Modeling and Analysis Needs and Resources for Small Metropolitan Area Transportation Planning: Report on a Peer Exchange

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TMIP

Better Methods. Better Outcomes.

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1 Executive Summary

A peer exchange on Modeling and Analysis Needs and Resources for Small Metropolitan Area Transportation Planning was convened on August 28 and 29, 2011, to explore the state of transportation modeling and analysis practice in communities with populations under 200,000. The peer exchange explored planning concerns in small urban areas, and discussed data and analysis methods available to address those concerns efficiently and cost-effectively.

Larger communities often rely heavily on travel demand models to develop an overall picture of future performance of the regional transportation system. However, such models represent a large resource investment with respect to development cost, data collection and preparation, and staff support for planning analyses. The peer exchange revealed that while most small MPOs often have travel models available, other tools such as sketch planning tools and corridor analysis microsimulations are frequently used and can provide useful, cost-effective support.

Small MPOs face a number of specific planning issues that influence the type of data they collect and the analyses that they perform. They are often constrained in funds available for large projects or major capacity improvements, and may consequently have few or no such projects in their long-range plan. Economic development and "livability" (even simply in the sense of making the community a more attractive residential and business environment) are often significant considerations. External traffic may be a larger portion of overall roadway volumes for a small MPO, which can limit the ability of a regional travel demand model to fully represent influences on demand. Small communities are sometimes dominated by a single large institution such as a major university (though such universities may be a resource through faculty and student interest in transportation planning considerations).

In these policy environments, capacity enhancements aimed at addressing community growth are often a lower priority than projects aimed at specific operational or safety concerns. Because these concerns are based on present-day needs and seek rapid results, the time frame addressed in the analysis of such issues is often shorter than in a regional model (2 to 5 years, rather than 20 or 25). Over the shorter analysis time frame, microsimulation models or highway capacity analysis may generate more specific measures of effectiveness than a regional model. Though regional models often have a role to play in project selection and prioritization when developing a long-range plan, the participating small MPOs used a number of other tools in addition to regional demand models.

The peer exchange also examined data needs at small MPOs. Though access to traffic count data is generally available, household surveys are uncommon due to their prohibitive expense. Some small MPOs received survey support from their State transportation agencies through the 2009 National Household Transportation Survey add-on program. Several participants in the

peer exchange had used innovative data collection methods such as GPS studies, smartphone applications, and video license-plate capture for external origin-destination surveys.

Small MPOs often face challenges in funding technical analysis and in retaining technical expertise on their staff. Nevertheless, these agencies frequently have generalist staff capable of performing many functions and of effectively and resourcefully using a wide range of analytic approaches to provide decision support for their policy boards.

Resource constraints may be addressed through in-kind exchanges of information and effort with partner or member agencies, with MPO host organizations, or with MPOs in neighboring regions. A number of State transportation agencies provide technical support and modeling resources to small MPOs. Technical support and training for small MPO staff may be available through user groups, but finding suitable groups might entail looking across State borders.

A number of information and training resources are summarized in an Appendix of this report.

2 Introduction

The Federal Highway Administration (FHWA) convened a peer exchange meeting on August 29 and 30, 2011 at the Keck Center of the National Academies of Science in Washington, DC. The purpose of the peer exchange meeting was to explore the travel modeling and analysis needs and resources of small Metropolitan Planning Organizations (MPOs), those with populations under 200,000. The peer exchange meeting included staff representing small MPOs, and State DOTs that provide various levels of support to small MPOs in travel forecasting. Twelve small Metropolitan Planning Organizations and three State DOTs were invited to participate, covering a range of size, organizational structure, and technical capacity.

The peer exchange sought information regarding the experience of small MPOs in the following areas:

- Which models and other analytic tools are used to support policy discussions?
- What gaps exist in availability of tools and data to provide policy support?
- What non-technical obstacles (organizational or fiscal) exist to hinder effective technical analysis?
- What practices and techniques for modeling and analysis have been effective to support the planning process?

This document reviews and summarizes the discussion and conclusions from the peer exchange meeting. It is intended both to capture the participants' discussion as well as to summarize useful ideas, practices, and resources that were identified during the meeting. The focus here is on strategies for meeting policy needs of small MPOs through modeling and technical analysis. Readers seeking an overview of MPO organizational capacity should consult the 2010

report entitled *Staffing and Administrative Capacity of Metropolitan Planning Organizations*[1], prepared by the Center for Urban Transportation Research.

2.1 Relevance of the Peer Exchange

The peer exchange sought and obtained information about the planning needs of small MPOs in relation to their technical capacity. The peer exchange identified certain tools, strategies, and practices that may be of interest to MPOs and State DOTs who are seeking to improve their practices and deploy their resources more effectively and efficiently. These strategies may enable State DOTs and small MPOs to provide effective technical analyses despite resource limitations. The central goal of the peer exchange was to improve the ability to conduct an effective transportation planning process in small urban areas.

Recent discussions of transportation reauthorization in Congress as this report was drafted have considered changing the criteria by which small MPOs are designated[2]. Regardless of the status of small MPOs under in the future, the need for transportation planning in small urban areas will continue. The Federal Highway Administration and State Departments of Transportation will continue to have to provide support for those planning activities (at least under the legislative mandate for a statewide planning process, if not explicitly through an MPO process in small areas). The technical, staffing, and organizational issues discussed in the peer exchange, while focused on MPO processes, will prove helpful in assembling staff support, data, and analytic tools for an alternative planning process with different organizational structures. The results of the peer exchange illustrate how various types of planning and policy needs could be addressed with suitable data, models, and analytic tools supported by sufficient organizational capacity.

2.2 Peer Exchange Structure and Participation

2.2.1 Genesis

The peer exchange project was initiated by a request to AASHTO from the Minnesota Department of Transportation regarding recommendations for a useful role of the DOT in

1 http:/www.cutr.usf.edu/programs/pcm/files/2010-05-Staffing_and_Administrative_Capacity_of_MPOs.pdf (accessed 6/22/2012) That document discusses the structure, staffing, governance, and operation of MPOs around the country. It allows MPO leaders to compare their agency to others, and to identify potential solutions to organizational problems. The project was funded by the FY 2008 FHWA Surface Transportation and Environment Cooperative Research Program, and it consisted of a survey, follow-up interviews, and case studies from 133 MPOs.

