

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

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**Project Title**

University Transportation Centers Program - Region 1

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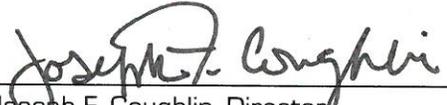
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## REPORTING CATEGORIES

### 1. Accomplishments

#### 1A. Research Projects

##### 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 37 research projects under this grant, and their current status:

Project No.	PI	Project Title	Status
MITR25-1	Abou-Zeid Ben-Akiva	Capturing the Relationship between Social Interaction and Travel Behavior Using Smart Phones	completed
MITR25-2	Caplice Caballero	High-Resolution Urban Freight Modeling in Cambridge, MA	completed
MITR25-3	Coughlin	Assessing Navigability and Livability of Public Transportation Systems	active
MITR25-4	Ellis Lavalliere	Transportation Workforce Health and Wellbeing	completed
MITR25-5	D'Ambrosio	Understanding the Adoption of and Education about New Auto Technologies among Older Adults	completed
MITR25-6	Frazzoli	Modeling the Impact of One-Way Car Sharing: An integrated data- and optimization-driven approach	completed

MITR25-7	Goentzel	Stochastic Analysis of Logistics Capacity in Disaster Response Networks	completed
MITR25-8	Gonzalez	Coupled Mobility Networks: A Data Driven Approach	completed
MITR25-9	Isaacson	Out and About in New England: Maintaining Active Life styles in Later Life	completed
MITR25-10	Lee	Effectiveness of Various Information Channels on User Training and Learning in Automobiles	completed
MITR25-11	Osorio	Optimal Road Traffic Operations for an Increasingly Autonomous and Connected Vehicle Fleet	completed
MITR25-12	Pentland Shmueli	Incentivizing Safer Driving Using Peer-Pressure	completed
MITR25-13	Reimer Dobres	Assessing the Effect of Typography on In-Vehicle Glance-Like Reading Across the Lifespan	completed
MITR25-14	Salvucci Murga	MALL Transit and Wider Economic Benefit Assessment	completed
MITR25-15	Sussman	Hub Stations As Catalysts for Regional Growth: The Case of New York Penn Station	completed
MITR25-16	Trancik	From Trip Data to the Energy Requirements of Personal Vehicle Travel	completed
MITR25-17	Zegras Pereira	Scenario Discovery for Resilient Urban Systems (or, The Future is "Big Data")	completed
MITR25-18	Zhao	Humanizing Travel: How E-hail Apps Transform Stakeholder Relationships in Taxi Services	completed

HVDR25-19	Glaeser	Transportation Stimulus Spending and Long Term Unemployment	completed
HVDR25-20	Gomez-Ibanez Fagan	The Experience with Managed Toll Lanes	completed
HVDR25-21	Howitt	Recreating Livable Communities after Catastrophe: Managing the Recovery from Japan's Earthquake, Tsunami, and Nuclear Disaster of 2011	completed
HVDR25-22	Mayne	The Politics of Transport Policy in the Greater Copenhagen Region, Part 2	completed
HVDR25-23	Shoag	The Local Effects of the American Recovery and Reinvestment Act on Economic Activity and Traffic Safety	completed
UMAR25-24	Christofa Knodler	Operational and Emission Analyses of Roundabouts under Varied Vehicle and Pedestrian Demands	completed
UMAR25-25	Fisher Knodler Zafian	Evaluating the Effect of Google Glass on Driver Distraction	completed
UMAR25-26	Gao	Routing Policy Choice Models in Stochastic Time-Dependent Networks: The Stockholm Case Study	completed
UMAR25-27	Gonzales	Route Choice in Congested Grid Networks	completed
UMAR25-28	Knodler Fisher	A Driving Simulator Evaluation of Driver Distraction and Traffic Control Device Comprehension for At-Grade Railroad Crossings	completed
UMAR25-29	Krishnamurty	An Innovative Design to Retrofit Seatbelts in Motorcoaches	completed
UMAR25-30	Ni Wang	Supplementary Vehicle Positioning to Connected Vehicles	completed
UCNR25-31	Atkinson- Palombo Garrick	A Multi-Scalar Model to Identify the Causes of Decreased Vehicle Miles Traveled (VMT) in the United States	completed

UCNR25-32	Garrick Atkinson-Palombo	Factors Contributing to the Decrease in Traffic Fatality Rates for Young People in America	completed
UCNR25-33	Ivan Ravishanker Townsend	Social Network Effects on Attitudes about Pedestrian Street Crossing Behavior	completed
UCNR25-34	Konduri Dalal	Exploration of Human Psychological Factors Underlying Mobile Phone Usage Behaviors while Driving	completed
UCNR25-35	Lownes	Clustering Algorithms for Transit Network Design	completed
UMER25-36	Garder	Deficient Bridges and Safety Information	completed
UMER25-37	Rubin Garder	Automated Vehicles: Economic Incentives for Environmental Benefits and Safety	completed

