AirSage Data use in Travel Demand Modeling and Project Development Studies

presented by
Daniel J. Beaty, AICP

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Partners

District Three Planning
Presentation Outline

• Data available from AirSage
• Design of Data Set (geography)
• Content of Data Set
• Limitations of Data Set
• Uses of Data Set
• Conclusions
• Questions
Data Available from AirSage
Available Data - Transportation

- Long-range transportation
- Travel demand modeling
- DRI
- Special Event
- Toll Road, HOV & HOT Projects
- Transit & Air Quality Studies
- Understanding commuter patterns

- Reducing traffic flow restriction, congestion & system bottle necks
- Determining whether proposed roadways will offer improvements or create new problems
- Logistics improvement & predicting cut-through traffic
Available Data - Composition

- Duration of Data (How many days)
- Size of Geography
- Detail of Geography
- Types of Trips

- Data Totaled or Averaged
- Time Periods
- Census Information
- Residence Class
Design of Data Set (geography)
Geography

• Northwest Florida Regional Planning Model Traffic Analysis Zones (TAZ)
• Capital Region Transportation Planning Agency Model TAZs
Final Combined TAZs

Large Zones on the outside are the externals
Content of Data Set
• All Data for Month of April 2014
• Days: Mondays – Thursdays only
• 24 Hour
• AM Peak = 6am – 9am
• PM Peak = 3pm – 6pm
Data File Elements (In all files)

- Origin Zone
- Destination Zone
- Start Date
- End Date
- Aggregation (24 Hr. vs. Period)
- Purpose (HBW, HBO, NHB)
- TOD – 24 Hour & AM/PM Peak
Data File Elements (File Specific)

- Trips
- By Age/Sex (23 Stratifications per Sex)
- By Income (16 Stratifications)
- By Auto Availability/Home Ownership
  - (5 Stratifications of AA Plus Own/Rent)
- Total of 8 Data Sets
### File Example

<table>
<thead>
<tr>
<th>Origin Zone</th>
<th>Dest. Zone</th>
<th>Start Date</th>
<th>End Date</th>
<th>Aggr</th>
<th>Class</th>
<th>Purpose</th>
<th>TOD</th>
<th>Count</th>
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<td>20140430</td>
<td>M-Th</td>
<td>Res</td>
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<td>281</td>
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<td>M-Th</td>
<td>Res</td>
<td>HBW</td>
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<td>0.63</td>
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<td>Origin Zone</td>
<td>Dest. Zone</td>
<td>Start Date</td>
<td>End Date</td>
<td>Aggr</td>
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<td>Purpose</td>
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<td>Count</td>
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<td>2401</td>
<td>20140401</td>
<td>20140430</td>
<td>M-Th</td>
<td>Res</td>
<td>NHB</td>
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<td>1345</td>
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<td>20140430</td>
<td>M-Th</td>
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<td>NHB</td>
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<td>0.58</td>
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</table>
Limitations of Data Set
AirSage Process Overview

Patented *Population Analytics*

15 billion location data points per day

100 million mobile devices

Consumer privacy protection
AirSage Process Overview
WISE Platform

• Behind the Firewall:
• AirSage processes and archives a location each time a mobile device interacts with the network...
AirSage Process Overview
Devises on the Move

Devices on the move create Transient Points.
Each location is analyzed and compared to other locations.
• Devices remaining at the same location (over 5 minutes – 300 meters) create Activity Points whose location is refined and then analyzed for:
  – Arrival time at location
  – Departure time from location
  – Activity duration
AirSage Process Overview
Understanding Activity Patterns

• “The average person doesn’t visit more than 13 unique locations per month” – Marta Gonzalez, MIT

• Activity Patterns:
  – Top 20 location clusters for every device
  – Cluster frequency summarized
  – Cluster schedule summarized
  – Cluster purpose research
AirSage Process Overview
Understanding Activity Patterns

- Activity Points are examined to determine the most common nighttime location.