2 For example, MAP-21 (**M**oving **A**head for **P**rogress in the **21**st Century") as proposed in December 2012.

supporting small MPOs. That request was referred to the FHWA Office of Planning, which oversees the MPO process defined in transportation authorization legislation, and which supports capacity building and deployment of modeling and analysis tools and techniques to support the MPO process. Planning for the peer exchange meeting began in January 2011.

2.2.2 Participation

Table 1 lists staff members of invited MPOs and State DOTs and others who were present at the meeting. Participants (Table 1) were selected by the peer exchange planning committee, who sought to bring together representatives who reflected a diversity of size, technical capacity, and geographic location. State DOT representatives were included from several States since State DOTs often support modeling and technical analysis for their State's MPOs. The focus of the discussion was nevertheless on the concerns of MPO staff related to technical and analysis capabilities.

2.2.3 Sponsorship and Funding

The peer exchange was organized by a planning committee that included staff representatives from FHWA (Ed Christopher, Brian Gardner, Jeremy Raw [committee chair], Scott B. Smith, and Sarah Sun), the Transportation Research Board (TRB; Kim Fisher), American Association of State Highway and Transportation Officials (AASHTO; Matt Hardy), Association of Metropolitan Planning Organizations (AMPO; Rich Denbow), the Duluth-Superior MPO (Ron Chicka), and the Minnesota DOT (Sara Aultman, Kirby Becker, Lynn Bly, Jonette Kreideweis, and Bobbi Retzlaff).

Funding to host the peer exchange meeting and report preparation was provided by the FHWA Office of Planning, and staff support for the meeting was provided under contract by the Transportation Research Board and the Volpe Center for Transportation Research.

This report was prepared by Michael Razo and Scott Smith of the Volpe National Transportation Systems Center, and Jeremy Raw of the FHWA.

2.3 Topics addressed by the peer exchange

The peer exchange addressed five topics, covered sequentially in the remainder of the report. First is the types of issues that call for modeling in a small MPO environment. Second is the modeling needs that go beyond traditional demand models. Third is data resources. Fourth is the use (or non-use) of consultants. Fifth is the issue of dealing with significant resource constraints.

Table 1 Peer Exchange Meeting Participants

Organization	City	State	Participant	2000 Population
Metropolitan Planning Organizations				
Bangor Area Comprehensive Transportation System	Bangor	ME	Rob Kenerson*	59,000
Bay County Transportation Planning Organization	Pensacola	FL	Gary Kramer*	170,000
Bryan-College Station MPO	Bryan	TX	Bart A. Benthul	195,000
Champaign County Regional Planning Commission	Urbana	IL	Rita Morocoima-Black	130,000
Charlottesville-Albemarle MPO	Charlottesville	VA	Stephen Williams	120,000
Cheyenne Wyoming MPO	Cheyenne	WY	Tom Mason	70,000
Duluth-Superior Metropolitan Interstate Committee	Duluth	MN	Ron Chicka	150,000
East Central Intergovernmental Association	Dubuque	IA	Chandra Ravada	185,000
Fargo-Moorhead Metropolitan COG	Fargo	ND	Joseph P. Nigg	173,000
Farmington MPO	Farmington	NM	Joe Delmagori	100,000
Gainesville-Hall MPO	Gainesville	GA	Srikanth Yamala	190,000
Thurston Regional Planning Council	Olympia	WA	Bharath Paladugu*	175,000

Organization	City	State	Participant	Number of Small MPOs
State Departments of Transportation				
Minnesota DOT	St. Paul	MN	Kirby Becker	3
North Carolina DOT	Raleigh	NC	Dan Thomas	8
Ohio DOT	Columbus	OH	Sam Granato	6

Organization	City	State	Participant
Facilitators			
Federal Highway Administration, Office of Planning	Washington	DC	Jeremy Raw
Federal Highway Administration, Resource Center	Matteson	IL	Ed Christopher
Observers			
Transportation Research Board	Washington	DC	Kim Fisher
Volpe National Transportation Systems Center	Cambridge	MA	Scott Smith*
Volpe National Transportation Systems Center	Cambridge	MA	Michael Razo*
Association of Metropolitan Planning Organizations	Washington	DC	Delania Hardy
Association of Metropolitan Planning Organizations	Raleigh	NC	Rich Denbow*

*Due to weather-related flight disruptions (Hurricane Irene), these participants joined the meeting by telephone.

3 Current MPO Activities and Model Usage

In preparation for the peer exchange, a short questionnaire was sent to all participants to collect information on their modeling experiences and challenges. The questionnaire was used to refine the meeting agenda, and to develop an understanding of the current modeling situation at the various participating MPOs. The following provides summary information on MPO activities and model usage based on the questionnaire and supplemented with discussions at the peer exchange meeting.

3.1 Model Types

All participants were involved in some form of travel demand modeling, with approximately one third of them using microsimulation. Several had included additional modes (such as transit), and others were very interested in doing so in the near future. All the MPOs are interested in land use and air quality models. A number of specific software packages were mentioned in the survey:

- **Traffic and Travel Modeling:** TransCAD (x2), Cube Voyager (x2), TP+/VIPER, VISUM, CORSIM , EMME/3, Dynameq.
- **Simulation:** Synchro (x3), Transmodeler.
- **Visualization:** Unspecified GIS software (x2), Google Sketch-Up (x2), Google Earth, Community VIZ, 3D Analysis/ARCScene.
- **Land Use:** LEAM (Land use Evolution and Impact Assessment Model used by Champaign-Urbana MPO), ULAM (Urban Land Use Allocation Model).

While most MPOs run their own models, many were initially developed by or in coordination with consultants or State DOTs. Several MPOs use models that are run at least in part by consultants or DOTs.

The participants were generally satisfied with their modeling efforts, but recognized a need for improvement, particularly in the areas of data and of dealing with modes other than automobile. One participant (Stephen Williams, Charlottesville, VA) remarked, “We are very happy with the vehicle and transit modes in the model. Bicycle and pedestrian modes are a huge issue in our region and I would like to start modeling those modes.” Other participants mentioned the need for more data in order to better model peak periods. Having a high proportion of external trips is sometimes an issue. Frequently mentioned data issues include outdated data and lack of locality-specific data. When the population of an area is small, it can sometimes be difficult to obtain a statistically significant sample. There are also some political and bureaucratic barriers to collecting or otherwise acquiring needed data. Data needs are discussed in more detail later in this report.

