TRAVEL MODEL IMPROVEMENT PLAN

Executive Summary

Submitted to:

SEMCOG

Southeast Michigan Council of Governments

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PARSONS BRINCKERHOFF

Southeast Michigan Council of Governments
Travel Model Improvement Plan

Executive Summary | July 15, 2012

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ABSTRACT

A vision for the continued evolution of the Regional Travel Model and supporting programs at the Southeast Michigan Council of Governments (SEMCOG) is outlined, along with associated data and staff development priorities. It seeks to build upon the commendable investment in urban modeling and data systems that SEMCOG has made over the past decade. The proposed recommendations are based upon a comprehensive review of SEMCOG's mission, analytical requirements, resources and capabilities, peer review recommendations, and the state of their current modeling and data programs. Five tracks of further development are recommended. Two are focused on meeting the traffic monitoring and travel survey requirements of the agency, and are required regardless of which of the remaining recommendations are embraced. The priorities for model development include the continued evolution of SEMCOG's trip-based modeling system, which will serve the agency while person and commercial activity-based models are implemented. The resulting system will enable SEMCOG to best meet current and anticipated local and federal transportation planning requirements.

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This year the Southeast Michigan Council of Governments (SEMCOG) will complete an ambitious decade-long overhaul of their Regional Travel Model (RTM). Virtually every component of the modeling system has been updated, as have the data used the build and apply the model. Productivity has been increased through the adoption of a GIS-based modeling platform and the development of supporting data systems. Steady increases in capabilities, usability, and sensitivity of the RTM to the unique travel behaviors and patterns in Southeast Michigan have been obtained as a result. Few metropolitan planning organizations (MPOs) have made as much progress in as short a time.

Given those accomplishments one might easily conclude that the RTM is a mature product, capable of being used without further investment for the foreseeable future. Indeed, this is true for a small subset of SEMCOG's analytical needs. Such models were originally mandated by federal planning regulations for long-range transportation planning and the evaluation of major capital projects, such as highways and transit systems. The structure of the models and the data underpinning them dates back to those times, when impacts and performance measures were required only on a regional basis. Many of the issues facing MPOs today were unknown at that time. Continual improvements in data, methods, and our understanding of travel behavior and system performance has also increased at an unprecedented rate during the period that the RTM has evolved.

Metropolitan areas across the country are changing their focus from building new transportation infrastructure to operating and maintaining current assets and systems. The questions posed to modelers and planners are therefore changing as well. In a workshop last fall the SEMCOG staff identified a variety of current and anticipated uses of the RTM, some of which push the envelope of what is currently possible with it. Many of the non-traditional uses involve using the model to study impacts of more localized projects such as operational strategies, highway work zone maintenance, and maintenance of mobility during roadway construction. The benefits of intelligent transportation systems and their ability to substitute for infrastructure investments are hot topics. The ability to examine equity and environmental justice issues are also important emerging requirements, both locally and across the nation. The need for models to evolve to meet these needs has been recognized at the national level as well, with the National Academy of Sciences concluding that current models are unable to meet these emerging needs.

SEMCOG has considered all of these factors in developing their own internal vision of how the RTM should evolve. The team preparing this report has conducted an independent assessment, as have two independent peer review panels convened by the U.S. Department of Transportation at SEMCOG's request. The first panel, in 2004, made 20 recommendations for model improvements that SEMCOG has largely completed. The second panel met in December 2011, and concluded that SEMCOG was both ready and needing to invest in the next generation of data and models.

The recommendations in this report seek to address all of these issues and viewpoints. The investment SEMCOG has made in the RTM positions them well to capitalize on them while carefully moving forward, adding new information and methods as dictated

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by near-term priorities and analytical needs. Several initiatives in data, models, and integration have been identified in order to do so:

