Presentation Outline

- Project Overview
- Analysis of NHTS Data
- Data from existing MPO models
- What’s in the guidebook?
- Next Steps
  - NCHRP 8-84: Rural and Long-Distance Transferable Parameters
Project Overview
Background

- 1978 – NCHRP Report 187
  - Quick Response Urban Travel Estimation Techniques and Transferable Parameters

- 1998 – NCHRP Report 365
  - Travel Estimation Techniques for Urban Planning

- 2011 – Project 8-61
  - Travel Demand Forecasting: Parameters and Techniques
# Project Overview

## Project Panel, Staff, and Research Agency Team

### NCHRP Staff for Project 8-61
- Nanda Srinivasan, Sr. Pgm. Officer
- Lori Sundstrom, Sr. Pgm. Officer

### Project 8-61 Panel
- Thomas Kane (Chair)
- Michael Bruff
- Ed Christopher
- Nathan Erlbaum
- **Jerry Everett**
- Bruce Griesenbeck
- Herbert Levinson
- Richard Pratt
- Bijan Sartipi
- Shuming Yan
- Dick Pratt
- Kim Fisher (TRB Liaison)
- Ken Cervenka (DOT Liaison)

### Research Agency Team
- Cambridge Systematics, Inc.
- In Association With
  - Vanasse Hangen Brustlin, Inc.
  - Martin/Alexiou/Bryson, PLLC
  - Gallop Corporation
  - Dr. Chandra R. Bhat
  - Shapiro Transportation Consulting, LLC

### Principal Investigator
- Thomas Rossi
Project Overview
Objectives

- Revise and Update NCHRP Report 365
  - Current travel characteristics
  - Guidance on forecasting
    - Procedures
    - Applications

- Develop User-Friendly Guidebook
  - Range of approaches
    - Application of straightforward techniques
    - Optional use of default (transferable) parameters
  - References to more sophisticated techniques
  - Broad range of transportation planning issues
Project Overview
Status to Date

- Analysis of 2001 NHTS data
- Analysis of MPO model documentation
- Guidebook finalized
- Case studies completed/documentated
Analysis of NHTS Data Process

- Information developed for four variables of interest
  - Person trip production rates
    - Per household by trip purpose
  - Reported average trip durations
    - By mode and trip purpose
  - Time of day of travel distributions
    - By trip purpose
  - Vehicle occupancy
    - By trip purpose

- Variables selected based on potential for transferability
Analysis of NHTS Data Classifications

- Trip purposes used for data summaries
  - Home based work
  - Home based school
  - Home based other
  - Non-home based
  - Home based non-work

- Urban area population classifications (from 2009 NHTS)
  - 1 million + with subway/rail; 1 million + without subway/rail
  - 500k to 1 million
  - 200k to 500k
  - 50k to 200k
  - Not in urban area
**Analysis of NHTS Data**

**Sample Tabulations**

- **Sample trip production tabulation (2009)**
  Home based work - MSA population less than 250,000

<table>
<thead>
<tr>
<th>Autos</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3+</th>
<th>Avg</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.0</td>
<td>1.2</td>
<td>2.3</td>
<td>1.6</td>
<td>0.6</td>
</tr>
<tr>
<td>1</td>
<td>0.0</td>
<td>1.0</td>
<td>1.7</td>
<td>4.7</td>
<td>0.7</td>
</tr>
<tr>
<td>2</td>
<td>0.0</td>
<td>1.3</td>
<td>2.5</td>
<td>2.8</td>
<td>1.7</td>
</tr>
<tr>
<td>3+</td>
<td>0.0</td>
<td>1.2</td>
<td>2.5</td>
<td>3.7</td>
<td>2.3</td>
</tr>
<tr>
<td>Avg</td>
<td>0.0</td>
<td>1.1</td>
<td>2.4</td>
<td>3.6</td>
<td>1.5</td>
</tr>
</tbody>
</table>
Analysis of NHTS Data
Sample Tabulations

* Sample trip length tabulation (2009)
  Home based work – Average travel time in minutes

<table>
<thead>
<tr>
<th>MSA Population</th>
<th>Auto</th>
<th>Transit</th>
<th>Non-Motorized</th>
<th>All Modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater than 3 million</td>
<td>29</td>
<td>56</td>
<td>18</td>
<td>31</td>
</tr>
<tr>
<td>Between 1 and 3 million</td>
<td>24</td>
<td>48</td>
<td>19</td>
<td>25</td>
</tr>
<tr>
<td>Between 500,000 and 1 million</td>
<td>24</td>
<td>53</td>
<td>14</td>
<td>24</td>
</tr>
<tr>
<td>Between 250,000 and 500,000</td>
<td>21</td>
<td>30</td>
<td>11</td>
<td>21</td>
</tr>
<tr>
<td>Less than 250,000</td>
<td>20</td>
<td>59</td>
<td>11</td>
<td>20</td>
</tr>
<tr>
<td>Not in MSA</td>
<td>21</td>
<td>57</td>
<td>8</td>
<td>21</td>
</tr>
<tr>
<td>All trips</td>
<td>25</td>
<td>55</td>
<td>15</td>
<td>26</td>
</tr>
</tbody>
</table>
Data from Existing MPO Models
Process

- Information from over 70 MPOs
  - Small, medium, large
  - Direct contact or publicly available reports
  - Information collected
    - Model parameters
      - Trip attraction rates
      - Friction factor parameters
      - Mode choice parameters
      - Volume-delay function parameters
      - ...
    - Model methods used
## Data from Existing MPO Models

