WINTER 2007

TMIP Connection

The Travel Model Improvement Program Newsletter

The Innovations in Travel Demand Modeling Conference 2006: A Personal View

By Ken Cervenka, North Central Texas Council of Governments; Conference Planning Committee co-chair

The Innovations in Travel Demand Modeling conference attendees.

Perhaps you were one of the 240 people in Austin, Texas, attending the May 21-23, 2006, Transportation Research Board (TRB) modeling conference, which consisted of:

- Two concurrent tutorial workshops on Sunday afternoon ("Innovations in Practice" and "FTA Findings for Meaningful Forecasts")
- Monday morning plenary sessions to set the context for better land use and travel models ("Overview of the Policy Issues" and "Moving Innovative Models into Practice")
- Monday afternoon and Tuesday morning concurrent breakout sessions on land use models, tour/activity models, data and synthetic populations, survey methods, assignment advances, emerging modeling considerations and education/outreach
- A final Tuesday afternoon roundtable discussion by six metropolitan planning organizations (MPOs) on what they did and did not learn from this conference and what needs to happen next

Conference Proceedings will be available in early 2007, so I will not attempt to summarize all the discussions. A comment by Frank Koppelman in the Monday morning opening session provided a particularly insightful reflection on the current state of modeling: "We have learned more about what we don't know; the more you know, the more you know you don't know." A comment by Michael Morris was equally insightful: "One size does not fit all," which recognizes there is not a single modeling approach that will make sense in all situations.

Here are my interpretations of other statements made by conference participants, which I hope will encourage you to read the full Proceedings. While these do not necessarily tell a "coherent story" on the state of the entire modeling profession, perhaps you will find some items that match your own views:

- At the conference there was wide recognition that the scope of real-world issues confronting local, state and national decision makers should be the driving force behind the development of better technical tools. Better models are developed not for the sake of better modeling, but as tools to aid in decision making that includes investment analysis, goods movement planning, operating decisions and policies, the impacts of pricing mechanisms on both revenue generation and behavioral change, environmental/energy impacts and the supply/demand relationships between transportation and land use/economic development.
- The past ten years have seen major advancements in modeling, in which there is a nice closeness between the state-of-the-art and practice among several MPOs. There is a positive push towards the need to understand the true causality of behaviors, rather than simply using surveys to statistically represent observed choices for the generation, scheduling, and location of individual activities.

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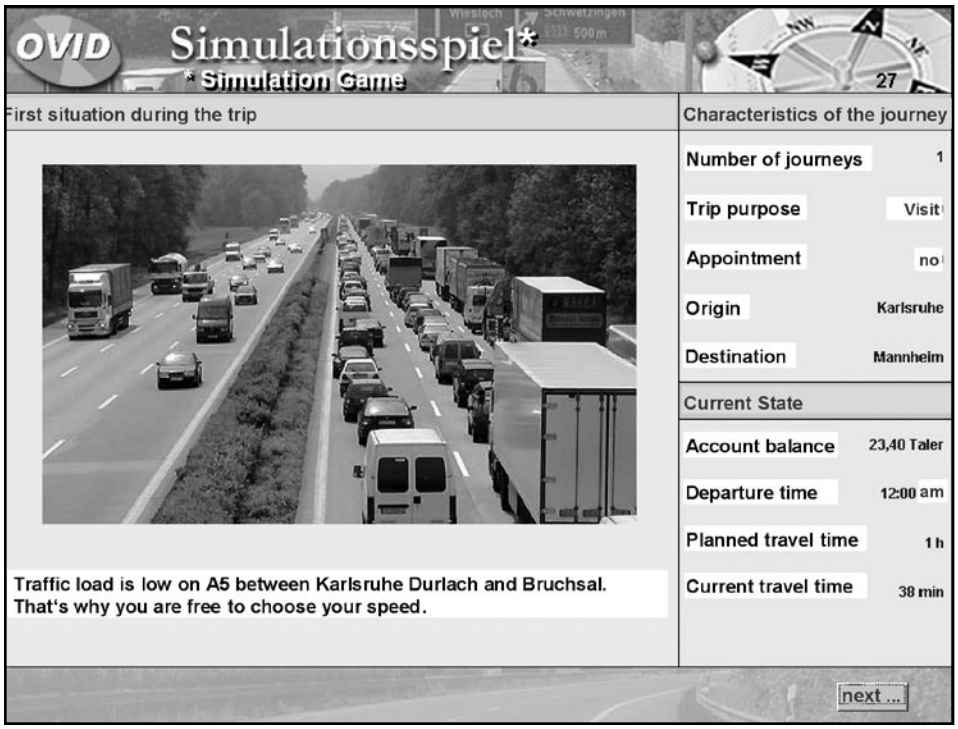
U.S. Department of Transportation
Federal Highway Administration