- A wide variety of data are used to build and apply travel demand models. These include an inventory of the socioeconomic activities in the region, a digital representation of the region's transportation system, and information on traveler preferences, choices, and values. SEMCOG has developed effective data systems for the first two, and relies heavily on household and transit on-board travel surveys to collect the latter. These surveys have been undertaken in conjunction with the Michigan Department of Transportation (MDOT), a partnership we strong endorse continuing. The next major survey in this program, called MITravelCounts, will likely be conducted in 2015. SEMCOG has already begun coordinating this effort with MDOT and, as in the past, will likely need to collect supplemental samples in Southeast Michigan. Looking further into the future, it is expected that such surveys will give way to passive data collection on travel patterns obtained from cellular devices. This will reduce the costs associated with data collection, eliminate its intrusiveness, and overcome the growing difficulties associated with recruitment.
- An incremental improvement in models can best be achieved through extending the current modeling system with dynamic traffic assignment, an approach that will permit SEMCOG to begin analyzing operational issues across the region, as well as better account for time-of-day movements within and through the region. Such a model will also increase SEMCOG's ability to report performance measures that take into account congestion and accessibility to employment centers. A move towards activity-based travel demand models will likely commence within the next few years, after new travel data from the MITravelCount program becomes available. It is recommended that SEMCOG adapt such a model from other regions rather than developing it "from scratch" locally. This will reduce the cost and risk of implementing such models, which are recommended for both person and commercial vehicle travel. Once implemented and tested selected parts of the activity-based model may be overhauled to better match local data, but such will only be carried out as needed.
- Current and future versions of the RTM should be integrated with the statewide travel model maintained by the MDOT to the extent practical. If sufficient accuracy can be achieved this integration will replace the external travel models currently in the RTM with much better information about the external ends of trips entering, leaving, or passing through the region. It will also substantially reduce the cost and effort required by SEMCOG for maintaining their own external trip model. The statewide model should be able to provide both auto and truck flows to the RTM.

These activities have been organized into five separate tracks, as shown in Figure 1. All five will span the next decade. The tracks are designed to produce important milestone products capable of adding new value to each successive cycle of Long Range Transportation Plan Updates. The timing of some work elements within a given track are flexible, and can be adjusted to match agency priorities and resources.

