ATD-2 Perspective: SWIFT Day 2 Introduction

May 22, 2019
ATD-2 is a Prosumer of SWIM Data

- ATD-2 has greatly benefited from existing SWIM feeds
  - The project is powered by real-time SWIM data

- ATD-2 consumes and utilizes the following SWIM feeds in real-time
  - (TFMS) Traffic Flow Management System - Flight & Flow data
  - (STDDS) SWIM Terminal Data Distribution System
  - (SFDPS) SWIM Flight Data Publication Service
  - (TBFM) Time Based Flow Management
  - (TFDM) Terminal Flight Data Management
  - (TAIS) Terminal Automation Information Service

- ATD-2 produces the following real-time SWIM feed on SWIM R&D
  - TFDM Terminal Publication (TTP)
  - This is in close coordination with the TFDM PO, using same JMSDD
  - The desire is to foster industry innovation in preparation for TFDM.
ATD-2 Provides a Unique Vantage Point into the Potential Future NAS

With ATD-2:
- Multi-Airport Scheduling with TOS
- Near-real time Analytics

Phase 3:
- Pre-Scheduling with EOBT
- Controller flight strip automation integration

Phase 2:
- Strategic Surface Metering
- Overhead Stream Scheduling
- Surface SWIM Publication

Phase 1:
- New Data Exchange and Integration
- NAS Data Fusion and Analytics
- Tactical Surface Metering

w/o ATD-2:
- SWIM
- Phase 1
- Phase 2
- Phase 3
- Future Technical Uncertainty

Palm Trees & Blue Skies
Demonstrating Benefits in the Field

• Multiple benefits mechanisms (benefits through 2019-05-06)
  • 2,295,383 lbs. of fuel saved
  • CO₂ savings equivalent to 82,226 urban trees
  • 270.7 hours of surface delay saved
    • $1,299,413 passenger value of time
    • $368,206 flight crew costs
  • 1,777 hours of reduced runtime on engines
Many people have worked hard to make SWIM data available (Thank you!) – Making the data available in a secure, stable platform was a major aviation engineering feat!

Pre-processing & merging SWIM flight data feeds can be difficult, expensive and error prone
– FAA decision support systems have valuable output data, but can provide inconsistent information on the same flight that is difficult for consumers to understand
– Without deep knowledge of the underlying 3T (TFMS, TBFM, TFDM - plus ERAM and STARS) systems, the consumption logic may not lead toward the benefit the community desires
– If everyone in the aviation industry creates their own SWIM flight data fusion process, many different organizations could come up with different definitions of the ‘truth’, degrading communication

The ATD-2 mission required swift progress in field (operational) demonstrations
– This led to a significant investment in logic that could address SWIM flight data pre-processing and mediation complexities. Much of this work is embodied in the ‘Fuser’ service.
– Additional analytical investment was made in post-processing, which evolved over time through an ATD-2 internal data governance process with a feedback loop into the Fuser for more data

ATD-2 desires to transfer this logic, lessons learned and software (if applicable)
– After numerous conversations with Industry and FAA, this ‘transfer’ process is unclear
– We welcome feedback from you to determine where any additional investments may be warranted
– The goal is to create the basis for more advanced analytics, which builds upon mediated flight data
Data Mining Requires Agility

- The image above illustrates the Cross-industry standard process for data mining, known as CRISP-DM. This is an open standard process model that describes common approaches used by data mining experts. It is likely the most widely-used analytics model.
- Experts in data mining widely recognize the iterative nature of this process, as well as the need for periodic engagement between business and technical contributors.