Research Recommendations
Statewide Travel Forecasting Model Workshop

WORKSHOP 1

Travel Survey - Conduct a nationwide survey of freight vehicles, carriers and commodities crossing state lines and a simultaneous port of entry survey. The surveys should be designed to capture the origin, destination and mode of shipments and should be used to establish a basic interstate flow matrix which the states could use as a start for their analysis of intra-state movements.

Economic Effects - Develop a better understanding of the relationships between commodity flows and models of the economy. Consider the implications of economic projections from economists and econometricians for commodity flows and demand for transportation facilities and services which are or might be supplied by or regulated by the states.

Synthesis of Practice - Conduct a review and synthesis of statewide travel demand forecasting and modeling practice across the states. This should be larger and deeper in scope than typical NCHRP Synthesis projects and should have greater resources than were available to Alan Horowitz for preparation of his draft manual. This would serve as a source of information about and contacts for statewide travel forecasting work. This would include an evaluation of the appropriateness of different techniques for various needs and circumstances. Guidelines should be prepared to help practitioners understand what is good and what is available for different uses.

Comparison to Urban - A comparison and analysis of the differences and commonalities between urban, regional and statewide travel demand forecasting procedures should be conducted.

Preference Surveys - Well designed, administered and coordinated stated preference and revealed preference surveys of choice of inter-city travel modes should be conducted. The choices offered in the survey should include both actual and prospective modes.

Model Options - There is no single best model or technique for statewide travel demand forecasting or for analyses and forecasting travel at the sub-state level. States should be encouraged to adopt techniques which best suit their particular and specific needs and available resources.

Training and Coordination - There is a need for better training for transportation planners in the use of GIS software and tools, better spatial data and geo-coding of currently available data, and better coordination by transportation planning and analysis agencies and staff with other users of spatial data at the state and local levels.

WORKSHOP 2

Data Issues - Research should be conducted to describe national data bases and their potential for use by states for travel forecasting. The research should also identify the similarities among travel model parameters and input data used by the states for travel models. The commonalities and similarities among inputs used by the states’ travel models should be used to validate or modify the national data
bases. Research should also investigate the sensitivity to input data of models and decisions based on them. The research should attempt to determine if, what and when national data can be used in lieu of or in addition to local data. The research should provide the states with guidance on the potential use of national data in their travel models and an assessment of the sensitivity of their models and decisions to particular inputs.

National data should be used more often and more extensively in statewide travel forecasting. Borrowing data and transferring travel model parameters between states having similar situations should be encouraged. These steps will help to reduce the cost of statewide travel analysis and will improve multi-state studies.

Procedures should be developed for estimating portions of freight movement not in the Commodity Flow Survey (CFS), such as waste and imports and considering dead-heading. Data should be developed on the total amount of commodities received at destinations.

Trip generation rates should be developed for rural areas. Changes in trip generation rates due to changes in employment and worker productivity should be examined.

**Freight Issues** - Tools should be developed that analyze the impacts on transportation of ports, sea borne commerce, railroad mergers and the global economy. Tools should be developed to treat intermodal transportation appropriately, particularly dealing with cost issues. Better data should be developed on intrastate freight movements. Models should be developed to incorporate freight logistics into statewide travel forecasting with particular emphasis on traffic assignment, and non-modeling solutions should be examined. Multimodal networks should be developed for use in these and other freight analyses.

**Model Applications** - The relationship between the economic health of a state and its transportation system should be investigated. The states and their MPOs should coordinate their travel forecasting procedures used for analyzing transportation policy issues. State and MPO models should at least be coordinated if not fully integrated. The trip purposes used for the 4-step urban travel forecasting process should be considered for use in statewide modeling. The potential for simulation based modeling should be considered for statewide modeling. Another enhancement would be developing transportation models for commercial trips.

**Land Use** - Research is needed on the relationship between land use and transportation for statewide travel. Incorporating land use into the statewide travel forecasting process will require resolving the issues associated with obtaining the data needed by the travel models. Among these are determining the ability of state and local agencies or other sources to collect and maintain a consistent statewide data base that includes land use and land price. The potential role and benefit of using expert panels to develop statewide land use plans should be investigated.

**Alternative Modes** - Tools should be developed that evaluate new modes, such as high-speed rail and air, versus truck freight, for multi-state, multimodal analysis. Research should be conducted on the potential effect of teleworking and electronic commerce on statewide freight transportation and how to incorporate that effect in statewide travel models.
External Trips - Methods should be developed for models to consider travel that extends beyond state borders. Travel models should be developed to assess impacts of snowbird/sunbird migrations and how to collect data and forecast growth in that travel. The gaps between local and national data on interstate travel should be assessed.