Simulation Game Explores Travelers Reactions to Transport Information

Stefan Geweke, Karlsruhe University, Germany



The image above shows an example of a screen of the computer-based game.

How do travelers react to information provided by advanced traveler information systems (ATIS)? Do they comply with recommendations or choose a route themselves? Transportation information services must influence travel behavior to control and improve the quality of traffic flow. User reactions are critical to the success of information providers, but we don't know a lot about how ATIS influence traveler behavior.

The Institute for Transport Studies at the University of Karlsruhe carried out an empirical study to survey personal reactions to ATIS and designed a computer-based game to explore stated preferences.

Objective of the Game

The objective of the game is to explore how ATIS influence travelers. Before starting a journey travelers rely on dynamic information services to decide the means of transportation, departure time and route. During the trip similar, information services provide route guidance. For modeling user reactions within the various situations it is important to determine and to quantify the impact of single factors on travel behavior. Hence, the empirical study was designed to answer the following main questions:

1. What is a traveler's past experience with transportation information services?

2. When do people use ATIS, both for planning (pre-trip) and during (on-trip) travel?

3. How do people comply with recommendations?

Right Survey Method for the Problem

According to the German Automobile Association, about one million travelers used ATIS in Germany in 2004. Germany has a population of 82 million and about 550 cars per 1,000 inhabitants. Thus, the majority of drivers have little or no experience with ATIS. It was assumed for the research project that market penetration will grow and the majority of travelers will have access to high-quality traffic information. Hence, if subjects took part in a survey and had to answer questions about ATIS today, they would be confronted with unfamiliar situations. A stated-preferences approach was an adequate survey method in this context, dealing with hypothetical situations.

Conventional stated-preferences surveys, such as paper-based questionnaires, are limited in illustrating complex and unknown situations. A computer-based game should improve on traditional approaches, increasing the ability of respondents to adapt to new situations and helping scientists achieve more differentiated results from the survey. Naturally, such an approach raises new questions with respect to validity.

Empirical Study

Respondents came to the research institute. A conventional questionnaire socio-demographic data as well as data about travel behavior, experiences with ATIS and the personal time cost rate. Then the experiment started. It was implemented as a computer-based simulation game to create a virtual world relating to the region where the study took place. Within this context test subjects made several journeys that were linked to their "revealed" travel. For example, if the respondent was retired, the game did not include a work trip.

Every journey consisted of situations before and during the trip. Furthermore, there was a budget for every journey to buy information, a train ticket or gasoline. The budget was related to the personal time cost rate stated in the questionnaire.

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SIMULATION CONTINUED FROM PAGE 2 ➤

After choosing an answer from the choice of possible reactions, the respondent was directly confronted with the consequences within the next decision situation.

Assuming that people want to maximize their individual utility, the final objective of the game was to arrive punctually, with a short travel time and at a reasonable price. Hence, the choice of one of the presented answers affected the individual budget, travel time or both. Budget and travel time with respect to punctuality influenced a financial account that was calculated and updated after every virtual journey. Finally, the program converted the account into a reward that was given to the respondent for participation after the game was over. Thus, there was an incentive for the respondent to act close to his or her behavior in the real world considering money and time for every decision.