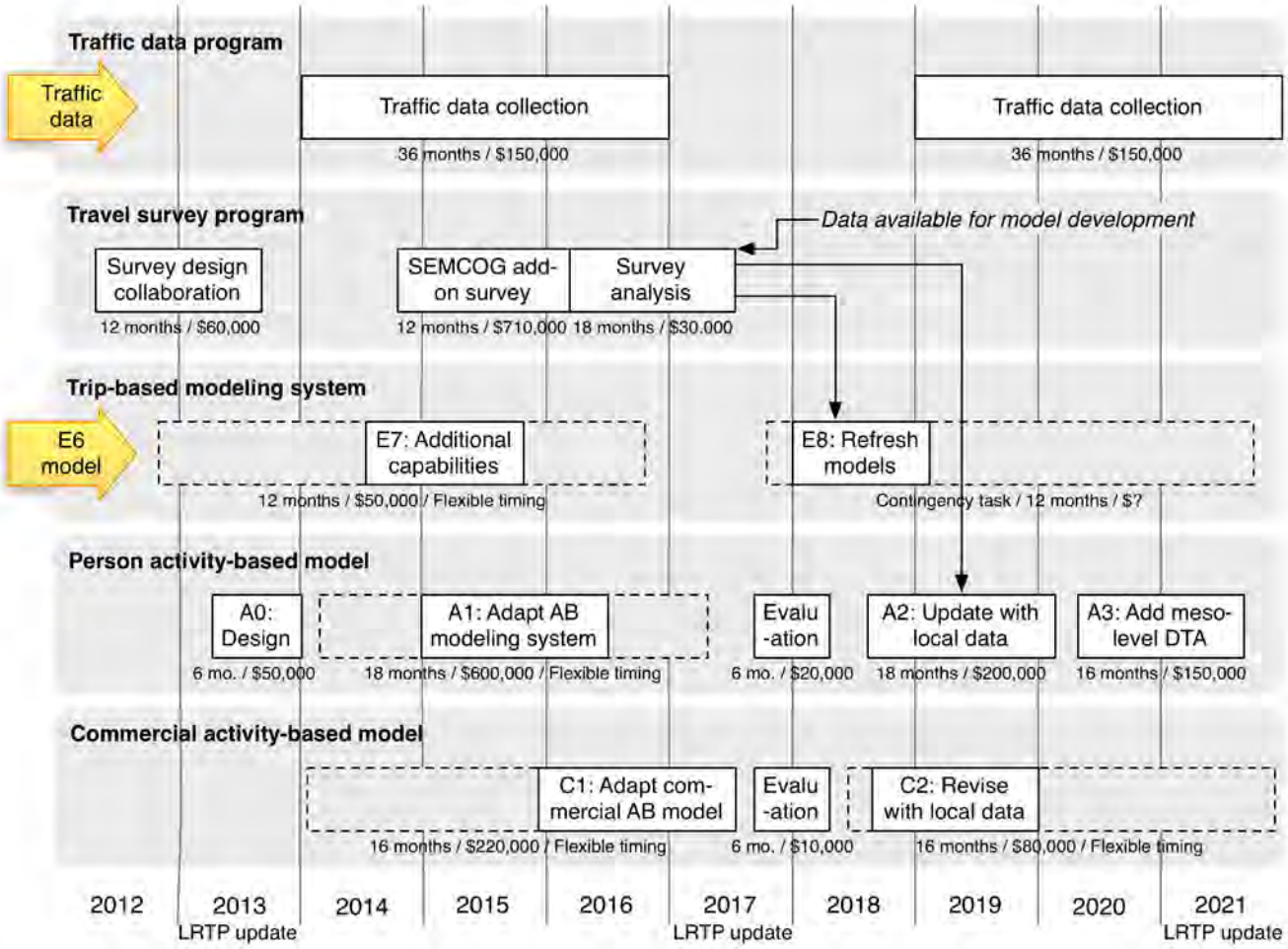

Figure 1: Proposed ten-year model improvement program

The recommendations summarized above are those that are considered essential in light of SEMCOG's mission. Other initiatives, such as conducting commercial establishment and vehicle surveys, are seen as desirable but not as essential as the steps above.

It is estimated that implementing these recommendations will cost between $30,000 and $1.025 million per year, as shown in Figure 2. The costs shown are in 2012 dollars. This is in addition to the cost of normally budgeted funds for application of the model and maintenance of the databases required to operate it. The average cost of $250,000 for each of the next ten years is very close to the average spent per year over the past decade. The tracks were designed to level out annual funding requirements to the extent possible. The exception is the large-scale MITravelCounts survey program, slated for 2015. The recommendations do not reflect additional requirements that may be imposed by reauthorization of the federal transportation bill (e.g., MAP-21) or SEMCOG's Transportation Planning Certification report from FHWA and FTA.

Most metropolitan planning organizations self-fund their travel modeling activities using their allocation of federal planning funds. However, one possible strategy for obtaining

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additional federal funding will be to portray the transfer of the person or commercial activity-based models – or both – as demonstration projects. Federal value would be obtained through the transfer of results and knowledge to the wider profession. Adopting that strategy may dictate moving such work forward so that SEMCOG is one of the first adopters of such technologies. Another possibility is one or more demonstration projects documenting how such models can inform equity analyses under reduced funding, a topic of interest across the nation. SEMCOG may be experiencing this earlier, giving them the opportunity to share knowledge and wisdom with other agencies. All such non-traditional funding sources should be closely investigated.

Finally, it should be noted that staff development has been identified as a priority, and is specifically budgeted for. This in no way suggests a deficiency in current capabilities. Rather, many of the new methods and techniques recommended are quite different than those currently employed. A full return on investment can only be obtained if the SEMCOG staff can creatively and competently apply the new modeling tools. The agency's ability to meet the ever evolving analytical and reporting issues anticipated over the next decade will depend upon current and capable data, models, and people. SEMCOG has clearly had that vision over the past decade, and is broadly commended for it. It provides the necessary momentum to accomplish the equally compelling work described in this report.

