Modeling Handbook and Standards

presented to

West Virginia Planning Conference

presented by

Cambridge Systematics, Inc.

Smith Myung
John (Jay) Evans, P.E., AICP

CAMBRIDGE SYSTEMATICS

Introductions

- Jay Evans, P.E., AICP – Principal with our Travel Demand Forecasting (TDF) Group
- Smith Myung – Senior Associate with TDF Group
- Barbara Sloan, P.E. – Principal with our Transportation Planning and Management (TPM) Group

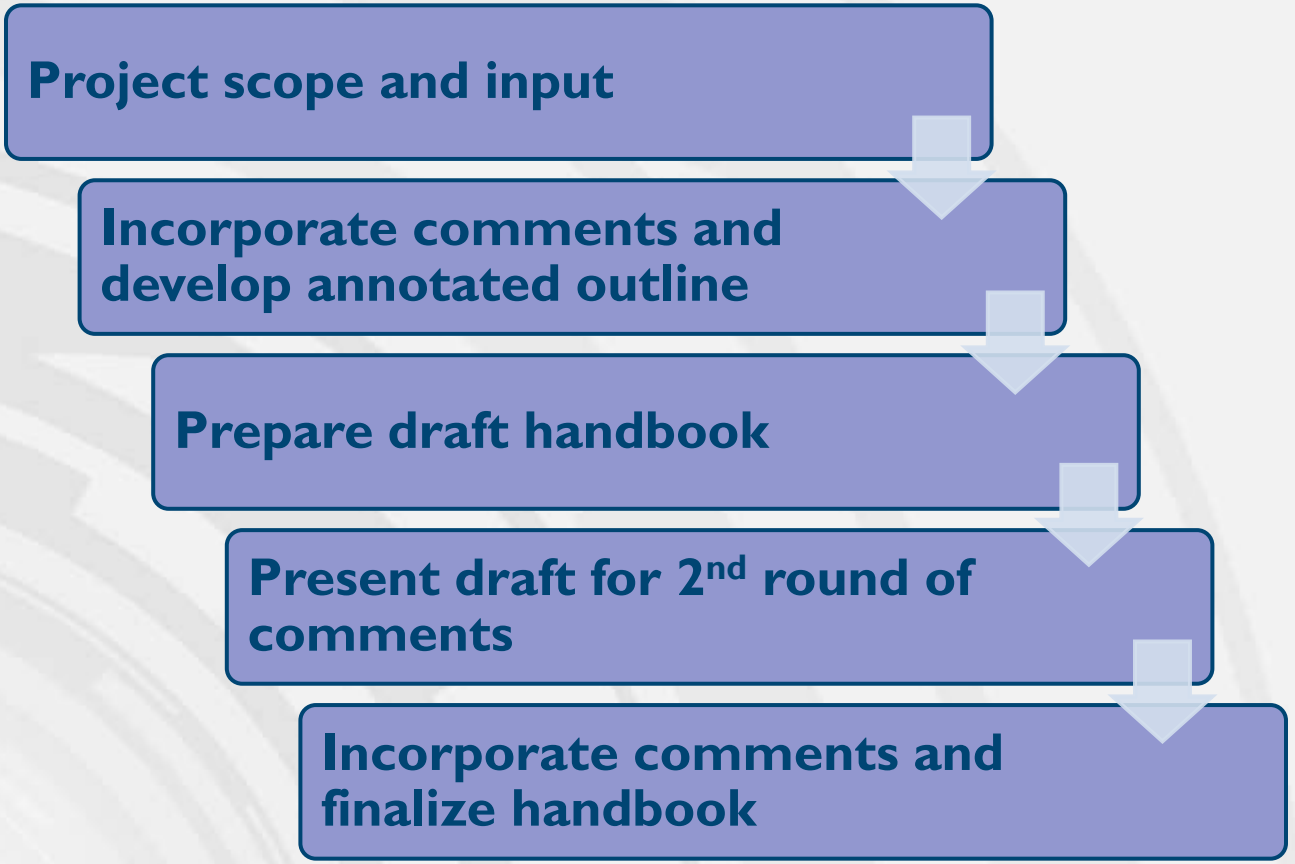
Agenda

- Purpose of Travel Demand Modeling (TDM) handbook
- Project scope
- Goals for today
- Potential topic areas
- Brief breakout session with smaller groups
- Reconvene and summarize input from breakout session
- Next steps

