Digital TMI

Creation, Storage, Retrieval, and Transmission of TMI Data

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June 27, 2012
• 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 TMIIs for all stakeholders. This will include historical, current, and near-future TMIIs. 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 3\textsuperscript{rd}, 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

Status:
- In progress
- Complete
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 TMXM

• 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
### MIT Example

<table>
<thead>
<tr>
<th>Frfac</th>
<th>ZBW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tofac</td>
<td>N90</td>
</tr>
<tr>
<td>Entryid</td>
<td>132493495</td>
</tr>
<tr>
<td>Rstnid</td>
<td>2920474</td>
</tr>
<tr>
<td>Rstnsource</td>
<td>DYN</td>
</tr>
<tr>
<td>Passback</td>
<td>N</td>
</tr>
<tr>
<td>Appevtime</td>
<td></td>
</tr>
<tr>
<td>Acft Type</td>
<td>JETS</td>
</tr>
<tr>
<td>Provider List</td>
<td>N90</td>
</tr>
<tr>
<td>Rstn Start</td>
<td></td>
</tr>
<tr>
<td>Rstn Stop</td>
<td></td>
</tr>
<tr>
<td>Stopflag</td>
<td>1</td>
</tr>
<tr>
<td>Rstntype Text</td>
<td>Departures</td>
</tr>
<tr>
<td>Airport</td>
<td>N90/ZNY</td>
</tr>
<tr>
<td>Dep Airport</td>
<td>N90/ZNY</td>
</tr>
</tbody>
</table>

| Arr Airport | 0 |
| Nas Element | MERIT |
| Impact Element | |
| Reason Txt | VOL:Volume |
| Mitnum | 278529 |
| Mitval | 15 |
| Alt Type | 0 |
| Alt | - |
| Spd Type | 0 |
| Spd | - |
| Qualifier | AS ONE |
| Oldendtime | 0 |
| Modid | 0 |
| Remarks | 0 |
| SwxRerte | N |

**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**

Ultimately, this will become a single DB query
Playbook Reroute Data
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