3.2 Role of Modeling and Analysis

The three primary uses of models are:

- Assessing volume and level-of-service for existing facilities.
- Project evaluation and corridor studies.
- Scenario analysis.

Participants noted that model use is required for dealing with air quality conformity in non-attainment areas and/or Federal Transit Administration's New Starts applications. There is an interest in using models for operational issues, including ramp metering, signal coordination, and transit priority. In the smaller MPOs the need for modeling is often sporadic. "Modeling requests are few. One example is what happens to traffic volumes if you build a new bridge between two existing bridges five miles apart." (Joe Delmagori, Farmington, NM)

3.3 Organizational Support

The participating small MPOs are often housed in a larger organization that provides basic office functions. The organization might be a city in the region, or the county planning department, or a regional planning or development council.

They do have active policy committees and most also have technical committees, with representation from the local jurisdictions in the region as well as the State DOT. The committees may sometimes include other important stakeholders, such as an airport authority, major landowners, or a major university.

Models are most often built by the State DOT or by consultants, but in four cases were built by MPO staff. The models are more often run by MPO staff, but sometimes by the State DOT or consultants.

3.4 Related Study in Illinois

The Champaign County Regional Planning Commission (Illinois) recently completed a research project entitled *Travel Demand Modeling Status and Needs Study for the Small and Medium Sized MPOs in Illinois*[3]. The document provides an overview of the status of travel demand modeling, and the need for such models, in Illinois and offers several recommendations for improvements. A key finding of this report, which was discussed in the peer exchange, is the usefulness of a statewide model in providing sufficient contextual information to support modeling and analysis of long-distance or through traffic, which is often a significant element of

[3] The document is available at http://www.ccrpc.org/transportation/pdf/ICT_Final_Report.pdf (accessed 6/22/2012), though readers are advised that it is a 100 megabyte file.

traffic in small urban areas. Statewide models can also help balance supply and demand over a broader area, which helps a smaller regional model account for effects of projects and development outside of the local model area.

4 Modeling and Analysis Applications

Participants reported that models and analytic tools support a variety of activities at their agencies. Due to a variety of institutional relationships, models were sometimes developed by the MPO itself, sometimes with consultant support, and sometimes by the State DOT for use by the MPO. Though some explicit requirements exist for travel modeling to support air quality conformity analysis and Federal Transit Administration (FTA) programs for major transit infrastructure investments (New Starts and Small Starts), the primary application of travel models was for needs determined by each agency without explicit regulatory or program requirements. Primary applications of models and related analytic tools by the peer exchange participants' organizations are discussed in the following paragraphs.

4.1 Applications of Modeling and Analysis Tools

4.1.1 Air Quality

Several participants mentioned that their MPOs were in non-attainment or maintenance areas for air quality. Air quality models, such as the Motor Vehicle Emission Simulator (MOVES)[4] offered by the EPA, make use of demand model outputs, and thus indirectly drive the need for travel demand models. However, the air quality issues that affect smaller MPOs are usually driven by larger regional or multi-State conformity concerns, or by the proximity of a much larger metropolitan area with its own MPO and air quality model.

4.1.2 Planning Alternatives Analysis

A common role of modeling and analysis is to prepare comparisons between transportation plan alternatives that reflect possible combinations of projects and priorities. In areas with few new projects, and where capacity is adequate for anticipated present and future needs, full regional travel demand modeling may seem unnecessary. Yet every MPO is faced with decisions regarding allocation of funds and resources for project work, operations, and maintenance, and for system policy. Regional travel models can generate baseline system performance measures that can be useful in prioritizing investments other than traditional capacity enhancements. Common measures used in small regional models include average daily traffic and vehicle miles traveled. Regional transportation demand analysis can have an

[4] Information on MOVES: http://www.epa.gov/otaq/models/moves/index.htm. (Accessed 6/22/2012)

important role to play in supporting economic development and land use planning. The analysis includes questions such as "what development is feasible given the present status of the transportation system, and what would the impacts of such developments be?".

4.1.3 Project, corridor, and development reviews

A frequent use of modeling is the evaluation of corridors and proposed projects. Projects might include proposed developments, operations projects and highway construction. "Projects [are] why we do traffic modeling…this includes land development, operations projects, and construction" (Sam Granato, Ohio DOT). Such analyses often includes fairly detailed modeling of small areas, with intersection analysis tools (e.g., Synchro®) and microsimulation tools (e.g., TransModeler®) playing an important role. Visualization tools are also important, with GIS maps frequently being used.

4.1.4 Operational Analysis

Operational analysis is commonly a significant concern for many small MPOs. Small urban areas are less frequently concerned with large-scale or long-term projects, and planning activities focus on near-term improvements in mobility and accessibility. Such analysis examines a shorter time frame, in which change in demand is a less significant factor. Attention focuses on intersection and roadway configuration updates associated with immediate traffic and development needs. High-quality data about base conditions is very important for the success of such analyses. Where travel demand models are applied, they are often used to supply traffic estimates for capacity and level of service (LOS) analysis at intersections or roadway segments to support design improvements in future years. Non-motorized accessibility is also a concern for some small MPOs, and may be associated with supporting community and economic development.

4.1.5 Economic Development and Land Use Analysis

A number of MPOs expressed interest in land use and economic development. The Champaign-Urbana Regional Planning Commission uses a land use model called *Land use Evolution and impact Assessment Model (LEAM)*[5], that can be linked with travel demand and air quality models. As many small MPOs are in low growth areas, there is general interest in alleviating transportation obstacles to economic development by improving system capacity and removing operational bottlenecks.

[5] More information on LEAM: http://www.leamgroup.com/technology/regional-modeling/leam-land-use-model (Accessed 6/22/2012)

4.1.6 FTA Programs

The FTA has specific modeling requirements for agencies seeking grants under the New Starts program for major transit investments.[6] Applications for New Starts funding require credible travel forecasts. These forecasts are typically developed via travel demand models that are grounded in current planning data. While few small MPOs enter the New Starts program (and none of the peer exchange participants had done so), other FTA programs such as the Small Starts or Very Small Starts also have analytic requirements, and may be served by models, though a full-blown mode choice model may not be necessary. Other options may include using a pivot-point model (estimating changes in mode share from baseline conditions), the EPA Commuter model[7], or TCRP Synthesis 66 on "Fixed-Route Transit Ridership Forecasting and Service Planning Methods."[8] As noted later in this report, several of the peer exchange participants felt that transit modeling simply increased model complexity without providing commensurate benefits. Few of the agencies in the peer exchange maintained transit components in their models, though some were considering doing so. Whether or not to support transit modeling is thus a local decision based on the specific needs of each MPO.