Some Results

For feedback on the game, participants were asked to score their agreement or disagreement with given statements on a scale from one to five, where one was the highest score of agreement. For example, 51% of the test subjects agreed with the statement "I was able to put myself into the described situation of journey context" with a score of "one." In addition, 74% of all test persons agreed with the statement "The sequential situations of the journey were understandable and comprehensible" with a score of "one."

In total, 402 people took part in the survey and went through the simulation game. About 50 participants went through the simulation game twice. As a result, two main indicators of travel behavior were determined: the rates of use and compliance. In general, about 81% of the test subjects used information services before departure time and about 98% during the trip. Furthermore, the average rate of compliance with individual dynamic services was about 84% applying to pre-trip and 73% to on-trip reactions.

The higher on-trip use rate is plausible because travelers are directly confronted with situations on the road that push them to quick reactions. Before starting a trip potential traffic problems will have an effect only in the near future. Hence, the impetus to react pre-trip is lower. The higher rate of compliance in terms of pre-trip reactions could be explained by a greater number of decisions that can be made in a trip planning stage, such as route choice and departure time, as opposed to the fewer possible decisions that are available in the midst of trip making. Based on analysis, rates of use and compliance in terms of ATIS should be quite high if the data access is easy. Although we assume a high market penetration in the future, in reality using ATIS will not be as easy as it was in the survey. Thus, the laboratory setting gives us an upper limit for use. ■

Surface Transportation Environment and Planning Cooperative Research Program

The Surface Transportation Environment and Planning Cooperative Research Program (STEP) is SAFETEA-LU's program to improve understanding of the complex relationship between surface transportation and the environment. STEP's FY 2007 plan includes eight major categories. One of which, Tools to Support Planning and Environment Emphasis Areas, is of particular interest to the travel modeling community. The plan is available at: http://www.fhwa.dot.gov/hep/step/ and was announced on the TMIP email list and linked to the TMIP website: http://tmip.dot.gov. For more information contact Fred Ducca, fred.ducca@dot.gov, or Felicia Young, Felicia.young@dot.gov. ■

H. Sarah Sun Joins TMIP

The TMIP team is delighted to welcome Sarah Sun as our newest staff member. Sarah has recently joined us from the Las Vegas Nevada metropolitan planning organization (MPO), and we very much look forward to her contributions to the program.

A note to the travel model community from Sarah Sun:

I have always believed that planning tools such as travel demand forecasting models play a critical role in transportation planning. Improvement and enhancement to travel demand modeling techniques and methods is a worthwhile endeavor. By improving tools we can go a long way to better identify current and future transportation problems. Thus, I am pleased to be able to contribute to this endeavor by joining the Federal Highway Administration and serving as part of the TMIP team.

TMIP has formed a 5-Year Plan as outlined in the January 2003 TMIP Connection (the newsletter):

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Sharing a regional transportation model between public and private entities – a snapshot of opinions from the modeling community

By Harun Rashid, Senior GIS Planner, Berkeley-Charleston-Dorchester Council of Governments, Charleston, SC

The issues involved in sharing a model were discussed at length among the TMIP email list members recently, following a general question seeking the existence of any standard protocol or agreement being used by metropolitan planning organizations (MPOs). The main concern raised by the question was the risk of non-conforming and often contradictory model results produced by two parties in the absence of any form of agreement or coordination. There were responses from agencies from across the continental U.S., both public and private, with several international inputs.

