Overview

- Introductions and Acknowledgments
- Data Purposes and Objectives
- Accessing and Utilizing the Data
- GIS and Visualization
- Methodology and Scripting
- Questions
Incident and Event Performance

- Example shown on next two slides:
  - North/West Passage Coalition
  - I-94 in North Dakota and Minnesota
  - February 9-11, 2013 Winter Weather
  - Hundreds of miles of interstate closed 12-18 hours

Question - How best to handle this in analysis...
Multistate Operations

West < I-94 Link Location > East

2/1/13 < Date & Hour > 2/20/13

Observations Present in NPMRDS

ND

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MN
Average Speed from NPMRDS
Wisconsin DOT

- Mobility Performance Measures
  - Vehicle Delay
  - Reliability
Wisconsin DOT

- Planning Processes
  - Traffic Operations Infrastructure Plan (TOIP)
  - Reliability Valuation
  - Merging with WisDOT GIS and data
Performance Measure Process Overview

- NPMROS (HERE) FTP
- TOPS Lab Python (recursive unpack package)
- Docs
  - Monthly TT (csv by month and state)
  - Archive TT (csv by month)
  - Inventory (csv static file)
- Prepared Data (in DB Format)
  - Monthly TT (by month and state)
  - Archive TT (by month and state)
  - Inventory with ATR and Corridor Associations
- ATR Hourly Volumes
- Join
  - Vehicle Delay Script
  - Reliability Script
- Total Vehicle Delay per month, per corridor
- Reliability per month, per corridor

ArcGIS
- Shapefile and TMC Lookup Table
- Corridor Definition Limits
- TMC to Corridor Association
- TMC-Corridor-ATR Association
- ATR Locations
- TMC to ATR Association
Accessing NPMRDS

- Suggest FTP
- File Structure
  - 2012q3, 2013q2, etc.
    - americas
      - additional_content_americas
        - ... static files, archive, monthly updates, shapefile (2013q2)
    - documentation_tools
      - documentation
        - ... technical references, availability dates, points of interest (poi), etc.
Utilizing NPMRDS

- Hardware, software, and skill set requirements
  - Don’t try to open CSVs in Excel

- Access has 2 GB per table limit, also quickly exceeded
- Requires database and scripting resources
- If mapping, requires GIS expertise
Integration with GIS

- Single spatial dataset provided with NPMRDS
  - NHS_NPMRDS_Shape_file_HERE_QX_YYYY
- Covers the entire US
- Composed of individual, unique “links” (road segments)
- LINKs are not TMCs – must use the lookup table to assign TMCs to the GIS data
  - NPMRDS_TMC_LUT_YYYYQX.dbf
Visualizing TMCs in GIS

- The relationship of the SHAPEFILE to the LOOKUP TABLE is MANY:MANY
  - ONE LINK can reference MANY TMCs (up to 8?)
  - ONE TMC can reference MANY links

<table>
<thead>
<tr>
<th>LINK</th>
<th>TMC</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>120N06503</td>
</tr>
<tr>
<td>C</td>
<td>120N06503</td>
</tr>
<tr>
<td>E</td>
<td>120N06503</td>
</tr>
<tr>
<td>B</td>
<td>118N14321</td>
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<tr>
<td>C</td>
<td>118N14321</td>
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<tr>
<td>D</td>
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Visualizing TMCs in GIS

- This can be challenging to represent in ArcGIS
- To accurately represent TMCs, link “C” should appear twice (because it represents TWO TMCs)

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**Visualizing TMCs in GIS**

- Our solution is to manage the spatial data in a relational database system using spatial types
  - **PRO** – very flexible
  - **CON** – Spatial View table is huge (1,792,650 => 2,609,048)

### Link Feature Class

<table>
<thead>
<tr>
<th>LINK</th>
<th>GEO</th>
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<tbody>
<tr>
<td>A</td>
<td>shp</td>
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<td>B</td>
<td>shp</td>
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<tr>
<td>C</td>
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### Lookup Table

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### Spatial View

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Displaying Road Direction

- Want to show different directions at all scales (no overlap)
- The lookup table has a field called DIR (so does the shapefile – DIR_TRAVEL, but that’s different!)
- Values are T or F
  - (could be B, but only found one instance of this in the entire data set)
- Indicates **Direction of Travel** *along the link* with respect to the reference node (the SOUTHERN end of the link, or WESTERN end if it’s an E-W line)
  - T = Direction of travel TOWARDS reference node
  - F = Direction of travel FROM reference node

Sometimes the geometry of roadways are shown offset (e.g. divided interstate highways), other times geometry will be coincident (e.g. non-divided US highway)
Displaying Road Direction

- Offset the line to the RIGHT or LEFT depending on the DIR value
  - FROM -> RIGHT
  - TO -> LEFT

Color indicates direction of travel, arrows show geometry direction.

Symbolize linework by offsetting FROM lines RIGHT and TO lines LEFT.

Allows you to see BOTH lines at all scales.

If you are trying to symbolize with a performance measure, you may need to add TWO layers, one for the FROM and one for the TWO.
Handling Outliers

It’s NOT like this

...rather an undifferentiated cloud

Nice distribution, but with long tails
Missing Observations

- Assumptions
- Imputation vs parameterization

Wyoming Interstates
Missing Observations

65 mph Posted Speed

3-hr grids
36 epochs

Question – What’s an efficient way to handle this?
Questions

- Without doing the work that data providers do to provide clean data sets, nor utilizing a sophisticated dashboard,
  - What is an efficient approach for agencies?
  - Is this a viable source for Performance Management?
Thank You

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