Digital TMI

Creation, Storage, Retrieval, and Transmission of TMI Data

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ATCSCC Visitors
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 TMIIs 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: 40%
Complete: 60%
Traffic Management information eXchange Model: TMXm
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

<table>
<thead>
<tr>
<th>ROUTES:</th>
<th>ORIG</th>
<th>DEST</th>
<th>ROUTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZME ZFW(-BNA-MEM)</td>
<td>EWR</td>
<td>MEM J29 DORET J584 FQM FQM1</td>
<td></td>
</tr>
<tr>
<td>ZME ZFW(-BNA-MEM)</td>
<td>EWR</td>
<td>VUZ J14 SPA J14 CREWE J51</td>
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<tr>
<td>ZHU</td>
<td>EWR</td>
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<tr>
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<td>EWR</td>
<td>MEM J29 DORET J584 FQM FQM1</td>
<td></td>
</tr>
</tbody>
</table>

061135-062230

10/07/06 11:35 FSB://lxstn08a 703-925-5308
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 TMX

- 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>
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<tbody>
<tr>
<td>Tofac</td>
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<td>Rstnid</td>
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<td>DYN</td>
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<td>Passback</td>
<td>N</td>
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<tr>
<td>Appevtime</td>
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<tr>
<td>Acft Type</td>
<td>JETS</td>
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<tr>
<td>Provider List</td>
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<tr>
<td>Rstn Start</td>
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<tr>
<td>Rstn Stop</td>
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<td>Stopflag</td>
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<td>Rstntype Text</td>
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<td>N90/ZNY</td>
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<tr>
<td>SwxRerte</td>
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</tr>
</tbody>
</table>

**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.
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