

OREGON MODELING STEERING COMMITTEE
Portland State University Urban Studies Building
506 SW Mill Street , Portland, OR
Thursday, October 9, 2008
1:00 p.m.-4:00 p.m.

MINUTES

ATTENDANCE

Members

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| Bill Upton, Chair | OR Department of Transportation |
| Dave Nordberg, Vice-chair | OR Department of Environmental Quality |
| Rick Wallace | Or Department of Energy |
| Dick Walker | Portland Metro |
| Dennis Yee | Portland Metro |
| Ray Jackson | Mid-Willamette Valley Council of Governments |
| Bud Reiff | Lane Council of Governments |
| Susan Payne | Lane Council of Governments |
| Vickie Guarino | Rogue Valley Council of Governments |
| Dan Moore | Rogue Valley Council of Governments |
| Ali Bonakdar | Corvallis Area Metropolitan Planning Organization |
| Shinwon Kim | Regional Transportation Council |
| Scott Drumm | Port of Portland |
| Derek Jaeger | Port of Portland |
| John Gliebe | Oregon Transportation Research and Education Consortium/Portland State University |

Others

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| Barbara Frasier | OR Department of Transportation |
| Becky Knudson | OR Department of Transportation |
| Brian Gregor | OR Department of Transportation |
| Jeff Stockum | OR Department of Environmental Quality |
| Andy Cotugno | Portland Metro |
| Sonny Condor | Portland Metro |
| Scott Higgins | Portland Metro |
| Cindy Peterson | Portland Metro |
| Ethan Seltzer | Portland State University |
| Miguel Figliozzi | Portland State University |
| Peter Hurley | City of Portland |
| Keith Lawton | Keith Lawton Consulting |
| Michal Wert | MW Consulting |

TRENDS IN MODELING IN OREGON AND BEYOND

Keith Lawton provided an overview of modeling trends in Oregon and elsewhere.

Oregon Practice

The three larger Metropolitan planning organizations (MPOs) in Oregon have dedicated staff and they run similar models. These include Portland Metro in the Portland metropolitan area, Lane Council of Governments (LCOG) in the Eugene-Springfield area, and the Mid-Willamette Valley Council of Governments (MWVCOG) in the Salem-Keizer area. Metro models include land use, trip-based personal travel, freight and static network loading. LCOG and MWVCOG do not have land use models in place.

The smaller MPOs include Bend MPO in Bend, Corvallis Area MPO in Corvallis, and Rogue Valley MPO in the Medford Area. The ODOT Transportation Planning Analysis Unit (TPAU) provides modeling services for these MPOs. TPAU uses an innovative land use allocation model (the Land Use Scenario Developer-LUSDR) and trip-based household travel models with static network loading (Joint Estimation Model in R Code (JEMnR)). The travel model is similar to large MPOs and uses shared data. Generally, Oregon has a more advanced state of the practice and there is no use of “Quick Response” models which is common in other states for small urban areas.

Innovation in Oregon

Oregon is recognized for a variety of innovations in transportation modeling:

- Metro developed the first activity-tour-based model (ABM) in 1997-98 for a pricing project.
- Metro also participated in TRANSIMS, a major research effort for FHWA. This was the first model that combined a detailed ABM with traffic microsimulation at a “meso” level. It included things like queuing and better estimation of speeds.
- The first institutionalized land use model is Metroscope. It was built and is used by Metro in a variety of applications.
- Metro is starting a new Dynamic Activity Simulator for Households (DASH) with help from PSU.
- California is developing a statewide model and Ohio has one that is somewhat developed, but Oregon has been using a statewide model for some time. The second generation of the Oregon Statewide Model (SWIM2) is in final calibration and it will be operational in 2009. It resides at TPAU in ODOT and is based on economic activity. It includes land use, freight, and household travel, has a static network assignment, and it can be coordinated with local models. The Oregon model is not unique, but it is rare and is probably one of the best in the country.

Modeling Concepts

A challenge in modeling is that everything is linked and the pieces affect each other at different time scales. These include:

- Long-term - takes tens of years to realize on the ground to assess how the model performed. This includes things like land use – housing and business locations.
- Medium-term - takes one to five years and looks at issues like acquisition and disposition of vehicles.
- Short-term - responds in days to months and includes things like household travel - quantity, activity location, mode of travel.
- Very short-term - takes seconds to hours and includes issues like choice of routes en travel.