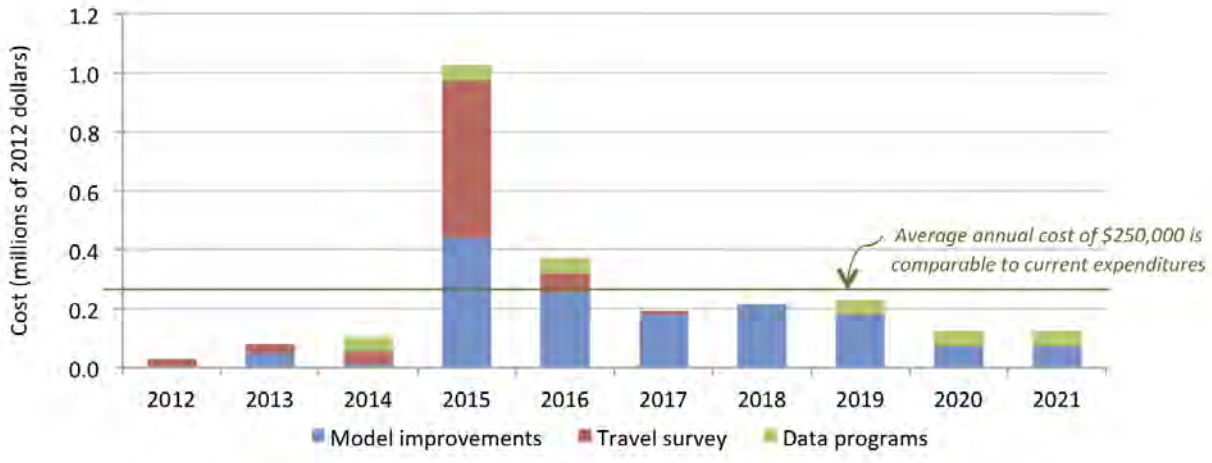

Figure 2: Estimated data and modeling funding requirements by year

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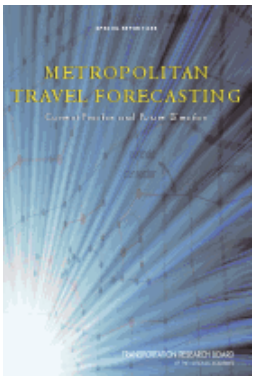
Further Reading

Several readily accessible reports and recorded webinars can provide additional information for interested readers:

TRB Special Report 288: Metropolitan Travel Forecasting: Current Practice and Future Direction



This report provides a high-level, non-technical examination of travel forecasting models that provide public officials with information to inform decisions on major transportation system investments and policies. The report explores what improvements may be needed to the models and how federal, state, and local agencies can achieve them. According to the committee that produced the report, travel forecasting models in current use are not adequate for many of today's necessary planning and regulatory uses. The findings of the surveys of metropolitan planning organizations used to help develop this report are available online.

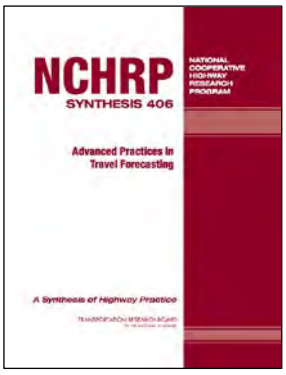
http://onlinepubs.trb.org/onlinepubs/sr/sr288.pdf

Activity-Based Modeling Executive Session 1

The Executive Session is intended to provide directors and non-technical managers with a high-level overview of how models are used in policy analysis and planning, why current models cannot answer certain policy questions, the benefits and limitations of activity-based models, and the time and resources needed to implement an activity-based modeling system. It is a recorded webinar developed by the USDOT's Travel Model Improvement Program, and can be viewed online. This session lasts just over two hours.

http://tmiponline.org/Clearinghouse/Items/20120202_-_Activity-Based_Modeling_Executive_Session_1.aspx

NCHRP Synthesis 406: Advanced Practices in Travel Forecasting



This report evaluates the benefits advanced models might offer, summarizes implementation and institutional issues that may form barriers to change, and distills lessons learned from those agencies that have invested in advanced modeling practices to date. The findings are based on narrative interviews with more than 30 agencies that have pioneered these models, literature reviews, and practical experience gained by leaders in tour and activity-based models, land use models, freight and commercial movement models, statewide models, and dynamic network models. Most of these advanced models have been successfully used to address policy and investment options at urban and statewide levels.

http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_406.pdf