Metropolitan Planning Organization Travel Forecasting State of the Practice

October 25, 2005

TRB

BMI-SG A VHB Company

Committee Members

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Disclaimer

- The presentation that follows was given to the TRB Committee on September 9, 2005. The materials included in the presentation are based on survey data as received through August 15, 2005 with only minimal time for review and quality control. Minor details of the data are subject to change but the overall findings are valid.

Study Objectives

- ”… gather, organize, describe and interpret information on the current “state of the practice....”
  - Present cogent picture
  - Summarize data in ways that aid TRB panel

Study Objectives (Continued)

- Support TRB Committee by noting forecasting practices that are:
  - Unusual
  - Questionable
  - Likely represent advance state-of-the-practice
  - Deficient
  - Ways to improve modeling
  - Otherwise of special interest

Survey Purpose

- Obtain travel forecast procedures from broad sample of MPOs
  - Sufficient detail to permit assessment & categorization of methods
- Survey Instrument Design
  - Respond to 21 committee questions
  - Additional questions identified by study team

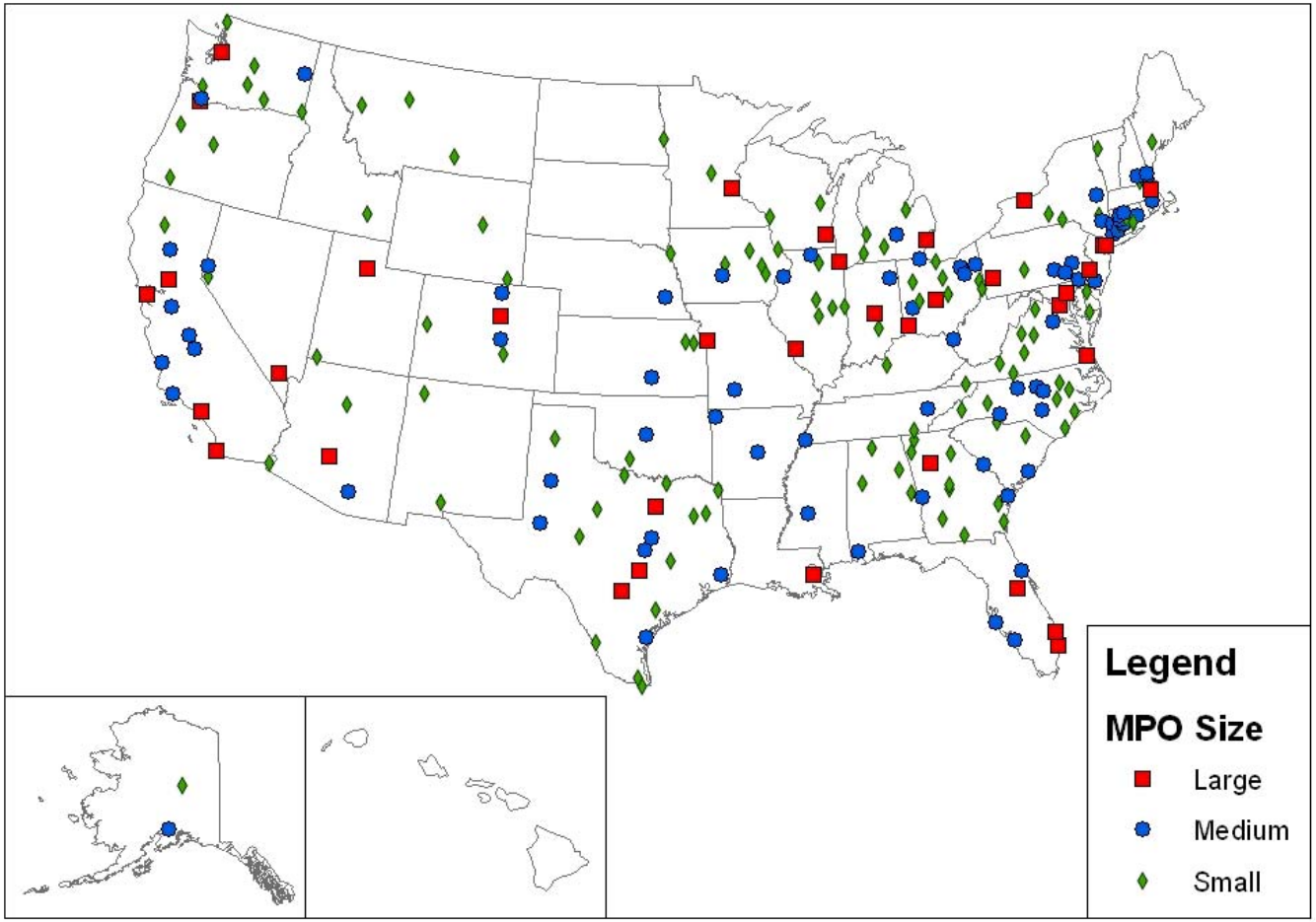
Survey Process

- Web-based survey designed by BMI-SG
- Pre-tested by five MPOs
- Distributed in late June to 381 MPOs
- TRB (Jon Williams), AMPO, NARC and AASHTO encouraged responses
- Responses received up to August 13
- Analyzed August 13 thru September 1
- Report distributed September 6

Surveys Sent and Responses Received (by MPO size)

MPO Classification	Surveys Sent	Surveys Returned	Percent Returned
Small (Population < 200k)	205	111	**54%**
Medium (Population >200k<1M)	133	72	**54%**
Large Population >1M	43	36	**86%**
Total	381	219	**57%**

MPOs Providing Responses



Model Characteristics

- Majority of MPOs use 4-step process
- Few MPOs use tour-based methods
- Many MPOs omit mode choice
- Some MPOs do no travel forecasting

Trip Generation

- Unit of travel
  - "Total Person Trips" for midsize and large MPOs
  - "Vehicle trips" & "Total Person Trips" evenly split for small MPOs
- Trip generation model
  - Cross-classification for trip productions
  - Regression analysis for trip attractions

Trip Distribution

- Gravity Model dominant methodology
  - Distributes person trips
- Impedance
  - Mostly based on travel time over highway network.
  - Significant portion of large MPOs use function combining highway and transit times or other factors
- About 1/2 of reporting MPOs apply some type of adjustment factors
  - "K" factors
  - Time penalties

Mode Choice

- Home-based work mode choice model
  - Used by 95% of large MPOs
  - 54% of mid-size MPOs
  - 21% of small MPOs
- Functional form overwhelmingly multinomial or nested logit.