**Accomplishments under the New England UTC’s research goal**

**Dr. Coughlin Named a 2018 World Mind  
May 23, 2018**

UTC Director Joseph Coughlin was recognized as a World Mind and selected as a keynote speaker at the WORLD.MINDS 12th annual symposium in Zurich, Switzerland. WORLD.MINDS is a community of leaders in science, arts, and business which meets once a year in Zurich, Switzerland, for an annual closed-door symposium. Twelve international thought leaders were named World Minds in 2018. The topic of the 2018 symposium was mobility. Dr. Coughlin spoke about disruptive demographics, a rapidly aging population, a falling birthrate, and a delayed ascent into adulthood for post-adolescent Millennials.

**Project MITR25-7  
Stochastic Analysis of Logistics Capacity in Disaster Response Networks**

Additional model enhancements were created in April and May, and preliminary solution analysis occurred in June and July. The added scenarios that will be run for a proposed future academic journal submission. A half-day webinar is being planned for the final dissemination of the new models. Also, we are making a presentation at PREPtalks, a FEMA event for new perspectives for emergency managers to be held in Washington, DC .

**Project MITR25-16  
From Trip Data to the Energy Requirements of Personal Vehicle Travel**

This project led to two distinct deliverables: (1) a parametrized emissions and cost model that allowed us to understand and compare the lifecycle emissions and costs of ownership of current light-duty vehicles on the market across all technologies and sizes, as well as the

impact of various parameters on these metrics; and (2) a model for highly resolved electric and conventional vehicle energy consumption across the United States that allowed us to better understand personal travel needs in the context of electric vehicle battery capacity and power system impact.

### **Project HVDR25-22**

#### **The Politics of Transport Policy in the Greater Copenhagen Region, Part 2**

This project resulted in a potential number of scholarly contributions. The first is to research on sustainable transportation in the Greater Copenhagen Region. We aimed to overcome the “under-theorization” and “under-testing” of politics that is present in existing research in this area. The second is to European urban politics research. Our goal was that the approach, rooted in comparative historical institutionalism, would serve as an exemplar for Europeanists working on urban politics. Third, we wanted to make an important contribution to comparative political science research. Overwhelmingly scholars of comparative political science focus on the national level and use countries as their primary unit of analysis. Moreover, transportation and mass transit are rarely an object of study among comparative political scientists. Our goal was that this project showed the analytic and normative merits of having the local and subnational as the unit of analysis and transportation policy as the outcome variable of interest.

### **Project UMAR25-26**

#### **Routing Policy Choice Models in Stochastic Time-Dependent Networks: The**

A case study was conducted in Stockholm, Sweden and data for the stochastic time-dependent network was generated from hired taxi Global Positioning System (GPS) readings. A latent-class Policy Size Logit model was specified, with routing policy users who follow routing policies and path users who follow fixed paths. Estimation results show that the routing policy user class probability increases with trip length, and the latent-class routing policy choice model fits the data better than a single-class path choice or routing policy choice model. This suggests that travelers are heterogeneous in terms of their ability and/or willingness to plan ahead and utilize real-time information, and an appropriate route choice model for uncertain networks should take into account the underlying stochastic travel times and structured traveler heterogeneity in terms of real-time information utilization.

### **How the New England UTC’s research results have been disseminated**

#### **Bryan Reimer Gives TEDx Talk on Future of Autonomous Vehicles**

**July 18, 2018**

UTC Research Scientist Bryan Reimer spoke at a TEDx event in Waltham, MA about the challenges ahead for making vehicles safer and what solutions are most sensible.

Road traffic injuries are the 8<sup>th</sup>-leading cause of death worldwide. Over 1.25 million fatalities and 50 million non-fatal injuries occur per year globally. By many measures, traffic accidents represent a vastly undertreated public health crisis. In the long run, automated and driverless vehicles will improve roadway safety. The question is, can we work together to successfully accelerate the process of addressing this public health crisis?

### **Project MITR25-7**

#### **Jarrold Goenzal gives presentation at PREPTalks**

PrepTalks Education Series is an educational video series for emergency management professionals across the United States. Presentation showcase cutting-edge research or relevant experience of value to emergency management to spread ideas, spark conversation, and promote innovation in the

emergency management field. The presentation will be in-person before a live audience and will be filmed with sound and edited for posting on the internet for public access.