The opinions presented ranged from not sharing at all to full disclosure of all files required to run a model, including the source codes for scripts/executables. While the question avoided the very notion of whether a set of model files should be shared in the first place, the issue was nevertheless discussed wholeheartedly, with the majority of the opinions supporting sharing. The main benefit to sharing was the opening up of modeling processes and underlying assumptions to a "free" critical review from consultants. This review can trigger both short-term adjustments and long-term major amendments—in the process benefiting all model users by ensuring a stable modeling platform, ensuring the integrity of the modeling process and the credibility of the traffic forecasts. Below are several specific points called out in discussion:

- Ken Cervenka of the North Central Texas Council of Governments (NCTCOG) in Texas opined that since a regionally calibrated model is not expected to produce meaningful traffic volumes for each link in a network, MPOs should always be open to outside evaluations. Responders to this thread, however, strongly recommended that there should be a close working relationship between the parties involved to ensure the integrity of the entire modeling exercise; with results being submitted to the planning agency for review and concurrence before being presented to a policy-making body and/or a public meeting. Not having this relationship can result in a loss of credibility in the modeling process when files are shared and conflicting results are presented; with the majority of responsibilities being the burden of an MPO—which was the main reason cited in responses at the opposite end of the spectrum to not share any model files.

- MPOs in the state of Iowa generally do not share model data outright; instead a team is formed for the specific project with staff from the MPO, the state department of transportation and the consultant. Phil Mescher of Iowa DOT stated that this practice has been easy to implement because of a close relationship between the DOT and MPOs in this state. However, as mentioned by Sam Shea from Linn County Regional Planning Commission in Iowa, this setup can increase the modeler's workload, since the majority of the modeling tasks have to be carried out in the agency.

- Most agencies revealed the lack of any strict, formal procedure in place to share data, with some form of informal agreements with consultants. The bottom line is, according to Guy Rousseau in Atlanta Regional Commission (ARC) in Georgia, when consultants maintain a good working relationship with MPOs, data sharing becomes rather informal where, in the spirit of reciprocity, results are communicated and models exchanged back and forth. While it remains on MPOs to let all the stakeholders know of any major updates, consultants should also check in periodically to be updated. ARC releases formal notices and announcements once a major update becomes ready to implement, via their transportation technical committee, and then makes it available for others, with the following caveat and disclaimer: all consultants/jurisdictions working on projects involving the use of the model should submit to the agency any results and analysis for review and concurrence before presenting them in any format to any other parties.

- Colby Brown of St. Paul Municipal Council in Minnesota described a process to develop an "Open Model Development Framework" implementing the following systems incrementally through a variety of ongoing projects:

  – Formal version of tracking and revision control systems, with designation of stable, development and derivative models

  – A standard metadata format for exchanging basic information about input files such as zone layers and networks, including a built-in license requiring that users share all derivative work with us, and an editing tool allowing others to provide their own metadata

  – A web-based application allowing user community members to query and download the current "stable" versions of model files

  – Partnerships and cooperative agreements with other agencies, such as counties and

DOTs, to assist in implementation and enforcement

- The Research Triangle area in North Carolina has a formal setup called "Triangle Regional Model Protocol" (TRM Protocol) that outlines the basic tasks and responsibilities among the agencies involved (two MPOs and a regional transit authority) for model creation, maintenance, updates and distribution. The basic rule of distribution is twofold—to make sure that any other party is using the most current official version, and that they share any changes/ modifications with proper documentation.
- Virginia DOT uses a form that basically asks the purpose and nature of project for which the model will be used, with an elaborate disclaimer.
- Gainesville, Florida, MPO password-protects the global parameters derived during the validation process.

The discussion then focused on a more detailed definition of "sharing a model," whether it involves only the input files (OD tables, TAZs, network geographies) or if it also includes all the customized scripts and executables in a model. Sonny Conder (Portland METRO) elaborates that most models used in North America are some variant of a 4-step model; of which the first 3 steps (generation, distribution and mode choice) may be open-source or proprietary. But the last step - Network Assignment and all specialized editing and visualization tools and routines to assign OD matrices—are proprietary. So, when all source codes are shared—does it also mean that proprietary network assignment codes are also shared? On this issue, Ken Cervenka provided this opinion: the term "making the model available" generally means making the scripts available that allow full interface with any proprietary software – sometimes the actual code in the scripts, but other times compiled executables of the scripts. Ronald Milam of Fehr & Peers California suggested that to avoid the proprietary issues of model code sharing, all parties involved should use open architecture, which would also be helpful to critically review and validate any modeling process. Continuing discussion on this issue, Chris Van Slyke of Houston-Galveston Area Council (HGAC) in Texas suggested that sharing any source code should be considered on a project-by-project basis. HGAC does provide source codes to consultants, with a written agreement that HGAC retains the right to the source codes, and that all source codes will be returned to HGAC upon the termination or the successful completion of the project.