Pricing is a big issue right now. Vehicle acquisition (fuel pricing) and operating costs of owning a car are not modeled well. At a minimum, what is needed is an ABM that deals with how people travel throughout the day and a Dynamic Traffic Assignment (DTA) that addresses speeds. Models that will do DTA are generally not available at the regional or the statewide level. Studies at the national level are underway to address these needs.

Innovations Elsewhere

There is limited use of land use models in the U.S. In most MPOs and states, these models are used at the beginning of transportation planning to provide forecast numbers. Sacramento continues to be a leader for land use modeling. Oregon also uses several land use models to support policy decisions: Metroscope runs quickly and gives credible results; SWIM was used for several statewide policy issues; LUSDR is being used by TPAU for MPOs for least risk analyses for investments.

ABMs are used in many places. San Francisco County found that its MPO model did not provide what it needed and put in place the same model used in Portland. The New York City area went from no models to state-of-the-art. Columbus Ohio also used an ABM. They are complete (estimated, calibrated, reviewed) and in use in Sacramento (SacMet) and in Oregon (SWIM). ABMs are under development in Atlanta, San Francisco (MTC), Montreal, and by the Ohio DOT. Portland Metro is just beginning development of DASH with PSU.

Dynamic Network Models deal with networks where bottlenecks and queues affect everything up and down stream. MPO models do not deal with this but many MPOs operate in areas with lots of congestion and there is no way to know whether congestion should be fixed or not. Microsimulations are used for corridor and subnetwork analyses but more realistic speed simulation is needed.

Micro and meso DTA is under development for MPO-level applications. It is in place for corridor and sub-network applications (Vissim, Paramics, Aimsun). Large-scale DTAs were developed in San Francisco (Dynasmart-P) and in Portland (TRANSIMS). The San Francisco area is about the size of a small MPO and has about 700 zones and 5000 links. Portland worked on research for TRANSIMS for every street in the Portland area. Argonne Labs are now working with TRANSIMS for homeland security issues.

Oregon: Where are We?

Oregon has strongly developed land use models that are used routinely. We have a good understanding of and some experience with ABM but need to continue development. We need a comprehensive strategy for DTA for development and implementation.

Discussion

Bill Upton: Oregon is faced with sustainability issues, including climate change and least cost planning. We know that we need to move our models in another direction from where we are, but where do we need to go?

Keith: To develop policies to address greenhouse gas emissions, Oregon needs to be able to model things like where fuel is coming from, how people change vehicles, how to address electric vehicles, and how to address the price of fuel. It is important to model traffic speeds at the low end when addressing greenhouse gas emissions. We also need the ability to look at how people respond to time. Some areas are doing pricing for parking that allows a person to reserve the time a space will be available in a parking garage. We need to get to a finer level of detail for our models. Dynamic traffic assignments will help. We need to be able to model how people move earlier or later in the day and this requires an activity-based model.

Brian: When we do modeling, we are asked only for the volumes on the links. We need to think about and improve the end of the modeling chain that produces performance measures. It is frustrating not to have the time to do this important piece of work. Least cost planning will be a new initiative and this work will increase the demand for performance measures. We need to look to innovation to be able to have performance measures for how people benefit from different actions and to have a measure that can evaluate alternatives in common terms.

When using SWIM, we started getting into more complex linked models. People did not just ask for volumes, they wanted to know why things were happening. We need to be able to look at data in relation to each other and define the results so that policy- and decision-makers can get a better perspective of the overall system.

Susan: It will be important to have software, graphics, and an expanded GIS system for visualization. Complex models require complex data and we need the appropriate scale and quality of data.

Sonny: Most of my time for Metroscope is spent on post-processing using rich output of the model and converting it into annual housing or transport costs. These support performance measures for scenarios indicative of policy responses that are within control of the Metro Council. When housing and transport costs are put together, it is interesting to see what happens, especially for the low-income levels. Metro has “dashboard” indicators that are reviewed for each scenario but we have a visualization problem.