4.2 Role of a Regional Travel Demand Model

Participants in the peer exchange noted that a regional travel demand model may not always be a central tool to support planning functions. For MPOs in areas with low growth and little transit use, one participant (Joseph Nigg, Fargo, ND) asked "Do you need a model? Why is this so important to the functioning of a region? There are other factors beyond traffic volumes that may be more important for project evaluation, such as economic impact, land use, or safety."

Regional models are most suitable for analyzing growth in daily traffic and vehicle miles due to growth in internal demand. External demand and through traffic may be accounted for but are not generated within such models. Project evaluation may involve additional measures for which regional demand models are unsuited or insufficient. Such measures may include land use and economic development considerations (for example, studying access to a potential intermodal transfer facility). Safety impacts are another area of rising concern. Operational concerns such as bottlenecks or congestion limitations may be more effectively addressed through corridor microsimulation. Because these concerns are typically analyzed relative to

[6] More information FTA project planning requirements can be located through the FTA Planning and Environment webpage: http://www.fta.dot.gov/about/12347.html (Accessed 6/22/2012)

[7] Information the COMMUTER model and related resources: http://www.epa.gov/otaq/stateresources/policy/pag_transp.htm#cp (Accessed 7/5/2012)

[8] http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_syn_66.pdf (Accessed 7/5/2012)

present-day needs and seek rapid analysis results, the time frame addressed in the analysis of such issues is often shorter than in a regional model (looking out two to five years, rather than twenty or twenty-five). Consequently, they may be addressed effectively through simulation tools or highway capacity analysis rather than demand models, using traffic growth estimates from trend analysis, or trip generation estimates based on new land uses. Models are necessary when it is important to understand traveler response to system changes. Where demand is already understood for a facility or small sub-area, deterministic methods such as microsimulation will provide greater understanding of operational performance.

Even with relatively large projects in small urban areas, the project cost and risk may be too low to warrant the expense of a full analysis with a demand model. The peer exchange participants were in agreement that a regional travel demand model serves as one tool among many, rather than playing a central role as at many larger MPOs.

5 Fitting Models and Analytic Tools to the Policy Environment

5.1 Explaining the Results

One of the challenges is explaining the results of models. Policy officials may not have confidence in the results, and may not know how to interpret them. Many of the stakeholders, such as university faculty, are extremely knowledgeable and will challenge modeling development and applications. Advocacy groups may try to use the models and their results for their own purposes, particularly when a controversial project is being planned. Ron Chicka echoed a point made by other participants regarding the importance of high-quality analysis, stating that "dealing with the public will be messy…make sure your work is not the weakest link in the chain."

Simple tabulations such as district-to-district flow tables, frequency distributions of travel time savings due to a new project or operational improvement, or GIS-based thematic maps can provide useful visualization of model results. Developing such summaries also provides an opportunity to verify model and analysis results, and to ensure that the results can be explained and defended, and that they support planning and decisionmaking needs.

5.2 New Areas of Application

Many small MPOs are finding that the traditional problem of meeting future travel demand is only one of several major challenges they face. There is great interest in using models to help analyze economic impact, operations, land use, air quality, safety, and other issues. "You need a whole range of measures to evaluate projects." (Bart Benthul, Bryan, TX)

5.2.1 Operations

Many participants expressed an interest in using models to improve operations on existing facilities. Often the MPO is in a low growth area, where system preservation and corridor management are economically feasible options, and where limited resources for highway infrastructure expansion are available. Such considerations are especially important in areas where limited economic and population growth prevent substantial investment in new infrastructure. One participant remarked that in a small area, the questions that matter to a policy board are very specific, e.g., "How to deal with the traffic on Main Street?" Therefore, models that deal with intersections and other small areas are often used.

Traditional 4-step models in use at small MPOs may not be detailed or flexible enough for complete analysis of operations. For operational analysis, a greater level of temporal resolution is often needed. Four-step models at small MPOs have sometimes been extended with advanced approaches such as Dynamic Traffic Assignment (DTA) and microsimulation, enabling modelers to investigate solutions such as ramp metering, signal synchronization, and other methods for increasing road capacity, such as geometric improvements.

DTA techniques can be used to obtain better information about traffic patterns across peak hours, and applied to support Planning for Operations or demand management strategies such as Commuter Trip Reduction. The four-step model can support such analyses by providing regional travel patterns and total traffic during a peak hour or peak period, but such models have generally been extended or supplemented with additional calculations or standalone tools to perform LOS analysis or analysis of queuing and bottlenecks. DTA is most suitable when large portions of the roadway system are operating near capacity. For a single facility where traffic diversion is not a significant concern, highway capacity analysis may be a simpler alternative. Concerns about traffic diversion to alternate routes typically will require analysis with a travel demand model.

5.2.2 Additional Modes

In areas with extremely low transit mode shares, modeling has traditionally been focused on the automobile mode. However, there is increasing interest in addressing transit, bicycle and pedestrian modes. Some small MPOs have already done planning studies in these areas, but others face challenges in procuring the resources, data, and technical expertise required to expand into additional modes.

For many small MPOs, transit ridership is too low to have any noticeable impact on traffic volumes, and demand may not be growing. Even so, transit models have sometimes proved beneficial in other efforts such as cost/benefit analysis, transit service planning, or air quality planning. Similarly, there is an interest in the non-motorized modes: bicycling and walking. In

some of the small MPO areas, particularly those in college towns, non-motorized mode shares have proved significant. Interest in non-motorized modes may also be motivated by decisions made outside the MPO planning process. For example, if the major university in a college town has chosen to pursue a policy of intense parking management, there may be reason to examine the impact of these policies on multimodal travel in the MPO area.