WORKSHOP 3

Internet Website - A world wide web site for statewide travel forecasting should be established to promote and establish new modeling techniques and case studies, to provide for ongoing sharing of information on travel model improvements, and to facilitate evaluation and critique of those improvements as they occur and become available. The new web site should facilitate access to technical documents (especially case studies), data sources, resources to aid model users, including a list of experienced contacts willing to provide technical assistance, and training opportunities. An electronic mail list for interchange of information and a search engine for scanning the Internet for further information on travel forecasting should also be provided. This should be an on-going activity funded by contributions or assessments from individual states signed up to use the web site and matched by contributions from the federal government agencies.

Secondary Data - The states should be encouraged to research, locate and use data available from various sources to supplement any data collected for statewide travel forecasting. A clearinghouse of data available from state and national data collection efforts should be created and made available as a resource for statewide travel forecasting. The existence of this clearinghouse should provide awareness of what is available, assess usefulness of the data, identify opportunities for enhancing usability of data and identify state and national contacts for obtaining that data.

An annotated directory of national and state data sources/contacts should be prepared, and it should provide data specifications for use in statewide forecasting model development (e.g., geographic referencing, time, stratification, etc.). The clearinghouse should specify requirements for ongoing maintenance of the validity of the data with federal and state participation in the effort.

Funding for this activity should be provided by subscriptions to the states with matching funding from the federal agencies.

Existing Freight Data - Research should be conducted to identify the existence, characteristics and location of data on freight movements for use in statewide travel forecasting. All potential public and private sources should be investigated. The availability of such data should be documented and advertised to facilitate its use. Such documentation will encourage cooperation among users of the identified public and private freight data bases. The documentation should include best practices in data “mining,” data fusion, ITS data for planning, and data warehousing. This work may be helpful for reducing expenditures for data collection and increase confidence in use of secondary source freight data.

This effort should be supported by cooperative funding between the states, the federal government and
organizations of freight providers.

**Using GIS** - Experience with GIS has shown that it can contribute greatly to improving the effectiveness of the travel forecasting process. It can help make the black box of travel forecasting transparent. It can help to demonstrate the relationship between point data (special generators) and the network. It is important for demonstrating and varying the levels of spatial aggregation. Applications of GIS for travel forecasting are still in infancy. Precision geo-coding required is necessary for effectiveness but time consuming.

The research should conduct a technology review and case studies of different actual applications. The review should identify software requirements for various applications and design a means of interfacing with jurisdictional data, and cross platform data exchange. It should also develop guidelines and understanding of the relationship to GIS-T, demonstrate its use, and how to get quick turn around on query and analysis.

**Transferable Parameters** - A review of the potential and experience of “borrowing” travel model parameters from other applications should be conducted. Such a review would demonstrate the cost effectiveness of using existing data for estimating travel forecasting models. The review should critically assess the validity of the commonality of data across state borders. One particular value of such commonality is that it provides a data base for statewide model development. This approach will provide seed data for states just beginning freight modeling.

Identifying this validity would contribute to better cooperation between states and would encourage federal agencies to provide dis-aggregated data for states and sub-state levels. Applying this concept would require uniform data formats.

**WORKSHOP 4**

**Statewide Tool Box** - Research should be conducted to develop a toolbox of statewide transportation planning techniques that could be used to address the different issues various states are facing. The synthesis would not necessarily develop new techniques but would aid planning officials in identifying and matching transportation planning procedures with their states’ problems. The techniques would range from simple trend analysis to complex 4-step statewide modeling. Characteristics that would be used to match problems with techniques would include:

- Data availability
- Scale or size of problem
- Accuracy requirements
- Risk (consequences of poor planning)
- Performance criteria
- Cost effectiveness
The toolbox would identify techniques necessary for strategic policy planning as well as demand forecasting. The project would prepare a topology of statewide techniques and describe the advantages, disadvantages and limitations of each technique. The general structure of the final report would be an expert system that would assist managers in determining what level of planning techniques is best suited for their state.

**Freight Traffic Indicators** - Research should be conducted to compile freight movement production and attraction indices for use in statewide freight transportation studies. In some cases these may be derivable from the Commodity Flow Survey (CFS). In other cases special analyses may be required, particularly on the destination and attraction end of flows. An attempt should be made to obtain these data for other flows not currently included in the CFS. These would include mail flows, municipal and construction waste flows and finer detail on certain crops and minerals and imports. The project should produce reports stating the derived flow productions and attractions.

**Major Changes** - Research should be conducted to identify the major changes that affect goods movement trends and how these will affect future goods movement forecasting at the national and state level. An expert panel should be assembled to identify the major trends expected to produce major changes in goods movement patterns and to recommend how to incorporate consideration of those trends in forecasting procedures at the abstract and operational levels. A process should recommended for tracking these changes over time.

Discussion Notes

**GROUP 1**

The premise for this conference is that statewide travel forecasting is a subset of transportation investment decisions and needs a better analytical foundation for those decisions. Current urban travel forecasting doesn't speak to decisions for smaller urban areas or to rural areas through or within which facilities need to be provided.

To support better decision-making, statewide analyses and statewide travel modeling are needed. Statewide transportation planning should be combined with other statewide functional area planning, such as economic development, recreation or land development.

