Annual Report 2015

TRANSPORTATION RESEARCH BOARD
JOINT TRAFFIC SIMULATION SUBCOMMITTEE

AHB45 (1)

SimSub

Chairman's Message

SimSub Chair
Dr. George List
NC State University

SimSub members,

It is always exciting to present another SimSub newsletter. My sincere thanks to David Hale for preparing it. I trust your time since last year has been productive. As you can see from the contents that follow, activity in the simulation area continues to be high. We should all take note of language in Section 1430 of the recent surface transportation law: "It is the sense of Congress that the Department should utilize, to the fullest and most economically feasible extent practicable, modeling and simulation technology to analyze highway and public transportation projects authorized by this Act to ensure that these projects (1) will increase transportation capacity and safety, alleviate congestion, and reduce travel time and environmental impacts; and (2) are as cost effective as practicable. This is an outstanding motivation; and a strong endorsement of our efforts. We need to push forward with advancing the frontier so that simulation becomes an even better tool for such purposes. As you are probably aware, an outline of the Transportation System Simulation Manual has been developed and an initial chapter has been prepared. The results of this effort will be presented during the workshop on Sunday afternoon (session 181) and perspectives on where the manual's development should go in the future will be presented. Also, an official TRB task force has been formed to guide the development of the manual. The mission and goals of that task force will also be presented during the Sunday afternoon workshop. On a personal note, this will be my last SimSub meeting serving as chair. It has been my great pleasure to lead the group forward since January 2011 when I took over from Ken Courage. He did a great job. And I endeavored to follow his lead. As we move into the future, Mohammed Hadi has agreed to serve as the new SimSub chair. Please welcome him into that role and offer your support. Much still needs to be done; your energy is needed; and the number of topics that need to be addressed is still great. I want to close by thanking Tomer Toledo, Kaan Ozbay, and Jorge Laval for volunteering to be the selection committee for the awards we offer each year. My sense is that this effort is critical for ensuring that professionals are rewarded for the quality of the work they do in advancing the simulation frontier. In closing, Mohammed and I look forward to your continuing involvement and support; and to seeing you at the annual meeting this coming January and at future SimSub meetings.

Sponsor Committees

AHB45: Traffic Flow Theory
AHB40: Highway Capacity and Quality of Service
AHB20: Freeway Operations
AHB25: Traffic Signal Systems
ADB30: Transportation Network Modeling
AHB55: Work Zone Traffic Control
ADC20: Transportation and Air Quality

Contents

2016 Upcoming Events

Call for Abstracts and Sponsored Sessions

ITE 2016 Annual Meeting and Exhibit - Institute of Transportation Engineers

08/14/2016 - 08/17/2016

Anaheim, CA

Join your peers the ITE 2016 Annual Meeting and Exhibit. The conference is designed to share knowledge, expertise and ideas on multifaceted approaches to addressing transportation issues and to exploring emerging trends in the industry. The meeting content will include sessions in a mix of presentation and training formats focused on state-of-the practice, advancement of the profession, and emerging issues designed to benefit transportation professionals in the public and private sectors. Transportation engineering students are encouraged to attend. Additionally, networking events provide opportunities to connect with one another outside of the classroom.

For the ITE 2016 Annual Meeting and Exhibit in Anaheim, the due date for proposed abstracts and sponsored sessions is expected to fall within August or September 2015. Please visit ite.org for more updates and information.

2016 Upcoming Events

ANT-2016 - Modeling and Simulation in Transportation Sciences

The 7th International Conference on Ambient Systems, Networks and Technologies (ANT-2016)

Track on Modeling and Simulation in Transportation Science

http://cs-conferences.acadiau.ca/ant-16/

Madrid, Spain (23-26 May 2016)

ANT-2016 is a leading international conference for researchers and industry practitioners to share their new ideas, original research results and practical development experiences from all Ambient Systems, Networks and Technologies related areas.

ANT-2016 will be held in conjunction with the International Conference on Sustainable Energy Information Technology [SEIT]).

ANT 2016 will be held in Madrid, Spain (23-26 May 2016).

Transportation Research Institute (IMOB)
Hasselt University
Wetenschapspark 5 bus 6
B-3590 Diepenbeek, Belgium

2016 Upcoming Events

SCOPE

The goal of the ANT-2016 conference is to provide an international forum for scientists, engineers, and managers in academia, industry, and government to address recent research results and to present and discuss their ideas, theories, technologies, systems, tools, applications, work in progress and experiences on all theoretical and practical issues arising in the ambient systems paradigm, infrastructures, models, and technologies that have significant contributions to the advancement of ambient systems theory, practices and their applications. At ANT-2016, there is a dedicated track on Modeling and Simulation in Transportation Sciences (MSTS) organized by the Transportation Research Institute (IMOB), Hasselt University, Belgium. The aim of this track is to bring together communities interested in the computation, knowledge discovery and technology policy aspects of transportation systems. Researchers in the domains of transportation sciences and engineering, computer science, urban and regional planning, civil engineering, geography, geo-informatics and related disciplines can submit papers for presentation and for publication in the conference proceedings. Check-out the website for a detailed overview of the topics of interest!

SUBMISSION AND PROCEEDINGS

All ANT-2016 accepted papers will be printed in the conference proceedings published by Elsevier Science in the open-access Procedia Computer Science. The submitted paper must be formatted according to the guidelines of Procedia Computer Science, MS Word Template, LaTeX, Elsevier. Submitted technical papers must be no longer than 8 pages for full papers and 5 pages for short papers including all figures, tables and references. Authors are requested to submit their papers electronically using the online conference management system in PDF format before the deadline (see Important Dates). The submission processes will be managed by easychair.org. All accepted papers will be scheduled for oral presentations and will be included in the conference proceedings published by Elsevier Science in the open-access Procedia Computer Science series on-line. At least one author of each accepted paper is required to register and attend the conference to present the work.

IMPORTANT DATES

Submission date: 20 January, 2016.
Notification of acceptance: 21 February, 2016.
Camera-ready date: 21 March, 2015.
Conference: 23-26 May, 2016.

REGISTRATION

Please visit: http://cs-conferences.acadiau.ca/ant-16/#registration for more information.

VENUE, ACCOMMODATION & VISA REQUIREMENTS

Please visit: *http://cs-conferences.acadiau.ca/ant-16/#conferenceVenue* for more information.

PROGRAM VICE-CHAIRS

Prof. dr. Davy Janssens | IMOB - UHasselt | Belgium | davy.janssens@uhasselt.be

You may also visit our website (http://cs-conferences.acadiau.ca/ant-16/) for more details.

2016 Upcoming Events

The 7th International Conference on Ambient Systems, Networks and Technologies (ANT-2016)

The 5th International Workshop on Agent-based Mobility, Traffic and Transportation Models, Methodologies and Applications (ABMTRANS'16)

http://cs-conferences.acadiau.ca/ant-16/workshop_approved *http://www.abmtrans.eu/*

in conjunction with ANT-2016 conference | Madrid, Spain (23-26 May 2016)

ABMTRANS 2016 provides an international forum on the latest technologies and research in the field of traffic and transportation modeling using an agent-based approach.

ABMTRANS 2016 will be held in Madrid, Spain (23-26 May 2016) in conjunction with The 7th International Conference on Ambient Systems, Networks and Technologies (ANT-2016).

Transportation Research Institute (IMOB)
Hasselt University
Wetenschapspark 5 bus 6
B-3590 Diepenbeek, Belgium

ELSEVIER

universiteit hasselt imob TRANSPORTATION RESEARCH INSTITUTE

2016 Upcoming Events

SCOPE

This workshop provides a multidisciplinary collaborative forum for researchers and practitioners to submit papers presenting new research results and novel ideas related to the theory or the practice of agent-based traffic and transportation modeling. This workshop also invites researchers to submit their work focusing on the data mining, management and configuration for agent-based traffic and transportation modeling. Check http://www.abmtrans.eu/ for a detailed overview of the topics of interest!

SUBMISSION AND PROCEEDINGS

All papers accepted for workshops will be included in the ANT-2016 proceedings, which will be published by Elsevier. The authors must follow Elsevier guidelines as given in ANT-2016 website (http://cs-conferences.acadiau.ca/ant-16/). The submission processes will be managed by easychair.org. The selective outstanding papers presented at the workshops, after further revision, will be considered for publication in journals special issues. All workshops accepted papers will be printed in the conference proceedings published by Elsevier Science in the open-access Procedia Computer Science series (online). The selective outstanding papers presented at the workshops, after further revision, will be considered for publication in journals special issues at ANT'16.

IMPORTANT DATES

Submission deadline: 20 January, 2016
Notification of acceptance: 21 February, 2016
Camera-ready deadline: 21 March, 2016
Workshop: 23 - 26 May, 2016

REGISTRATION

Please visit: http://cs-conferences.acadiau.ca/ant-16/#registration for more information.

VENUE, ACCOMMODATION & VISA REQUIREMENTS

Please visit: http://cs-conferences.acadiau.ca/ant-16/#conferenceVenue for more information.

WORKSHOP ORGANIZERS

Prof dr. Ansar-Ul-Haque Yasar
Transportation Research Institute (IMOB) | Hasselt University (Belgium)
ansar.yasar@uhasselt.be

dr. ir. Luk Knapen
Transportation Research Institute (IMOB) | Hasselt University (Belgium)
luk.knapen@uhasselt.be

If you have any further questions please contact one of the workshop organizers.

2016 Upcoming Events

5-day training on Adaptive Traffic Control Systems

Hands-on experience with adaptive traffic control systems in a microsimulation environment

2016 Upcoming Events

Save the Date – March 7-11, 2016

PURPOSE

Adaptive Traffic Control Systems (ATCSs) are slowly, but surely, replacing traditional coordinated actuated signal systems. Yet, only few training opportunities about existing ATCSs are available for the general public. Potential ATCS users struggle to find information about several aspects of ATCS deployments - anywhere from selecting the right corridor/network for a successful ATCS installation, through the process of selecting a right technology, to better understanding of the fundamental principles of the existing systems. This comprehensive 5-day training is intended to cover all of these issues and give attendees an opportunity to gain additional knowledge about ATCSs, from an unbiased perspective.

TARGETED AUDIENCE

- Public agency decision makers, traffic operation center's staff, and traffic signal practitioners interested in deployment, selection, and utilization of ATCSs.
- Private consultants interested in prioritization of the corridors for ATCS deployment, selection of the technologies, and ATCS features and capabilities.
- Researchers and scholars interested in ATCS's frameworks and their fundamental concepts.

ABOUT INSTRUCTOR

Source: http://www.wptv.com/news/region-s-palm-beach-county/boca-raton/smart-traffic-signals-aim-to-give-you-green-light-on-pbc-roads

Aleksandar Stevanovic, PhD, PE
Associate Professor - Civil, Environmental & Geomatics Engineering @ FAU. Director - Laboratory for Adaptive Traffic Operations & Management (LATOM).
http://latom.eng.fau.edu/
astevano@fau.edu
Phone: (801) 671-2868

Dr. Stevanovic's is the author of the NCHRP Synthesis on "Adaptive Traffic Control Systems: Domestic and Foreign State of Practice". He has authored numerous journal papers and reports on ATCS and traffic signal systems. He is the member of TRB AHB25 Committee on Traffic Signal Systems and he has presented on the ATCS topics at a dozen of ITE, TRB, ASCE, and ITS conferences and webinars. He has been involved with multiple field evaluations of ATCSs and has had hands-on experiences with multiple ATCSs.

