

**Program Progress Performance Report
for the
New England University Transportation Center
Massachusetts Institute of Technology**

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REPORTING CATEGORIES

1. Accomplishments

Major goals as stated in New England UTC Prospectus

Research Goal

- To conduct research in technology applications and systems integration with related work in policy, planning and human factors that improve transportation safety as well as further our understanding and realization of livable communities to support mobility across the lifespan.
- To support peer-reviewed investigations that address safety and livability by exploring and furthering research, policy, and practice in the application of ubiquitous intelligence, use of big data, and improved human performance.

Following is the list of the 34 research projects under this grant, and their current status:

Project No.	PI	Project Title	Current Status
MITR24-1	Ben-Akiva Abou-Zeid Zegras	Capturing the Relationship between Motility, Mobility and Well-Being Using Smart Phones	active
MITR24-2	Coughlin	Transportation Wellbeing, Age and Safety	active
MITR24-3	D'Ambrosio	Assessing Alternative Transportation Options for Older Users	active
MITR24-4	Glass Mehler	Spoken Dialog Planning to Reduce User Distraction in Mobile Environments	active
MITR24-5	Gonzalez	Transportation Model in the Boston Metropolitan Area from Origin Destination Matrices Generated with Big Data	active
MITR24-6	Murga Salvucci	Kendall Square: Lessons Drawn from Its Past Development to Guide Its Future	active
MITR24-7	Osorio	Urban Transportation Optimization: A Multi-Modal Simulation-Based Approach	active
MITR24-8	Reimer	Technology Adoption and Use Across the Lifespan	active

MITR24-9	Salvucci Murga	Development of a "Universal" Residential Public Transportation Pass, as Part of a Comprehensive Multi-Modal Approach to Urban Parking	active
MITR24-10	Sheffi Goentzel	Big Data During Crisis: Lessons from Hurricane Irene	active
MITR24-11	Sussman	Determining Performance Measures to Evaluate the Effect of High Speed Rail on Communities' Livability	active
HVDR24-12	Howitt Giles	Disaster Recovery for Transportation: China's Wenchuan Earthquake of 2008 and Japan's Tohoku Earthquake and Tsunami of 2011	active
HVDR24-13	Gomez-Ibanez	The Challenges of Growth and Motorization: Transportation Policy in Rapidly Developing Cities	active
HVDR24-14	Muehlegger Shoag	Cell Phones and Vehicle Safety	active
UMAR24-15	Christofa Collura	A Person-based Comparison of Transit Preferential Treatments on Signalized Arterial Corridors	active
UMAR24-16	Collura Burleson Gao	A Decision Support System to Assess Disruptive Impacts of Alternative Transportation Financing Approaches	active
UMAR24-17	Fisher Romoser	Moving Map Displays: Using CTIL and Eye Tracking Technologies to Measure Distraction in Locomotive Cabs	active
UMAR24-18	Ganz Collura	Hybrid NFC and Vision Based Navigation System in Subways for the Blind and Visually Impaired	active
UMAR24-19	Gao	A Spatial Learning Model for the Micro-Simulation of Travel Dynamics	active
UMAR24-20	Gao	Cognitive Maps for Route Choice Modeling	active
UMAR24-21	Gartner Jones Statmatiadis	Robust Performance of Transportation Networks Using Quantile Metrics	active

UMAR24-22	Knodler Romoser Fisher	Evaluating the Effects of Integrated Training on Minimizing Driver Distraction	active
UMAR24-23	Ni Gao	Making More Value out of Transportation Data	active
UMAR24-24	Ni	Modeling Drivers' Lateral Motion Control	active
UMAR24-25	Romoser Knodler Fisher	Reducing Older Driver Crashes: Technology, Training and Livable Communities	active
UMAR24-26	Stamatiadis Gartner Xie	ITS Equipment Placement for Safety and Mobility	active
UMAR24-27	Zarillo Collura Burleson	Security & Privacy Breaches in ETPS: Problem Survey & Case Study of I-90	active
UCNR24-28	Garrick Atkinson- Palombo	The Impact of Parking Policies on the Long-term Vitality of American Cities	active
UCNR24-29	Gokhale Lownes	Automated Congestion Prediction with Smart Phones	active
UCNR24-30	Ivan Ravishanker	Investigation of Road and Roadside Design Elements Associated with Elderly Pedestrian Safety	active
UCNR24-31	Konduri Lownes	Transportation System Modeling in the Information Era	active
UCNR24-32	Lownes	t-HUB: Connecticut Public Transport Data Hub	active
UMER24-33	Garder	Elderly Pedestrian Safety and Driver Distractions	active
UMER24-34	Rubin	Regional Credit Trading: Economic and GHG Impacts of a National Low Carbon Fuel Standard	active

Accomplishments under this goal

MIT student presents on Google Maps/GPS system at international conference September 20, 2013

MIT Aeronautics and Astronautics Master's candidate Celena Dopart presented a paper at the 2013 International Annual Meeting of the Human Factors and Ergonomics Society held in San Diego, CA from Sept 20-Oct 4. The paper, "A Driving Simulation Study Examining Destination Entry with iOS 5 Google Maps and a Garmin Portable GPS System," was co-authored by MIT Mechanical Engineering PhD candidate Anders Haggman, MIT AeroAstro Master's candidate Cameron Thornberry, and New England UTC researchers Bruce Mehler, Johnathan Dobres, and Bryan Reimer. The three graduate students work in MIT human factors affiliated labs: Ms. Dopart in the Man Vehicle Lab, Mr. Haggman in the Ideation Lab, and Mr. Thornberry in the System Safety Research Lab.

New England Center contributes to USDOT Spotlight September 24, 2013

New England Center research scientists Dr. Bryan Reimer, Bruce Mehler and Daniel Belyusar contributed to the UTC Spotlight—a USDOT publication—on their findings regarding driver interactions with in-vehicle technologies. The article is entitled, "Disruption in the Driver's Seat: How Technological Advancements are Changing What We Do in the Car and on the Road." Findings discussed include how cognitive processing demands induced by voice-based tasks are comparable to that of traditional manual tasks. A pdf of the publication is available [here](#).