Full-scale regional modeling efforts are certainly not the only available approach to these challenges. Given the specialized nature of these challenges (for example, modeling a shuttle used by college students), "out of the box" modeling approaches may not produce useful results. Simpler analyses based on comparisons with similar situations, consultation with transit employees, or other 'back of the envelope" techniques, may produce equally good estimates of transit demand. As with other modeling and analysis challenges, effective solutions have started with the question, "What do we want to evaluate?", and only when that question is answered to do they move on to, "What are the appropriate tools?"

5.2.3 Safety

Another aspect of being in a low growth area is that projects may have objectives other than increased capacity. One important objective is improved safety, something that is not covered in traditional demand models (even the typical traffic simulation will assume that drivers behave safely). Safety analysis techniques are discussed in the *Highway Safety Manual*[9] and implemented in various supporting tools. Safety analysis techniques often make use of traffic estimates such as average daily traffic and thus may require information from other models or traffic estimation strategies.

5.3 Performance-Based Planning

Participants in the meeting expressed an interest in performance-based planning.[10] A number of the participating MPOs are using, or are considering using, elements of a performance-based planning approach. Participants noted the desirability of defining performance measures that are relevant and measurable, within the constraints of limited resources for data collection and analysis. They also felt that the selection of planning models should be made not simply because certain tools such as a regional demand model are available or are traditionally considered necessary. Rather, tools were selected based on their ability to identify, evaluate and prioritize projects with respect to estimated impacts on the chosen performance measures.

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[9] AASHTO, 2010: http://www.highwaysafetymanual.org/Pages/default.aspx (Accessed 7/5/2012) and the FHWA Highway Safety Manual site: http://safety.fhwa.dot.gov/hsm/. (Accessed 7/5/2012)

[10] For one definition of performance measurement in transportation, see http://www.ops.fhwa.dot.gov/perf_measurement/fundamentals/index.htm. (Accessed 6/22/2012)

6 Data Resources

The issues of data quality and availability were major discussion topics at the exchange. While all involved had encountered major obstacles to obtaining data for their models, many also had found innovative ways to collect new data or use existing data from other sources.

6.1 Data Sources

Participants were asked, what data do you use in your planning process (not just for modeling and technical analysis)? Are there data you would like that you have trouble getting or maintaining?

Most of the discussion centered on demand-side data, including land use, household surveys and traffic counts. A common theme, was expressed by one participant as "can we make do with national data or when do we need local data? "

6.1.1 National and State Sources

National sources include the National Household Travel Survey, the American Community Survey and its associated Public Use Microdata Sample, the Census Transportation Planning Products, Census Longitudinal Employment Household Dynamics data, and the Quarterly Census of Employment and Wages from the Bureau of Labor Statistics.

Private sources of employment data include REMI, Dun & Bradstreet, Global Insight, and Reference USA (a public version of Info USA). The Cheyenne MPO, located near the Colorado-Wyoming border, obtained employment data from the Wyoming and Colorado departments of employment.

A few participants mentioned the highway performance monitoring system (HPMS), and pointed to the benefits of having the MPO do the counts for the HPMS.

Traffic counts are frequently obtained from State DOTs, as is crash data. Population forecasts are also sometimes obtained from the State. However, there may be conflicting forecasts, "the Chamber of Commerce projects a higher growth rate, but the State DOT doesn't believe it." (Tom Mason, Cheyenne, WY).

6.1.2 Local Data

Locally gathered data includes land use, employment, travel surveys, and traffic counts.

In a small MPO, it is "challenging to break socio-economic data into small zones." (Rob Kenerson. Bangor, ME). In some cases, land use data is available by parcel (often, from local assessors). Tax parcels provide a useful basis for allocating available socio-economic data to small areas, and can serve as a good basis for building zones. Parcels generally form a stable

basis because although they are sometimes subdivided, they are rarely re-assembled into larger parcels.

As mentioned earlier, multiple sources of employment data are available. But all employment data sources have limitations, and the work required to assemble and verify employment data may be considerable.

A number of MPOs have conducted household surveys, but the panelists felt that such surveys are expensive. As a result, household surveys are conducted infrequently. Though full regional surveys are expensive, smaller focused surveys can shed light on travel characteristics such as major trip generators or visitor and external travel markets that may be difficult to understand without insights from local data.

Traffic counts are another source of data. They may include link counts (typically gathered over a period of several days via tubes on a road), intersection turning movement counts (typically gathered manually at intersections during the peak periods) and bicycle/pedestrian counts (also gathered manually). There is interest in using origin-destination matrix estimation techniques to synthesize more accurate O-D tables based on the traffic counts. The Thurston, WA, MPO conducted a cordon survey to develop external O-D traffic flow data.

External trips are often significant for a small MPO. Possible sources for external data include the Freight Analysis Framework (FAF), or a statewide model. A challenge is that these data sources are often not at enough of a geographic level of detail to be useful. (For example, in the FAF model an entire State might be one zone.) A new national long-distance passenger survey is not imminent, and it likely will not occur at the level of detail that small MPOs need. Expansion of statewide model results to provide external origin-destination (O-D) data has been applied, and some small MPOs have conducted their own surveys to develop O-D data, as noted in the next section.

6.2 Innovative data approaches

Many small MPOs have found creative ways to overcome budget constraints, political barriers, and practical difficulties and collect relevant, quality data.

With the growing popularity of GPS-enabled smartphones, many MPOs and other organizations have sought ways to collect detailed data directly from users. One especially successful example is CycleTracks, an open-source application originally developed by the San Francisco County Transportation Authority (SFCTA) to collect bicycle travel data[11]. CycleTracks records cyclists' travel patterns via GPS and submits the data to a centralized database. Many cyclists

[11] http://www.sfcta.org/content/category/12/97/483/ (accessed 9/26/2012)

have welcomed the software, as it also allows them to track and review their routes and other statistics.

The Bryan-College Station (TX) MPO was able to adapt CycleTracks from the freely available source code and implement it locally, even expanding it to modes beyond cycling. With help from Texas A&M University, the effort has become a very useful and relatively inexpensive method of data collection.

Concerns with GPS studies include privacy and possible under-representation of certain groups. For example, the elderly might be over-represented in a phone survey, and under-represented in a GPS survey.