TRAINING CONTENT

DAY 1

- Definition, history, and overview of ATCSs
- Infrastructural and institutional requirements
- Brief description of various commercially available ATCS technologies

DAY 2

- Corridor/network prioritization for successful deployment of ATCS technologies
- Criteria and process for technology selection

DAYS 3-5

- Detailed coverage of fundamental principles of various ATCSs (3-6 major technologies)
- Hands-on exercises on simulated ATCS corridors

Each training day will be closed with a short quiz to test acquired knowledge. Full-description of the training program will follow soon…

REGISTRATION & COSTS

Further details about registration will follow soon. Training capacity is very limited (about 20 trainees) and it will be handled on the first-come-first-served basis. Interested parties are strongly encouraged to reserve their seats by contacting the organizers asap at astevano@fau.edu.

Estimated training fees (per person) vary from $500 for one day to $1,500 for the duration of the entire training. Discounts will be available for the staff of the local (FL) public agencies (~25%) and students of the US universities (~50%). The fees will cover training material, food & refreshments, parking, and certificates of completion.

2015 Recent Events

Workshop: Modern Bottleneck Identification & Practical Mitigation Solutions

FHWA is funding practical research on modernized congestion identification, and cost-effective mitigation strategies that are not dependent on advanced vehicle technology.

BACKGROUND

U.S. traffic congestion is worsening, and the associated economic damages are increasing. States are being asked to manage their transportation problems with minimal funding. When transportation investments are made, it is critical to demonstrate a clear return on those investments, based on methods that are scientific and not anecdotal. Given that a large portion of congestion is caused by bottlenecks, mitigation of bottlenecks is a top priority. New technologies (e.g., real-time data) and ideas (e.g., dynamic lane use) are giving us a new set of possible solutions.

NEW RESEARCH AND PRACTICAL MITIGATION STRATEGIES

This workshop will present a number of new strategies and ideas for congestion identification, diagnosis, and mitigation. Bottleneck intensity and frequency can now be precisely identified, in both space and time, in ways that account for visibility and weather. New software tools can analyze annual trends, and allow states to customize their definition of congestion. Data-driven methods of congestion classification, which determine congestion causalities more accurately, are now being developed.

Regarding the bottleneck mitigation strategies, researchers have developed a comprehensive playbook of solutions for 70 specific bottleneck causes, across seven classification categories. In addition, five of the most promising solutions were selected for detailed micro-simulation studies, and benefit-cost analysis. Further, researchers investigated a newer set of innovative bottleneck treatments, which have not been deployed before.

WHEN & WHERE

Wednesday, May 27th, 2015 | 1:00 PM – 5:00 PM
Florida's Transportation Showcase – i3
Omni Orlando Resort at ChampionsGate
1500 Masters Boulevard
ChampionsGate, FL 33896

To register, visit the event page at http://goo.gl/nFBdSG, or scan the QR code below. Click http://goo.gl/aty0N9 for a detailed agenda.

Note: For those unable to attend the full conference, a one-day registration option is available.

AGENDA

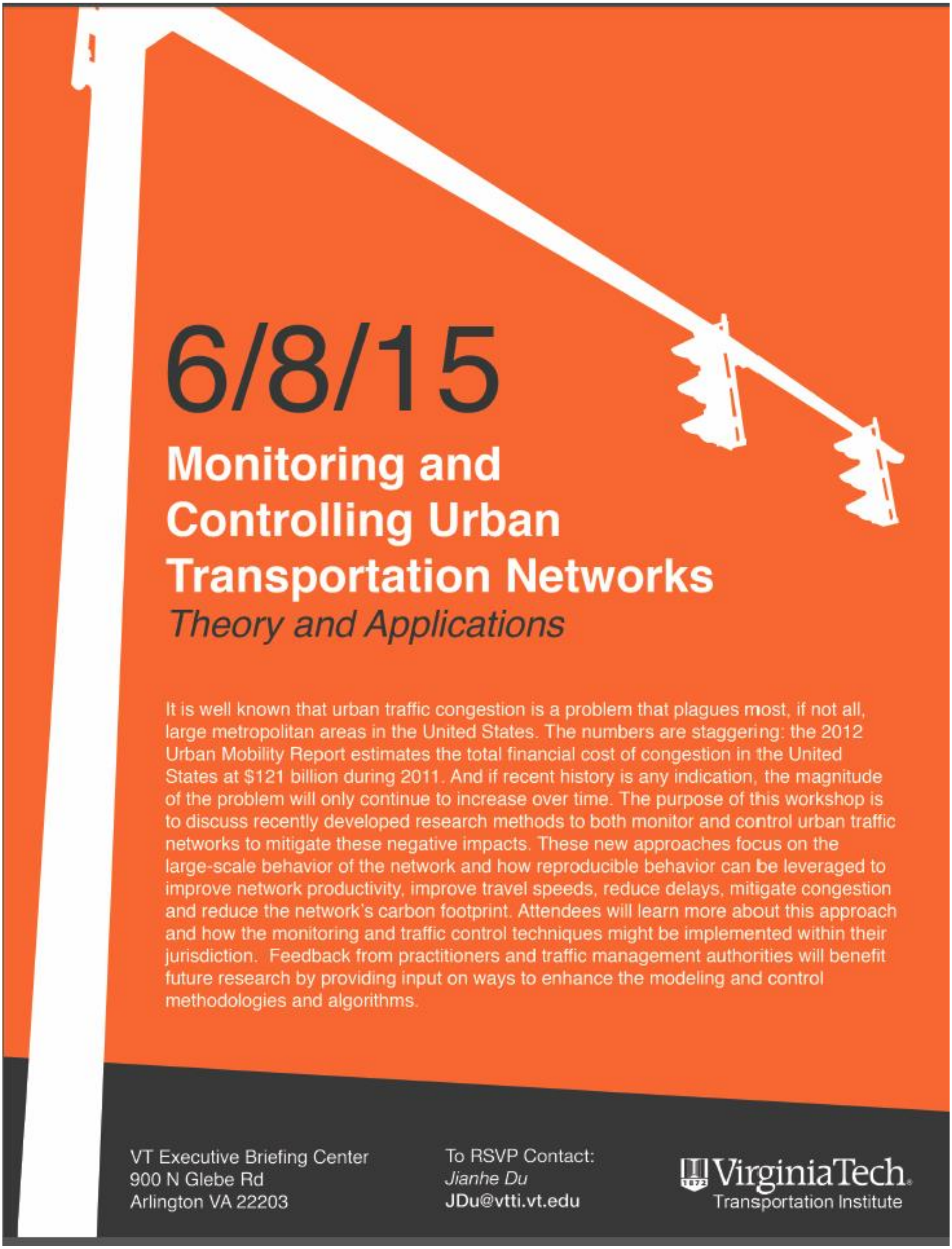
1. Congestion and bottleneck concepts
2. Congestion and bottleneck identification methods
3. Congestion causal pie chart
4. Cost-effective bottleneck mitigation strategies
5. Innovative bottleneck mitigation strategies

EXPECTED OUTCOME

Participants should gain additional knowledge on how to evaluate and improve the performance of their roadways. The modernized causal pie charts may provide new insight into the causes of congestion. Participants will also receive a preview of practical tools, which can provide scientific justification for transportation system investments.

Scan the QR code to register, or visit http://goo.gl/nFBdSG

2015 Recent Events



Workshop Agenda / June 8, 2015

7:30 am – 8:30 am

Registration and continental breakfast

8:30 am – 8:45 am

Welcoming remarks – Dr. Hesham Rakha, Virginia Tech

- Introduction
- Summary of workshop purpose and goals

8:45 am – 9:45 am

Discussion of state of the art in management of urban traffic networks – Dr. Jason Tao, Senior ITS Engineer, Traffic Operations Administration, Washington D.C. DOT

9:45 am – 10:30 am

Presentation and discussion – Dr. Vikash Gayah, Penn State

- Introduction of theory behind MFD/NEF
- Existence, evidence and conditions of MFD/NEF using empirical/simulated data
- Use of MFD/NEF

10:30 am – 10:45 am

Break

10:45 am – 12:00 am

Presentation and discussion – Dr. Hesham Rakha, Virginia Tech

- State of the art research
    - Metering/gating strategies
    - Routing strategies
    - Adaptive traffic signal control
    - Partitioning networks into smaller regions
- Simulation results of these types of strategies

12:00 pm – 1:15 pm

Lunch

1:15 pm – 3:00 pm

Presentation and discussion – Dr. Jianhe Du, Virginia Tech

- Issues with detector-based estimations
- Use of mobile probe vehicles in traffic state estimation

3:00 pm – 4:00 pm

Discussion – Dr. Hesham Rakha, Virginia Tech, Dr. Vikash Gayah, Penn State

- Realistic challenges to implementing large-scale MFD-based traffic control (including real-time estimation of traffic states)
- Remaining challenges in this area

4:00 pm – 5:00 pm

Open discussion and conclusion

- Expectations of using MFD/NEF as a managing tool in real life from participants
- Open discussion on how MFD/NEF can be used to address challenges noted earlier

Monitoring and Controlling Urban Transportation Networks : Theory and Applications

VT Executive Briefing Center . 900 N Glebe Rd . Arlington VA 22203

2015 Recent Events

Jason Tao
(DC Department of Transportation)

Vikash Gayah
(Penn State University)

Jianhe Du
(Virginia Tech Transportation Institute)

Hesham Rahka (far right)
(Virginia Tech Transportation Institute)

2015 Recent Events

2015 Road Safety & Simulation International Conference

http://stc.utk.edu/STCevents/rss2015/index.html

October 6-8, 2015, Orlando, Florida, USA

Co-hosted by University of Central Florida & The University of Tennessee

The University of Central Florida (UCF) and the University of Tennessee, Knoxville (UTK) are pleased to host the 2015 Road Safety & Simulation International Conference.

The RSS series showcases advancements in traffic simulation and driving simulator technologies, introducing new initiatives and concepts that have emerged since the first RSS conference in Rome, Italy in 2007. Under the auspices of the Southeastern Transportation Center, three world-class research centers will support the conference: Center for Advanced Transportation Systems Simulation, and the Institute for Simulation and Training at UCF; and UTK's Center for Transportation Research. These centers conduct sponsored research in driving simulators, traffic simulation, traffic safety, commercial vehicle operations, Intelligent Transportation Systems deployment, and congestion pricing; human factors; and comprehensive transportation safety, including surface modes, rail, and bicycle and pedestrian issues.

The STC is administered through the Center for Transportation Research, part of the College of Engineering at The University of Tennessee.