MIT students win Volpe Best Transportation Presentation award October 10, 2013

MIT graduate students Celena Dopart, Anders Haggman, and Cameron Thornberry received the Volpe Best Transportation Presentation Award for their research paper entitled "A Driving Simulation Study Examining Destination Entry with iOS 5 Google Maps and a Garmin Portable GPS System." Ms. Dopart, an AeroAstro Master's candidate in the Man Vehicle Lab, presented this paper at Volpe Transportation Center on October 10th as part of this award.

NY Times publishes article by Dr. Bryan Reimer on potential danger of autonomous vehicles October 28, 2013

Research by New England Center associate director Dr. Bryan Reimer was the focus of a October 23, 2013 New York Times article, entitled, "Wake Up, Sleepyhead: A Virtual Poke to Drivers." The article weighed the potential risks of vehicles that increasingly take workload away from drivers, as technology moves toward autonomous vehicles.

Read the article [here](#).

Mehler talks to Consumer Reports and SC Public Radio at LA Auto Show November 26, 2013

New England Center research scientist, Bruce Mehler, took part in the panel "Overcoming the Distracted Driving Roadblock" at the LA Auto Show 2013 and discussed research directed at understanding how drivers interact with in-vehicle voice recognition systems. While there, he was interviewed by Southern California Public Radio (89.3 KPCC) about challenges car manufactures face in offering drivers alternatives to picking-up their smartphones. The audio and article are available [here](#). Mehler also spoke with Consumer Reports about the pros and cons of voice control. The article is available [here](#).

Plans during the next reporting period to accomplish this goal

Project MITR24-9

Development of a Universal Residential Public Transportation Pass, as Part of a Comprehensive Multi-Modal Approach to Urban Parking

Complete 'In-Progress' objectives. Apply research findings to a larger analysis of residential parking issues in the form of a student researcher's dual-degree Masters thesis (Science of Transportation & City Planning). Coordinate with City of Cambridge to apply findings to current planning efforts.

Organize findings in shorter paper submissions to conferences and publications.

Project MITR24-10

Big Data During Crisis: Lessons from Hurricane Irene

We plan to submit abstracts to participate in the Information Systems for Crisis Response and Management conference (ISCRAM): <http://iscram2014.ist.psu.edu> and also the Joint Interagency Field Experimentation program (FEMA JIFX field event), which was started in 2012 under the sponsorship of the Office of the Secretary of Defense and the Department of Homeland security: <http://www.nps.edu/Academics/Schools/GSOIS/Departments/IS/Research/FX/JIFX/JIFX.html>

Project HVDR24-12

Disaster Recovery for Transportation: China's Wenchuan Earthquake of 2008 and Japan's Tohoku Earthquake and Tsunami of 2011

We will be writing up results of some of our work in Japan and preparing for additional field work on Japan and China.

Project UMAR24-15

A Person-based Comparison of Transit Preferential Treatments on Signalized Arterial Corridors

Next steps include improving the analytical model to account for differences in vehicle (both bus and car) delay between queue jumper lanes and dedicated bus lanes; plan to model and test analytically and through simulation the impact of intermittent bus lanes, when implemented individually and in combination with time preferential treatments, on the person delay and person discharge flow; plan to develop a code for implementing green extension and red truncation when a bus is approaching a signalized intersection; perform simulation tests using the code we will develop through the external control function of Aimsun instead of utilizing the existing preemption module of the software (as we have done so far).

Project UMAR24-25

Reducing Older Driver Crashes: Technology, Training and Livable Communities

Recruiting of older drivers is currently underway. In the coming weeks will visit various Councils on Aging to recruit participants for the training study. The subject pool is now nearly full. However, because of the winter months, it was decided to start the training in late March, early April of 2014 so that the field drives could take place in more favorable weather conditions.

Project UCNR24-29

Automated Congestion Prediction with Smart Phones

During the next 6-months, we will use the location tracking app developed to conduct a set of controlled data gathering experiments. The data collected will be used to develop machine learning algorithms to predict to mode of travel utilized by an individual. Modes of travel to be considered include automobile, bus, bicycle, and walking. Various techniques from machine learning will be employed to compare the accuracy of the predictions they are capable of producing. The results will be prepared for submission to the 2015 TRB conference.

Project UCNR24-31

Transportation System Modeling in the Information Era

The study team is currently updating the codebase for OpenAMOS so that the model system can mimic the changes in travel demand choice dimensions to real-time traveler information (as designed in the framework). The study team is also working with the authors of DTALite to update the codebase of that software so as to accommodate the changes in traffic assignment choices in response to real-time traveler information. As soon as the software development is complete, the study team will embark on full population scenario analysis runs.

Education & Workforce Goal

- To introduce transportation to all levels of education: K-12, undergraduate, graduate and continuing education.
- To place graduates into transportation fields.
- To provide current and developing methods, tools and insights to today's transportation workforce to support their capacity to build, operate and manage a safe and efficient transportation system.

Following is the list of the 5 education projects under this grant, and their current status:

Project No.	PI	Project Title	Current Status
MITE24-35	Coughlin	Massachusetts Avenue Area Living Laboratory (MALL)	active
MITE24-36	Jarzombek Hendricks	Engaging emerging minority youth in real-time, community-based transportation research and modeling	completed
UMAE24-37	Knodler	Creating an Education ASSET	active
UCNE24-38	Lownes	Senior Design	active
UCNE24-39	Lownes	Graduate Course	active

Accomplishments under this goal

Ferrentino named New England Center 2013 Outstanding Student of the Year December 31, 2013

Cara Ferrentino received her Master's degree in city planning from the Department of Urban Studies and Planning at the Massachusetts Institute of Technology. While attending MIT, Cara's coursework included urban transportation, urban design, geographic information systems, urban energy systems, and public finance. Cara was responsible for analyzing the evolution and impacts of local parking and travel demand policies for the MIT Transit Research Lab. She also holds a master of philosophy in environmental policy from the University of Cambridge and a bachelor's degree in environmental science from Harvard College. Cara previously worked as a summer public policy fellow in the Economic Planning and Development Department for the Massachusetts Port Authority. In this role, she analyzed the transportation, urban design, real estate, and political implications of a proposed roadway reconfiguration project on 15 acres of the South Boston Seaport area and developed recommendations for project implementation. She was named the UTC Outstanding Student of the Year in December 2013.