The Thurston, WA Regional Planning Council used cameras for automatic license plate recognition in conducting their O-D survey. Follow up surveys were sent to the addresses based on the license plate data. Response rate of the survey was around 15 percent. Analysis of the thousands of survey responses was conducted using Scantron technology. Bharath Paladugu remarked that "privacy is an issue and coordination is the key...you need to notify the public and local jurisdictions via news articles, website postings, [and] memos ahead of time."

7 Leveraging Other Resources

7.1 Limits on Small MPO Resources

Although an MPO in a region with small population may not have as many demands as an MPO in a big city, there is a minimum level of resources required for the MPO to be effective. In other words, an MPO in an area with 100,000 people is more than 1/20th of an MPO in an area with 2 million people. Furthermore, an MPO may have travel issues (for example, a high number of through trips) that are not reflected in its region's population. Steve Williams noted that "at any MPO there are three trains of thought: policy, process, and quantitative. At a small MPO, the quantitative may drop off."

Participants suggested that the minimum staff size of an MPO might be three people, with annual funding of perhaps $150 – 200K. The skills required for an effective MPO are varied, and rarely reside in a single person. They include:

- Understanding of policy and political issues within a region.
- Ability to build relationships with the decisionmakers (typically, elected officials).
- Ability to build relationships with the technical people in other agencies, such as the State DOT and municipalities, to obtain and understand needed data (i.e., traffic counts, surveys).
- Ability to work with data.

- Ability to do quantitative modeling, and talk with other modelers.
- A good public face for answering the phone, dealing with public meetings, andcommunicating the results of any modeling efforts.

Often, to reduce administrative costs, the MPO may be housed within another entity, such as a city or county planning department or a regional planning council. The MPO may draw on expertise from other agencies. For example, the city where the MPO is housed may have qualified GIS staff and a traffic counting program. Or, a nearby university may provide data and modeling expertise. The State DOT often provides assistance with modeling and data to small MPOs. The MPO may also seek government or private grants, for example, from a computer vendor. Certain data may also be inexpensively available from peer agencies with similar population and travel characteristics.

Overall, there is a significant reliance on in-kind (for example, office space from a city) and shared resources.

For further information on MPO governance and staffing, please see the May 2010 report[12], *Staffing and Administrative Capacity of Metropolitan Planning Organizations*, produced by the University of South Florida Center for Urban Transportation Research.

7.2 State DOTs

Many State DOTs are very active in modeling efforts, maintaining statewide or local models, assisting and coordinating with MPOs, or even mandating certain modeling practices. This involvement can help keep local models compatible and facilitate data sharing among MPOs. DOTs may also have resources and expertise that would be difficult for smaller localities to afford.

State DOTs and other State-level organizations typically collect and archive a wealth of data that can be used in modeling efforts. Employment, census, vehicle registration, and licensing data are typically maintained by States. Accessing certain sensitive information, such as driver records, can be somewhat challenging for MPOs or any other organizations outside of State government. One participant overcame this difficulty by hiring the State Department of Employment to perform analyses that required access to sensitive data.

7.3 Universities

Universities can be an excellent source of modeling expertise and other assistance to MPOs . “Being in a college town, it is easy to find people with technical abilities” (Rita Morocoima-

[12] http://www.cutr.usf.edu/programs/pcm/files/2010-05-Staffing_and_Administrative_Capacity_of_MPOs.pdf. (Accessed 6/22/2012)

Black, Urbana, IL). Since universities often perform transportation-related research in their own localities, they may offer highly relevant data, knowledge, or even existing model components. Some MPOs near major universities have also been able to make great use of the abundant skilled, short-term labor in the student population.

University faculty may also provide helpful input on modeling techniques, especially when new or experimental methods are being considered.

7.4 Consultants

The use of consultants has both advantages and disadvantages. If sufficient in-house expertise exists, consultants may not be necessary at all. However, in cases where the MPO does not need to engage in modeling all of the time, it may be difficult to maintain the in-house expertise. Here, a consultant may be beneficial. Consultants may also have good insights, from their work in other areas, on what tools might be most beneficial in a particular situation. They may also offer technical assistance to MPO staff.

One participant (Dan Thomas, NC DOT) remarked that "we had really good experiences…Contract and expectation setting are important…we need to be able to use the model afterwards." Steve Williams added that the "model is a long term investment, calibration not just for the corridor in question." Gary Kramer noted that "validation of the model by the consultant can be helpful." Srikanth Yamala noted that a "consultant is as good as the team hiring them."

Disadvantages of using consultants include the high cost, and the sometimes differing objectives. For example, in a corridor study, the consultant might deliver a model that works well for the corridor (thus, fulfilling the contract), while the MPO might be more interested in the model as a long-term investment, well calibrated everywhere in the region. Another challenge is turnover within the consulting firm, where the new consultant personnel need to be re-educated on the MPO's particular situation.

Several participants stated that it is important to set clear expectations on both sides, with a thorough request for proposal (RFP). To be successful, the MPO needs to work closely with the chosen consultant. Typically, the MPO will want to be able to use the model afterwards, and have the in-house capacity to replicate the consultant-supplied model. This suggests that the contract should include documentation as an intermediate deliverable, as well as on-call support from the consultant. The MPO should documentwhat they learn from the consultant so that they may be included in future contracts. It also may be helpful to build up a database of "model" RFPs.

In some cases, alternatives to consultants may exist. In a college town, it may be easy to find people with technical expertise. The software vendors or the State DOTs may provide training opportunities.

7.5 Resource Guidance

7.5.1 Federal Resources

A number of resources are also available at the Federal level. They include the Travel Model Improvement Program (http://tmip.fhwa.dot.gov[13]). In additional to a clearinghouse of documents, TMIP has a peer review program. A number of national data resources (often identified by their acronyms) were mentioned earlier, including the National Household Travel Survey (NHTS), the American Community Survey (ACS) and its associated Public Use Microdata Sample (PUMS), the Census Transportation Planning Products (CTPP), Census Longitudinal Employment Household Dynamics (LEHD) data, the Quarterly Census of Employment and Wages (QCEW) from the Bureau of Labor Statistics, and the Freight Analysis Framework (FAF) from FHWA.