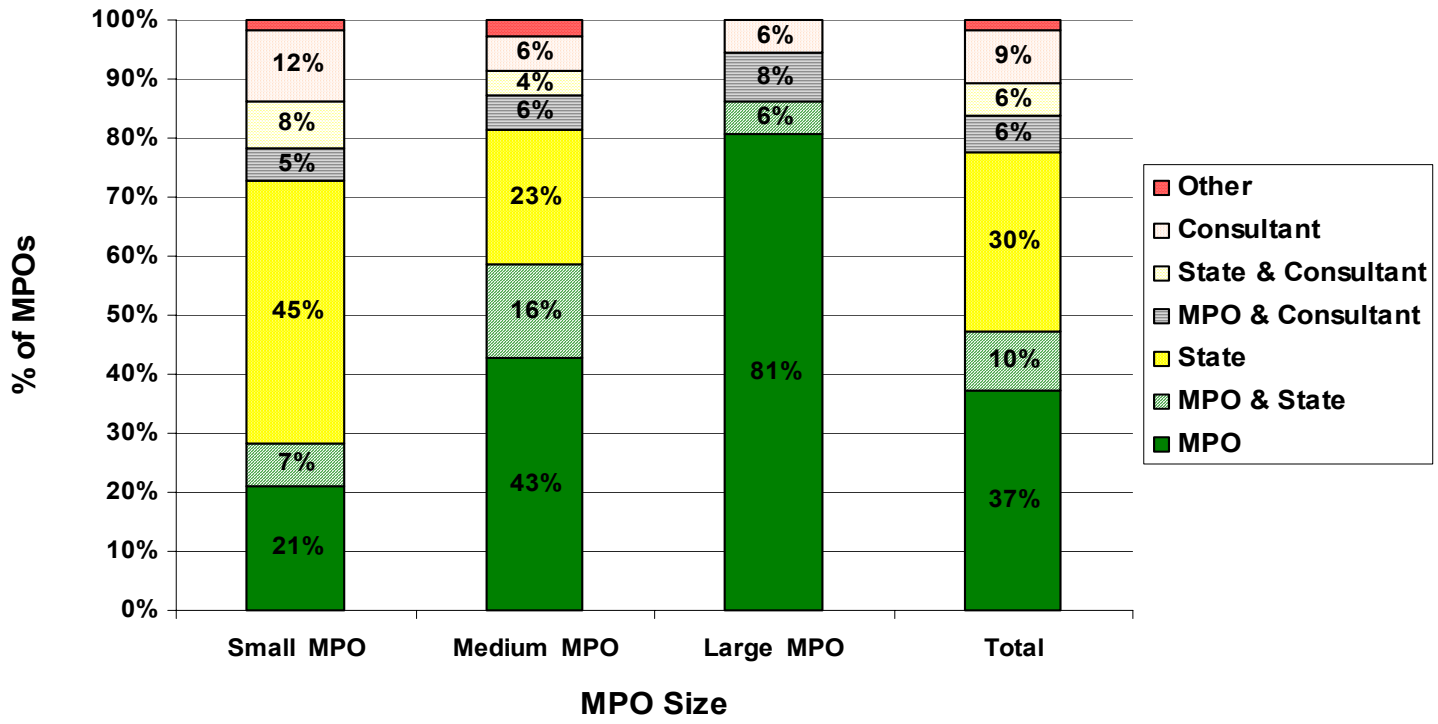
Assignment

	All MPOs	Large MPOs
Equilibrium assignment of highway trips	75%	91%
Transit trips assigned	34%	94%
Post-processing for mobile source emissions	55%	97%