Technology Transfer Goal

- To increase the awareness and level of information concerning transportation issues facing New England.
- To further our well-established technology transfer and outreach activities.
- To engage the public and private transportation sectors throughout the New England Region and the nation.

Following is the list of the 2 technology transfer projects under this grant, and their current status:

Project No.	PI	Project Title	Current Status
MITT24-45	Coughlin	MIT Technology Transfer Initiative	active
UCNT24-46	Shea	LTAP/TTAP Core Competency Development and Pilot	completed

Accomplishments under this goal

UMass & MIT co-host New England Transportation Workforce Summit September 26, 2013

On September 26 and 27, 2013 The University of Massachusetts and The Massachusetts Institute of Technology co-hosted the New England Transportation Workforce Summit, held in Boston and Cambridge.

The Summit Program was designed to foster a cross-cutting dialog on the transportation workforce of the future for the New England Region. It dealt with all modes of transportation, the range of transportation occupations from technicians to professionals, and the variety of educational experiences to develop and improve individuals' competencies and skills. It addressed key workforce challenges; identified administrative and legislative actions for effective workforce policies and programs; and established a Regional Framework for Transportation Workforce Development to link education and training to workforce development policies and programs.

The summit was opened by Massachusetts Department of Transportation Secretary Richard Davey. A panel discussion led by Dr. Glenn McRae of the University of Vermont's Transportation Research Center explored priorities, issues and activities for effective, efficient workforce development in different communities. Dr. Beverly Scott, Chief Executive Officer/General Manager of the MBTA also spoke. Other speakers included a representative from the New England Transportation Certification Program and the Massachusetts Local Technical Assistance Program.

New England Transportation Workforce Summit follow-up: roundtable and listserv host November 15, 2013

Prof. Donna Shea—as part of her Principal Investigator duties on technology transfer Project UCNT24-46: LTAP/TTAP Core Competency Development and Pilot—participated on the planning committee, and led a breakout session on professional learning for the New England Transportation Workforce Development Summit held in Boston, MA on September 26-27 (see above). After the summit, Prof. Shea agreed to take the next step of organizing a Connecticut statewide roundtable discussion among transportation workforce stakeholders (including many who were unable to participate in the regional summit). The CT roundtable discussion was held on November 15, 2013. The discussion included an overview of the outcomes of the New England Summit and a discussion of next steps. It represented an opportunity to meet new stakeholders and begin the discussion of

developing a set of core competencies for municipal highway department employees. Since the group was interested in keeping connected in the future, Prof. Shea offered to host a Connecticut Workforce Development Listserv at the University of Connecticut. This listserv was established and began accepting members in December of 2013.

Plans during the next reporting period to accomplish this goal

New England Transportation Workforce Summit follow-up: final report January 2014

A final report from the New England Transportation Workforce Development Summit held in Boston, MA on September 26-27 (see above) is being compiled by the University of Massachusetts for dissemination to the stakeholders in each state. Minutes of the Connecticut roundtable discussion (see above) will be shared with the participants and other interested parties through the new listserv.

2. Products

Journal publications

Lars Leden, Per Gårder, Anna Schirokoff, Hector Monterde-i-Bort, Charlotta Johansson and Socrates Basbas, "A sustainable city environment through child safety and mobility—a challenge based on ITS?" *Accident Analysis & Prevention June 2013* (available online since 18 June, 2013) [Federal support through NEUTC].

Md. Saidul Islam, Volodymyr Serhiyenko, John N. Ivan, Nalini Ravishanker, Per Erik Garder, Explaining Pedestrian Safety Experience at Urban and Suburban Street Crossings Considering Observed Conflicts and Pedestrian Counts, accepted by the *Journal of Transportation Safety & Security* in December 2013 (a Taylor & Francis publication) [Federal support through NEUTC].

Productivity of Passenger Rail Transportation Services in the Northeast Corridor, Archila, Sakamoto, Fearing and Sussman, in review, *Journal of the TRB*

Reimer, B., Mehler, B. & Donmez, B. (2014). A Study of Young Adults Examining Phone Dialing while Driving using a Touchscreen vs. a Button Style Flip-Phone. *Transportation Research Part F: Traffic Psychology and Behaviour*, 23, pp. 57-68.

The impact of high-speed rail and low-cost carriers on European air passenger traffic. Clewlow, Sussman and Balkrishnan, in review - *Transportation Policy*

Uncertainty and Inter-Jurisdictional High-Speed Rail Planning: Insights from Portugal and the United Kingdom, Stein and Sussman, in review, *Journal of the TRB*

Zhao, N., Reimer, B., Mehler, B., D'Ambrosio, L.A. & Coughlin, J.F. (2013). Self-Reported and Observed Risky Driving Behaviors among Frequent and Infrequent Cell Phone Users. *Accident Analysis and Prevention*, 61, pp. 71-77. [Federal support acknowledged – yes]

Books or other non-periodical, one-time publications

Annotated Bibliography of Papers Relevant to High-speed Rail, Regional Economic Development and Related Areas (.pdf [ESD-WP-2013-23](#))

NEC FUTURE Preliminary Alternatives Report: Public Comment (.pdf [ESD-WP-2013-11](#))

Pagliara, Abreu, Stein and Sussman "Megacities and High-Speed Rail Systems: Transportation Demand Management. Insights from the mobil.TUM 2012 International Scientific Conference on Mobility and Transport."