7.5.2 Training and Technical Information on Models and Their Application

Bay County (Florida) Transportation Planning Organization

1. Each of the MPOs has representation on the State of Florida Model Task Force created by the Florida Department of Transportation.
2. FDOT provides statewide training on different aspects of Transportation Modeling.
3. FDOT's web site on transportation modeling provides detailed background information (www.fsutmsonline.net[14])

North Carolina DOT

Two documents used include

1. Small Area Travel Demand Model Procedures Manual, 2008.
2. Small Area Travel Demand Model Guidelines, 2008.

The Guidelines are theory, and the Procedures are the "how to." They are specific to TransCAD. NCDOT also offered a training class over a period of several months. Students went over certain elements of modeling in class and then there was an out of class assignment. These tools are also being used in a class at NC State University for model development. While it is not being used in its entirety (due to time constraints in the

[13] Accessed 6/22/2012

[14] Accessed 6/22/2012

classroom) it does provide the basis for modeling element of the class. These documents are available upon request to the Transportation Planning Branch at NCDOT.

7.6 Benefit of Additional Guidance

There are three major areas where the peer exchange participants concluded that it would be helpful to document additional best practices and have more guidance for MPOs. They include:

1. Communications with MPO board members and the public, to build support and acceptance of modeling efforts. This may include education on the best uses of models. Certain important questions in this area include: What can be done about specific, tangible issues in the MPO planning area? Can we provide objective evaluation criteria? How can credibility be maintained (for example by ensuring that consistent analyses are used by the MPO and the State DOT).
2. Addressing data issues in a small MPO environment. This includes acquiring statistically significant samples (in an area with low population, a survey may not return enough data), and external trip data.
3. Determining when a regional travel demand model is needed, and having more information on available alternatives. If a model is needed, it would be helpful to have guidance regarding the minimum resources, in terms of people and qualifications, required to build and maintain it. It would also be helpful to have technical guidance on the model form and structure to ensure suitable analytic power without "over-building" the model.

Appendix A: Peer Exchange Agenda

DAY ONE

Monday, August 29, 2011, 8:30 a.m. – 4:30 p.m .

Theme of the Day: "Where Do We Stand?"

1. **Overview of Peer Exchange** **8:30 – 9:00**
   - Genesis, participation, desired outcomes and products, discussion format, agenda review and adjustment, travel reimbursement and other logistics
2. **Introductions of Participants** **9:00 – 9:30**
3. **Review of Participant Questionnaire** **9:30 – 10:00**
   - Overview and Summary of issues raised by the participant questionnaire
4. **Break** **10:00 – 10:15**
5. **Modeling and Analysis in the Planning Process** **10:15 – 11:45**
   - What are your agency's activities and planning products (required, optional, and special requests), and how does your organization perform those?
   - What role does modeling and analysis play in your planning process, and how well do your current approaches meet your organizational needs?
6. **Lunch** **11:45 – 12:45**
7. **Organizational Support for Modeling and Analysis** **12:45 – 2:00**
   - Who builds your model? Maintains it? Runs it? Pays for it? What resource challenges have you faced, and how have you met them?
8. **Break** **2:00 – 2:15**
9. **Data Resources** **2:15 – 3:45**
   - What data do you use in your planning process (not just for modeling and technical analysis)? Are there data you would like that you have trouble getting or maintaining?
10. **Challenges to Effective Modeling and Analysis** **3:45 – 5:00**
    - What is missing in your modeling and analysis practice, or holding you back?

DAY TWO

Tuesday, August 30, 2011, 8:30 a.m. to 12:00 p.m

Theme of the Day: "Where Would We Like to Be, and How Do We Get There?"

11. **Review of Day One** **8:30 – 9:00**
12. **Good Practices in Modeling and Analysis** **9:00 – 10:00**
    - What are the best examples of good practice that you have heard, especially things that might help your own practice?
13. **Break** **10:00 – 10:15**
14. **Future Resources and Recommendations** **10:15 – 11:30**
    - What additional resources (dedicated funding, organizational support, training, low-cost tools, research) would be most beneficial to you, and to other MPOs?
15. **Recap and Adjournment** **11:30 – 12:00**

Appendix B: Modeling Resources for Small MPOs

Participants in the meeting shared some of the resources that they found to be helpful. They are listed below.

Travel Model Improvement Program (TMIP)
TMIP has links to many resources, including documents, recorded webinars, and the popular TMIP email list for networking with peers.
http://tmiponline.org/ (Accessed 6/22/2012)

Travel Forecasting Resource
TRB and FHWA are developing the Travel Forecasting Resource as a comprehensive knowledge base for travel forecasting.
http://www.tfresource.org/ (Accessed 6/22/2012)

NCHRP 365 -- Travel Estimation Techniques for Urban Planning
In 1998, drawing upon several data sources including the 1990 Census and National Personal Household Travel (now called the NHTS) the Transportation Research Board under the National Cooperative Highway Research Program (NCHRP) released NCHRP Report 365. This report provides default values for many of the model inputs and evaluation measures used to support transportation travel demand forecasting.
http://ntl.bts.gov/lib/21000/21500/21563/PB99126724.pdf (Accessed 6/22/2012)

NCHRP 716 -- Travel Demand Forecasting: Parameters and Techniques
NCHRP 716 is a supplemental update to NCHRP 365 that addresses certain new modeling techniques and offers updated default parameters based on more recent research and survey data.
http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_716.pdf (Accessed 6/22/2012)

Travel Model Validation and Reasonableness Checking Manual
Discussion of methods and data for checking the performance of a travel demand model.
http://tmiponline.org/Clearinghouse/Items/Travel_Model_Validation_and_Reasonableness_Checking_Manual_Second_Edition.aspx (Accessed 6/22/2012)

National Household Travel Survey (NHTS)
The NHTS is the authoritative source of national data on the travel behavior of the American public. The data set allows analysis of daily travel by all modes, including characteristics of the people traveling, their household, and their vehicles.
http://nhts.ornl.gov/ (Accessed 6/22/2012)

Census Transportation Planning Products (CTPP) - Data Products

Since 1970 the transportation community has been paying for a special set of tables from the decennial censuses that are designed for transportation planning purposes. For a description of the CTPP, see **http://www.fhwa.dot.gov/ctpp/index.htm**. (Accessed 6/22/2012)

To begin to work your way through the CTPP products go to **http://www.fhwa.dot.gov/ctpp/dataprod.htm**. (Accessed 6/22/2012)

For another look at the available CTPP data products also see **http://trbcensus.com/products/**. (Accessed 6/22/2012)