**MANAGEMENT/ADMINISTRATIVE ISSUES**

Staffing is a significant issue; Should the states staff in-house or engage consultants? The real issue here is qualified, trained staff, which raises, in turn, the problem of training staff and retaining them.

Cooperation among the states is another issue. The Interstate System satisfied many of the functional issues of accessibility, but there remain questions of continuity and connectivity which can be resolved only by communication between states.

**DATA**
Despite a wealth of various kinds of data, not enough is adequate for use in statewide travel forecasting. For example, despite a large amount of employment data, rarely is it adequate for conventional travel forecasting. There are concerns and questions about both availability and format of data needed by one or another travel forecasting model.

Much of the data needed for statewide planning will be similar to that needed for urban transportation planning. These include substitutes for roadside surveys because of the danger and congestion they cause. Statewide population, employment, and vehicle occupancy data are needed. Other data needs are different because of their relative importance for statewide as opposed to urban forecasting.

**FREIGHT**

What analyses of freight movement do the states want to do? The states may use that information for facility planning in response to traffic or capacity problems, especially in heavy truck corridors or for port or airport access. They may also use it as a catalyst for economic development.

There is a lack of good freight data (for both commodity movements and the carriers’ vehicles). There is not a good understanding of the relationship between commodity movement and volume and economic development (and the physical development which accompanies economic development).

There is a tendency among transportation planners who have experience in passenger travel forecasting to attempt to treat freight movement in the same way. They see it as an origin-destination movement of units when, in fact, freight may be consolidated or disaggregated between it’s “origin” and it’s “destination.” Because the sources of commodities and the selection of carrier and route are so price sensitive, the patterns of movement are much less predictable (and may be statistically less stable) than passenger movements. Compared to passenger flows, freight flows also are “lumpy,” which compounds the problem.

A nationwide survey of freight crossing state lines and a simultaneous “port of entry” survey should be conducted to establish a basic interstate flow matrix which the states could use as a start for their analysis of intra-state movements.

There is a reluctance of shippers and carriers to share information, presumably because they fear losing competitive advantage, fear government interference or worry about confidentiality of data in government hands for tax or other reasons.

A better understanding of the relationship between commodity flows and models of the economy is needed. What are the implications of economic projections, from economists and econometricians for first, commodity flows and second, demand for transportation facilities and services which are or might be supplied by the states or regulated by the states?

**GIS**

Informal contacts with several states found that generally they are not using GIS capabilities for analysis or modeling, but primarily for visualization and presentation. Apparently capabilities supplied by
vendors are not as effective for analysis or modeling as other software available for planners. Most GIS software is not designed to efficiently support network analysis. What GIS does do better than other software is facilitate integration of spatial data using location coding as the common linkage. Many planners do not know the potential of GIS software because their only training is from the software vendors. Consequently they do not realize the full potential of GIS software and don't "push" vendors/providers to include capabilities or expand software to its capacity.

There is also poor communication and lack of mutual understanding between planners and engineers on the one hand and GIS users on the other, particularly when they are separated from one another in an organization’s information technology department.

Most of the good applications and uses of GIS in planning and analysis have been developed by the planners rather than by GIS specialists. In combination these factors cause planners to not use GIS to its full potential.

Need: There is a need for training planners and engineers so they can take advantage of GIS strengths and provide better spatial data. The software providers/vendors need to interact with users more so they better understand potential for using GIS for transportation planning and analysis. There also needs to be better coordination with other state and local agencies collecting and using geographic data.

MODEL APPLICATIONS

It seems wrong to try to have one model to meet all needs. It is clear that the needs of Rhode Island are different than those of Texas and California, and there is a range of needs in between. Those different needs are created by varying circumstances, both among and within individual states. There may be entirely different modeling frameworks for analysis of statewide flows than for analysis of corridor truck traffic or the congestion near a major generator. The states have a great deal to learn from each other, but “one size won’t fit all.”

There is a tendency to treat statewide travel demand forecasting as urban modeling and to simply expand what has been done at the urban area level to the state level. Whether this tendency is appropriate or not, there needs to be better understanding of the similarities and differences between urban/regional and statewide travel demand forecasting and of techniques to interface the two where appropriate.

There is a potential problem, which may exist for some applications now, as urban/regional models are integrated with statewide models, where study boundaries and trips are not integrated well resulting in loss of trips (by classifying them as intra-zonal) and failure to reproduce or anticipate congestion.

TECHNICAL PROCESS

Traffic volumes on highway network links common for the MPO and the state procedures should be compared and rationalized.

The effects of land development on transportation facility needs and vice versa need to be incorporated in the forecasting process.
Modal alternatives for both passengers and freight should be considered and evaluated in the planning process.

Travel attributable to trips originating and/or terminating outside the state should be considered along with intra-state travel. Information is needed on the entry and/or exit points for such trips as well as the origin and/or destinations within the state.