Feedback of highway and transit times

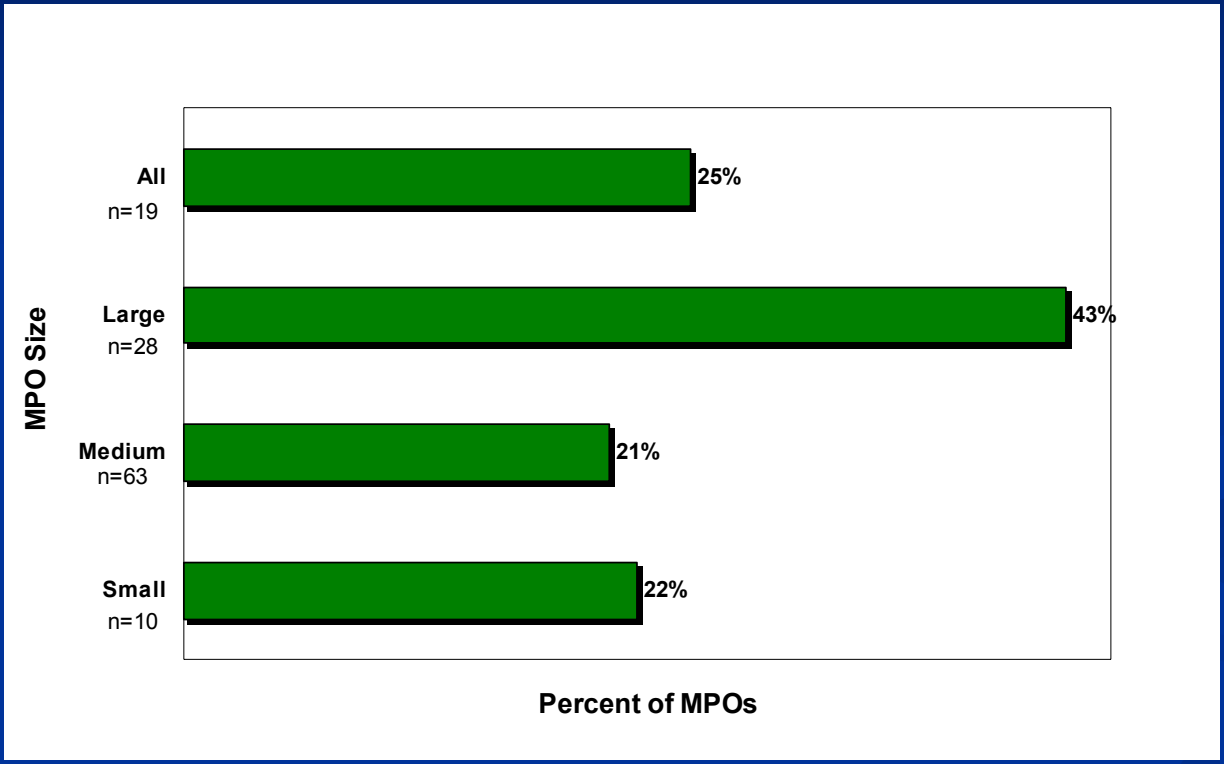
Model Component	All MPOs	Large MPOs
Auto ownership	13%	38%
Trip generation	14%	31%
Trip distribution	37%	82%
Mode choice	25%	79%
Land use	9%	37%