Dick: It is important to keep models relevant. Questions are getting more complex. How long will this delay last? How far does this queue back up? If we do not improve our models, we cannot answer the questions that are being asked. Metro has many projects and most staff is dedicated to projects. It is good to use models for practical applications but there is no time to do innovation. The work Keith talked about is multidisciplinary and very complex. It is more than a single agency or person – it will require a large team. We must recognize the need to change how we do business to be able to address these issues and establish a funding stream to support the required work.

Keith: Oregon is fortunate to have the Oregon Modeling Steering Committee (OMSC) structure to share knowledge and expertise among ODOT, the MPOs and other agencies. Broad coordination is also important - for example, when surveys are designed, they are designed the same so that data can be used by everyone. The concept of a much larger team is important.

Brian: Oregon is pretty advanced in the state-of-the-practice. Not many MPOs in the country use destination choice in their trip distribution models but Oregon has this for every model in the state. The demand to deal with climate change is pushing us to get something new in place. Just as a new model is developed, there is a need for yet another new model.

Susan: As a small MPO, LCOG does not have time and money to develop models and we rely on Metro for innovations. The smaller MPOs rely on others to look to the future for emerging issues and to develop strategies to respond to these needs.

Andy: There needs to be discussion on vehicles, fuel, type of fuel, and greenhouse gas emissions. How will fleets or auto purchasing characteristics change over time? How will auto operating costs affect where people live? Some say it will be more expensive to drive over time, others say it will be cheaper. How are Federal Highway Administration (FHWA) numbers and new fuel efficiency standards factored in? How do we address the cost of electricity and the degree of penetration of electric cars over time? Has anyone done development work to model these issues?

Keith: There has been a lot of work on the technology of vehicles but almost no work on behaviors and reaction to price. A fixed and common cost per mile that is the same for everyone cannot be assumed. Stated preference surveys can ask people what they would do in different circumstances and long-term panels can ask people how their behavior has changed over time. There is a good sense of what needs to be done but no one is doing it. The OMSC needs to pool information and push the National cooperative Highway Research Program (NCHRP) and the Transportation Research Board (TRB) to undertake the research that is needed.

Brian: We need to make our models modular so that when we have a good model, we can put it to work but continue to do sensitivity testing.

Bud: Do you see a more stochastic approach to modeling that deals with a range of prices that will produce model results and an associated risk? We have no idea what technology will be in the future. We need to bracket our assumptions and bracket the risks associated with making choices.

Keith: If we do not have data, we can still structure a model that makes sense, make assumptions, and make these assumptions clear. Data can be added later. For example, when TPAU was developing a model for Bend, there was no data on hotels. TPAU developed a model, made sensible assumptions and communicated them clearly. This filled the hole for data. Thinking about the data that is needed is important, but waiting until it is obtained is not an option.

Dan: Will there be a time in the future when a planner can run a model without knowing the technical details of the model? TPAU does the modeling for RVCOG but without a modeler in house, there is no one readily available that can address day-to-day questions. Planners know what questions they want to have answered, but they do not know how to run models.

John: It is important to understand theoretically what the model is doing and how to interpret output. It is important to improve the user interface with the model but education and training for model development and application is needed too. PSU is working with the Metroscope model to create a training manual.

Sonny: Metroscope has a one-page instruction sheet on the land use side of modeling and on what to put in and how to use results. It is feasible for someone not familiar with modeling to run the model but it is important that they have the background to be able to critically interpret whether the model is making sense or not.

Brian: Errors can easily be made by those who do not understand the model and its interactions. ODOT has often given the EMME-2 data bank to a consultant, who then changed the links in the network and reran an assignment without going back to the initial distribution. Sacramento has a limited screening model that could be used by planners.

Andy: Metro's experience with the counties in its area is instructive. The counties do not do full model runs and they know what they can and cannot do. If modelers need to be the source of all modeling, then they will be the bottleneck. It is important to find the easy things that others can do and let them do it. They can work with the user interface part as long as they know when they need to come back for help.

Dick: The Metro partnerships require good relationships with those interested in doing their own modeling. Metro provides several days of instruction in its office for potential model users to help them understand how to use the model/results and when they need to ask for help.

Shinwon: A problem at RTC is that staff turnover is very high. It takes a lot of effort to train staff how to operate the models, then they move on, and we need to train their replacement.