The appropriateness of a state’s boundary should be considered as a "cordon" line. Major traffic generators need to be considered in a special way as do weekend and occasional trips. Special treatment of weekend travel should be included when it is significant because of tourism or other recreational activity. Why are we meeting; why are we talking about statewide travel demand forecasting?

Premise: We are talking about statewide travel demand forecasting because a subset of transportation investment decisions needs a better analytical foundation. Current urban area transportation planning doesn't speak to decisions for small urban areas, outside the MPO areas, or to rural areas through or within which facilities need to be provided. To support that decision-making, we need state level analysis and state level modeling.

State level analysis is statewide travel demand forecasting. It should be combined with other statewide functional area planning such as economic development, recreation or land development.

**MANAGEMENT/ADMINISTRATIVE ISSUES**

Staffing is a significant issue; do we try to staff in-house or engage consultants? The real issue is qualified, trained staff, which raises, in turn, the problem of training staff to perform the work and retaining them, once trained.

Cooperation between and among states is an issue. The Interstate System satisfied many of the functional issues of accessibility, but there remain questions of continuity and connectivity which can be resolved only by communication between states.

**DATA**

There is a wealth of data, but not enough is relevant to the needs of statewide travel forecasting; for example, good employment data. There are questions and concerns about both availability and format of existing data.

*Need:* Many data needs are similar to those for urban transportation planning: substitute for roadside surveys because of danger and congestion, population, employment, vehicle occupancy, etc.

Other data needs are different because of their relative importance in and to statewide as opposed to urban analysis.

**FREIGHT**
Why do states do what they do or want to do with analysis of freight movement?

Occasionally for facility planning in response to traffic or capacity problems: heavy truck corridors, port or airport access, for example as a catalyst or incentive for economic development.

PROBLEMS
There is a lack of good freight data (for both commodity movements and the carriers’ vehicles) and there is not a good understanding of the relationship between commodity movement and volume and economic development (and the physical development which accompanies economic development).

There is a tendency among planners with experience in passenger travel analysis to attempt to treat freight movement in the same way: to see it as an origin-destination movement of units when, in fact, freight may be consolidated or disaggregated between it’s “o” and it’s “d.” Because the sources of commodities and the selection of carrier and route are so price sensitive, the patterns of movement are much less predictable (statistically stable?) than passenger movements. Compared to passenger flows, freight flows also are “lumpy,” which compounds the problem.

Recommendation: A nationwide survey of freight crossing state lines; a simultaneous “port of entry” survey to establish a base interstate flow matrix which the states could use as a start for their analysis of intra-state movements.

There is a reluctance of shippers and carriers to share information, presumably because they fear losing competitive advantage, fear government interference or worry about confidentiality of data in government hands for tax or other reasons.

Need: Better understanding of the relationship between commodity flows and models of the economy. What are the implications of economic projections for commodity flows and demand for transportation facilities and services which are or might be supplied by the states or regulated by the states?

GIS
Informal contacts with a number of states show that generally they are not using GIS capabilities for analysis or modeling, but primarily for visualization and presentation. Apparently capabilities of current GIS programs are not as effective for network analysis or forecasting as conventional travel forecasting programs. What GIS seems to do better than planning software is facilitate integration of several types of spatial data using common location coding.

Many planners do not use the full potential of GIS software because their only training is from vendors who only know the conventional applications of their software. The planners don't "push" vendors or providers to include or demonstrate planning capabilities or expand software applications to capacity.

There is poor communication and lack of mutual understanding between planners and engineers, on the one hand, and GIS people on the other, particularly when the latter are in information technology units.
separated from the planners and engineers. Most of the good applications and uses of GIS in planning and analysis have been developed by the planners, rather than the GIS specialists.

In combination, these factors have usually limited planners’ use of GIS to less than its full potential.

Need: Training for travel forecasting personnel to take advantage of GIS strengths for developing better spatial data; interaction between planners/engineers and software providers/vendors so they all better understand potential uses of GIS for transportation planning; better coordination among personnel responsible for geographic data preparation both within and between states.

MODEL APPLICATIONS

It seems unlikely that one model will meet the needs of all states or even needs within a state. The needs of Rhode Island are different than those of Texas and California, and there is a range of needs in between, created by varying circumstances. Also within a state there may be entirely different modeling frameworks for analysis of statewide flows, a corridor’s truck traffic or the congestion near a major generator. States have a great deal to learn from each other, but “one size won’t fit all.”

There is a tendency to treat statewide travel demand forecasting as urban modeling “writ large,” to simply expand what has been done at the urban area level to the state level. Whether this tendency is appropriate or not, there needs to be better understanding of the similarities and differences between urban, regional and statewide travel forecasting and of the need for integrating them.

There is potential for problems, which may exist now, for some applications as urban and regional models are integrated with statewide models. Traffic analysis zones, study area boundaries and trips may not be integrated well, resulting in loss of trips (by classifying them as intra-zonal) and inability to reproduce or forecast congestion.