Integrated Public Use Microdata Series (IPUMS)

IPUMS is a microdata set of individual person records drawing data from more than 150 years of Censuses as well as the new American Community Survey. Most population data—especially historical census data—are typically available only in aggregated tabular form. The IPUMS is microdata, which means that it provides information about individual persons and households. This makes it possible for researchers to create tabulations tailored to their particular questions.
http://usa.ipums.org/usa/ (Accessed 6/22/2012)

Employment Securities Data (ES202) now Quarterly Census of Employment and Wages (QCEW)

The QCEW (formerly ES202) is a Bureau of Labor Statistics program that publishes a quarterly count of employment and wages reported by employers covering 98 percent of U.S. jobs, available at the county, MSA, State, and national levels by industry.
http://www.bls.gov/cew/ (Accessed 6/22/2012)

On the Map - Longitudinal Employer-Household Dynamics (LEHD)

The LEHD is a program within the U.S. Census Bureau that links employment records with Census demographic data to produce synthetic Origin-Destination flow data at the Census Block level.[15]
http://lehd.did.census.gov/led/ (Accessed 6/22/2012)

List of Private and Federal Employment Data Sources (Circa 2007)

In 2007 the TRB Travel Data Users Forum focused on employment data and this annotated list of private and Federal employment data sources was put together.
http://edthefed.com/data/Employment_Data_Sources.pdf (Accessed 6/22/2012)

[15] FHWA maintains a web page with resources on application of LEHD data for transportation planning applications: http://www.fhwa.dot.gov/planning/census_issues/lehd/ (Accessed 9/24/2012)

County-to-County worker flows from 1970, 1980, 1990, and 2000
http://www.bea.gov/regional/reis/jtw/ (Accessed 6/22/2012)

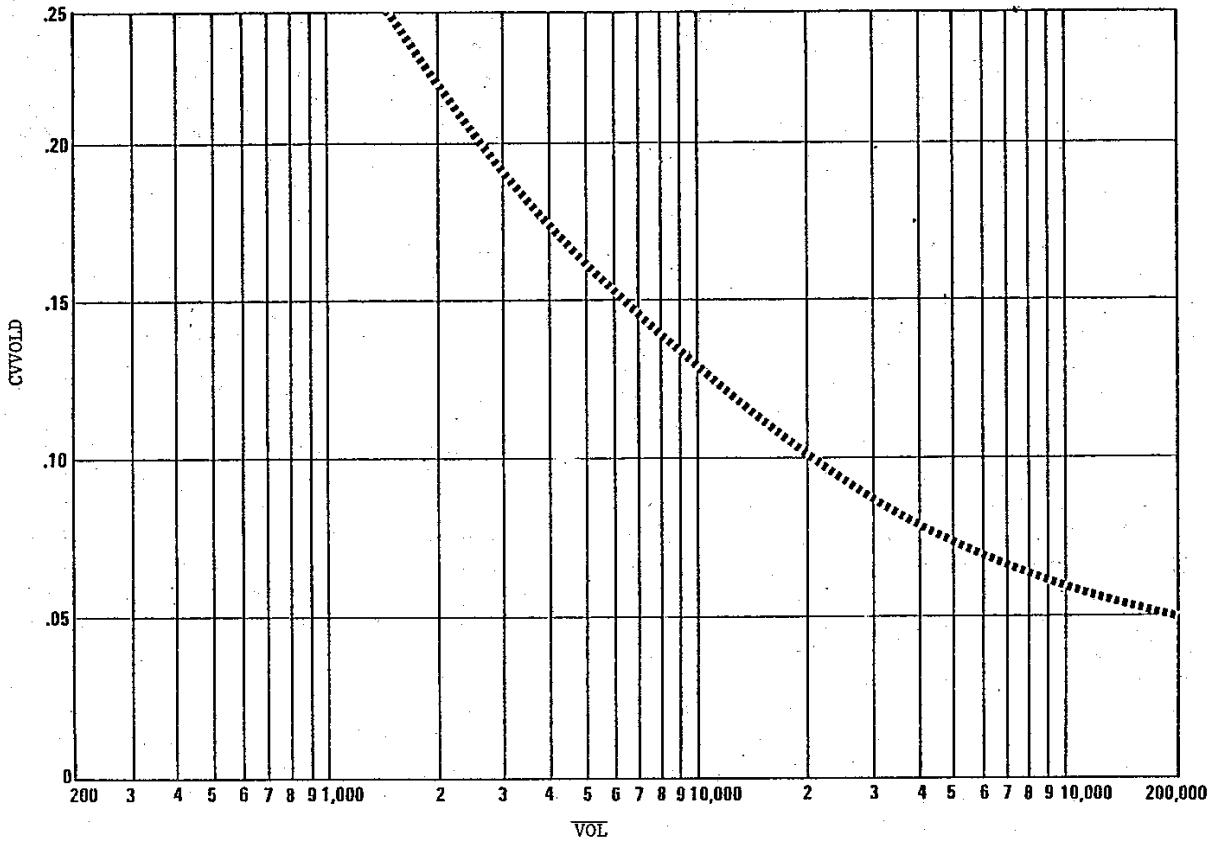
Metropolitan Travel Survey Archive
The Archive was developed by the University of Minnesota as a place to store, preserve, and make publicly available— via the internet—travel surveys conducted by metropolitan areas, States, and localities. It contains the data, documentation, and results for a variety of regions throughout the country.
http://www.surveyarchive.org/index.html (Accessed 6/22/2012)

Supplemental Trip Generation Report
Though old (1985), this document provides some useful supplementary information related to trip generation compared to the standard ITE Trip Generation Report (now in its 8th Edition).
http://ntl.bts.gov/DOCS/382DNA.html (Accessed 6/22/2012)

Guide to Urban Traffic Volume Counting
Guide to Urban Traffic Volume Counting[16] was cited in FHWA's Model Validation and Reasonableness Checking report but is not on the web. The graph from this report on estimating sampling error in traffic counts appears below:

[16] USDOT Federal Highway Administration Urban Planning Division, *Guide to Urban Traffic Volume Counting,* 1981, HHP-22/10-81 (OCLC 16112004)

DEFAULT COEFFICIENT OF VARIATIONS FOR DAILY VOLUME ACROSS DAYS



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