On a later message, Ken Cervenka raised these issues as to the sharing of every detail of a model with a consultant—down to the source codes (paraphrasing):

- Often model developers write "template" code that is used to convert the commercial off-the-shelf software into a fully integrated model system. Typically these source codes are provided along with other deliverables to the client MPOs, with the original rights retained by the consultant. In this case, does the MPO even have the "right" to distribute this source code to anyone who requests "full access?"
- If and when source code is shared with another consultant, it is more likely that the consultant will provide some "value added" service to their client, hence producing different roadway or transit ridership forecasts. Now, who would be responsible to figure out which version represents the better forecast?

Overall, this was a lively discussion and the question was very well accepted, as many agencies have been struggling with this issue for some time now. With the absence of any formal/concrete structure, the general consensus seems to be to share the modeling files with some form of working relationship between all parties involved, which would ensure a smooth work-flow and produce results accepted by all. ■

H. SARAH SUN CONTINUED FROM PAGE 3 ➤

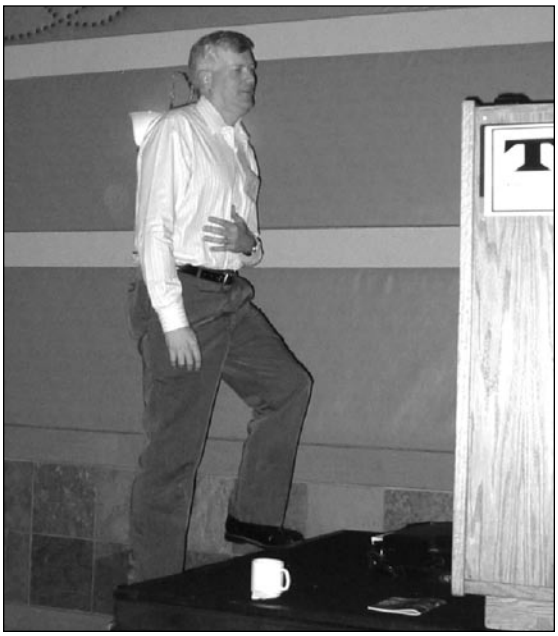
- to help planning agencies build their institutional capacity to perform travel-related technical analysis;
- to develop analytical methods that respond to the needs of planning and environmental decision-making processes; and
- to support mechanisms to ensure the quality of technical analysis used to meet local, state and federal program requirements.

I will continue the ongoing effort to implement the 5-Year Plan following the strategies identified in the newsletter. I will also explore the prospects of:

- Hosting regular seminars conducted on the Web (webinars)
- Working with local travel demand model user groups
- Following up with Peer Review recipients to gain more in-depth understanding of the impacts of Peer Review Panels
- Working with universities to solicit/ sponsor students to do their theses on modeling issues
- Highlighting MPOs' modeling successes and lessons through TMIP media

I am looking forward to the opportunity of working with you. I am here to serve and to promote the TMIP mission: support and empower planning agencies through leadership, innovation and support of planning analysis improvements for the purpose of providing better information to support transportation and planning decisions. You can contact me at sarah.sun@dot.gov or 202-493-0071. ■

Cervenka Honored



At the Transportation Research Board (TRB) Innovations in Travel Demand Modeling conference, Ken Cervenka receives a plaque and the thanks of the TMIP program for his outstanding effort and dedication to the state-of-the-art and the state-of-the-practice of the travel model community. ■

INNOVATIONS CONTINUED FROM PAGE 1 ➤

- In spite of many modeling advances, average modeling practice in the U.S. appears to be well below the state-of-the-art—which raises questions about whether average agencies might be more successful if they focus on better collection/use of data and implementation of tools that will first bring them up to a reasonable state-of-the-practice level. But even this runs into difficulty because many agencies appear to be satisfied with the tools they currently have—and have a general lack of interest in going beyond what is necessary to meet state and federal requirements.