TECHNICAL PROCESS

Interfacing with MPO models: compare volumes on links common to MPO and statewide models at the points where they interface.

Using land use models: incorporate the impacts of land development on transportation facilities and vice versa.

Provide for alternative modes, for both passenger and freight: consider and evaluate modal alternatives to highways for transporting both passengers and freight.

How to handle trips external to state: consider intra-state travel of trips originating and/or terminating outside the state.
- Obtain entry and/or exit point for such trips as well as the o-d within the state.
- Obtain origin and destination location as well as state entry and/or exit point(s).
- Examine appropriateness of state boundary as
"cordon" line.

Special generators: consider special generators.

Weekend and occasional trips: include weekend travel when significant because of tourism, recreation or other.

GROUP 2

MANAGEMENT/ADMINISTRATIVE ISSUES

Staffing
• Hiring freezes
• Staff named by default
• New Hampshire – 2 of 4 in charge of model
• Massachusetts – staff of 1 for traffic modeling; budget constraints
• Contract out a lot of work – time consuming, can’t run model
• Michigan – 4 people – staff depends on what requirements are (everyone specialized)
• DBase, FoxPro, or some database application
• One person for data, one for modal model, one for GIS
• Separate unit supporting urban models
• Closely coordinated staff in one unit
• Data collection in another section
• MD – consulting team developed – had to train staff
• Retaining talented staff

Cost/benefit – not worth the cost to maintain models for questions asked
• Models don’t handle statewide issues well
• Minnesota has statewide license for TranPlan
• $2 million on data collection – data prohibitive
• Cost issue – depends on what you need the model for; depends on states regulating issues – non-attainments need VMT estimates
• Michigan uses urban and fills in with state
• Can keep cost down with federal data – can’t get current modeling framework to answer questions being asked
• Keeping models from a lot of agencies compatible
• Need a person interested in modeling to maintain models in house
• Data collection not glamorous – won’t put money into it;
• Hard to find and keep staff people
• DOT staff change positions
• Cooperation among adjacent states – trade corridor studies
• Use of CTS, NPTS for north state planning projects
• Michigan – SEMCOG coordinating with Canada
• New Jersey – coordinating with Pennsylvania and New York
• Common referencing of facilitates and data sharing
• Simplified procedures for multi-state corridors
• What are models used for – just traffic forecasts?
• Need to evaluate policy; can’t just extend to trucks and recreational
• Need help from federal government
• Need good network models

FEDERAL REGULATIONS

HPR funds inadequate for some states
• 22 factors to 7 (broader) factors
• Reorganization of offices; resources centers don’t have as much bite don’t know what new roles are
• What do they have to do outside urban areas?
• What does it mean to involve public?
• Air quality standards change; how big will non-attainment areas grow? rural counties, conformity analyses for rural areas
• What do they mean by statewide model?
• Some want/some don’t
• Governor, legislators need to define questions that the state needs to address
• Different sets of issues in different states, need tools to address policy issues, share methodology

DATA ISSUES

• Making better use of data we have
• Survey responses are down
• New Jersey - $1 million HH survey 1986
• NYMTC – $700k
• Traffic counts – HPMS – but done anyway
• New Hampshire - $160k O.D. 29,000 HH
• Transit, vehicle intercept $200k
• Michigan – Supported SEMCOG
• SCAG – 16,000 HH $100 per hour to collect
• CALTRANS
• Oregon – Urban – 15,000 HH 7-9 rural counties
• Minnesota – count program – twelve highways and county roads

FREIGHT DATA

• Indiana – Data free – used all BTS data
• Michigan – Same data sources and truck weight commodity classification
• California – Truck volume by axle class every year; developing a trip table
RESEARCH ISSUES

- Borrowing data from other states
- Density factors from rail
- Trip generation rates in rural areas
- Rural areas – on board survey important since they are so rare
- Portions of freight movement not included in CFS: waste, dead headings, imports – don’t have good grasp on information there
- No data on total amount received at destination – CFS
- Productivity issue related to trip generation, changes in employment

FREIGHT ISSUES

- Private, government as adversary, specific problems
- What is the benefit/cost (value) of analyzing freight?
- Commodity focus – specific interest groups; what an improvement means for movement of grain
- Dollar value of goods moving over system
- Washington study – commodities on rail vs. truck
- Issue of smoothness of pavement
- Barge – truck transfers
- Impact of investment choices
- Where commodities originate and where they are going – through trips
- New Jersey doesn’t really care about commodities – wants to know how many trucks, OD
- Maryland – not doing 24 hour truck weighing, need improvement in vehicle classification
- Enforcement problem
- Indiana – difference in values: 1 ton coal = 1 ton furniture – truck may weight the same but need to know commodity to get truck equivalent
- Service transportation not addressed – vending machines, police cruisers.
- CALTRANS – anything with dual tires = truck in model
- Ports, seaborne commerce, rail mergers, global economy – don’t have tools to analyze effect of these things

