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Report on CMAP's Advanced Model Peer Exchange

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Introduction and Background

On February 11, 2011, CMAP hosted a joint peer exchange on Advanced Modeling for Regional Planning in metropolitan Chicago. This event coincides with the conclusion of model design for two new analysis tools at CMAP. The first tool is a meso-scale Freight System demand model that will provide commodity-based estimates of commercial goods movements within the Chicago region. The second tool is an activity-based highway traffic demand model that responds to pricing and toll strategies currently outlined in our regional plan. These two models are included in [CMAP's Strategic Plan for Advanced Model Development](#) and were selected because they surfaced as policy priorities in the development of Go To 2040.

The exchange was between three teams: 1) The freight consulting team, 2) The pricing consulting team and 3) an independent panel. Each of the consulting teams was comprised of the project manager and his deputy. The panel was comprised of five experts with sufficient professional standing to evaluate the consultant products.

The event was open to the public and ran from 9 a.m. to 3 p.m. including a working lunch. Announcement of the event was made at the previous month's CMAP Board Meeting, on the agency's home page and via the CATMUGⁱ mail list. In total, about 25 people [participated](#) in the event either as presenter, panelist or audience member.

Panelists

Dr. **Hani S. Mahmassani** is the William A. Patterson Distinguished Chair in Transportation at Northwestern University, and Director of the Transportation Center. His research areas include multimodal transportation systems analysis, planning and operations, dynamic network modeling, travel behavior and demand forecasting, and models of logistics and distribution

systems. He has published over 200 referred articles and 120 technical reports. Past editor-in-chief and current associate editor of Transportation Science, Dr. Mahmassani is also the associate editor of Transportation Research C: Emerging Technologies and of IEEE Transactions on Intelligent Transportation Systems. He is emeritus member of TRB committees on travel behavior analysis, telecommunications and travel behavior, and network modeling (for which he is the founding chair). Dr. Mahmassani received his Ph.D. from the Massachusetts Institute of Technology in transportation systems in 1982 and his MS in transportation engineering in 1978 from Purdue University.

Dr. Mark W. Burris is the E.B. Sned I Associate Professor in the Department of Civil Engineering at Texas A&M University, and an Associate Research Engineer at the Texas Transportation Institute. Dr. Burris's main area of interest is traveler behavior in response to pricing, particularly congestion (or value) pricing. He has been, and continues to be, involved in many projects in this area and has published extensively in this area of research. His research has provided a better understanding of traveler behavior in response to pricing strategies and helped to improve our ability to predict this reaction. Prior to joining Texas A&M in August 2001, he was a senior research associate at the Center for Urban Transportation Research (CUTR) in Tampa, Florida. Dr. Burris is a member of the Institute of Transportation Engineers, the Transportation Research Board's (TRB) Congestion Pricing committee and chair of TRB's Transportation Economics committee.

Ms. Maren Outwater, PE, has 26 years of experience in developing data systems and conducting technical analyses for land use, transportation, environmental, and economic systems. She has focused on advanced modeling systems, such as activity-based travel forecasting, integrated land use, travel and emissions modeling, tour-based and supply chain freight forecasting, and integration with dynamic traffic assignment. She is currently a Director of model development activities at the Resource Systems Group and previously was the Director of Data Systems and Analysis at the Puget Sound Regional Council. Ms. Outwater is currently leading a research project on supply chain and tour-based freight forecasting framework for FHWA and activity-based model developments for Fresno County and San Joaquin, Merced, and Stanislaus Counties in California. She directed the development of an integrated land use and activity-based travel forecasting model for the Puget Sound Regional Council (PSRC). She also managed the model design of micro-simulation activity-based model for the Denver Regional Council of Governments (DRCOG) and the development, calibration and validation of the San Francisco Model Development (SFCTA) project. Ms. Outwater is advising on the development of an integrated activity-based and dynamic traffic assignment for Jacksonville as part of the Strategic Highway Research Program (SHRP).

Erik Sabina is the Regional Modeling Manager for the Denver Regional Council of Governments (DRCOG.) He holds engineering degrees from the University of Colorado and the Massachusetts Institute of Technology. He has 25 years public and private sector experience as an engineer, software developer, and travel demand forecaster. Most recently he has led completion of a five-year project to develop an activity-based travel model for the Denver region, which culminated in fall, 2010 with the use of the new model for official transportation plan development for DRCOG. He also is managing a suite of travel surveys of the Colorado Front Range area, including household, cordon, and commercial vehicle surveys, supported by nine funding partners and encompassing four MPO regions that together cover 80% of the state's population.