Deadlines

- Abstracts due: **January 23, 2015**
- Notification of abstract acceptance or rejection: **March 27 2015**
- Full papers due (for accepted abstracts): **May 29, 2015**
- Full paper notification of acceptance or rejection: **July 31, 2015**
- Confirmation from authors to present: **August 28, 2015**
- Conference: **October 6 - 8, 2015**

Sponsorship

RSS 2015 will soon offer companies the opportunity to gain visibility and showcase their products and services during the conference

Southeastern Transportation Center
309 Conference Center Building
Knoxville, Tennessee 37996-4133
865.974.5255

Media contact: Lissa Gay
lissa@utk.edu | 865.974.8760

2015 Recent Events

Summer School in “'Mobility-Management, Traffic-Safety and Simulations (MTS) 2015 ”

The Transportation Research Institute (IMOB) of Hasselt University organizes the second Summer School on 'Mobility-Management, Traffic-Safety and Simulations (MTS) 2015'.

http://www.mts-summerschool.eu

This Summer School will take place at:
Hasselt University, Campus Diepenbeek | Agoralaan Building D | 3590 Diepenbeek from July 13-16

Topics

The School will feature lecturers by renowned researchers in the following topics: Mobility modeling: basic principles and tools. Behavior modeling, activity based models (activity selection, planning, daily schedule generation) Multi-modal trips, modeling cooperation, cooperative scheduling (e.g. carpooling), ontologies, traffic and transportation related models, travel demand prediction models, simulations in practice: what conclusions can be drawn?

Special focus

Agent based modeling (ABM) and simulation for mobility, travel behavior, mobility market, electromobility (including smart grid, etc.) and freight transport, delimiting domain: where can ABM be useful? Models for cooperation, mutual influence, negotiation, computability issues, scalability, ontologies, how to interpret results, what can be expected?

Big data as source for modeling

Big data repositories, annotation, semantic enrichment of big data, data mining and process mining to extract information from big data, crowd sourcing and publicly available data: pitfalls and challenges, using data from different sources: how to align?

2015 Recent Events

Road Safety
Evaluation studies & risk modelling, conflict observation research, driving simulation to study the effect of infrastructural measures on driving behavior, driving simulation to understand underlying mechanisms of dangerous or distracted driving, driving simulation to assess and train driving behavior

Transport applications
Electric vehicles (including smart grid concepts), carpooling (cooperation on trip traveling), multimodality and car-sharing (cooperation on resource usage), markets based on big data related to traffic, business models for EV, multi-modal trips, car-sharing, carpooling, online support systems (ride sharing advisors), traffic load prediction systems, effect of EV characteristics (range anxiety, charging time, limited range) on household travel behavior

Industry Showcasing
In partnership with a young and innovative company ABEONA bvba, the summer school will provide a unique opportunity for interested attendees to experience and work with real life solution and systems. ABEONA bvba will identify key technologies and stakeholders in transportation modeling, big mobility data analytics and road safety. Representatives from exhibiting companies will exhibit their solutions and products and will answer visitors questions and inform them about the latest trends in their domains. Exhibitors will cover the following domains: Driving simulator platforms (small and large) for both research and training purposes, mobility and accessibility mobile applications developers, hands-on experience with state-of-the-art activity based models which simulates personal mobility patterns, transport related agencies and establishments.

Target audience
The School is suited for professional researchers, students, practitioners and companies working in transportation sciences, data mining, agent/activity based modeling, road safety and related topics. Participants interested only in applications and industry trends can attend the related events in the Summer School. Academic participants can get feedback on their work during the graduate symposium sessions. Participants can submit a 1 page (A4) abstract motivating the main research challenge they are addressing and stating the approach being taken. All submitted proposals will be presented in a graduate symposium. Abstracts can be submitted during registration (in the registration form). Please email us at: ansar.yasar@uhasselt.be for more information.

2015 Recent Events

University of Cyprus

Announcement of Summer School in "Advanced Traffic Simulation"

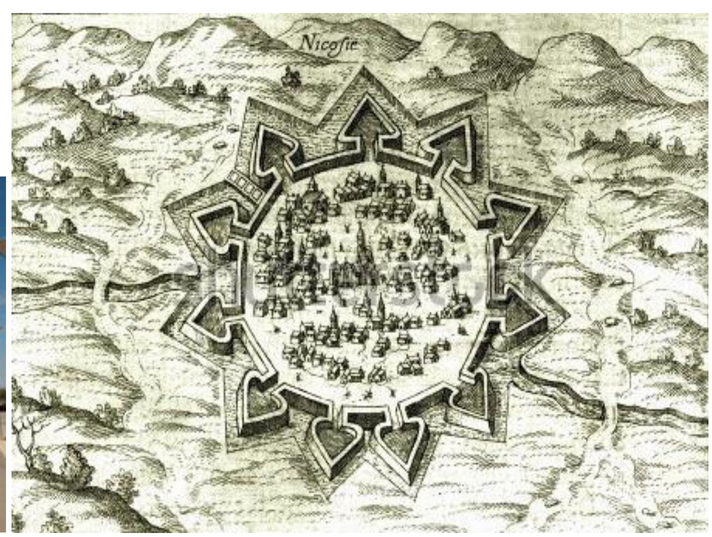
A focused and intensive three day Summer School on Advanced Traffic Simulation will be hosted in the University of Cyprus in ***June 10-12, 2015*** , building on the COST Action TU0903 – MULTITUDE (Methods and tools for supporting the Use, caLibration and validaTIon of Traffic simUlation moDEls - www.multitude-project.eu). The selected and invited lecturers are some of the most experienced academics and researchers in the field across Europe (alphabetically, Constantinos Antoniou-NTUA, Mark Brackstone-TSS, Biagio Ciuffo-EC-JRC, Loukas Dimitriou-UCY, Nikolas Geroliminis-EPFL, Serge Hoogendoorn-TU Delft, Vincenzo Punzo-UniNA). The Summer School is balanced between theoretical coverage and training on advanced traffic simulation methods and models, their systematic calibration and validation, the reliability of predictions made by traffic simulation models, and tools and frameworks for the management of realistic systems. Several case studies will be presented and a team-based, hands-on, practicum will guide attendants through the application of the whole process of uncertainty management in traffic simulation.

The school is targeted at graduate students, engineers, researchers, consultants and government employees who wish to improve their understanding and skills in applying traffic simulation to real-world scenarios. The school will follow a 2-day advanced training program on AIMSUN, offered by TSS.

Info and Deadlines
Maximum number of participants: 40
Registration opens: January 30, 2015
Registration deadline: April 15, 2015
Acceptance confirmation: April 25, 2015
Registration fee: 50 Euros (includes coffee-breaks, lunches and a social dinner)

Applications and more information soon at:
www.multitude-project.eu

For information contact:
lucdimit@ucy.ac.cy
antoniou@central.ntua.gr



Operational Analysis of Two-Lane Highways Depending on the Distribution and Characteristics of their Passing Zones

Ana-Tsui Moreno, Ph.D.
Universitat Politècnica de València

Two-lane highways have a level of interaction between vehicles traveling in the same and in opposing direction that results in unique operational characteristics; mainly because faster vehicles wishing to travel at their desired speed must use the oncoming lane to pass slower vehicles (where a passing lane is not present). Moderate to high traffic demands in the opposing direction can greatly restrict passing opportunities and usually decreases the perceived level of service.

The Spanish geometric design guideline is intended to provide operational efficiency, comfort, safety and convenience for the motorist (Ministerio de Fomento 1999). For passing zones it indicates that the length of roadway with sight distance ahead equal to or greater than the minimum passing sight distance should be as long as practical. The desirable proportion is 40 % of the total length, for each travel direction; and passing zones and no-passing zones should be evenly distributed. The standards indirectly expect to accommodate the design hourly volume.

In order to analyze the level of service, Spanish standards (Ministerio de Fomento 1999) rely on the procedures of the US Highway Capacity Manual (Transportation Research Board 2010). For two-lane highways, the level of service is based on one or more of three performance measures, depending on highway classification: average travel speed (ATS), percent time spent following (PTSF) and percent free flow speed (PFFS). Given the difficulties to measure PTSF in the field, percent followers (PF) could be used as surrogate for PTSF. The HCM recommends to use a 3-second headway threshold to determine the follower condition, since it provided the lowest differences between PTSF and PF (Harwood et al. 1999).

The HCM procedure estimates traffic performance for the base scenario (passing is allowed along the whole segment) and adjusts for the effect of passing restrictions through adjustment factors to the performance measures. These adjustments are based in large part simulation results from the microsimulation program TWOPAS (Harwood et al. 1999; Harwood et al. 2003). Field data were collected in the 1990s and were used to calibrate TWOPAS results on ATS and PTSF, although passing behavior was not updated (Harwood et al. 1999). Moreover, no indications on the precision of the adjustment or how passing zones were distributed were given (Luttinen 2001).

The differences in road environment (more limited passing sight distance), driving behavior (likely more aggressive) and vehicles' performance (smaller cars and heavy vehicles) may be enough to indicate that the HCM procedure is not completely suitable for application to Spanish conditions. Besides, current passing zone design criteria do not consider how traffic operations would be affected and which could be the optimal passing zone length.

Consequently, there is a need to document current passing behavior in Spain and relate it to traffic performance (ATS and PTSF). Unfortunately, field measurements can be expensive and most importantly, they rarely provide sufficient repeatability for the full range of traffic demands; so the conclusions may only be applicable to the observed conditions. Therefore, traffic microsimulation must be considered. Among the possible microsimulation programs, TWOPAS was selected for the simulation, as it was the only program available at the time of the research that had previously been calibrated to two-lane highway passing field data.

2015 Research Results

CONCLUSIONS

Directional split has a profound effect on traffic performance. Therefore, directional analysis is preferred.

The distributions of percent followers (PF) and PTSF are very different in shape and value; considering all the traffic and geometric scenarios. The average PF was 40 %, compared to PTSF's 73 %. The maximum values were also very different: 84 and 100 %, respectively. The distribution of PF4 was closer to PTSF but had lower sensitivity to directional traffic volume.

Following behavior and speed distributions were similar in Spain and the US, for the same observation conditions (low directional traffic flow rate and balanced traffic flows).

The best functional forms for ATS and PTSF on the base scenario (no passing restrictions) are the same as in the HCM 2010. However, the influence of opposing traffic volume on PTSF is modelled instead of relying on interpolation of the coefficients a, b.

Passing restrictions do not affect traffic operations when directional split is lower than 30/70 or directional traffic volume is higher than 800 veh/h (for balanced flows). For those traffic conditions, passing zones are no longer effective.

The influence of percentage of no-passing zones is maximum for directional traffic volumes between 300 and 500 veh/h. This range also maximizes the number of passing maneuvers.

Four groups of PZL were identified: very short passing zones (250 m); short passing zones (500 and 714 m); medium passing zones (1,000; 1,250; 1,670 m); and long passing zones (2,500; 5,000 m). Very short passing zones did not contribute to operational efficiency of the segment. Medium passing zones had little reduction on the operational efficiency of the highway, only decreasing ATS 2 km/h and increasing PTSF 5%. Long passing zones have the operational results, which were stabilized from passing zone lengths of 2,500 m. The number of passes increased almost linearly as the passing zone length increased.

Even distributions of passing zones are more efficient than uneven distributions, even though some uneven distributions produce more passing maneuvers.

HCM 2010 procedure could be applied to evaluate, without many errors, ATS on directional splits over 60/40 and passing zones longer than 1,250 m; and PTSF in balanced traffic flows and passing zones longer than 1,670 m. For different conditions, adjustments should be applied.