**Project UCNR25-35**

**Clustering Algorithms for Transit Network Design**

The project was represented in the University of Connecticut 2016 National Summer Transportation Institute held on the UConn campus in June 2016, funded by the Federal Highway Administration. Eighteen high-school students from across Connecticut participated in a week-long residential program in Storrs, CT learning about transportation careers and seeing results from several ongoing research efforts, including UNCR25-35. In 2018, researchers requested software developed as part of this project for their research activities, expanding the footprint of this research.

**Plans during the next reporting period to accomplish the New England UTC's research goal**

No change on our major goals contained within our approved Application.

## **1B. Education Projects**

### **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 2 education projects under this grant, and their current status:

<b>Project No.</b>	<b>PI</b>	<b>Project Title</b>	<b>Status</b>
HVDE25-38	Howitt	Teaching Case Study on Korea Ferry Disaster of April 2014	completed
HVDE25-39	Davis Altshuler	Transforming Urban Transport: A Set of Case Studies	completed

### **Accomplishments under the New England UTC's education goal**

#### **Project MITR25-16**

##### **From Trip Data to the Energy Requirements of Personal Vehicle Travel**

This work has produced one patent and seven academic publications, one of which won the best paper award by the Transportation Research Board (and appeared in the Transportation Research Record: Journal of the Transportation Research Board). The research has generated news coverage in the New York Times, Washington Post, Guardian, and NPR, among other outlets. The research has also been presented at numerous conferences, including to policy makers and businesses. The public website we developed [Carboncounter.com] continues to attract visitors and media coverage since its launch, and is also being used in university courses in various countries.

#### **Project HVDR25-21**

##### **Recreating Livable Communities after Catastrophe: Managing the Recovery from Japan's Earthquake, Tsunami, and Nuclear Disaster of 2011**

Dr. Howitt incorporated research findings from the project into the curriculum of two Harvard Extension School graduate courses ("Disaster Relief and Recovery" and "Crisis Management and

Emergency Preparedness”) and a suite of Harvard Kennedy School Executive Education programs for professionals working in emergency management, homeland security, the military, and related fields. All of these courses were offered annually throughout the duration of this project.

### **Project HVDE25-39**

#### **Transforming Urban Transport – The Role of Political Leadership (TUT-POL)**

Among research on urban transportation, TUT-POL is most distinctive for its emphasis on, and its thorough treatment of, the political dimensions of the policy decision-making process. The products of this research have proven highly valuable in the education of planners, transportation professionals, policy makers. Graduate students of Urban Planning, Public Policy and Administration, Education, and Engineering alike have demonstrated interest in and enthusiasm for our case studies, as have practitioners of urban transport, land use planning, and urban governance situated in urban and regional contexts ranging from Los Angeles to Boston to Tallinn, Estonia to Dakar, Senegal. Many have shared remarks that they have generated useful information and insights from the 2-page case study briefs summarizing each TUT-POL transport initiative and political story, as well as political strategies and tactics that were used to make the transportation initiatives possible.

### **How the New England UTC’s education results have been disseminated**

### **Project HVDE25-39**

#### **Transforming Urban Transport – The Role of Political Leadership (TUT-POL)**

This project, hosted at the Harvard Graduate School of Design (GSD), has developed a collection of 8 case studies of significant transportation innovations recently implemented in democratically governed cities across the world. Also, we have held webinars, brown bag discussions, and conference events to expand the scope of findings and implications outside of our case study cities and apply our strategies and tactics to other places around the world. Finally, the 30-page project summary, which we recently published and disseminated at the annual ITDP Mobilize summit, held in Dar es Salaam this year (June 2018), were highly popular among transport experts, activists, and researchers in attendance such that we ran out of copies half way into the event.

Our book, which is being published by Oxford University Press (Fall 2018), is well suited to be adopted as course reading by pedagogical audiences, including instructors and students affiliated with disciplines such as urban policy, urban planning, urban governance, public policy and management, urban design, transportation and civil engineering, economics, political science, comparative politics, urban sociology, and environmental or sustainability science. As an early indication, several of the cases included in the book have already been discussed in classes offered at Harvard University as well as at Northeastern University and Boston University.

## **1C. Technology Transfer Projects**

### **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	Status
MITT25-43	Coughlin	MIT Centralized Technology Transfer Initiatives	completed
UMAT25-44	Collura	UMass Centralized Technology Transfer Initiatives	active

### **Accomplishments under the New England UTC's technology transfer goal**

#### **Project UMAT25-44**

##### **UMass Centralized Technology Transfer Initiatives**

The focus of this initiative is on workforce development and technology transfer.

The first Northeast/Mid-Colonial ITE Student Leadership Summit was held at UMass/Amherst in April 2018. The three day event was organized by the ITE/UMass student chapter. The program included: Career Advice Panels, Leadership Development Sessions, the Northeastern District Traffic Bowl Competition, Interview & Resume Workshops, Technical Sessions, and Workshop Presentations.