Dick: We need ideas on how to generate a continuous funding source for this work. There are many pressing needs for the money at the MPO level. Staff costs, costs related to federal requirements (i.e., transit onboard surveys before and after), etc. are expensive items. Federal grants may be available for some things but this is not a continuous source.

Andy: The fact that FHWA invested in TRANSIMS is a good sign. The fact that modeling is required for much of their work represents a level of awareness that modeling is important. The OMSC needs to talk with policy makers about what can be done and then produce results. Policy people need to understand what questions can be answered and what it will take to get additional answers. They need to understand that they will only get the capability if they spend the money.

OREGON MODELING CENTER

John Gliebe stated that, for the past several months, PSU, ODOT and Metro have been talking about the possibility of establishing an Oregon Modeling Center (OMC). Everyone has too much day-to-day work and a lot of sophisticated work needs to be done. The Governor's Global Warming Commission has placed heavy demands on ODOT staff. Metro and ODOT are talking about DTA and ABM and updating existing models. The idea is that PSU and other Oregon universities can help and there could be a stronger and more permanent partnership.

The idea of the OMC is to establish a partnership whereby the center will take on specific projects and help develop workable solutions. This could include research projects, such as DTA where there is no accepted process, and ABMs that PSU and Metro are working on now together. There needs to be a place where new technologies can be easily shared around the state.

Every agency has staff shortages and it would be great to have students involved in projects. They could work on a project with good supervision to get more work done. This is also good training for future careers in Oregon. There are talented students graduating that do not want to go into modeling but are interested in related fields. There is a range of students interested in the OMC – PhD students, Masters students who need employment through school, and other students who want to go into transportation and do not need funding but just want to be involved.

PSU continues to hire new faculty to bring a multi-disciplinary approach to problems we are trying to address. For example, Miguel is an expert in intercity commercial movements, and PSU has hired transportation economists.

A white paper was prepared to explore the idea of an OMC. It would operate with a small staff and would have a master agreement with permanent research staff and other partners. It will be important to have a manager for the OMC who can focus on building the business and who does not have teaching commitments. The OMC would be located at PSU but would not be part of the University.

Susan: The OMC white paper talks about the Texas Transportation Institute (TTI), which is a branch of the University of Texas. It is heavily supported by TxDOT, they have a large research staff, and many students are involved in projects. TTI does some modeling but they do a lot of traffic engineering and ITS work.

Dennis: It would be good if the OMC grows in the direction of land use modeling and economic forecasting. It would be nice to work with faculty in economic-land use-transportation modeling.

Dan: How will the OTC work with the small MPOs that work with TPAU today? Will this work be transferred to the OTC?

Bill: The OMC will start small with modeling and see how it grows. There will be no changes to the Oregon modeling program in the short-term. In the medium term, TPAU would like to shift a lot of its research and development to the OMC and free staff to work on projects. In the long term, there is discussion about shifting some MPO work to the OMC that can be done by the universities. This will depend on the work and priorities, but the overriding issue will be to continue with the high level of customer service that TPAU provides today. The biggest effort right now is to prepare a mission statement, goals and objectives for the OMC, and to develop a work program. This will include how the OMC will interact with the OMC. It is intended to have a seamless transition of work with the OMC and there will likely be several iterations of the work program before it is completed.

Dave: California recently passed a law that will substantially increase the amount of land use and transportation modeling for greenhouse gas emissions. It is likely this will happen in Oregon in the next Legislative session and the OMC would be useful to help respond to this increased emphasis on modeling.

Susan: Students are relatively inexpensive. Internships would be good so that students get to work directly with an MPO or ODOT and contribute. They would learn the day-to-day and political issues that we all work with.

Dick: An example of how the OMC could work is the DASH model that Metro and PSU are working on together. Metro staff meets with John and his student team monthly. PSU is doing the majority of the work, but Metro and PSU staff regularly talk about the strategic elements of the project. When it is ready to implement, Metro staff will understand the model and its nuances. Practitioners have a lot to offer in development of these tools and working together provides mutual benefit to everyone involved.

John: There are many transportation centers around the country, but the OMC would be unique in its focus as a modeling center.

ADJOURNMENT

The meeting adjourned at 2:30 p.m.

A reception followed the meeting, sponsored by Portland State University.