RECOMMENDATIONS

The use of the HCM methodology on Spanish two-lane highways is not recommended, despite the good estimates of the Spanish models to previous U.S. field studies; for the same observation conditions. Local adjustment factors should be considered instead.

The three second headway recommendation of the HCM could be used to determine followers and calculate PF as surrogate measure for PTSF, even though they are not completely related. Further study is needed to determine the exact headway criterion, which is between 3 and 4 seconds.

Passing zones should be evenly distributed along the segment to improve traffic operations. The ideal passing zone length is between 1,000 and 1,670 m; as it balances traffic performance and passing rate. Shorter passing zones would increase considerably PTSF and decrease ATS; while longer passing zones would increase the number of passes (and therefore risk exposure) without much operational improvement.

ATS and PTSF can be calculated using Equation 1 and Equation 2, respectively. It is simpler than the current HCM procedure.

$$ATS = ATS_{base} + ATS_{npz} + ATS_{pzl} \quad (1)$$

$$ATS_{base} = FFS - 0.01504 \cdot V_d - 0.0064 \cdot V_o - 0.0522 \cdot HV_d \quad (1b)$$

$$ATS_{npz} = -2.06 - 0.0166 \cdot V_d - 0.064 \cdot P_{npz} + 0.027 \cdot HV_d + 2.92 \cdot 10^{-5} \cdot V_d{}^2 - 1.45 \cdot 10^{-8} \cdot V_d{}^3 + 5.43 \cdot 10^{-5} \cdot P_{npz} \cdot V_O \quad (1c)$$

$$PTSF = PTSF_{base} + PTSF_{npz} + PTSF_{pzl} \quad (2)$$

$$PTSF_{base} = 100 \cdot (1 - exp(a \cdot V_d{}^b) \quad (2b)$$

$$a = -2.12 \cdot 10^{-3} - 3.48 \cdot 10^{-5} \cdot V_o + 6.15 \cdot 10^{-4} \cdot ln(V_o) \quad (2c)$$

$$b = 1.33 - 2.23 \cdot 10^{-5} \cdot V_o - 0.1 \cdot ln(V_o) \quad (2d)$$

$$PTSF_{npz} = \frac{-26.86 + 0.122 \cdot V_d + 0.573 \cdot P_{npz} - 0.025 \cdot V_O}{1 + exp(0.0025 \cdot V_d - 0.0106 \cdot P_{npz} + 0.0037 \cdot V_o)} \quad (2e)$$

Where:

- *ATS*: average travel speed (km/h).
- ATS_{base}: average travel speed in base conditions (km/h).
- ATS_{npz}: adjustment factor of percentage of no-passing zones for average travel speed (km/h).
- *FFS*: free-flow speed (km/h). In this case, it was equal to 89.5 km/h.
- V_d: directional traffic flow rate (veh/h).
- V_o: opposing traffic flow rate (veh/h).
- HV_d: percentage of trucks (%).
- P_{npz}: percentage of no-passing zones (%).
- *PTSF*: percent time spent following (%)
- $PTSF_{base}$: percent time spent following in base conditions (%)
- $PTSF_{npz}$: adjustment factor of percentage of no-passing zones for percent time spent following (%).
- ATS_{pzl} is the adjustment factor of average passing zone length for average travel speed (km/h) (Table).
- $PTSF_{pzl}$ is the adjustment factor of average passing zone length for percent time spent following (%) (Table).

The results could be applied on both geometric design criteria and operational analysis procedures. On one hand, operational contribution of passing zones was analyzed and criteria to include passing zones during design phase considering their operational impact were developed. On the other hand, a global model to estimate traffic performance was calibrated and could be used on Spanish two-lane highways. Besides, the global model to estimate the number of passes could be used on safety analyses of passing zones as indicator of exposure. Finally, TWOPAS was adapted to the Spanish conditions and could be utilized on further operational studies in Spain or calibration of other programs. In fact, the models of TWOPAS are being currently compared to field data from Germany, in order to validate the results in different conditions.

The conclusions are limited to the observed and simulated conditions. Therefore, they can be applied to highways in Spain with speed limit of 100 km/h, low sinuosity and level terrain. Uneven distribution of passing zones should be studied in detail by using traffic microsimulation. Moreover, adverse weather and deteriorated pavement were not considered on the analysis.

2015 Research Results

by M. Scott Shea (University of Utah), and Kevin Croshaw (Horrocks Engineers)

Operational Performance Assessment of innovative High Speed Urban Arterial Intersections – A Case Study in Salt Lake City, UT

Intersections are being pushed to capacity as urban development expands and standard improvements cannot improve capacity indefinitely. Traffic engineers look for innovative solutions to increase intersection capacity. Identifying a "one-size-fits-all" solution to address all intersection types is unlikely; adequate assessment of intersections requires an individualistic approach. State department of transportation (DOT) agencies have additional constraints in identifying a preferred alternative, including: operations, right-of-way (ROW), funding, and construction management of traffic (MOT). This research develops a comparative technique for selecting a preferred alternative for intersection improvements. Arriving at a preferred alternative is best displayed through a case study. Bangerter Highway (SR-154) and Redwood Road (SR-68) intersect in Salt Lake City, UT as an at-grade multilane intersection. Bangerter Highway is an urban belt route with heavy AM eastbound and PM westbound traffic. Redwood Road is a major north and south arterial. Roadway volumes are near capacity and the 2040 outlook indicates a failing level-of-service (LOS). For this case study, there were four alternatives analyzed: 1) standard intersection improvements, 2) a continuous flow intersection (CFI), 3) a single point urban interchange (SPUI), and 4) a diverging diamond interchange (DDI). An intersection rating is provided to minimize cost, ROW impact, and meet LOS criteria. VISSIM was used for modeling.

RESULTS

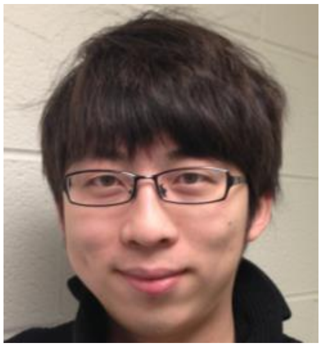
The DDI and SPUI options both provide a reliable alternative meeting delay, queuing, and capacity analysis. Consideration for ROW acquisition, construction costs, safety, and user expectation is required to determine a preferred alternative. The SPUI provides better consideration and safety to pedestrians and bicyclists, as well as providing a better driver expectancy in maneuvering through the intersection. The SPUI alternative provides the best rating while meeting all design requirements.

Constructing a grade-separated SPUI intersection improves the 2040 vehicle delay to LOS B. The design SPUI provided dual left turn lanes, however, triple left turns would provide greater capacity and improved LOS if built immediately or in the future. The reduction in delay from the future no build to the SPUI interchange is approximately 49.1 seconds per vehicle. Using a value of time (calculated as the average wage in the state per UDOT research and development team) as $21.00/hr., the SPUI interchange results in 8,100 vehicles saving 49.1 seconds during the peak period. The calculated average savings will be $2,320 per peak period and when using a 250 workday year, a yearly savings of $1,160,000. Project costs will be saved over the life of the improvements as the 2040 lifespan of the SPUI saves $34.8million during peak periods alone. The calculated total value for this project is $44.5million as assessed by UDOT. This project analyzed movement and intersection delay (LOS), queue length, and capacity (V/C) for each alternative, and determined a SPUI as the preferred alternative.

2015 Research Results

by Jiaqi Ma (Leidos Inc.), Xuesong Zhou (Arizona State University), Jeffrey Taylor (University of Utah), and Fang Zhou (Mississippi State University)

Providing Personalized System Optimum Traveler Information: Agent-based Simulation and Optimization



Jiaqi Ma, Ph.D.
Leidos, Inc.

The advancement of information and communication technology allows the use of more sophisticated information provision strategies for real-time traffic management in a congested network. This paper proposed a Personalized System Optimum Traveler Information (PSOI) system under ubiquitous communication, which allows traffic system operators to fully optimize and coordinate individuals' trip plans according to the personal value of time, allowable budgets for congestion tolling, and willingness to taking detours.

The key concept of PSOI strategy includes three key attributes - "Personalization", "Predictability", and "System Optimum (SO)", and the study developed an efficient queue-based evaluation and solution heuristic algorithm using DTA simulation models (DTALite) to solve for near optimal PSOI strategies. The simulation optimization algorithm can account for different information users and provide predicative information that robustly accounts for potential decisions of other travelers in real-time. The comparison between this approach and traditional studies is shown in Table 1. The flow chart of the algorithm is demonstrated in Figure 1. Interested readers can refer to the references [1][2] for more detailed discussions.

Several numerical experiments were performed, including a real-world subarea network of Salt Lake City, Utah, which includes 149 nodes, 387 links, and 41 OD zones. There are a total of 12638 trips/agents for a 2-hour typical evening peak hour period (3PM-5PM). Each iteration of simulation run took about 4.3 seconds of CPU time on a personal PC, which was fast for a network of this size.

Table 1 Comparison of Models from Different Key Aspects for Proposed Approach

	Traditional Studies	Our Approach
Agent/Flow	Traditional flow-based approach tracks vehicle flow using origins, destinations and departure time. However, due to factors like traffic congestion, vehicles in the same flow may reach different locations at the same time. Flow-based models are not able to describe these attributes.	Agent-based models can track the locations of each vehicle (e.g.,) and separately consider their characteristics in the modeling in a more targeted way; real-time probe data can be incorporated easily into such models, such as GPS locations.
Predictive Optimization with Mixed Users	Traditional studies consider either one single user class or multiple user classes; these classes are usually modeled together and collective effects are evaluated through simulation.	The algorithm for simulation optimization is able to account for different users (habitual users, pre-trip, en-route, VMS), and provide optimized information. This also requires the algorithm to be predicative, to robustly account for potential decisions of other travelers in real-time.
Computational Challenge (large network and real time deployment)	Many traditional studies (esp. optimization-based) use complex algorithms and cannot be applied in real-time for large problems.	The proposed algorithm uses queue-based flow relationships and analytical results of system-optimal models. Our algorithm has proven efficient with large networks.