INTERMODAL TRANSPORTATION

- Build intermodal task force to discuss freight needs/problems
- Modeling freight flows – absence of intermodal network, how to handle cost of movement over dual mode system – rail haul doesn’t minimize lengths of haul, highway does
- Air freight – not an issue of tonnage – volume – congestion around airports
- Freight data – lack of good data – Reebie or BTS – Reebie too expensive, good data between states, not good data within states
- What actions can USDOT take to lower cost, increase efficiency of freight
- Do not know how to model behavior of shippers/transport companies. (decisions made by a small group of people)
- Freight logistics not transferred to transportation
• Forecasting issue of truck related accidents
• Non-modeling solutions
• How to assign truck traffic to network

GIS – Intermodal Networks
• Models need GIS component
• Useful for different types of analysis; graphic presentation and display useful
• Florida doing good job with GIS – what are other states doing?
• GIS maintenance and updating of data
• Michigan – partnership with OMB – TIGER – used by state agencies
• CALTRANS – used in planning part of department. Labor intensive to develop, help with partnering with local agencies.

• Virginia – enterprise level initiatives for GIS, data warehousing project, integration (GIS talk to warehouse)
• Keep GIS and modeling software separate – let them talk to each other need expertise in both areas
• What is being displayed in GIS – flow, accidents, bridges
• Indiana – Using it for everything
• New Jersey - growth
• Institutional/Enterprise issues (how to implement)

MODEL APPLICATIONS

• Oregon model – economy, land use, multiteried, not quite complete, prototype
• Not realistic to do everything with one model
• Some things are best done at certain level of geography
• Too tightly integrated – nothing works unless everything works
• Need to be independent, but interact with each other
• Michigan model – quick turnaround, but sometimes bad numbers (management expectation unreal, limited resources, have to anticipate management questions) models constantly evolving
• Have to know what you want to use model for;
• limits scope, initial phase of model specification
• Virginia – simplified user interface – Michigan thinks it’s unrealistic doesn’t have to understand model
• Modelers versus users
• Update cycles
• New Jersey – meets 2 times a year
• True models never finished
• A lot tied to census – 3 year typical base year update
• Depends on attainment and non-attainment areas
• Policy sensitive issues
• MPO – State role interaction
• Mode policies, smart growth
• Economic health of state, transportation
• Education on GIS, planning
TECHNICAL PROCESS

Interfacing with MPO models
- Several already doing
- Same answers among competing models
- Recognize differences in needs of application
- When to use statewide and when to use regional
- If moving away from 4-step process and trip purposes are different, may have different models
- Network detail and content different
- Make statewide networks more flexible – intermodal facilities

Base statewide model on regional models
- Smaller states, not larger states
- Extend 4-step process to statewide
- applies more to larger states

Simulation
- Implies greater level of detail
- Traffic operations tool
- Data issues
- Jury still out – certain events might be more amenable to simulation/replicability
- Is TRANSIMS applicable at statewide level?

Use of land use models
- Statewide activity allocation model
- need to promote economic models at county level
- SCAG – tried to adopt Dram Empal – no success
- Oregon model – designed to deal with land use issues
- like growth management, investment impact
- Big data problems – land use and price information hard to get on consistent basis statewide
- Need to think in long terms (timeframe) to collect data, calibrate, and validate
- Research link between transportation and land use at regional level – amount of land use change caused by policy relatively small.
- Policies (large increase in gas tax, preserve farmland) need extremely large changes to impact
- New development – special impact study
- Maryland – 50 mile corridor – effect on land use
- Expert panel – don’t use MPO land use forecast
- Research – use of expert panels

Provide alternative modes for passenger and freight
- Try to model
- High speed rail vs. air
- High value commodity flow – truck versus air
- New modes – mag-lev – existing techniques won’t adequately address – stated preference won’t cut
Service modeling
- Electronic replacement of freight – models miss commercial trips
- Telecommuting impacts
- Rural delivery systems
- Research on better understanding impact of intercity commercial trips
- Freight mode designs, truck versus rail, distribution decisions
- Shipper on advising committee
- HOV & TDM as alternative models (statewide versus urban)
- Commuting modes
- HOV – regional

Integrate demand models with other
- Integrate too much – becomes very complicated loosely integrated
- Air quality must be added on to all models

External trips
- Defining external generators/attractions
- Difficulty in getting data
- Forecasting
- Differences in modeling if trips stop at state border versus extending into neighboring states
- Develop appropriate ways to extend beyond border
- National data versus local data – gaps in data

Special generators
- Casinos, recreation, parks, campgrounds, marinas, airports, major shopping malls, military bases and hospitals
- New data on recreational trip generation
- Attraction rates

Weekend and occasional trips
- Need to include weekend and recreational travel
- More corridor analysis than statewide model
- Weekend – separate data collection effort
- Snowbirds/Sunbirds – how to collect data and forecast growth