Which agency (or consultant) performs the travel forecasts for the long-range plan, TIP and conformity?



- The majority of travel forecasting work is carried out either by the MPO or by the state transportation agency.
- For smaller MPOs, the states play a major role, while in larger areas the MPOs dominate.

Are you working toward any activity or tour-based approaches to replace the existing trip distribution model?



- Large MPOs are more likely to be working toward replacing the existing trip distribution model with an activity or tour-based method than small or medium sized MPOs.

Top Ten Best Features

10. Multipath Transit Assignment
10. Detailed Operations Outputs
9. Accurate Land Use Data
8. Intersection Impedances
7. GIS Based
6. Multiplicity of Trip Purposes
5. Modes/Mode Choice Model
4. Standardized Model
3. Zone/Network Details
2. Well Calibrated and Validated
1. Ease of Use/Flexibility

What are the best features of your model?

Responses	All	MPO Size		
		Large	Medium	Small
1. Ease of Use/Flexibility	39	2	16	21
2. Well Calibrated and Validated	27	5	7	15
3. Zone/Network Details	17	2	8	7
4. Standardized model	14	0	5	9
5. Modes/Mode Choice Model	14	10	3	1
6. Multiplicity of Trip Purposes	13	4	5	4
7. GIS Based	12	1	6	5
8. Intersection Impedances	10	0	4	6
9. Accurate Land Use Data	9	3	3	3
10. Multipath Transit Assignment	7	0	3	4
10. Detailed Operational Outputs	7	1	1	5
Other	47	25	10	12

- 32% of all MPOs stated that the best feature was ease of use/flexibility
- 22% said the best feature was that the model was well calibrated and validated

What are the best features of your model?

Other Responses	
Time of Day	NCHRP 255 Procedures
Market Segmentation	Summit Interface
Quality Travel Survey	AQ Interface
Feedback Loop	Kinds of Questions Structured to Easily Answer
Accurate VMT Projections	AQ Post Processing
Tourism	Interface with Statewide Model
Transit Sensitive	Area Type and Trip Generation
Comprehensive Documentation	Combined Destination Choice Model
Thru Trips	Generalized Cost Impedance
Microsimulation	Journey Based
HOT Lane Modeling	Land Use Sensitivity
Staff Knowledge of Model	None

Top Ten Worst Features

10. Lack of Tour Based Activity Model
9. No Mode Choice Model
8. Lack of Commercial Vehicle/Truck/Freight Modeling
7. Lack of Toll/HOT Lane Modeling
6. Lack of Recent Quality Calibration
5. Lack of Travel Survey Data
4. Lack of Time of Day
3. Trip Generation
2. Lack of Detail/Quality of Mode Choice in Model
1. Land Use Forecasting

Which features are most in need of improvement?

Response	All	MPO Size		
		Large	Medium	Small
1. LU Forecasting	38	4	12	22
2. Lack of Detail/Quality in Mode Choice Model	30	5	16	9
3. Trip Generation	24	3	10	11
4. Lack of Time of Day	15	4	5	6
5. Lack of Travel Survey Data	14	4	3	7
6. Lack of Recent Quality Calibration	12	5	2	5
7. Lack of Toll/HOT Lane Modeling	11	3	4	4
8. Lack of Commercial/Truck Vehicle/Freight Modeling	9	3	4	2
9. No Mode Choice Model	9	2	3	4
10. Lack of Tour Based/Activity Based Model	8	5	2	1
Other	66	21	22	23

- 27% of all MPOs stated that land use forecasting was the feature of their model that was most in need of improvement
- This is followed by the detail and quality of the mode choice model (21%).

Next Steps