UMass Students attended the 2018 ITE Northeastern District Annual Meeting held in May. Seven students participated in the poster sessions.

UMass Students participated in the MAITE/NEITE annual meeting held in September 2018. The program included the following sessions: "Smart Cities: Land Development Patterns, Site Design, and Autonomous Vehicles"; "Transit Signal Priority and Bus Rapid Transit"; and "Morrissey Boulevard DCR Improvements".

Faculty, staff and students organized and participated in the 2018 MassDOT Innovation & Mobility Exchange Conference held in April 2018. The two day conference attracted a total of 1,125 attendees. Sessions included, among others, the following: "Drones Part 1 - DOT Applications and Best Practices"; "Strategies for Effective Bus Lane Management"; "Inland Climate Change Impacts and Response Plans"; "Latest Developments in Pavement Research"; "Use of Modeling to Develop Safety Barriers for Bridges"; "Addressing Community Transportation Needs in Rural Areas"; "Safe Driving for Seniors and People with Disabilities"; and "Autonomous Vehicle Plenary".

Students/faculty/staff participated in six UMass/Amherst Transportation Engineering Program

seminars. The topics were: “Zero-Emission Transit Bus and Refueling Technologies and Deployment Status: a Review Across U.S. Transit Agencies” (speaker - Aikaterini Deliali, MS candidate, UMass/Amherst); “Incorporating Biking in a Car-Dominated Environment: Comparison of the three attempts and three successes” (speaker - Dr. Anne Lusk, Research Scientist, Harvard T.H. Chan School of Public Health); “Cooperative Platoon Control for a Mixed Traffic Flow Including Human Drive Vehicles and Connected and Autonomous Vehicles” (speaker - Dr. Lili Du, Associate Professor, University of Florida); “Complete Streets – Transportation Equity for Gateway Cities” (speaker - Nicolás H. Bosonetto, PE Project Manager, VHB); and “Big Data, Intelligence to Optimize Transport Planning and Operations Decision-Making” (speaker - Amy Lopez, Director Public Sector Services, INRIX).

During the Fall semester 2018, UMass, Amherst again offered a course in transportation aviation, “Application of Unmanned Aerial Systems”.

An upgrade to the Air Traffic Control Simulator installed in the UMass Transportation Center (UMTC) in the Department of Civil and Environmental Engineering, in the College of Engineering is in process. This will upgrade the UMass ATTower Tower Simulator to a 360° visual system from a 180° system.

The UMTC organized five Governor’s Commission on the Future of Transportation Listening Sessions held in May – July, 2018. Governor Charlie Baker created a Commission on the Future of Transportation in the Commonwealth to explore anticipated changes in technology, climate, land use, and the economy, and advise the Administration on factors likely to impact transportation between 2020 and 2040. This work was conducted through a robust grounding in facts and trends, development of plausible future scenarios, and formulation of recommendations to the Governor, Lieutenant Governor, and other key decision makers. The Commission, in partnership with MassDOT and the UMTC, hosted a series of five listening sessions to capture ideas and discuss policy, and take questions and comments. The sessions were held at UMass/Amherst, Clark University, UMass/Lowell, UMass/Boston, and UMass/Dartmouth. Speakers included faculty from UMass/Amherst, UMass/Boston, UMass/Lowell, UMass/Medical, Dartmouth College, and Worcester Polytechnic Institute. Members of the public were invited to attend and share their thoughts on the following topics: “Autonomous and Connected Vehicles”; “Transportation Electrification”; “Transit, Active Transportation and Mobility Services”; “Land Use and Demographic Trends”; and “Climate and Resiliency”.

## 2. Products

### Journal publications

Bertolaccini, K. and N. Lownes (in review) Measuring and Mapping transit opportunity: an expansion and application of the Transit Opportunity Index, *Journal of Transport Geography*.

Ding-Mastera, J., Gao, S., Jenelius, E. and Ben-Akiva, M. A Latent-Class Adaptive Route Choice Model in Stochastic Time-Dependent Networks. *Transportation Research Part B*. Under 2<sup>nd</sup> Review.

Khalighi, F., and Christofa, E. A Cellular Automata Model for Roundabouts: An Environmental and Operational Assessment in Multimodal Environments. [in preparation]

Wei, W., Needell, Z.A., Ramakrishnan, S., Trancik, J.E. Potential for increasing electric vehicle adoption through charging infrastructure expansion *[in preparation]*.

### Books, dissertations, or one-time publication

Nothing to report

### Other publications, conference papers and presentations

Nothing to report

### