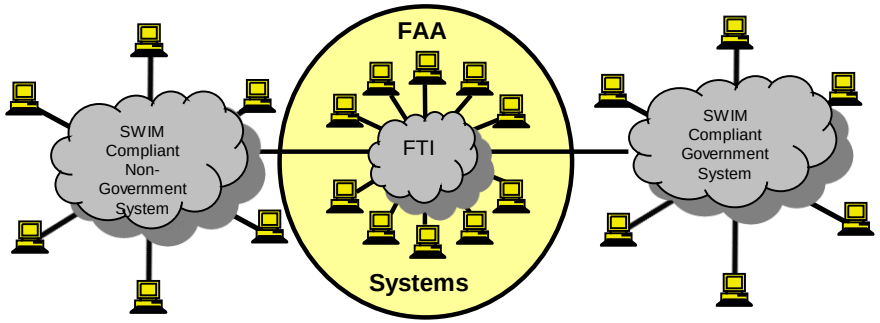
# The SWIM Challenge

## Today



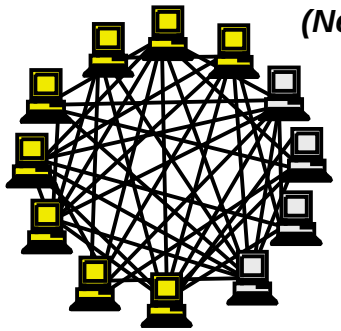

- Existing point-to-point, hardwired NAS
- Unique interfaces, custom designs

## Enterprise Management




## Business as Usual

***(NextGen without SWIM)***



- More unique, point-to-point interfaces
- Costly development, test, maintenance, CM
- New decisions linked to old data constructs
- Cumbersome data access outside of NAS

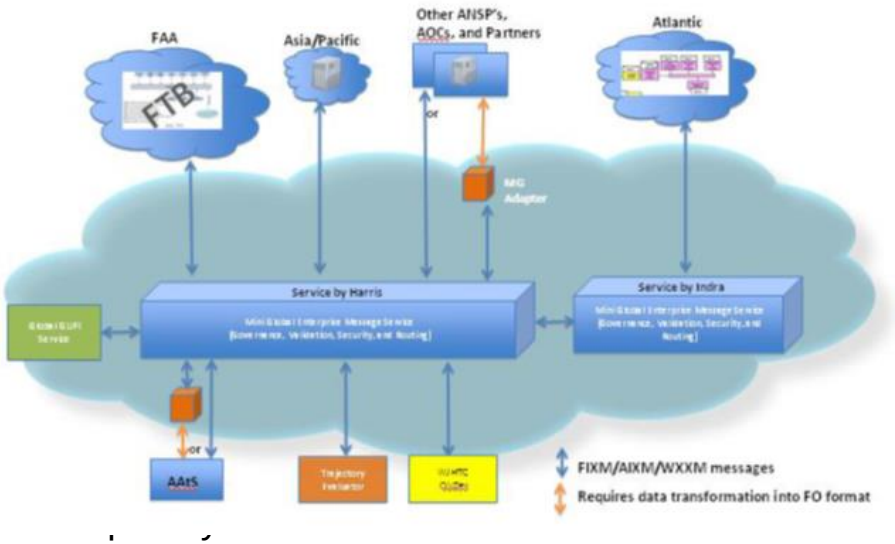
http://www.icao.int/APAC/Meetings/2010/amhs/sp25.pdf

# FAA Mini Global Overview

The FAA Mini Global demonstrations show how the FAA, International Air Navigation Service Providers (ANSPs) and flight operators are able to share common information within and across all regions to:

- Improve collaborative decision making (CDM)
- Improve air traffic management (ATM)
- Promote international harmonization

- Currently
  - data is exchanged 'point-to-point'
  - separate interfaces for each country
- Mini-Global I (2014)
  - FAA Enterprise Messaging System (EMS)
  - central hub to share information
  - utilizing standards for:
    - flight (FIXM)
    - weather (WXXM)
    - aeronautical (AIXM) information
- Mini-Global II (2016) adds
  - Traffic Flow Management (TMXM) – Partially