- While the more advanced tools are acknowledged to have a stronger theoretical foundation, it is still not clear if the currently available tools will lead to different forecast results that result in different choices by decision makers. Some speakers claimed that while the current tour-based models are in need of improvements, they are still a whole lot better than the best four-step models; even with their limitations, these newer models "tell us a lot more, inform us of a lot more, and they make us think differently about the way our modeling goes."

- There is a strong desire by practitioners to put more advanced tools through rigorous sensitivity tests and "forecast validation" checks. We should also put our existing four-step models through the same scrutiny.

- Many references questioned the need for truly integrated land use-transport models. While activity models were noted by one person as "not that hard" to implement, their effectiveness will still be limited by the quality of the land use forecasts and the assignment procedures.

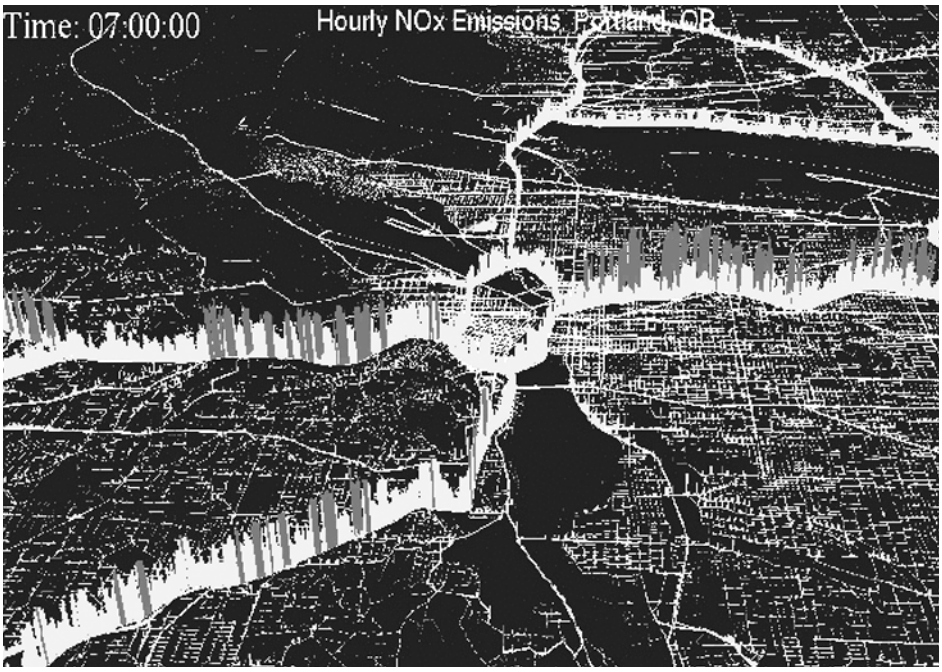
- Better communication is needed between modelers and decision makers—modelers must learn how to present model outputs so they are most useful to decision makers, while also staying as objective as possible. But this is a two-way issue where there needs to be a clear understanding that not everything can be modeled, and priorities must be established for focusing on what is most relevant to the decision-making process.

- There is also a gap between researchers and practitioners, where everyone still seems to be talking but not actually listening to each other's problems—but this seems to be getting better. And many participants noted that this conference is a positive sign of people with different perspectives desiring to interact.