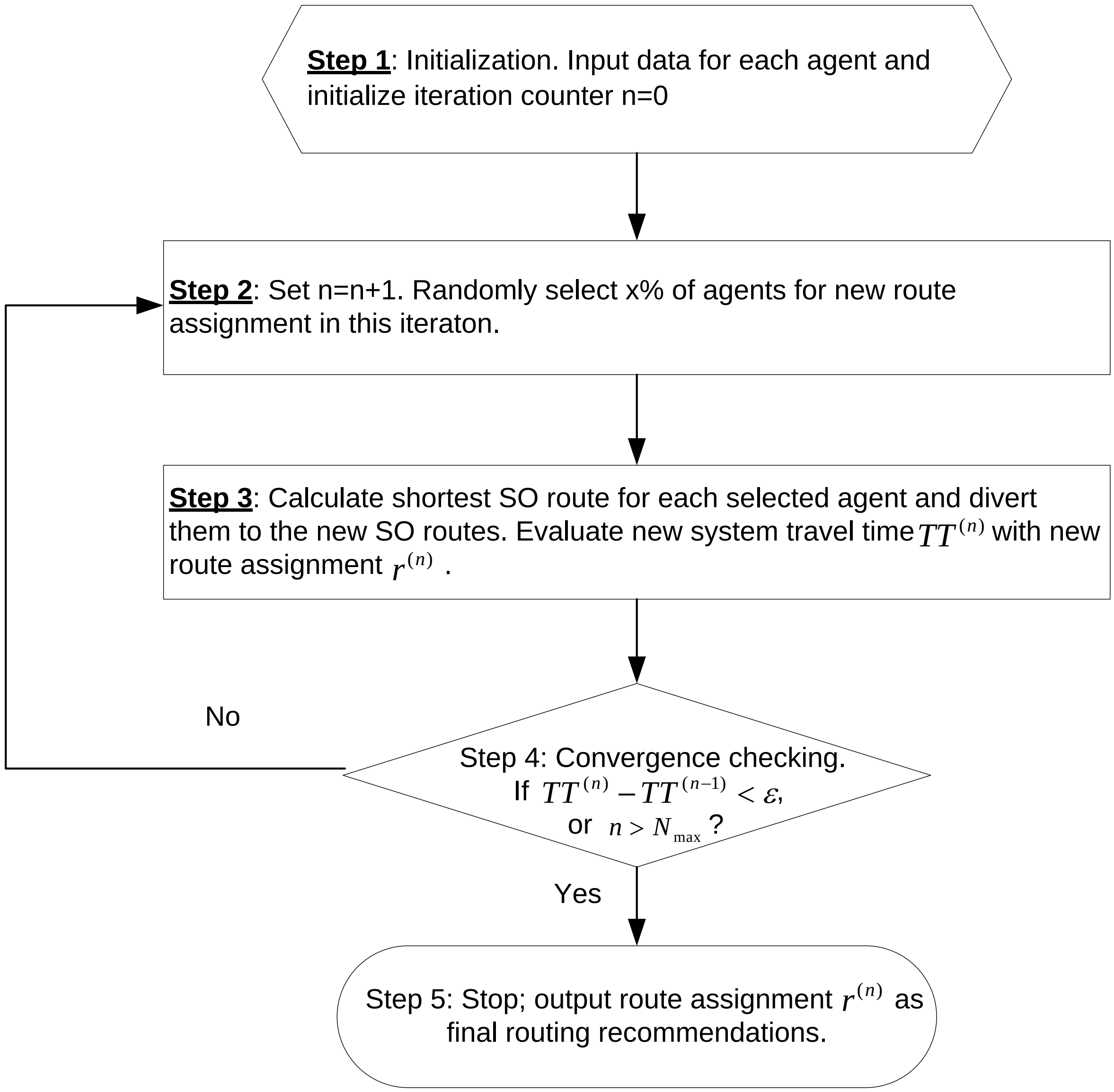


Figure 1 PSOI algorithm for Personalized SO information

A work zone scenario was simulated on Highway 60, causing capacity decrease for that link and lasted for 50 minutes. Sensitivity analyses were conducted to examine the impact of PSOI market penetration for SLC subarea network, as shown in Figure 2. As PSOI penetration increases, the travel time all travelers decrease, and PSOI agent's travel time is usually better than HI agents. After a large penetration rate (e.g., 75%), the benefit brought by PSOI information is only marginal.

For evaluation of mixed traffic conditions with 20% PTI (Pre-trip Information) and ERI (En-route Traveler Information), Figure 3 demonstrates how PSOI market penetration increase can reduce travel time of all travelers in the network. More interestingly, PSOI users experience travel time as relatively short compared with other information users, making this strategy acceptable as a personal information tool.

Thus, PSOI is recommended by this paper as an advantageous way for next generation advanced information systems and dynamic traffic management. Traffic Operations Centers of State DOTs and local agencies should give it full consideration when required hardware facilities are in place.

2015 Research Results

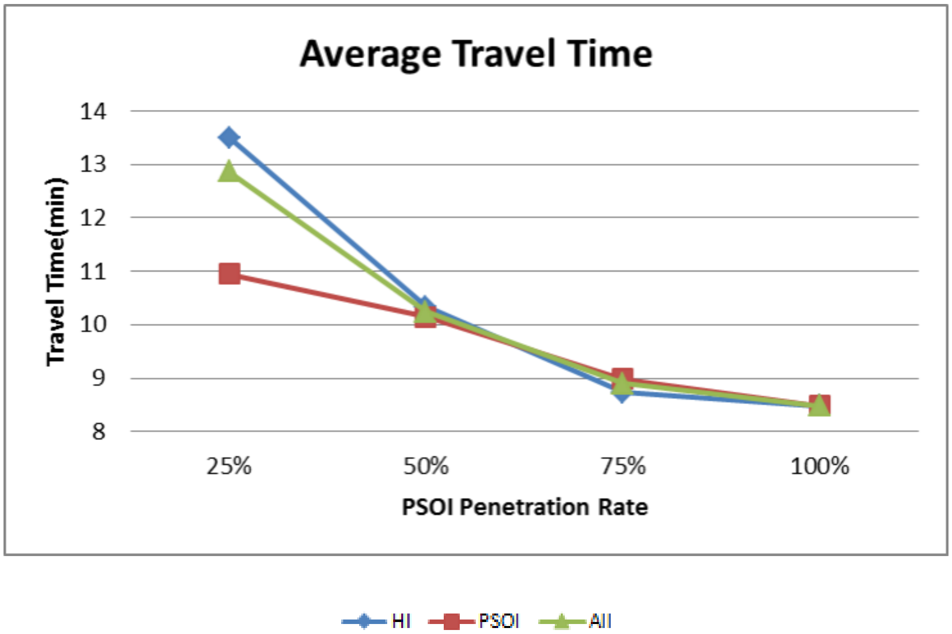


Figure 2 Sensitivity Analysis of PSOI Market Penetration Rate for SLC Subarea Network

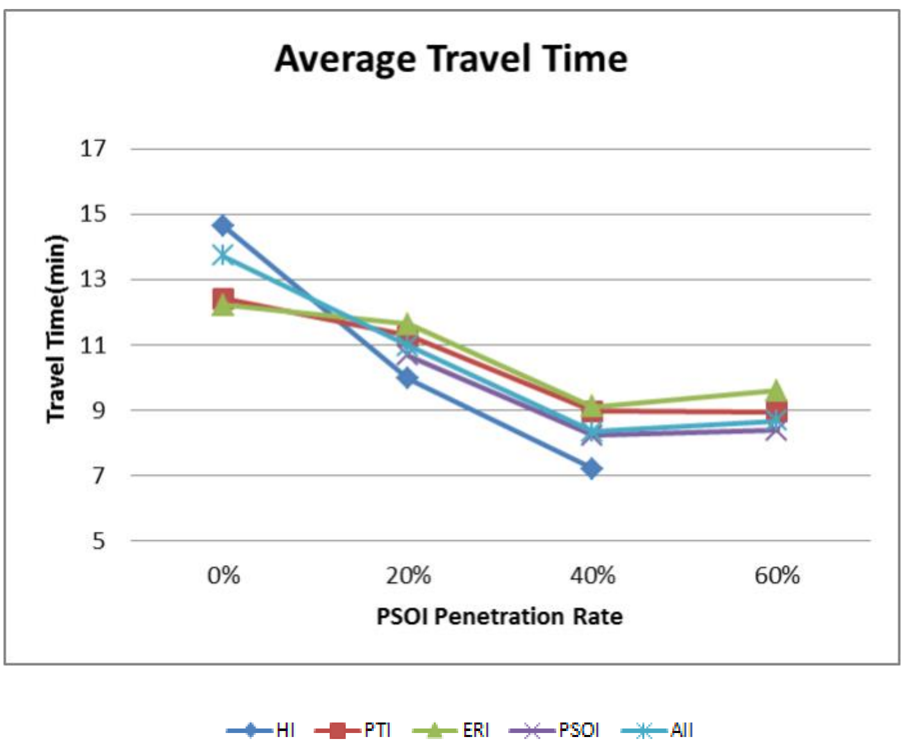


Figure 3 Sensitivity Analysis of PSOI in Mixed Traffic for SLC Subarea Network

References

Ma, Jiaqi, Xuesong Zhou, and Brian Smith. (2015) Personalized Real-time Traffic Information Provision: Agent-based Optimization Model and Solution Framework. Transportation Research Part C, http://dx.doi.org/10.1016/j.trc.2015.03.004.

Ma, Jiaqi, Jeffrey Taylor, Xuesong Zhou, and Fang Zhou. (2014) Providing Personalized and System Optimum Traveler Information: Simulation-based Heuristic Algorithm and Evaluation Framework. Accepted to 94th TRB Annual Meeting Compendium.

by Haifeng Xiao (SEH Inc.), Kevin Sommers (Mn/DOT), David Hale (Leidos Inc.), and Dimitra Michalaka (The Citadel)

Enhanced Calibration Method for Micro-Simulation Analysis of Tolled Managed Lanes

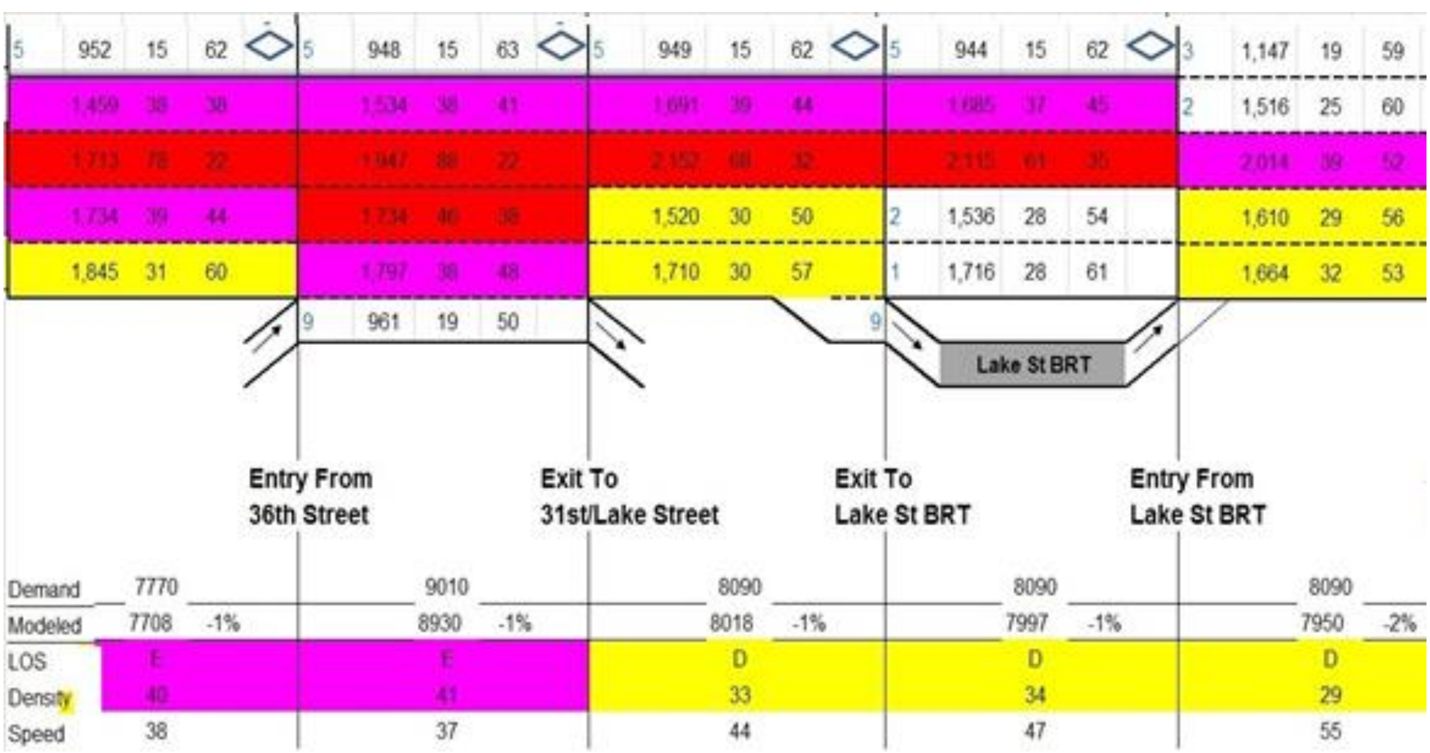
Haifeng Xiao, P.E.
SEH, Inc.

