Digital TMI

Creation, Storage, Retrieval, and Transmission of TMI Data

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• Traffic demo
Project Overview

- The goal of Digital TMI is to offer specific and reasonable suggestions for improvements to the creation, storage, retrieval, and transmission of Traffic Management Initiative data, which may facilitate day-of-operations decisions and historical analysis.

- The TMI Cube will offer a unified view of TMI data for all stakeholders. This will include historical, current, and near-future TMI data. The TMI Cube will be accessed through the FAA’s NAS Common Reference.

- Started August 2011, currently funded through August 2013 by Rich Jehlen’s group.
Traffic Management Data

- The National Traffic Management Log (NTML) and Traffic Flow Management Data to Industry (TFMDI) are two primary sources.

- Currently, Traffic Management Initiative (TMI) data is generated, stored, and retrieved (mostly) to aid day-of-operations.

- TMI data serve their intended purposes well.

- Future sources? FPS?
Downside

• The major drawback to the current state of data in the NAS is the difficulty of historical analysis

• Examples
  – Non-trivial to extract meaningful relationships between the data within the NTML
  – Archive of TFMDI data not readily available and is stored only as a set of individual XML files

• Secondary drawback is the data living in (and accessed from) different systems
Fundamental, ‘Hard’ TMI Questions

- What are all the current TMIs affecting flights from ZOA to ZNY? To ATL?
- Given a choice between 3 routes, which one is least likely (based on history) to receive multiple TMIs?
- On May 3rd, 2011, how did the day’s TMI plan evolve? How many changes to the plan were required?
Approach

• Create a unified data source for TMIs that is suitable for analysis and for ‘day-of’ operations

• Leverage existing/developing models and architectures
  – AIXM, GML, etc.
  – SWIM
Development Plan and Progress

- Gather domain knowledge, create requirements
- Develop necessary schema
- Implement database
- Implement interface to outside world
- Test, refine
- Deliver documentation for potential FAA implementation

In progress
Complete
Traffic Management information eXchange Model: TMXm

pkg Package view

- «XSDschema» TMI_Message
  - (from TMI Data Models)

- «XSDschema» TMI_Features
  - (from TMI Data Models)

- AIXM Abstract Feature
  - (from AIXM)

- AIXM Data Types
  - (from AIXM)

- ISO 19136
  - (from AIXM-5-1-20100201)

- ISO 19115 Metadata
  - (from AIXM-5-1-20100201)

- ISO 19107 Geometry
  - (from AIXM-5-1-20100201)
Reroute

Time Slices

Segment Filter

Reroute Segments

Reroute Properties

Reroute Waypoints
Reroute Advisory from NTML

- Reroutes only occur in the ‘Advisories’ table of NTML.

- Few columns:
  - Times
  - Cause
  - Text blob (example)

- Difficult to parse, error-prone
Traffic Flow Management Data to Industry

- TFMDI is available similarly to ASDI
- XML-formatted reroute, FCA, and FEA data
- “Publish-Subscribe” system
  - New reroute is issued
  - Encoded in TFMDI XML format and saved
  - “Announced” to all clients that it is downloadable
- Example...
Translating TFMDI to TMXMF

• Since both formats are well-structured, translation is not difficult
• Example…
MIT Data

- MIT sourced from NTML

- Important columns from RSTN database table:
  - Frfac
  - Tofac
  - Rstn Type (MIT, ALT, STOP, SPD, etc.)
  - Start/Stop Times
  - Rstntype (Departures, Arrivals, Enroute)
  - Airports (Arrival, Departure)
  - NAS Element (Usually a fix/waypoint?)
  - Various parameters (MIT value, ALT type, Spd, etc.)

- Not yet implemented in Digital TMI system
Is Flight ZZ100 affected by any MITs?

Check: ZZ100 flight path goes through MERIT during this MIT?

Check: ZZ100 is a jet?

Check: ZZ100 departs from N90/ZNY?

ZZ100 is affected by this MIT

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Data Needs

• Historical TFMDI data
  – We collect all TFMDI data now
  – Only have a number of months in archive

• “Digitized” Playbook Reroute data
  – Only access to playbooks is via website
  – ATCSCC has ‘machine readable’ playbook data

• Scheduled NTML query
  – At least a daily query, but perhaps an hourly?
  – System is in place to do this already, need permissions

• TMA samples
  – Members of FCT noted importance of TMA data
  – Even though TMA data is not centralized, we’d like to examine it