Travel Demand Modeling

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Discussion Flow

- What is Travel Demand Modeling
- Scenario evaluation
- 4-Step Models
- Inputs & results
- Current model recalibration effort
- MOVES methodology update
Introduction
Introduction

- Who
- What
- When
- Why
Introduction—Where do we fit?

- **When**
- **Where**
- **Why**
What is Modeling?

Mathematical representation of a system or concept
What Is a Travel Demand Model?

*Mathematical representation of how, where, when and why people travel*
Transportation Modeling

- Micro Level
- Intersection
- Link Connection
- Area or Corridor
- Regional
- Macro Level
Transportation Modeling

Micro Level

Macro Level
Model Uses
3-D Analysis

Network (highway and PT)

Land use/Demographics

TDM and Policy Measures
3-D Analysis

Network (highway and PT)

Land use/Demographics

TDM and Policy Measures
Scenarios Evaluated
Analysis Variables

- Land use/ SED

- Network Supply (highway and Public Transport network changes)

- Travel Demand Measures/Policy—leading to targeted goals

- Analysis Years—2015, 2030, 2040....
Final Scenarios......

- Study the effect of various combinations
- Final 'best' solution
Four Step Travel Demand Modeling
Trip Making Behavior

You decide to make a shopping trip

You then decide where to go for shopping

Then you decide how you will travel; car, bus, rail or walk

Last, you decide which route you want to take based on time and distance
You decide to make a shopping trip

**Trip Generation**

You then decide where to go for shopping

**Trip Distribution**

Then you decide how you will travel; car, bus, rail or walk

**Mode Choice**

Last, you decide which route you want to take based on time and distance

**Assignment of Traffic**
Traditional 4 Step Model

1. Trip Generation
2. Trip Distribution
3. Mode Choice
4. Trip Assignment
Inputs
Input Requirements

1. Highway and Transit Network
2. Land use and Socio-economic Data
3. Equations translating this into travel demand – Model Algorithm
How Travel Demand Models Work

Model Inputs

Land Use

Road and PT Network

Model Outputs

Travel Demand Model

Highway Congestion

Creating Solutions Across Jurisdictional Boundaries
Analysis Year Network
Highway Network 2014
Highway Network 2025
Highway Network 2040
Model Updates
§ 93.122 (b)(1)(i) Procedures for determining regional transportation related emissions

(i) Network-based travel models must be validated against observed counts (peak and off-peak, if possible) for a base year that is not more than 10 years prior to the date of the conformity determination. Model forecasts must be analyzed for reasonableness and compared to historical trends and other factors, and the results must be documented;
Why Update Travel Demand Models

1. Current Behavioral Attributes
2. Travel Pattern and Travel Mode Choices
3. Impact of other externalities on travel—fuel price, transit fares, attitudes etc
4. Revised demographics, land use data, Census and ACS data
Recalibration
ON-BOARD TRANSIT SURVEY

1.02

Activities:

1. Prepare a regional database of existing transit users travel patterns in the bi-state St. Louis area by conducting travel surveys on all the transit modes, including light rail and buses, available in the region.

2. Analyze the travel pattern of transit users in the bi-state St. Louis area.

3. Analyze relationship between transit user demographics, socioeconomic characteristics and travel patterns, and better understand the travel characteristics of many specialized populations.

4. Develop relationships and techniques for estimating the mode choice behavior in the bi-state St. Louis region.

5. Recalibrate the regional travel demand model TransEval, by integrating these updated relationships and techniques in the mode choice model to better reflect the current mode choice behavior.

6. Validate and transition to the recalibrated model.

7. Prepare technical documentation of the survey methodology, instrument and transit travel pattern database development, including a final report.


*(Note: All activities will be performed by a consultant)*

Products/Outcomes:

A. Executed contract for consulting services to conduct the on-board survey and recalibrate the travel demand model based on the survey results (October 2012)

B. On-board transit survey proposed methodology report, survey instrument, pilot survey (February 2013)

C. Conducted on-board transit survey (April 2013)

D. Data sets of transit users travel and socioeconomic characteristics (June 2013)

E. Validated base highway and transit travel demand model, and updated mode choice model parameters (June 2013)
MOVES Update
Running MOVES

Inventory Mode

Emission Rate Mode
Why Emission Rate Mode

1. Creates emission rates lookup table
2. Use same rates across multiple counties
3. MOVES run only when an input changes
4. Network change warrants only travel model run
   i. VMT
   ii. Speed distribution
   iii. Road Type
MOVES—Emission Rate Mode

- Run MOVES Model

- Source Type Population
  * Non-Running Emissions

- Run TDM
  - Prepare Model Links
  * Running Emissions

Summarize and Calculate Emissions
Questions?