In micro-simulation analysis, it becomes more critical and challenging for professionals and researchers to calibrate high-occupancy/toll (HOT) lanes, due to several pricing and lane choice parameters involved in the process. Many previous studies and research projects have performed traditional calibrations of micro-simulation models without the tolling component. However, when analyzing tolled managed lanes, the traditional calibration approach can be shown to produce inferior or misleading results; due to insufficient differentiation between general purpose lanes (GPLs) and managed lanes (MLs), whether caused by tolling components in the system or not. Based on previous studies, we propose a 3-stage calibration method for calibrating a micro-simulation model with HOT lanes. This allows the overall calibration of managed lanes to be conducted more efficiently and consistently, with more robust results in the GPLs and MLs. The proposed method is demonstrated by calibrating a tolled managed lanes corridor in the Twin Cities metropolitan area (known as MnPASS), using CORSIM.

The proposed calibration methodology is performed in three stages. The non-HOT parameters are calibrated in Stage I. All HOT modeling related parameters are calibrated in the final Stage III based on the HOV model calibration results of Stage II.

Stage I: calibrate non-toll parameters by replicating traffic conditions as if there were no toll systems
Stage II: interim HOV modeling scenario with no toll systems and SOVs not allowed to use MLs
Stage III: calibrate the model that includes HOT components as it operates in the field

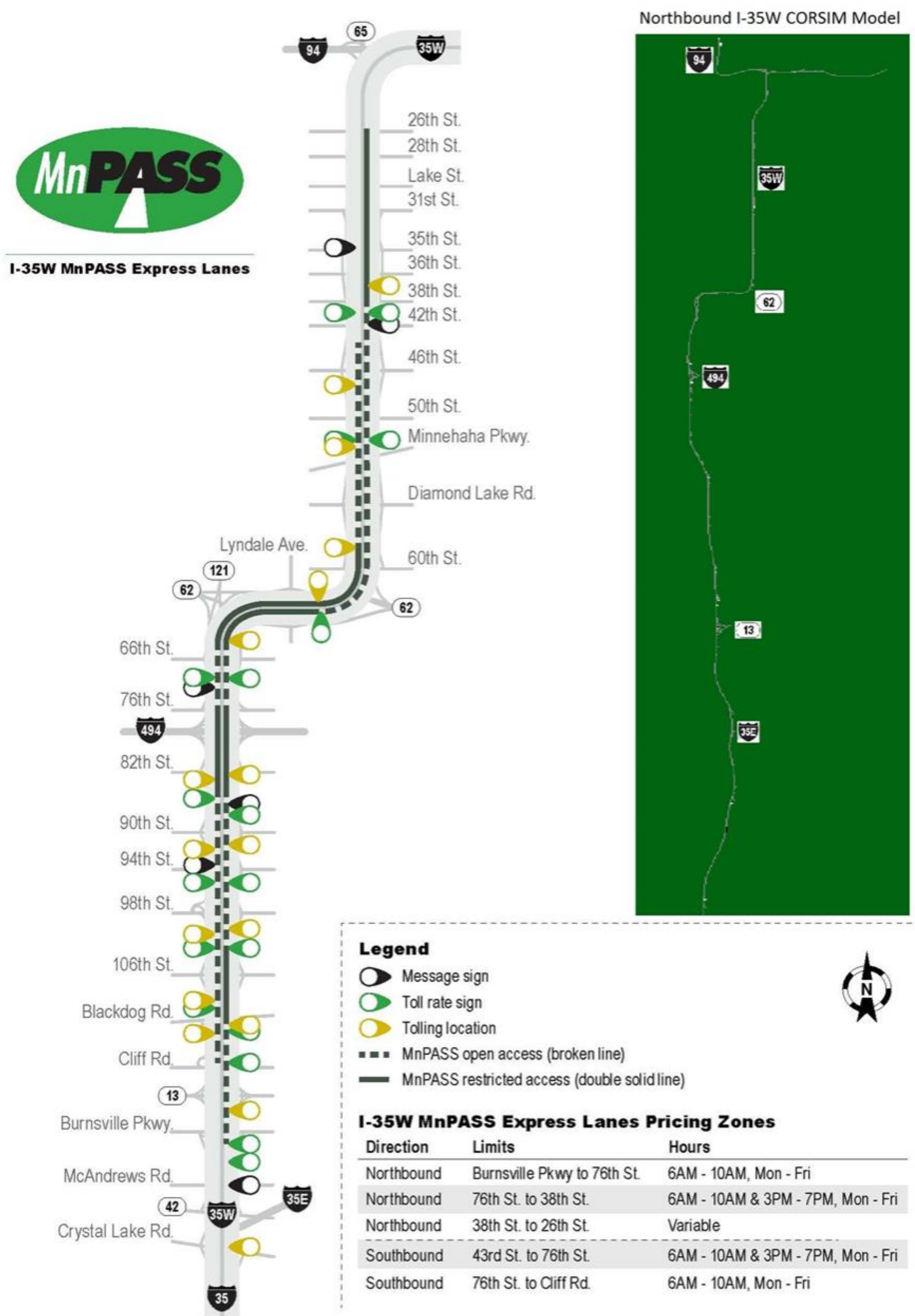
Although the I-35W MnPASS model was calibrated to a level that could be utilized for MnPASS operations analysis, further calibration might be needed for revenue analysis. HOT modeling is challenging for all current models regardless of if they are micro-simulation, mesoscopic or travel demand models. If



a local travel demand model (or mesoscopic model) produces better demands in MLs and thus revenue forecasts, the calibrated S1 model could be utilized with results from the travel demand model, for future freeway operations analysis.

The calibration of micro-simulation models with tolled MLs is challenging, due to several pricing and lane choice parameters. According to the case study of I-35W in Minneapolis, the MnPASS lanes were successfully calibrated by this method.

The authors wish to thank Mr. Brian Kary at Mn/DOT and Associate Professor John Hourdos from University of Minnesota for providing MnPASS data and their ongoing MnPASS research study reports. The authors also wish to thank Mr. James McCarthy at FHWA for the idea of by-lane MOE evaluation for freeway operations and Mr. Tom Sohrweide at SEH Inc. for his support on this effort.



Direction	Limits	Hours
Northbound	Burnsville Pkwy to 76th St.	6AM - 10AM, Mon - Fri
Northbound	76th St. to 38th St.	6AM - 10AM & 3PM - 7PM, Mon - Fri
Northbound	38th St. to 26th St.	Variable
Southbound	43rd St. to 76th St.	6AM - 10AM & 3PM - 7PM, Mon - Fri
Southbound	76th St. to Cliff Rd.	6AM - 10AM, Mon - Fri

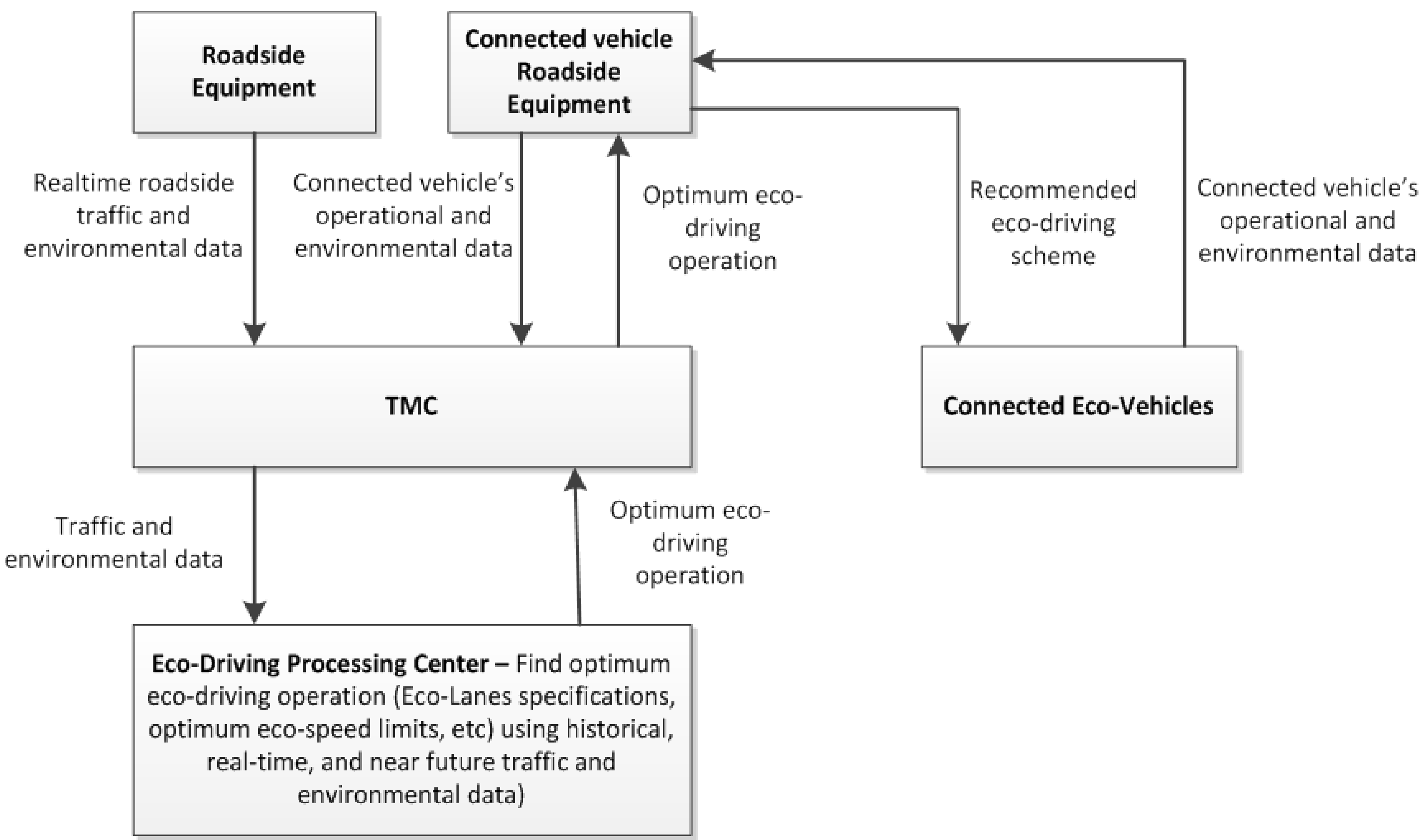
Eco-Lanes Applications: Preliminary Testing and Evaluation

by Kyoungho Ahn and Hesham Rakha
Virginia Tech Transportation Institute

This study investigated the feasibility of Eco-Lanes applications that attempt to reduce system-wide fuel consumption and GHG emission levels through lane management strategies. The study focused its efforts on evaluating various Eco-Lanes and SPD-HARM applications using the INTEGRATION microscopic traffic simulation software.