Purpose of TDM Handbook

- Why develop a handbook?
  - » Produce easy to reference guidelines for developing, validating, and applying travel demand models
  - » Provide a resource for public agency staff and consultants
  - » Share and encourage good practices from across the state

Project Steps



CAMBRIDGE SYSTEMATICS

Assemble and Review Data Sources

- Acquire documentation for existing models
- Review recent publications and other materials
- State and Federal regulations
- Identify common Federal, state, and local data sources

CAMBRIDGE SYSTEMATICS

Schedule

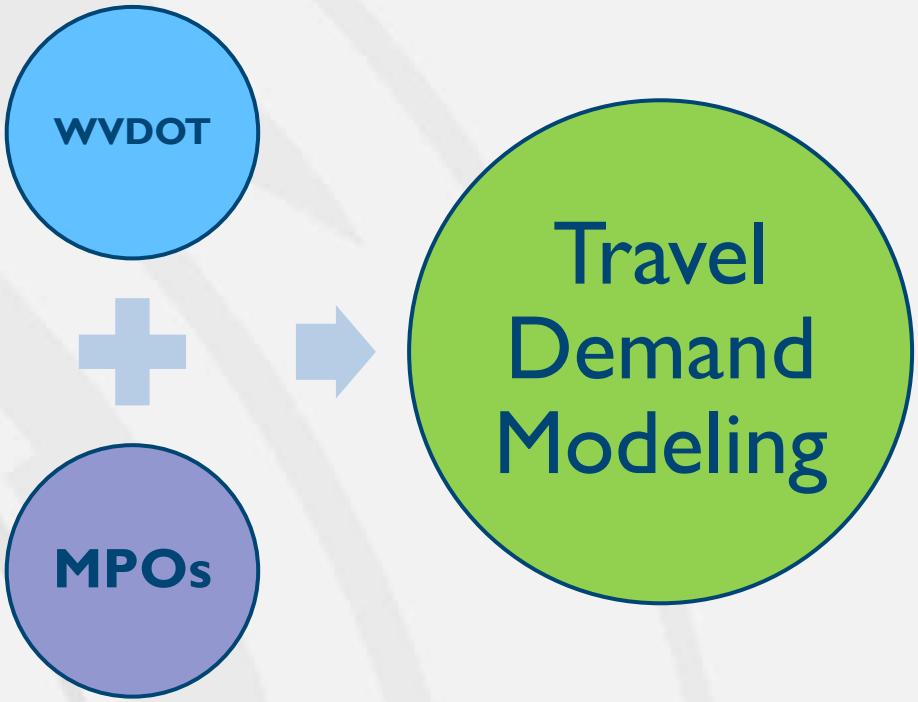
Task	Month									
	1	2	3	4	5	6	7	8	9	10
Task 1. Assembly and Review of Potential Resources	■	■								
Task 2. Prepare Annotated Outline for Handbook		■	■							
Task 3. Prepare Draft and Final Handbook			■	■	■	■	■	■	■	■
Task 4. Outreach Support		■	■			■	■			

Goals for Today

- Refine topic areas for the handbook
- Breakout into smaller groups and discuss priorities
- Summarize findings

Modeling in West Virginia

- WVDOT Modeling and Visualization Unit – support MPOs on regionally significant projects
- MPOs – maintain and apply models for daily planning activities



CAMBRIDGE SYSTEMATICS

Potential Topic Areas

- Data development for travel modeling
  - » Input data
    - Networks
    - TAZs
    - Socioeconomic data – population (e.g., West Virginia University Bureau of Business and Economic Research) and employment
  - » Surveys – household, external, truck, visitor, special generator
  - » Census data
  - » Traffic counts and transit ridership data
  - » Emerging data source (e.g., cell phone, GPS devices)

Potential Topic Areas

- Model validation process and standards
  - » Definition – process of checking models to ensure their results are reasonable and properly sensitive to changes in input data
  - » Guidelines and standards – FHWA Travel Model Validation and Reasonableness Manual
  - » Other: estimation, calibration, assertion