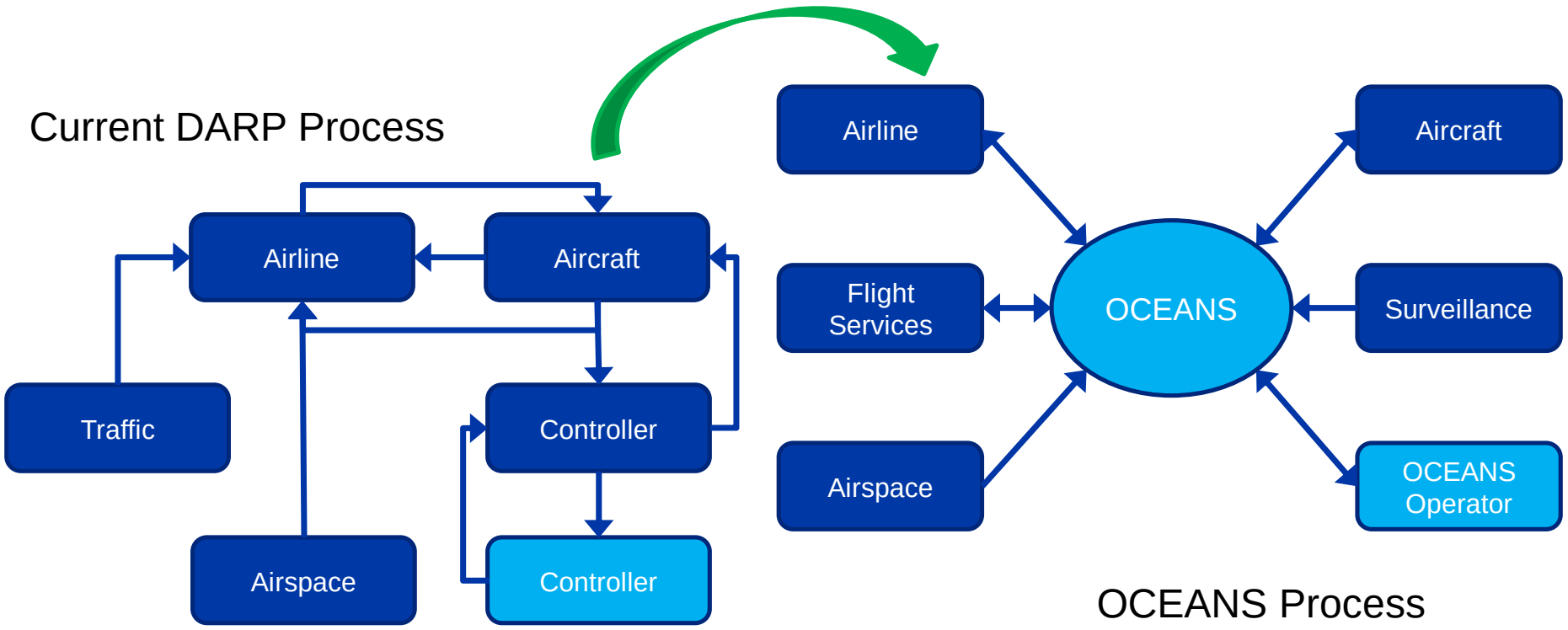



http://www.aviationsystemsdivision.arc.nasa.gov/news/highlights/af_highlights_20140919.shtml

# Boeing OCEANS

Create a flight optimization service for oceanic, polar and remote airspace operators which helps them improve their flight efficiency and reduce their cost.

Reduce airline operational cost and environmental impact through reduced fuel consumption and flight time.



# What Is TDX

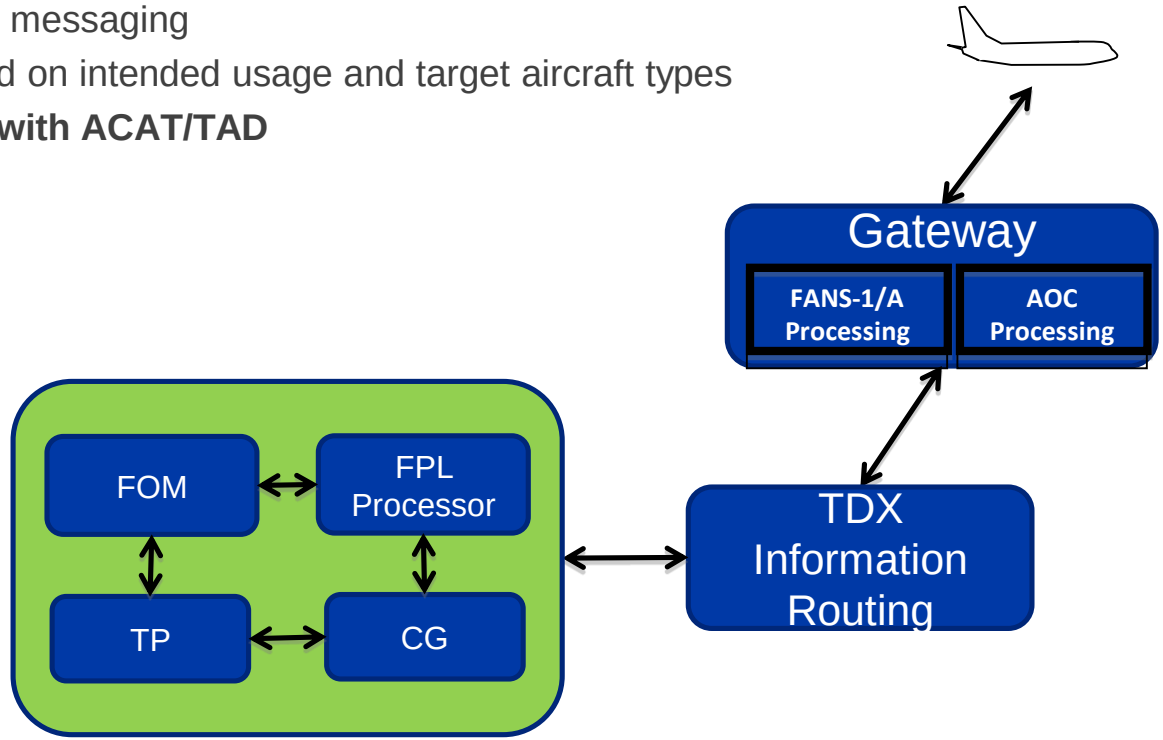
**TDX is a system that**

- Establishes and manages datalink connections with aircraft
- Collects datalink messages (both AOC and FANS-1/A data, if available)
- Normalizes different datalink message types
- Outputs specific parameters, depending on user's needs
- Focuses on aircraft intent

**TDX only collects data when needed**

- Triggering is designed to minimize messaging
- Actual messaging used will depend on intended usage and target aircraft types

**TDX shares common components with ACAT/TAD**



# Final Comments

- Communication of information is critical, not just for in-flight efficiency, but for system efficiency.
- Ensure everyone haves the right information to make proper plans.
- Avoid surprises as often as possible.
- Remove processes that have the potential to introduce error.
- Need to make use of equipment already on the planes.
- Information Technology enables future increases in air traffic density.

# Contact Information

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