The study demonstrated that the proposed Eco-Lanes system can significantly improve fuel efficiency and air quality while reducing average vehicle travel time and total system delay. For this case study, the proposed system reduced travel time, delay, fuel consumption, HC, CO, and CO_2 emissions by 8.5%, 23%, 4.5%, 3.1%, 3.4%, and 4.6%, respectively, compared with the base case scenario. The study also examined the feasibility of a predictive Eco-Lanes system. This system predicts the onset of congestion and starts the Eco-Lanes system before congestion occurs. The simulation study found that the 30-minute predictive Eco-Lanes system produced greater reductions in fuel consumption and CO_2 emissions compared with the non-predictive Eco-Lanes system. The study also found that the optimum throttle levels and the optimum eco-speed limits can significantly improve the mobility, energy savings, and air quality of such systems.

Furthermore, the study demonstrated that SPD-HARM as an Eco-Lanes application produced reductions in delay, fuel consumption, HC, CO, NO_x, and CO_2 emissions by 7.6%, 6.3%, 23.9%, 26.1%,



17.2%, and 4.4%, respectively, compared with the base case scenario.

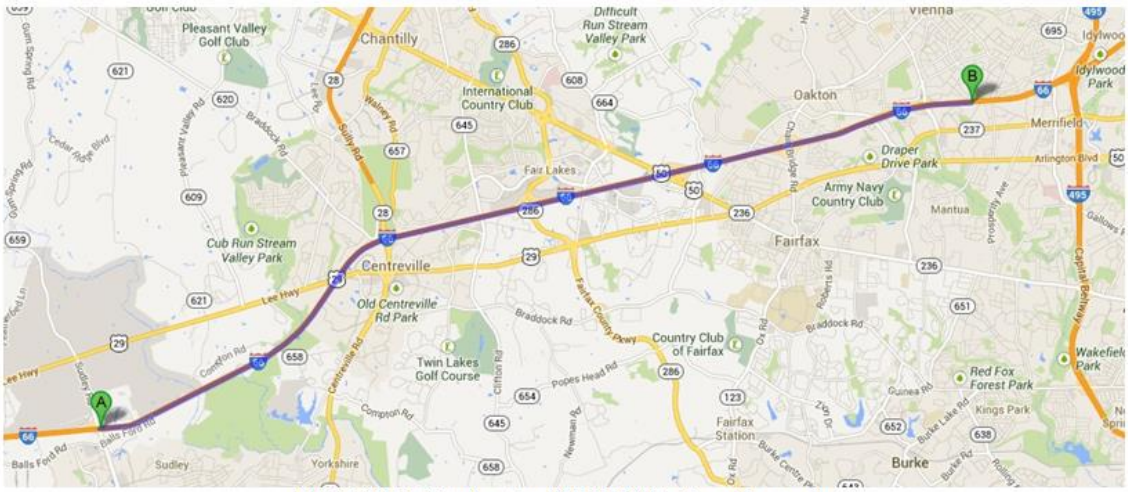


FIGURE 1 Study site (SOURCE: Google map).

Future research should quantify the potential benefits of using the proposed Eco-Lanes systems on different networks with various vehicle types, including alternative vehicle emission and fuel consumption technologies. Also, further studies are required to characterize the optimum eco-lanes specifications, such as the spatial and temporal eco-lanes boundaries, and to enhance the optimum eco-speed limit algorithms. Furthermore, the car-following behavior of non-eco-vehicles should be investigated. Finally, further research is needed to validate the simulation outputs using field tests.

TABLE 1 T-test Results (p-values) Comparing Eco-Lanes Systems

	Travel Time	Total Delay	Fuel	HC	CO	NO_x	CO_2
Eco-Lanes vs. Pred. Eco-Lanes 15 min.	0.180	0.179	0.016	0.906	0.923	0.016	0.029
Eco-Lanes vs. Pred. Eco-Lanes 30 min.	0.188	0.188	0.000	0.452	0.582	0.000	0.003
Pred. Eco-Lanes 15 min. vs. 30 min.	0.967	0.966	0.238	0.542	0.571	0.119	0.357

TABLE 2 Impact of Different Maximum Throttle Levels on Eco-Lanes Operation

	Travel Time (s)	Total Delay (s)	Fuel (l/veh)	HC (g/veh)	CO (g/veh)	NO_x (g/veh)	CO_2 (g/veh)
Base Case (No Eco-Lanes)	717.86	270.14	1.51	7.43	188.47	4.62	3237.54
10% Throttle	727.55	279.22	1.46	7.48	188.76	4.84	3135.13
30% Throttle	646.54	198.41	1.43	7.18	181.50	5.07	3072.24
50% Throttle	640.75	192.68	1.43	7.17	181.43	5.05	3060.60
70% Throttle	661.24	213.18	1.43	7.12	180.05	5.00	3072.51
90% Throttle	665.64	217.59	1.43	7.11	179.72	4.99	3072.42

TABLE 3 Impact of Different Maximum Vehicle Speeds for Eco-vehicles on Eco-Lanes Operation

	Travel Time (s)	Total Delay (s)	Fuel (l/veh)	HC (g/veh)	CO (g/veh)	NO_x (g/veh)	CO_2 (g/veh)
Base Case (No Eco-Lanes)	717.86	270.14	1.51	7.43	188.47	4.62	3237.54
Max. speed 104 km/h	640.75	192.68	1.43	7.17	181.43	5.05	3060.60
Max. speed 93.6 km/h	706.87	258.71	1.44	6.97	175.22	4.92	3100.48
Max. speed 83.2 km/h	700.15	251.87	1.44	7.12	179.55	4.83	3089.69
Max. speed 72.8 km/h	667.49	219.17	1.45	7.65	193.82	4.89	3088.00
Max. speed 62.4 km/h	735.85	287.47	1.49	8.06	202.29	4.93	3181.14
Max. speed 52 km/h	746.20	297.76	1.52	8.64	215.39	5.04	3228.48

NOTE: 1 mi/h = 1.6 km/h.

Product Updates

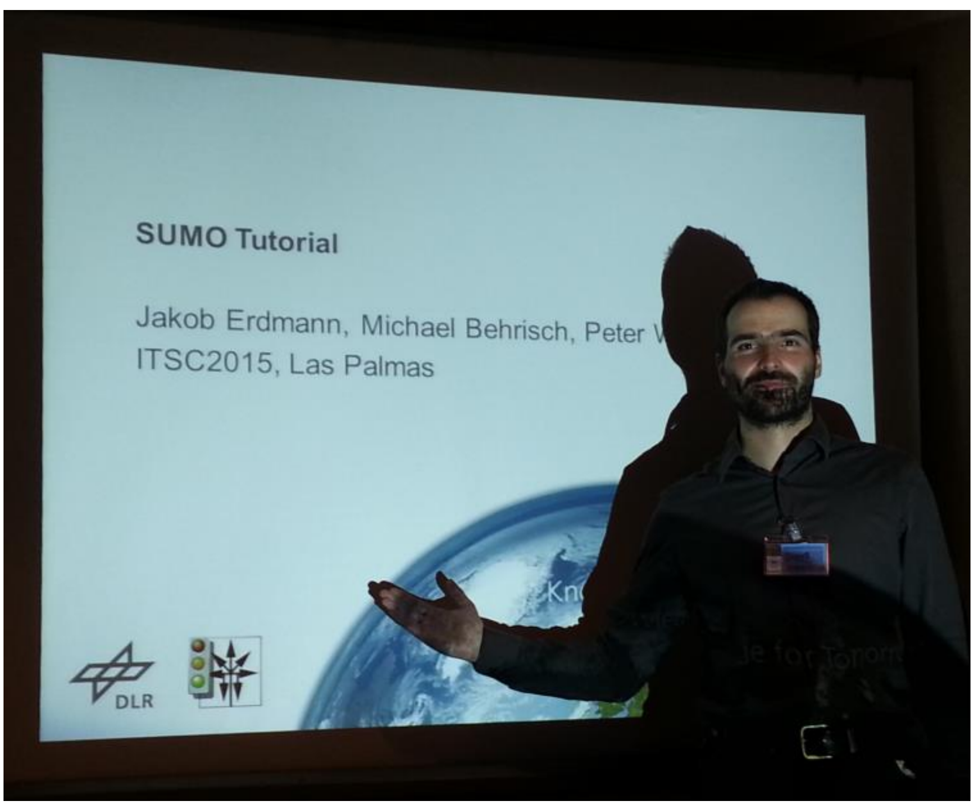
SUMO: Simulation Urban Mobility

18th IEEE International Conference on Intelligent Transportation Systems, September 15-18, 2015

Las Palmas de Gran Canaria, Spain

The goal of the tutorial was to make participants familiar with the SUMO application suite and get them started on performing their own traffic simulations. The complete tool chain for building and running a simulation scenario was shown. The topics covered included:

- Building a simulation network from publicly available data sources;
- Specifying multi-modal traffic demand;
- Visualizing the simulation;
- Exporting traffic data for further analysis; and
- Advanced interaction with the simulation.



Jakob Erdmann presents the SUMO Tutorial at the IEEE ITSC 2015 Conference

ASCE MINI-WEBINAR

Cloud/Distributed/Parallel Computing in Microscopic Traffic Simulation

By Prof. Li Zhang

ABSTRACT

An open source microscopic traffic simulation software engine called "Enhanced Transportation Flow Open-source Microscopic Model", or ETFOMM, and its Application Program Interface (API) were modeled and developed under US DOT SBIR Phase I, Phase II and on-going Phase IIB project with additional support in a Phase II matching funds project from the State of Kentucky. ETFOMM was constructed on FHWA's CORSIM (Corridor simulation) models and algorithms. It features advanced computing: including cloud computing, parallel computing and distributed computing in microscopic traffic simulation. One of ETFOMM's major objectives is to support US DOT's advanced research especially in the area of connected vehicle research. The seminar will explore applications of distributed, cloud and parallel computing in microscopic traffic simulation.

WHEN

2:00 – 3:00 pm ET, Thursday, Dec. 10, 2015

WEB URL

https://sas.elluminate.com/m.jnlp?sid=2008268&username=&password=M.D44F2CEA51E637707CEC3FEC37201

SPEAKER

Dr. Li Zhang received his MS in Computer Science and Ph.D. in Civil Engineering from Virginia Tech, and is currently an Associate Professor in the Department of Civil and Environmental Engineering at Mississippi State University. Dr. Zhang is the president of his own private company, which has been awarded US DOT small business awards and other FHWA subcontracts over the last few years. Currently, he is working with FHWA using said awards to develop and promote a cloud based microscopic traffic simulation to help the research and education community.