Potential Topic Areas

- Trip generation
  - » Practice
    - Trip production and attraction models – types, formulations
    - Trip purposes – minimum categories, common extensions
  - » Validation
    - Data – household surveys; National Household Travel Survey (NHTS)
    - Compare trip rates or parameters from other regions

Potential Topic Areas

- Trip distribution
  - » Practice
    - Model forms – gravity models, destination choice models
    - Example on next slide
  - » Validation
    - Data - Household surveys and CTPP for home-based work trips
    - Checks - Average trip length by trip purpose; area-to-area trip flows

Potential Topic Areas

Small and Large geography identification allows further flexibility

Acceptable and ended practice ation allows xibility

Table 6.1 Trip Distribution

Component	Acceptable		Recommended[a]	
	Small	Large	Small	Large
Model form	Gravity model	Gravity model	Gravity model	Destination choice model
Impedance measure	Highway travel time	Highway travel time	Highway travel time	Composite impedance that includes transit (if market is large) and any other significant modes
Income segmentation	No	No	No	Yes for HBW
Singly versus doubly constrained	Singly or doubly constrained		HBW: Doubly or singly constrained. Other purposes: Singly constrained	

[a] Note: Recommended characteristics are subject to resource constraints such as data availability and budget.

Potential Topic Areas

- External travel modeling
  - » External-Internal (EI) trips
  - » Internal-External (IE) trips
  - » External-External (EE) trips

Potential Topic Areas

- Mode choice*
  - » Practice
    - Model form – logit models, diversion curves
    - Modes: automobiles, transit, and non-motorized
  - » Validation
    - Data – household travel surveys, onboard survey, transit ridership data, national sources
    - Validation checks – mode shares, modeled transit trip length

* Current West Virginia models do not include this model, but adding it could provide additional decision support where transit investment is under consideration

Potential Topic Areas

- Trip assignment
  - » Highway assignment practice
    - Assignment algorithm – multipath or equilibrium assignment
    - Time periods – daily or daily: AM, PM, and Off-peak
    - Speed volume relationships – Akcelik, BPR, Conical
  - » Transit assignment practice (if transit is represented in model)
  - » Validation
    - Data – traffic counts, speed data, and HPMS
    - Checks – VMT by link group, screenlines and cutlines, R^2, RMSE

Potential Topic Areas

- Feedback loops, convergence, and related checks
  - » Description
    - Feeding back travel times that are outputs from the highway assignment process to be used as inputs in earlier model steps
  - » Procedures
    - e.g., set of number of iterations versus defined convergence criteria

Potential Topic Areas

- Truck and freight modeling
  - » Practice
    - Trucks – as a component of MPO models
    - Freight – statewide freight models (similar to 4-step models); direct commodity tables
  - » Validation
    - Data – commercial vehicle surveys, vehicle registration data, classification counts, commodity flow data (e.g., TRANSEARCH)
    - Checks – truck trip generation, truck trip distribution, and assignment

Potential Topic Areas

- Application and analysis
  - » Developing model outputs for presentation
    - Traffic volumes, highway speeds and travel times, total travel demand
  - » Using model results for planning applications
    - Corridor and subarea analysis
    - Air quality conformity analysis (e.g., using MOVES)
    - Evaluation of transportation system performance
    - Project prioritization and performance measures
  - » Maintaining linkage with PROVIS for long-range transportation plans

Potential Topic Areas

- Other topic areas?

Breakout Session

Breakout Session Objective

- Identify missing topics of high importance
- Rate the topics based on priority for developing and/or sharing West Virginia guidance and experiences
  - » Essential topic areas (high priority)
  - » Important, but not essential (medium priority)
  - » Non-essential topic areas (low priority)

(Try to assign each rating to one-third of topics)

Summary from Breakout Session

Breakout Session Summary

- Additional topics identified
- Common high-priority topics

Next Steps

- Develop annotated outline that will become the framework for the handbook
- Develop draft handbook
- Provide opportunities for stakeholder input at key intervals
- Incorporate comments and finalize draft

Contact Info

- Smith Myung
  Cambridge Systematics, Inc.
  +1-303-357-4662
  smyung@camsys.com

CAMBRIDGE SYSTEMATICS