### Sample Tabulation

Sample gamma function gravity model parameters (home based work)

<table>
<thead>
<tr>
<th>Model</th>
<th>“b”</th>
<th>“c”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large MPO 1</td>
<td>0.503</td>
<td>-0.078</td>
</tr>
<tr>
<td>Large MPO 2</td>
<td>-1.650</td>
<td>-0.040</td>
</tr>
<tr>
<td>Large MPO 3</td>
<td>-0.156</td>
<td>-0.045</td>
</tr>
<tr>
<td>Medium MPO 1</td>
<td>-0.812</td>
<td>-0.037</td>
</tr>
<tr>
<td>Medium MPO 2</td>
<td>-0.388</td>
<td>-0.117</td>
</tr>
<tr>
<td>Medium MPO 3</td>
<td>-0.020</td>
<td>-0.123</td>
</tr>
<tr>
<td>Small MPO 1</td>
<td>-0.265</td>
<td>-0.040</td>
</tr>
<tr>
<td>Small MPO 2</td>
<td>0.850</td>
<td>-0.200</td>
</tr>
</tbody>
</table>
Data from Existing MPO Models
Sample Gamma Function Comparison (Home Based Work)
What’s in the Guidebook?

- **Chapter 1. Introduction**
  - Purpose, objectives, and roadmap
  - Summary of modeling process
  - How parameters used

- **Chapter 2. Planning Applications Context**
  - Planning context affect on model
  - Examples from urban areas
What’s in the Guidebook? (continued)

- Chapter 3. Development of Data
  - Purposes
    - Model development
    - Model validation
    - Model application
  - Considerations
    - Limitations of typical data
    - Primary and secondary data sources
    - Conversion of data from secondary sources
    - Network coding procedures

Table 3.2 ACS Data Releases

<table>
<thead>
<tr>
<th>Data Product</th>
<th>Population Threshold</th>
<th>Geographic Threshold</th>
<th>Planned Year of Release</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PUMAs, counties, large cities</td>
<td>2009 2010 2011 2012</td>
</tr>
<tr>
<td>1-year Estimates</td>
<td>65,000+</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau.
*Five-year estimates will be available for areas as small as census tracts and block groups.
Chapter 4. Model Components

- Discusses each model component
- Each subsection presents:
  - A brief description of best practice(s)
  - Basis for development of parameters
  - Parameters classified by urban area category
  - Explanations of use in model
    - Estimation
    - Validation
  - Parameter transfer
What’s in the Guidebook? (continued)

Chapter 4 subsections

- Vehicle Availability
- Trip Generation
- Trip Distribution
- External Travel
- Mode Choice
- Automobile Occupancy
- Time-of-Day Characteristics
- Truck/Freight Modeling
- Highway Assignment
- Transit Assignment
Chapter 4 appendices

- % of HHs by number of vehicles by U.S. metro area
- Coefficients for logit vehicle availability models
  - 1 vehicle HHs
  - 2 vehicle HHs
  - 3+ vehicle HHs
- Mean trip length in minutes by purpose and mode by population range
- Trip production rates by population size and purpose:
  - HBW
  - HBNW
  - NHB
  - HBSC
  - HBO (nonwork, nonschool)
- Time-of-day distributions by purpose and direction
What’s in the Guidebook? (continued)

• Chapter 5. Model Validation Process
  • Validation overview
    - Consistent with other sources
    - Appropriate out-references
    - Not duplication of existing references
  • Basic guidance
    - Focus on information in the guidebook

<table>
<thead>
<tr>
<th>Urbanized Area Population</th>
<th>Percent of Daily Person Trips by Trip Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HBW</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>50,000 to 100,000</td>
<td>16</td>
</tr>
<tr>
<td>100,000 to 200,000</td>
<td>20</td>
</tr>
<tr>
<td>200,000 to 500,000</td>
<td>20</td>
</tr>
<tr>
<td>500,000 to 1,000,000</td>
<td>25</td>
</tr>
<tr>
<td>1,000,000 to 3,000,000</td>
<td>25</td>
</tr>
<tr>
<td>More than 3,000,000</td>
<td>25</td>
</tr>
</tbody>
</table>

Notes:
- a. Shares by purpose are based on person trips in motorized vehicles.
- b. Shares by purpose are based on person trips by all modes.
- c. Because of differences between urban area categories in the three reports, the rates shown were
  chosen from the closest matching category.

What’s in the Guidebook? (continued)

- **Chapter 6. Advanced Modeling Practices**
  - Overview
  - Tour and activity based approaches
  - Traffic microsimulation

- **Chapter 7. Case Study Application(s)**
  - Two studies
    - Smaller urban area with little transit
    - Larger area with transit
  - Illustrate use of the information from Chapters 4 and 5
  - Draw on concepts presented guidebook
    - Similar to approach in NCHRP Report 365
Next Steps

- Publication of Final Report

*Related study in progress – NCHRP 8-84, Long-Distance and Rural Transferable Parameters for Statewide Models*
  - Conduct Review of Long-Distance Data Sources - *complete*
  - Review of Statewide Model Long-Distance Trips - *complete*
  - Prepare Interim Report - *complete*
  - Implement Approved Analytical Plan - *underway*
  - Prepare Guidebook with Executive Summary – *complete by Summer 2012*
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