CONTACT

ASCE T&DI Advanced Technologies Committee

Brian Park
bpark@virginia.edu

2015 SimSub Activities

AHB40 Highway Capacity and Quality of Service Committee, TRB

Traffic Simulation Applications Subcommittee Meeting Agenda

Thursday June 4, 2015, 3:15 - 4:45 PM – Little Rock, Arkansas

Subcommittee Objective: "To develop HCM guidance on the application of traffic simulation tools"

Introductions

- Attendee introductions
- Membership/roster circulation
- Review meeting objectives and finalize agenda

Discussion Items

- HCM 2010 Major Update
  - ◊ Draft Chapters 6 and 7 prepared and reviewed
  - ◊ Responses to review comments discussed at the 2015 annual meeting
  - ◊ Final chapters posted
  - ◊ Discussion
  - ◊ Recommendation to Full Committee
- FHWA Activities
  - ◊ Trajectory Validation Project
  - ◊ The ATM Test Bed Project
  - ◊ Other
- SIMSUB
  - ◊ Status: Analysis Modeling and Simulation (AMS) Manual
  - ◊ Coordination
  - ◊ Suggestions for Simulation Workshop—2016 TRB Annual Meeting
- Other issues?

Jim Sturrock chairs the SimSub meeting in the Razorback Room at Little Rock, Arkansas

2016 TRB Simulation Activities

Transportation System Simulation Manual

Sunday 1:30 PM- 4:30 PM
Convention Center, 102A
Workshop 181

Calvin Leggett, North Carolina Department of Transportation, presiding

Sponsored by:
Standing Committee on Traffic Flow Theory and Characteristics (AHB45)
Task Force on System Simulation (AHB80T)

Efforts to develop a Transportation System Simulation Manual are under way, with a draft outline and chapter already prepared and a task force formed by TRB to spearhead the development. This workshop describes the status of the effort, and a number of speakers worldwide are providing their sense of what the manual should be, how it should be structured, and how it should be aimed at the audiences that will use it.

Task Force on System Simulation

Monday 1:30 PM- 5:30 PM
Marriott Marquis, Marquis Ballroom Salon 9 (M2)
By Invitation

Calvin Leggett, North Carolina Department of Transportation, presiding

Sponsored by:
Task Force on System Simulation (AHB80T)

Welcome and Call to Order C. Leggett
- Introductions
- Review and Approval of Minutes C. Leggett
- Task Force Meeting of September 14, 2014
- Task Force Membership Update C. Leggett
- Chair Report C. Leggett
- TRB Report R. Cunard/R. Bertini/P. Briglia
- FHWA Project Report B. Nevers
- Sample Chapter/Volume
- Research Problem Statements
- NCHRP Report C. Leggett
- FHWA Activities J. Halkias/J. Sturrock
- SimSub Report G. List
- Sunday Workshop
- Research Problem Statements M. Hadi
- Liaison with TRB Committees
- International Liaison
- MULTITUDE C. Antoniou/M. Brackstone
- New Business
- Next Meeting
- Next Steps

Future "Products" and Activities
- Announcements and Future Meetings
- Adjourn

Microscopic Traffic Flow Modeling

Wednesday 2:30 PM- 4:00 PM
Convention Center, 101
Lectern

Ludovic Leclercq, Universite de Lyon, presiding

Sponsored by:
Standing Committee on Traffic Flow Theory and Characteristics (AHB45)

Vehicle-type Dependent Car following Model Using Spring-mass-damper Dynamics for Heterogeneous Traffic

Caleb Munigety, Indian Institute of Technology, Bombay
Prakkhar Gupta, PricewaterhouseCoopers LLP
Krishna Murthy Gurumurthy, National Institute of Technology
Srinivas Peeta, Purdue University
Tom Mathew, Indian Institute of Technology, Bombay

Although traffic modellers consider driver-vehicle as a single unit to describe the driving behaviours, it is important to understand that the type of a vehicle dictates many a times how a driver should or shouldn't behave. Most importantly, it is the weight of a vehicle as well as its engine characteristics that affect the vehicle acceleration which in turn affects the driving behavior. This aspect of vehicle-type dependent driving behavior is more significant in heterogeneous traffic conditions prevailing in developing countries like India, China, Indonesia, Bangladesh, and the like due to the presence of multiple vehicle types. Thus, a vehicle-type dependent car following model is proposed in this paper using the dynamics involved in spring-mass-damper mechanical system. The component of 'mass' present in the spring-mass-damper system inherently replicates the 'vehicle-type'. The proposed model when tested, behaved pragmatically in representing the vehicle-type dependent car following behavior.

A Lane Changing Cell Transmission Model for Modeling Capacity Drop at Lane Drop Bottlenecks

Anupam Srivastava, University of California, Irvine
Wenlong Jin, University of California, Irvine

Over the years the capacity drop phenomenon at freeway bottlenecks has remained a topic of interest and intrigue. Capacity drop has an undeniable impact on freeway performances, directly affecting the throughput. Various studies have tried to measure, predict, and model capacity drop. In this paper, we integrate a simplistic lane changing model and an acceleration model together into the Cell Transmission Model framework. The capacity drop is modeled as a combined effect of a lane changing area upstream of the bottleneck location and an acceleration region downstream. Each lane changing vehicle is considered to contribute towards density on two lanes during the lane changing maneuver as it effects the following vehicles on both the original and target lanes. This effect is modeled through the introduction of a `perceived density' variable. This perceived density is obtained by scaling the actual density up by the lane-changing intensity, and is used to determine the demand at the bottleneck. A demand function linearly decreasing in density under over-saturated conditions is used to model the acceleration process of vehicles as they discharge from the bottleneck. It is shown that the capacity drop can then be predicted from calibrated demand-supply functions and lane changing intensity.

A Study of Mandatory Lane-Changing Execution Behavior Model for Heavy Vehicles and Passenger Cars

Xiaoying Cao, Monash University
William Young, Monash University
Majid Sarvi, University of Melbourne

Lane change models are one of the basic driver behaviour interactions in the microscopic traffic simulations for traffic, safety and transportation system analysis. However, many of the present traffic simulations mostly pay attention to the lane changing decision process, while the lane change execution process is often simplified or even ignored. This paper presents a study of lane change execution of heavy vehicles and passenger cars in a blocked-lane traffic situation. A video camera was used to collect data from an arterial road in Melbourne, Australia. This paper investigated the mandatory lane changes behaviours of heavy vehicles and passenger cars and proposed a lane change execution model framework with regarding to the emergency status and surrounding traffic for individual lane changing drivers. The distance-to-block is used to denote the emergency status. In terms of the surrounding traffic impact, it is assumed that the driver will adjust its execution if a traffic conflict is detected and will continue the lane change if there is no conflict around. A probability model is developed to interpret the driver's execution choice on whether to continue lane change. The data analysis found out that the HV's lane changing performance differs from PC's lane changing execution. Therefore the model was calibrated for HV and PC separately. In the conclusion, the paper provides a framework of the future work of lane change execution models on traffic simulation to assess the traffic safety and road efficiency.

Drivers' Heterogeneity in Traffic Micro-Simulation

Marcello Montanino, University of Naples Federico II
Vincenzo Punzo, University of Naples Federico II

The paper investigates the impact of different sampling strategies of car-following and lane-changing model parameters on traffic simulation results. The investigation considered seven possible sampling strategies including sampling parameters from independent normal distributions, which is customarily in commercial simulation software. Study results revealed that model performances in case of sampling from normal pdfs are extremely poor. In turn, results proved that parameter correlation, as well as the parameter distribution model, entail a big impact on model performances and should be properly take into account in the microsimulation practice.

Car-Following and Lane-Changing Behavior Involving Heavy Vehicles

Danjue Chen, University of Wisconsin, Madison
Soyoung Ahn, University of Wisconsin, Madison
Soohyuk Bang, University of Wisconsin, Madison
David Noyce, University of Wisconsin, Madison

This paper presents empirical findings on the car-following and lane-changing behavior involving heavy vehicles using trajectory data. It was found that when following passenger cars, heavy vehicles tended to reduce speed variations caused by traffic disturbances, thereby dampening traffic oscillations. In contrast, passenger cars following heavy vehicles tended to amplify traffic disturbances, though with lower probability and magnitude compared to the dampening effect. Moreover, heavy vehicles tended to discourage lane changes, particularly behind them. This finding has convoluted implications: while reduced lane changes can further improve traffic stability by preventing or reducing disturbances, large gaps can persist behind heavy vehicles and contribute to underutilization of road capacity.

Freeway Simulation Subcommittee

Sunday 8:00 PM - 9:30 PM
Marriott Marquis, Marquis Ballroom Salon 12 (M2)
Panos Prevedouros, University of Hawaii, presiding
Sponsored by Freeway Operations (AHB20)

ATDM-DMA Analysis, Modeling, and Simulation (AMS) Testbed Project Update
James Colyar, FHWA, Washington, DC

Tolled Managed Lanes Calibration Study on the I-35W MnPass
Haifeng Xiao, PE, SEH, St. Paul, MN

MnPASS HOT Dynamically Priced Lane Simulation with AIMSUN
John Hourdos, PhD, Minnesota Traffic Observatory, University of Minnesota, Minneapolis, MN

VISSIM-Based Simulation Platform for Connected Autonomous Vehicles
Guohui Zhang, PhD, University of New Mexico, Albuquerque, NM

Simulation of Evolutionary Introduction of Cooperative Adaptive Cruise Control Vehicles into Traffic
Patrick Peng Su, PhD, Leidos Inc, Washington, DC

Modeling the Proactive Driving Behavior of Connected Vehicles: A Cell-Based Simulation Approach
Feng Zhu, PhD candidate, Lyles School of Civil Engineering, Purdue University, Lafayette, IN

Joint Traffic Simulation Subcommittee

Transportation Research Board Annual Meeting
Monday, January 12, 2015, 7:30-9:30PM
Marriott Marquis, Marquis Ballroom Salon 7 (M2)

A. Introductions - George List
B. Sponsoring Committee Chair Remarks - attending chairs or liaisons
C. Task Group Reports
   a. Annual Workshop Report (brief synopsis) – Monty Abbas
   b. Research Needs and Resources Task Group - Mohammad Hadi
   c. Calibration, Verification and Validation Task Group - Ray Benekohal
   d. Awards – Ed Lieberman
   e. SimSub Reports – David Hale
   f. Mesoscopic Task Group – Yi-Chang Chiu
   g. Safety Simulation Task Group – Amir Sobhani (for Bill Young)
   h. Agent-Based Simulation Task Group – Monty Abbas
D. FHWA ATDM-DMA Simulation Testbed Project Update – James Colyar
E. New Business
   a. TRB Circular based on 2014 Workshop – Rob Bertini
   b. ATDM Trajectory Validation Project – Michalis Xyntarakis
   c. Modeling Intelligent Mobility – Pete Sykes
   d. 2015 Annual Workshop Planning – George List
F. MULTITUDE-related activities - Loukas Dimitriou
G. Transportation System Simulation Manual – John Halkias
H. Other Business
I. Closing