Eric Pihl began his career with the Atlanta Regional commission where he supported the development and application of regional passenger and freight models to support long-range transportation planning. Later with the Federal Transit Administration he provided technical assistance to local agencies on suitable forecasting methods for major transit investment planning and project development. In his current position with FHWA's Resource Center, Eric provides training and technical assistance related to passenger and freight forecasting and analysis methods for state and local agencies. He has co-instructed a workshop on multimodal freight forecasting methods for the National Highway Institute, and serves on a congestion pricing advisory committee for the Southern California Association of Governments. Eric holds an MS in transportation engineering and a Master of City Planning from Georgia Tech.

Proceedings

Agenda

9:00 - 9:30 a.m. Welcome and Introductions

- Peer Exchange Overview
- CMAP's Strategic Plan for Advanced Model Development
- Opening Salvo

9:30 - 12:30 Project Team Presentations and Discussion

- Advanced Freight Model – Dan Beagan and Monique Urban
- Advanced Pricing Model – Peter Vovsha and Joel Freedman

12:30 - 1:30 Working Lunch

- Special Presentation: FHWA sponsored Freight Modeling Research – Maren Outwater

1:30 – 3:00 Moderated Discussion

Welcome and Introductions

Kermit Wies, CMAP's Deputy Executive Director for Research and Analysis, served as moderator for the Peer Exchange. He began by giving an [overview](#) of the day's objectives,

presenting a summary of CMAP's [advanced modeling work program](#) and then offering the “opening salvo”; intended to provide some basic parameters on the project to help keep the discussants focused.

Advanced Freight Model

The advanced meso-scale freight model is being developed by a team from Cambridge Systematics. The project manager is Daniel Beagan and the deputy project manager is Monique Urban. The Freight team presented a one-hour [overview](#) of their model design and concluded with a functioning [spreadsheet](#) application that demonstrated the computational sequence being developed.

Advanced Pricing Model

The advanced pricing model is being developed by a team from Parsons Brinckerhoff. The project manager is Peter Vovsha and the deputy project manager is Joel Freedman. The Pricing team presented a one-hour [overview](#) of their model design that included statistics derived from Chicago data being used to develop the model and a summary of the programming and IT requirements necessary for implementation.

FHWA Sponsored Freight Modeling Research

Over lunch, Maren Outwater from Resource Systems Group provided a verbal overview of her work to develop a general Freight Forecasting Framework for use in metropolitan planning nationally. In coordination with CMAP's meso-scale Freight model development, RSG is using the CMAP region as a prototype for the Framework definition. Work-to-date includes preparing a thorough literature review in metropolitan freight modeling to help illustrate the deficiencies in current practice and to identify avenues for advancement. The proposed framework offers a new and rich set of dimensions to explain commercial goods decision-making including attributes of firms, supply-chain logistics, tour-based itineraries, freight-based mode choice, and vehicle flow considerations. Very importantly, this project will seek to enumerate and explore the possible sources of freight model input data.

Moderated Discussion

The afternoon proceeded with a [moderated discussion](#) (beginning on slide 8). The moderator was unsuccessful in maintaining the line of questioning as originally planned. The panel, however, thoroughly covered these topics with the questions and comments they had accumulated during the morning presentations.

With regard to Freight Modeling, panel members agreed that current travel model practice typically lacks any explanatory power, but rather is intended to provide plausible background truck volumes to highway traffic assignment procedures. This is insufficient for modern planning applications. The panel agreed that CMAP's 3-tier freight modeling construct was intuitive and tractable. It makes sense to begin with the middle tier, the meso-scale model, because it serves as a partial replacement for the regional truck distribution model currently in use. Of singular importance, however, is the dependence by the meso-model on an econometric-based macro-model that specifies the Chicago region's position in the national and international freight economy. The panel agreed that the practical value of the advanced meso-model depended on quick attention to the required macro-scale products.

With regard to the Pricing Model, panel members were impressed with the comprehensiveness of the proposed model framework; particularly with regard to the effects of value-of-time, value-of-reliability, time-of-day choice, latent demand and toll bias. Concern regarding the limitations of traditional (static) traffic assignment was recognized as one of the most vexing challenges to the otherwise clear superiority of activity-based demand modeling; i.e. current activity-based model applications are not yet able to take advantage of dynamic traffic assignment results at the metropolitan scale. Intensive research on this problem is underway elsewhere and panelists agreed that the hoped-for breakthrough is not far off.

¹ Chicago Area Travel Model User Group. CATMUG hosts monthly meetings at CMAP and maintains an e-mail contact list of about 100 interested professionals.