- This is deemed the “Home Location”

- A penetration analysis is done at the Census Block Group level to determine the extrapolation factor for each device

- **The sample is then scaled to represent the movements of 100% of the Population.**
AirSage Process Overview
Understanding Activity Patterns

Activity Points are examined to determine:
Home Location
Work Location

And then Linked to generate Trips by
  Daypart by Type (Home, Work, Other)
  Time of Day Information (Minimum 3hr bracket)
Resident Classifications (Resident Worker, Home Worker, Inbound Commuter, Outbound Commuter, Short-Term Visitor, Long-Term Visitor)
AirSage Process Overview
Understanding Activity Patterns

• Additional Analysis Options:

1. Demographics
2. Long Distance Filter
3. External Zones Tier Structure
4. Nationwide Home Assignment of Visitors
5. Select Zone transient OD Analysis
6. Super (2\textsuperscript{nd} leg) and Sub (Corridor) Matrix.
• **ACCURACY**
Accuracy describes the nearness of a measurement to the standard or true value, i.e., a highly accurate measuring device will provide measurements very close to the standard, true or known values. Example: in target shooting a high score indicates the nearness to the bull's eye and is a measure of the shooter's accuracy. Refer to pictures below:

• **PRECISION**
• Precision is the degree to which several measurements provide answers very close to each other. It is an indicator of the scatter in the data. The lesser the scatter, higher the precision.
Examples

- **www.opensignal.com**
- Site does not show the 1G data and other “low level transactions”
- AirSage assured us the map they see has very few holes in our study area. They cannot share their map due to confidentiality with the providers

- Data is more precise in areas with dense tower coverage and less precise in rural areas that are covered with fewer towers
- 2 Examples follow with 1 being in an urban area and 1 in a rural area
Towers Example 1
Towers Example 2
Towers Example 2
Towers Example 3
### Traffic Count Data Comparison

<table>
<thead>
<tr>
<th>SR 292</th>
<th>FDOT 2014</th>
<th>AirSage Adjusted*</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>@Theo Baars Bridge</td>
<td>17,000</td>
<td>14,047</td>
<td>-2,953 / 17.37%</td>
</tr>
<tr>
<td>W of River Road</td>
<td>11,000</td>
<td>13,684</td>
<td>+2,684 / 24.40%</td>
</tr>
<tr>
<td>@FL/AL Stateline</td>
<td>11,000</td>
<td>13,665</td>
<td>+2,665 / 24.22%</td>
</tr>
</tbody>
</table>

*April 2014 Data Divided by 18 days Factored by FDOT 2014 Peak Season Factor Category for Escambia Countywide ALL
Uses of Data Set
Travel Demand Modeling

• External Trips
  • External to External
  • External to Internal
• Trip Distribution
• Trip Patterns (O&D)
• Demographic Data
  • Auto Availability (Already used from Census)
  • Age (Also from Census)
• TOD
Desirelines - AirSage Data
Desirelines - AirSage Data
Project Development Studies

- Corridor Travel Patterns
  - Load trip table into Travel Demand Model
  - Save all paths
  - Ability to do on the fly Select Link Analysis with Bandwidth plots

- District Travel Patterns
  - Combine TAZs into Districts
Corridor Travel Patterns
Corridor Travel Patterns
• Work with vendor upfront to create parameters for your data set. **Take time on this!**
• Understand the limitations of the process before ordering.
• Work with the vendor to get questions answered after you receive the data. **This is critical!**

• Understand that some of the uses of the data will have to be relative and not absolute.
• Understand the factoring of the data
• Understand the grouping of the data
• The data has proven to be useable for our projects.
Questions?

• Dan Beaty
  • Daniel.Beaty@atkinsglobal.com

• Linda Little
  • Linda.Little@dot.state.fl.us

• Bill King
  • bking@airsage.com

Thank you