GROUP 3

MANAGEMENT/ADMINISTRATIVE ISSUES

- Cooperation and coordination
- Resource needs for statewide models
- Federal education and training
Cooperation and Coordination

State of Practice
• Between states
  - Cross border TAZs
  - Western transportation network – pooled fund research
  - Data sharing
• Inter-regional
  - Modeling steering committee
  - Air quality district modeling
  - Florida – interconnected state, regional and metropolitan models
• Intra-organizational
  - Washington plans bring together all programs (maintenance, operations, capacity) planners don’t do all planning
  - Florida designers must follow modeling methodologies
  - California planning division manager oversees programming of funds for maintenance and operations

Conclusions
• Need documentation of what is taking place (case studies)
• Need information on how to apply good practice
• Need study of what kind of institutional cooperation arrangements are necessary and how to transfer them
  - Example – studies of ITS cooperative arrangements.
• Study model user group techniques that work

Resource Needs for Statewide Models

Issues and State of Practice
• Not well documented
• Too many surveys
• No threshold information on who should do it
• What policy issues drive modeling issues?
• Need to look at multi-year over time
• Is consistency among states needed?

Conclusions
• We don’t know how effective forecasting program are
• Need to evaluate a matrix of resources; not just modelers, but support/input/ review staff as well
• Resource needs to depend on the complexity of models. There’s no ready information about the resources needed to address issues

Federal Education and Training Issues
State of Practice

- Federal short courses
- Identify FHWA & BTS people to call
- Florida teaches twelve courses a year – 1/3 state, 1/3 local and 1/3 consultant
- California has some university extension training

Issues

- Federal courses aimed at DOTs; consultants left out
- Federal training courses cannot compete with private courses
- Could universities develop and maintain ongoing training program?

Conclusions

- Necessary but hard to train when practice is so new
  - Training needs to react to changes.
- All local people need training
  - Decentralize training. Bring to audience.
- Training needs management support.
- Not enough funding for training.

DATA ISSUES

- Inventory data systems – HPMS
- What is the value of data elements?
- Transferability of data
- To what extent does national data meet local needs?
- Reusing data collected by others; surrogate data.
- Are there ways to make federal data more usable?
- Availability of private sector data
- Tradeoff between secondary and primary data.
  - How much primary data necessary?
  - What is the ability to use secondary data?
- Florida – all data collected is to satisfy TMIP to be able to move to activity based models
- All federal data should be collected for use at state level
- Timeliness – how old is too old?
- Using ITS data in planning
- Difficulty in sharing data collection costs between states
  - Multi-state collection needs federal support.
- Data enrichment – over sampling
- Collected data needs to be geocodable

MAJOR TOPICS

Maximizing Secondary Data Use

- National data, surrogate data, other people’s data
• Transferability – meta data
• Archiving data – times series data
• Federal databases that can be used – what is available and what could be available?

Primary Data Collection
• Data enrichment – enhance surveys, greater sample frequency
• Interdependence with model structure and format
• Need minimum data specifications. If collecting urban model data, might as well get statewide model data
• Value of data: inventory and timeliness – what is the amount needed to get the product?

GIS

State of Practice

Increasing use of GIS
• Primarily an interface – visualization
• Problems with transferring changes between GIS and modeling packages. Some software aids this
• Need consistent identifier across all data
• Build model network off GIS database
• Kentucky(?) molding a model out of Oracle database
• Interoperability of software is an issue – standardization
• Linear Reference System
  ∙ LRS – GIS – model
• Starting with a good network
• Data referencing consistency
  ∙ Florida – start with state highway base map
  ∙ MPOs enhance network, network and parcels
  ∙ Needed for land use/transportation linkage
• Training in GIS application – state staff and consultants
  ∙ Florida has automated procedures for passing updates between GIS and model (TranPlan); also teaches GIS; agreement with ESRI to use and loan software for training.

Issues
• Interface of model and GIS
• Building model networks from GIS
• Interoperability of GIS software
• Data referencing consistency
• Training in GIS
• Organization – IS, mapping, planners – coordination and ownership

FREIGHT

• Difficulty getting private shipper data. There is private data available at modest price (Russ Capelle BTS) BTS has some data now and will have more. TIUS database (will be VIUS - vehicle
inventory and use survey); www.bts.gov has papers on using – check Boston area trip table
generation from TIUS

• FRA has truck-rail diversion model commodity flow survey
• Need more talking between planners, engineers, business, geographers; need methods for using the
  existing freight data in modeling
• Modeling truck-car equivalency
• More plausible to model trucks at statewide level – better methodologies at state level; technology
  has helped
• Integrating freight (multimodal) into statewide model or parallel; can run on same platform
• Modelers and planners lack knowledge about freight logistics; sequence of modes and transfers;
  business schools – supply chain management – is a supply chain as opposed to truck trip
• Commodity to vehicle conversion needs development converting freight data (commodity) to what is
  useful in planning
• Appropriate performance measures: tonnage, vehicle volume, value and economic
• Air quality – particulates
• Traffic safety issues
• Increasing amounts of commodities are moving in non-truck vehicles (small trucks, package and
  courier)
• Multimodal freight
  ∙ Rail, air, marine and pipeline
• Develop interactive intermodal model
• Functional classification of facilities for other modes.
• Validation information available
• Study case studies of ports
• Florida: treating intermodal facilities (water ports, airports)
• Land use – Neotraditional development; impacts on freight movement and accessibility