So how does one determine if the conference was a success—does this mean agency practitioners have now gone back to their offices with renewed energy to implement more advanced modeling tools? And what about university researchers and consultant practitioners—have new funding sources been found that allow active pursuit of land use and travel demand modeling advances? My opinion is that the best our profession can hope for is a gradual shift towards better and better land use and transport model implementations, in which the objective interpretations of the model outputs become more and more relevant to the needs of our decision makers. So I look upon the 2006 conference as a successful keep-things-moving-forward step in maintaining open communication channels about who is doing what and what is and isn't working. The number of registrants exceeded original expectations, with a nicely balanced representation of the university researcher, agency practitioner and consultant practitioner communities—and over 95% of those who filled out a Conference Feedback Survey checked either the "very helpful" or "interesting" box for the question, "Overall, how useful was this conference to you?" So my appreciations to the Transportation Research Board (TRB), the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA) and others for sponsoring a conference that allowed an open exchange of ideas by both researchers and practitioners. ■

TRANSIMS Status

By Frederick Ducca and Brian Gardner, FHWA



Transportation Analysis and Simulation System (TRANSIMS)

Transportation Analysis and Simulation System (TRANSIMS) development continues and we are now focusing on applications and further deployment. TRANSIMS activities include continuation of the Portland study, additional applications, software modifications, open source distribution and support, training and solicitations for further TRANSIMS applications.

Portland Application
Due to funding issues, work on the Portland application halted in the summer of 2005 and resumed in April of 2006.

The Portland application of TRANSIMS was designed to be a complete application of tour-based models on the demand side combined with traffic microsimulation to represent network supply. In the process of model development, methods were created to combine tours with destination choice and mode choice procedures. In the process of specifying the model, it became clear that tour destinations on which transit is the primary mode of access need to be handled differently from auto-oriented tours. The current status is:

- The highway simulations, using existing trip tables from the Portland METRO, are complete
- We are completing the GEN 2 model, which includes complete feedback by time of day, for all auto tours
- We are specifying a GEN 3 model which will include both highway and transit tours

Other Applications
There are four TRANSIMS applications either planned or underway. They include:

- Central New Jersey – Congestion Study, Rutgers University
- Buffalo, New York – Feasibility and scoping study of freight congestion at the Canadian border in the Buffalo, New York, area
- Burlington, Vermont – Planning and Congestion Study, RSG Associates
- New Orleans, Louisiana – Simulation of emergency evacuation, Louisiana State University

Software Modifications
Significant modifications have been made to the software during the last year. The Microsimulator, Router and Activity Estimator have been rewritten to run on a single processor and to run in Windows® and Linux® operating systems. In addition we are preparing a series of "How to" manuals to assist users in TRANSIMS installation and application. The first of these, describing installation, has been completed and is available at http://transims-opensource.net.

We have released TRANSIMS under an open source license. As part of the open source release we have engaged Mitretek as a systems integrator. Mitretek's responsibilities will include testing, source code management, documentation management and limited technical support.

Training
We have developed a one-week course on TRANSIMS. A pilot offering was presented in the fall of 2006 and we plan for a second pilot in the spring of 2007. The course uses a data set from Blacksburg, Virginia and works through a small sample problem. Information on the course can be obtained from Brian Gardner at brian.gardner@dot.gov, 202-366-4061

Further Applications
We recently ran a Broad Agency Announcement soliciting new applications of TRANSIMS and provided funding for these applications. Subject to availability of funds we anticipate another solicitation in 2007. Information on the solicitation will be posted on the TMIP Listserv when available. ■

Conferences

86th TRB Annual Meeting
January 21-25, 2007 – Washington, D.C.

11th TRB Transportation Planning Applications Conference
May 6-9, 2007 – Daytona Beach, FL

Training

Activity and Tour Based Forecasting Seminar
January 30, 2007 – San Diego, CA

Travel Model Calibration, Validation and Reasonableness Checking Seminar
January 31, 2007 – San Diego, CA

Forecasting Land Use Activities Seminar
February 1, 2007 – San Diego, CA

Model Citizens Sought

TMIPConnection is seeking subjects for the Model Citizen column. If you are a modeler employed in the public sector working on an interesting problem and you would like to talk about it in the *TMIPConnection*, please send an email describing the work to penelope.weinberger@dot.gov.

Additional offerings may become available; consult the TMIP website http://tmip.fhwa.dot.gov/ for the latest training information.

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tmip@tamu.edu

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