Transport infrastructure evaluation using cost-benefit analysis: improvements to valuing the asset through residual value—a case study (.pdf [ESD-WP-2013-21](#))

Other publications, conference papers and presentations

Dopart, C., Häggman, A., Thornberry, C., Mehler, B., Dobres, J. & Reimer, B. (2013). A Driving Simulation Study Examining Destination Entry with iPhone iOS 5 Google Maps and a Garmin Portable GPS System. Proceedings of the 57th Annual Meeting of the Human Factors and Ergonomics Society. San Diego, CA. pp. 1889-1893.

H. Dong, J. Kang, J. Schafer, A. Ganz, "Android based Visual Tag Detection for Visually Impaired Users: System Design and Testing," to appear in International Journal of E-Health and Medical Communications.

"Interactive Web-Based Mapping for Title VI Analysis and Public Transit System Data Management", GIS in Transit Conference, Washington, DC, October 16, 2013.

Konduri, K.C., Ning, Y., Angueira, J., and Pendyala, R.M. Transportation System Modeling in the Information Era: An Application of a Continuous-Time Integrated Transport Modeling Framework for Capturing Activity-Travel Behaviors in Response to Real-Time Traveler Information. Presented at the Conference on Agent-Based Modeling in Transportation Planning and Operations, Blacksburg, Virginia, September 30 – October 2, 2013.

Lerner, N., Chrysler, S., Cooper, J., Jenness, J., Manser, M. & Reimer, B. (2013). On-The-Road Driver Behavior Experimentation: Issues and Approaches (panel). Proceedings of the 57th Annual Meeting of the Human Factors and Ergonomics Society. San Diego, CA. pp. 1914-1917.

"Leveraging big data for equity and efficiency in public transportation systems", Invited Lecture, University of New South Wales Transportation Seminar Series, Sydney, Australia, June 3, 2013.

Mehler, B., Reimer, B., Chahine, N., Levantovsky, V., Matteson, S. & Gould, D. (2013). The Impact of Typeface Design in a Text-Rich Automotive User Interface on Driver Distraction. Presentation at The 3rd International Conference on Driver Distraction and Inattention, Gothenburg, Sweden.

Reimer, B. (2013). The pathway to self-driving vehicles: Disconnects between human capabilities and advanced vehicle systems? Japan International Transport Institute Self-Driving Car Technologies: Challenges for People, Automobile Transportation and Society Seminar, Osaka, Japan. October 21, 2013. [By Video]

Reimer, B. (2013). Tutorial, Understanding Multi-Modal Interfaces. Society for Information Display (SID) Vehicle Displays and Interfaces 2013, Dearborn, MI. (Federal support acknowledged – yes)

Reimer, B. & Mehler, B. (2013). The Effects of a Production Level "Voice-Command" Interface on Driver Behavior: Summary Findings on Reported Workload, Physiology, Visual Attention, and Driving Performance. MIT AgeLab White Paper No. 2013-18A. Massachusetts Institute of Technology, Cambridge, MA.

Reimer, B., Mehler, B., Dobres, J. & Coughlin, J.F. (2013). The Effects of a Production Level "Voice-Command" Interface on Driver Behavior: Reported Workload, Physiology, Visual Attention, and Driving Performance. MIT AgeLab Technical Report No. 2013-17A. Massachusetts Institute of Technology, Cambridge, MA.

Zhang, Y., Reimer, B., Mehler, B., Dobres, J., Pala, S., Angell, L. & Ifushi, S. (2013). An Evaluation of the Visual Demands of Portable Telematics in Young Adult Drivers. Proceedings of the 20th ITS World Congress. Tokyo, Japan.

Websites or other Internet sites

<http://karthikkonduri.weebly.com/projects.html>

<https://code.google.com/p/simtravel/>

<https://sites.google.com/site/dtalite/>

<http://www.thub.uconn.edu>

<http://mzgis.prod.umassd.edu/sop/index.php>

<http://web.mit.edu/hsr-group/index.html>

[Voice Controls Can Be Surprisingly Distracting to Drivers. MIT Technology Review, November 20, 2013](#)

[Survey: Drivers ready to trust robot cars?. CarInsurance.com, November 1, 2013](#)

[Driverless Cars Are Further Away Than You Think. MIT Technology Review, October 22, 2013](#)

[Can Technology Prevent Teen Distracted Driving? Experts Don't See Eye to Eye.](#) [edmunds.com](#), October 11, 2013

[Rise of The Machines.](#) [CNBC](#), September 18, 2013

[Nissan Announces Plans to Release Driverless Cars by 2020.](#) [The New York Times](#), August 29, 2013

Technologies or techniques

Project MITR24-1

Capturing the Relationship between Motility, Mobility and Well-Being Using Smart Phones

We are currently extending the mobile application to support the real-time based approach. In addition, this phase includes several other enhancements such as capturing more features from the mobile phone (e.g. phone call duration, Bluetooth devices in range). These features serve as proxies for different types of social interactions that may affect happiness. We are also finalizing the survey questions and web-interface design for the first pilot (planned for early to mid 2014), planning the first pilot itself, and the deployments as well.

Project MITR24-9

Development of a "Universal" Residential Public Transportation Pass, as Part of a Comprehensive Multi-Modal Approach to Urban Parking

A GIS buffering technique for estimating on-street parking spaces has been adapted from past research collaborations between MIT students and the City of Cambridge.

Project MITR24-10

Big Data During Crisis: Lessons from Hurricane Irene

Transportation outage data was collected from four New England states affected by Hurricane Irene (NY, NJ, NH, VT). Informal interviews were conducted with DOT employees with experience in Hurricane Irene response about the traditional sensor networks and processes employed for detecting failures in the transportation network. Data from transportation agencies was assessed and cleaned in order to compare Twitter data with transportation outage data to determine if Twitter data could have identified issues sooner than other data.

Project MITR24-11

Determining Performance Measures to Evaluate the Effect of High Speed Rail on Communities' Livability

The most significant aspect of our activities on this research project is to create a body of knowledge about the relationship between high-speed rail (HSR) and the urban transportation systems through which people access the high-speed rail intercity mode. It requires a new style of thinking for researchers and also new styles of governance for what we have called *discontinuous regions*. When one develops a mega-region connecting various urban areas, the governance of the nodes on that network – the cities – and the urban transportation systems *within* those cities is a particularly interesting but challenging research issue.