MODEL APPLICATIONS

• Help to decision making
  ∙ Technical justification of decisions
• Modular – can grow, evolve, expand, new applications
• Always interoperation. Manage expectations. Just because answer tomorrow is different than today,
  doesn’t mean wrong
• Need risk assessment; scenario testing. Present ranges, not averages
• Model outputs can be marketed to more parts of organization.
  ∙ Example – economic development department can use data
  ∙ Innovative applications
  ∙ Often organizations that can use outputs
  ∙ Linkage between secondary data providers and the results for the model outputs
• Update cycles and air quality estimates. Danger that statewide models will be pulled into a
  regulatory environment (regional air quality). Potential misuse of models
• Real time analysis capabilities
• Incident inclusion in modeling – non-recurring delay
TECHNICAL PROCESS

Response to Economic Conditions

- Data availability
- How to incorporate an economic model into a transport model
- Oregon – statewide economic activity model; what can be learned and transferred to other states – critical look and evaluation
- Transportation planners tend to look at land use differently than land use planners: “activity” versus “land use”
- Model should include a real economic activity component
- Land use is the shell – economic activity is the flow
- Cost of living differences, effects on travel behavior; how it effects the parameters of the model

Relative Error of Forecasts

- Acceptable ranges of error for different uses of forecasts
- Need to communicate relative error of forecasts
- May need several forecasts with a probability distribution faster computers allow this
- How to deal with uncertain future?

Effects of Taxes and Speed Limits

- How do people choose their routes. A lot of issues beyond simple impedance functions
- Dulles toll road: price sensitivities vary; market segmentation
- Origin of trip assigned to centroid, but actual costs faced by driver vary across zone
- Statewide recreation trips – different route selection criteria
- Responsiveness of models to speed limit policy, communicate back to policy decision makers

Compatibility between travel and air quality models

- Coordinate between travel and emissions forecasts

Zone Structure for Passenger Versus Freight

- More passenger zones than freight (tends to be available on a county or larger level
- Freight tends to travel on fewer links – freight centroid can be more easily located
- Freight centroid can be different than passenger centroid
- Appropriate zone structure for intermodal movements
- One structure related to trip length

Time Series vs. Cross-sectional Analysis

What Level of Statistical Accuracy

Transferability Between States

- Can you transfer across states
ATS and CFS – use as a backdrop for comparing state data
Need to develop transferable parameters for states as in NCHRP 187
Need to analyze national databases for use by all states
Not on a state-by-state basis
Need to model different border states differently
Dependent on culture, weather and topography
Should there be national networks and models?
BTS – Oakridge – International transportation database
Los Alamos – National Transportation Network Analysis Capability
Share assumptions and data

What Network Size and Detail

Oregon – nesting with regional models to get more detail
Many just use state system
States have different state highway systems
Functional classification should be basis, not state highways
Don’t need to model low-volume roads
Need consistency with zone structure; freight and passenger may be different
Compatibility between TIGER/GIS route descriptions and how states describe routes

Include Refinements from Corridor Analysis

Is total state coverage needed, or would analysis of substate corridors be sufficient?
Do corridor studies officially get adopted into statewide models? Documentation is important
Multimodal intercity corridor studies not well accepted practice
How to incorporate into statewide model?
Incorporate and use data from ITS corridor studies
Truck transporters
FHWA borders and corridors study results need to be incorporated into statewide models

GROUP 4

STAFF & STRUCTURE

Staff and funding for statewide planning are limited
Statewide planning techniques are a function of the state structure
Strong central technical staff is more likely to have a technical planning process
Separate modal administrations are likely to have separate planning processes for modes statewide
Model task force forums promote technical processes and are a valuable tool for statewide planning

FEDERAL ROLE

Provide training courses for statewide planning
No technical requirements and no standards
• Facilitate more multi-state corridor studies
• Rural officials will be involved and may impact statewide planning
• Federal government should continue to provide and maintain national databases to assist statewide planning – commodity flow survey, NPTS, ATS

GENERAL COMMENTS

• Statewide planning is input to decision support systems
• Statewide planning is important for evaluating multimodal tradeoff
• First step in statewide planning is to determine what questions you want the planning process to answer
• Tourism is an important issue for some states
• Statewide planning procedures include several types of techniques:
  · Trend analysis
  · State Planning Panels
  · Management Systems
  · HPMS Evaluation Systems
  · Surveys
  · Four-step models
  · Synthetic models
  · Traffic counting programs
• Level of planning on a statewide basis is a state by state decision.