Project UCNR24-28

The Impact of Parking Policies on the Long-term Vitality of American Cities

This study examines the changes in parking supplies, development characteristics, and travel mode shares over the past sixty years in six medium sized cities. In three of these cities, parking supply increased significantly over the study period, while in the other three cities parking supply increased only slightly. The main focus of this work was to illustrate how these changes in parking supplies have affected the tax revenues in each city. A GIS analysis is being used to calculate the tax revenue of all real estate properties in the study area of each city. Tax revenues generated from parking were evaluated and compared to tax revenues from non-parking uses on a proportional basis. The results to date shows that land with surface parking contributes between 4% and 17% of the tax revenue that land with non-parking uses contributed. This preliminary analysis characterizes an important concession involved in devoting large areas of land in the center of a city to surface parking.

Project UCNR24-29

Automated Congestion Prediction with Smart Phones

A smartphone app was developed to collect location information on travelers and transmit this information to a secure database. The phone periodically transmits data to a secure server, where the path of the individual is stored for analysis and modeling. A research protocol to involve human subjects was approved at the end of the Spring 2013 semester. Students have been recruited for experiments to be conducted beginning February 2014. Goals to be met include experiments to collect data with the app developed, development of algorithms to predict mode of travel based on data characteristics, and preparation and submission of a manuscript for the 2015 TRB conference.

Project UCNR24-30

Investigation of Road and Roadside Design Elements Associated with Elderly Pedestrian Safety

We completed field observation and processed the data to prepare them for analysis and have completed preliminary analysis of the data. Our analysis is aimed at identifying how pedestrian phasing design choice at signalized intersections is associated with pedestrian signal compliance and conflicts between Our preliminary findings suggest that exclusive phasing is not necessarily safer for pedestrians in downtown and heavy pedestrian areas. Due to low pedestrian signal compliance and the resulting increased rate of conflicts, it is safer for pedestrians to employ concurrent phasing in these areas. In areas with higher vehicle speeds and lower pedestrian volumes, the current preference for exclusive pedestrian phasing is warranted.

Project UCNR24-31

Transportation System Modeling in the Information Era

The team has completed testing the individual model systems of travel demand – OpenAMOS (Open-source Activity Mobility Simulator) and traffic assignment – DTALite (Open-source Dynamic Traffic assignment) to mimic the travel demand and traffic assignment conditions respectively for the study area – Hartford metropolitan area. Further comprehensive analysis has been performed to examine the outputs from the individual model systems for reasonableness against the baseline conditions. The research team has also designed a framework for modeling the full range of activity-travel decisions that may be exhibited by individuals in the presence of real-time traveler information including pre-trip, en-route, and post-trip decisions.

Project UMER24-34

Regional Credit Trading: Economic and GHG Impacts of a National Low Carbon Fuel Standard

We adapted an existing national simulation model, Transportation Regulation and Credit Trading (TRACT) to examine regional trading of low carbon fuel credits. This new model TRACTR (Regional) has all new data and a completely new regional trading system that looks at trading low carbon fuels at the census tract level.

Other products

Project MITR24-1

Capturing the Relationship between Motility, Mobility and Well-Being Using Smart Phones

We have developed a conceptual approach to a first and second phase implementation of happiness evaluations within a survey platform that we call the Future Mobility Survey (FMS). The FMS is a smartphone-based system that tracks users' trips and activities and detects certain trip attributes such as the mode. Users can visualize their travel and activities as an activity diary on a website where they also have the option to validate their trips and answer further questions (prompted recall survey). The FMS has initially been developed as part of the Future Urban Mobility project of the MIT-Singapore Alliance for Research and Technology (SMART) and is under continuous development as part of other projects as well including this UTC project.

Project MITR24-6

Kendall Square: Lessons Drawn from Its Past Development to Guide Its Future

We have developed models for transport accessibility for the work commute, demand models for Greater Boston describing 1990, 2000 and 2010 conditions, regression models between accessibility and job density per transport mode, system dynamic model of Kendall Square

Development, and a database of commuting patterns for the major job centers in Boston.

Project MITR24-9

Development of a "Universal" Residential Public Transportation Pass, as Part of a Comprehensive Multi-Modal Approach to Urban Parking

Developed models for mapping of Excise Tax data (first of its kind for Cambridge, MA).

3. Participants & Other Collaborating Organizations

Organizations that have been involved as partners

AAA Foundation for Traffic Safety - Financial support

BMW (Germany) - Financial support

Center for Transportation and Livable Systems, Storrs, CT - financial support; facilities.

City of Cambridge, Cambridge, MA - collaborative research (city staff aiding in data retrieval and analysis) and personnel exchanges (project staff have been granted space at city offices to work)

Connecticut Department of Transportation, Newington, CT – financial support

Denso North America - Financial support & In-kind support

East Japan Railway Co. (JR East), Japan – financial support, collaborative research and personnel exchanges (professional staff from JR East enroll as students at MIT and they also visit for extended periods as visiting associates)

Global Automakers – Financial support

Honda North America - Financial support & In-kind support

Idibon, San Francisco, CA - in-kind support and collaborative research (partner's staff work with project staff on the project)

Insurance Institute for Highway Safety - Financial support & In-kind support

IST, Lisbon, Portugal – financial support (via FCT in Portugal), collaborative research and personnel exchanges (through visiting students)

Kyoto University, Graduate School of Global Environmental Studies, International Disaster and Environmental Laboratory. Academic institution in Japan. Provided office space and equipment, expense allowance, collaborative research during field work – May 21-July 13, 2013.

Monotype - Financial support, Collaborative research & In-kind support

NURail, University of Illinois, Urbana-Champaign – financial support and collaborative research

Subaru Research and Development, Inc. - Financial support

Takata (Germany) – Financial support

Toyota North America - Financial support & In-kind support

University of Massachusetts, Dartmouth, Massachusetts - the postdoctoral fellow supported on this project continues to partner with project staff on the project.

VTT – Technical Research Centre of Finland, Espoo, Finland - collaborative research on pedestrian safety and ITS.

Other collaborators or contacts that have been involved

Birsen Donmez (University of Toronto) Canada – publication collaboration

Volvo Cars (Sweden) – data acquisition and driver behavior analysis

4. Impact

The impact on the development of the principal disciplines of the program

Project MITR24-4

Spoken Dialog Planning to Reduce User Distraction in Mobile Environments

Studies showed that the problem of driver distraction is more complicated than previously known. Automotive control systems that are designed to keep drivers' hands on the wheel may sometimes actually lead people to take their eyes off the road. Modern vehicle control systems are highly multi-modal, placing demands on the driver's attention in multiple ways, including visual, manual and auditory senses, among others a number of human factors design challenge exist as technology developers try to find a balance across these demands to optimally support drivers of differing capabilities and preferences.

Project MITR24-9

Development of a Universal Residential Public Transportation Pass, as Part of a Comprehensive Multi-Modal Approach to Urban Parking

As part of the Universal Pass research project, the research team is studying the current and future environment of parking supply, demand and policy in Cambridge, MA. To understand the current state of residential parking supply and demand, we have completed the following tasks: the mapping of Cambridge vehicle ownership at the parcel level with 2013 excise tax data and GPS address points; the mapping of Cambridge off-street residential parking supply at the parcel level with 2013 Tax Assessing data; and the mapping of Cambridge parking policy with Residential Parking Permit data on the neighborhood scale (only available scale).

Project MITR24-11

Determining Performance Measures to Evaluate the Effect of High Speed Rail on Communities' Livability

Commenting on the principal disciplines of this program is especially interesting in the context of this particular research project, because the kinds of issues we are researching are inherently interdisciplinary in content and approach. So while we advance the field of transportation, we do that in a context of a deeper understanding of regional economics, land use planning and other related fields. A good analogy can be made to sustainability as a concept that involves economic development, environmental protection and social equity with each of those goals requiring different quantitative as well as qualitative approaches that are nonetheless integrated. In essence, that's what we are trying to create in this research.

Project HVDR24-12

Disaster Recovery for Transportation: China's Wenchuan Earthquake of 2008 and Japan's Tohoku Earthquake and Tsunami of 2011

Extensive field work relevant to this project was carried out in Japan from May 21-July 13, 2013. More than 35 interviews were conducted with policy makers in national ministries, three prefectural governments, and four municipalities impacted by the tsunami.

Project HVDR24-14

Cell Phones and Vehicle Safety

We have collected traffic data with detailed geographic and time information, and with the help of PhD student Jameson Toole, we have paired this data with local cell phone usage data at the hourly level. Using this data, we've produce initial estimates relating cell phone usage on the road with the probability of an accident. We are now in the process of refining those estimates, and deepening the research to discover under what conditions cell phone usage has the largest effect.

Project UMAR24-15

A Person-based Comparison of Transit Preferential Treatments on Signalized Arterial Corridors

The research offers guidance on choosing transit preferential treatments for various traffic and transit operating conditions in urban multi-modal transportation systems; allows us to determine the best preferential treatment to be implemented that will improve person mobility and the reliability of transit service without compromising the performance of cars too much. More reliable transit operations improve its economic competitiveness, which along with improved efficiency of traffic and transit operations can lead to enhanced air quality and more livable urban areas.

Project UMAR24-25

Reducing Older Driver Crashes: Technology, Training and Livable Communities

The development of mobile-capable training for older drivers will allow for much wider and cost-effective dissemination. In the past, simulator-based training for older drivers has been shown to be highly effective in improving older drivers' scanning for hazards – especially in intersections where they are most at risk. The primary research question is whether this same training, delivered on a smaller, more compact and lower cost interface is as effective as simulator-based training.

Project UMAR24-27

Security & Privacy Breaches in ETPS: Problem Survey & Case Study of I-90

Education of ETPS breach attributes is lacking in the professional community. Only recently have experts defined breach types and their attributes. By providing agencies access to the database, awareness of the problem will increase and possibly stimulate discussion about possible protective measures and solutions. Running simulations of tolling facilities with various lane configurations, patterns and with various buffer zone sizes, adds to the knowledge and understanding of traffic flow through electronic toll collection plazas and determine best design practices.

Project UCNR24-32

t-HUB: Connecticut Public Transport Data Hub

The results of this research will have profound impacts on the management of transit data and the usage of data in public transit planning and operations. In particular, the t-HUB database and webtool will create a centralized repository of the network, demographic and socio-economic data necessary to perform equity and environmental justice analysis by transit planners and operators. Furthermore, the repository will create a valuable resource for students and researchers looking for living laboratory opportunities – that is, opportunities to test their methods, techniques and technologies on real data from real transit systems.

The impact on other disciplines

Project MITR24-6

Kendall Square: Lessons Drawn from Its Past Development to Guide Its Future

The two theses produced by this research project should be of interest to transport planners, urban planners and those focused on economic development projects.

Project MITR24-11

Determining Performance Measures to Evaluate the Effect of High Speed Rail on Communities' Livability

The *CLIOS Process*, developed at MIT by Prof. Joseph Sussman's research group, is an approach that can be used across many disciplines. So the research we are doing here using the CLIOS Process can be used for different applications. The Process in the past has been used to study the provision of broadband access in Kenya, a developing country. We have also studied Cape Wind, an offshore wind farm in New England as well as air combat from a strategic and tactical perspective. So we are hopeful that as the Process matures, it will be used in quite disparate disciplines and that further applications will emerge.

Project UMAR24-25

Reducing Older Driver Crashes: Technology, Training and Livable Communities

The training developed for this program has implications for driver training in other at-risk groups including teenage drivers and drivers recovering from brain injury, as well as driving for professional services such as police, fire fighters, EMTs and commercial drivers.

Project UMAR24-27

Security & Privacy Breaches in ETPS: Problem Survey & Case Study of I-90

Other electronic payment systems other than transportation will benefit by stimulating discussion about possible protective measures and solutions similar to those adopted by ETPS.

Project UCNR24-32

t-HUB: Connecticut Public Transport Data Hub

Both computer science and geography stand to benefit from this project, as it will serve as an example of a successful collaboration between civil engineering, computer science & engineering and geography.

The impact on the development of transportation workforce development

Project MITR24-10

Big Data During Crisis: Lessons from Hurricane Irene

Informal training on Natural Language Processing techniques for analyzing twitter data is being completed in January 2014.

Project UMAR24-27

Security & Privacy Breaches in ETPS: Problem Survey & Case Study of I-90

By creating a database of news articles reporting breaches, University Transportation Programs can begin to include awareness and “lessons-learned” in their curriculum. Transportation Agencies are demanding a workforce that is trained in Information Technology that includes skills that protect electronic payment systems from torture breaches.

Project UMER24-34

Regional Credit Trading: Economic and GHG Impacts of a National Low Carbon Fuel Standard

This research project provided for the professional training of a MS student, Nadeesha Thewarapperuma, who assisted on data collection and research on the above noted project LCFS as well as her MS in Resource Economics and Policy, August 2013. Thesis: "Park Aid Systems: Factors That Affect Consumer Purchase Decisions."

Project UCNT24-46

LTAP/TTAP Core Competency Development and Pilot

The New England Workforce Development summit held in Boston, MA on September 26-27 provided a significant professional learning opportunity for all participants. The breakout session on professional learning was very successful and provided a diverse group of transportation professionals an opportunity to learn from each other's challenges/successes. The Connecticut workforce development roundtable discussion engaged CT stakeholders in considering workforce development priorities and strategies for the future. The new CT WD listserv will provide a continuing opportunity to learn from colleagues in the transportation community.

The impact on physical, institutional, and information resources

Project UMAR24-15

A Person-based Comparison of Transit Preferential Treatments on Signalized Arterial Corridors

A ten-intersection signalized arterial of San Pablo Avenue in Berkeley, CA has been built in the simulation software Aimsun and can become available to other researchers in the University. Several modifications of the existing arterial and signal control system have been coded, namely: additional exclusive bus lane, replacement of an existing lane with an exclusive bus lane and insertion of queue jump lanes as well as time preferential treatments such as transit signal priority for which we used the module provided by the Aimsun software.

Project UMAR24-24

Modeling Drivers' Lateral Motion Control

Experiments of this research can add to the existing facility at the University—the Regional Traveler Information Center—and allow it to be more functional.

Project UMAR24-27

Security & Privacy Breaches in ETPS: Problem Survey & Case Study of I-90

Additional software and computer laboratories will be required for a new curriculum that provides

students with skills that will protect ETPS.

Project UCNR24-29

Automated Congestion Prediction with Smart Phones

The data collected on travel around the university will enable transportation models for the local area and can serve as input to future transportation planning projects.

The impact on technology transfer

Project MITR24-4

Spoken Dialog Planning to Reduce User Distraction in Mobile Environments

Presentations are scheduled at the SAE Government and Industry Meeting, January 2014 and Life Savers, 2014.

Project MITR24-8

Technology Adoption and Use Across the Lifespan

A manuscript has been submitted for review to Ergonomics and we are in the process of revising the manuscript based upon reviewer comments.

Project HVDR24-12

Disaster Recovery for Transportation: China's Wenchuan Earthquake of 2008 and Japan's Tohoku Earthquake and Tsunami of 2011

Project results have been presented in Dr. Howitt's Harvard University Extension School course, *Disaster Relief and Recovery*, and in a lecture at Kyoto University, "Perspectives on Disaster Recovery" (June 2013).

Project HVDR24-14

Cell Phones and Vehicle Safety

We prepared an abstract and proposal for the conference "Humanitarian Technology: Science, Systems, and Global Impact 2014". (<http://www.humanitariantechnology.org/>) This conference will draw many of the experts in this field. Our project was accepted for the conference and for the peer-reviewed conference proceedings. We have also presented initial results at research workshops at the Harvard Kennedy School, Boston Federal Reserve, and Northeastern. We've also discussed this project and other cell-phone related projects with the Gates Foundation, which is interested in funding this type of research.

Project UMAR24-27

Security & Privacy Breaches in ETPS: Problem Survey & Case Study of I-90

This new field will result in transportation consulting agencies that provide protection services to transportation agencies using ETPS. Cryptology and other protective measures on newly developed smart cards and toll transponders will be developed.

Project UCNR24-28

The Impact of Parking Policies on the Long-term Vitality of American Cities

Technical presentations were made at TRB, to the city of Buffalo, NY, to the Hartford Area Business Economists, and to the National Endowment of the Arts – Mayor's Institutes. One lecture was given at MIT and the Danish Technical University, and four class lectures were given at the University of Connecticut.

Project UCNR24-31

Transportation System Modeling in the Information Era

All project material and products including reports, software, and results will be disseminated for public use. However, data for the project was obtained from Capital Region Council of Governments (CRCOG) which is the metropolitan planning organization for the Hartford metropolitan area. Therefore, data utilized in the effort may be made available to interested individuals after consultation with CRCOG.

Project UCNR24-31

Transportation System Modeling in the Information Era

Preliminary findings from the research including the proposed framework have been presented at the Conference on Agent-Based Modeling in Transportation Planning and Operations scheduled to run from September 30 through October 2, 2013 in Blacksburg, Virginia. The team has also submitted an abstract to the Innovations in Travel Demand Forecasting to be held in Baltimore, Maryland from April 27-30, 2014 which currently under review. If selected, the authors will present a draft of the final results at the conference.

Project UCNR24-32

t-HUB: Connecticut Public Transport Data Hub

A presentation was given at GIS in Transit conference, October 2013 and also at the American Association of Geographers annual meeting in Los Angeles, CA in April 2013. A second workshop for transit operators and regional planners was held February 7, 2013. This workshop, funded through the Connecticut DOT was affiliated with t-HUB and dealt with Title VI reporting requirements to FTA. A third workshop has been scheduled for fall 2014.

Project UCNT24-46

LTAP/TTAP Core Competency Development and Pilot

The establishment of a New England Regional Framework for Transportation workforce development could be critical in providing opportunities to link education and training to workforce development policies and programs. Having University research representation in these discussions, provides added opportunity to transfer the latest in technologies to the workforce of the future.

[The impact on society beyond science and technology](#)

Project MITR24-9

Development of a Universal Residential Public Transportation Pass, as Part of a Comprehensive Multi-Modal Approach to Urban Parking

As part of the Universal Pass research project, the research team is studying the current and future environment of parking supply, demand and policy in Cambridge, MA. We've noted establishing trends over time for vehicle ownership, population, household size and other socio-demographic indicators to evaluate scenarios for the future state of residential parking supply and demand. This is demonstrated in the following completed task: the mapping of Cambridge parking policy permeation with Residential Parking Permit data over time on the neighborhood scale (only available scale).

Project MITR24-9

Development of a Universal Residential Public Transportation Pass, as Part of a Comprehensive Multi-Modal Approach to Urban Parking

We are establishing likely scenarios for Cambridge's future development, land uses and transportation systems. Based on these scenarios, what are the likely challenges to achieving a future Cambridge which is socially equitable, environmentally responsible and economically successful? What policy and institutional interventions, including a Universal Pass program, can help the City of Cambridge overcome these challenges?

Project MITR24-11

Determining Performance Measures to Evaluate the Effect of High Speed Rail on Communities' Livability

The impact on society of this research beyond science and technology can be profound. One would hope, for example, that we are able to create surface transportation systems that are truly sustainable in the 3Es manner described above. That is, economic growth, environmental protection and social equity will all be advanced if the results of this study – concerned with intercity rail access and its interface to urban transportation – leads to implementation. One could imagine changing travel behavior; in the US people tend not to think of trains as the intercity mode of choice, but perhaps this research can help change that. Understanding how policies and decisions are made in both the private and public sector – using this research as a case study – can advance “public knowledge attitudes, skills and abilities.”

Project UMAR24-15

A Person-based Comparison of Transit Preferential Treatments on Signalized Arterial Corridors

Designing efficient transit preferential treatments that improve transit operations and person mobility in congested urban areas is expected to improve the reliability of transit service. This could potentially encourage more travelers to use the transit service, which would lead to reduced congestion, time spent traveling, and air pollution. In general, it is expected to improve the livability of large metropolitan areas.

Project UMAR24-18

Hybrid NFC and Vision Based Navigation System in Subways for the Blind and Visually Impaired

This technology may help the blind and visually impaired navigate through unfamiliar indoor spaces.

Project UMAR24-25

Reducing Older Driver Crashes: Technology, Training and Livable Communities

Driving instructors and occupational therapists who work directly with older drivers would be the primary target audience for such training. Therapists could prescribe training programs for those drivers they believe would benefit from additional remediation of driving skills.

Project UMAR24-27

Security & Privacy Breaches in ETPS: Problem Survey & Case Study of I-90

By developing the website containing news reports of ETPS breach events, concerned transportation, transit and tolling agencies have improved their awareness of ETPS security vulnerabilities.

Furthermore, the use of ETPS will create more efficient operations at toll plazas, parking areas and other electronic transportation facilities. Capacity of these facilities will increase.

Project UCNR24-29

Automated Congestion Prediction with Smart Phones

The data collection tool developed will enable new transportation models that more accurately predict travel behavior. This will enable more efficient use of transportation infrastructure.

Project UCNR24-32

t-HUB: Connecticut Public Transport Data Hub

The focus of early applications of t-HUB has been on equity analysis for large transit operators. This application stands to benefit society by providing decision support and data analysis for assessing the equity in service provision.

5. Changes/Problems

Changes in approach

Project UMAR24-22

Evaluating the Effects of Integrated Training on Minimizing Driver Distraction

We have had some challenges with identification of the appropriate platform from which to make the training available. A secure web-based platform will allow for great access to the training. We have, as a result, established a Moodle research page that will allow us to assign guest access to study participants.

Additional information regarding Products and Impacts

Outputs

Project UCNR24-31

Transportation System Modeling in the Information Era

The main products resulting from the research project are software prototypes. The software

prototypes will be made available under open-source licensing agreements for anyone to access and use for their own modeling needs.

Project UCNR24-32

t-HUB: Connecticut Public Transport Data Hub

A prototype database architecture and initial software prototype are completed and have been demonstrated to Connecticut DOT and presented at the University of Queensland, Monash University and the University of New South Wales. At the end of this project we will have a public transit database and a prototype of NetWare designed to access the database through an intuitive GIS-based graphical user interface.

Outcomes

Project MITR24-11

Determining Performance Measures to Evaluate the Effect of High Speed Rail on Communities' Livability

We believe that the results of this research will ultimately lead to a deeper understanding among researchers as well as the general public of the multidimensional transportation issues we face. We believe the processes we are using in this research can generally be applied more generally in the field of transportation.

Project UCNR24-29

Automated Congestion Prediction with Smart Phones

Expected outcomes include pervasive data collection procedures for analysis and development of transportation models.

Project UCNR24-32

t-HUB: Connecticut Public Transport Data Hub

We have the GTFS translator tool in development, which will allow the application of newly developed tools to a broader set of networks. We will then finalize the application of all tools to statewide equity analysis.

Impacts

Project MITR24-11

Determining Performance Measures to Evaluate the Effect of High Speed Rail on Communities' Livability

Our hoped-for impacts – “longer term fundamental changes” – will be a generally enhanced and sustainable transportation system. We believe our research can have impact of cities, on the development of economically viable mega-regions and improved environmental impact of the transportation system with respect to air quality and global climate change.

Project UCNR24-29

Automated Congestion Prediction with Smart Phones

Intended impacts include more accurate models of transportation networks, which will enable the efficient use, management, and growth of transportation networks.

6. Special Reporting Requirements

Nothing to report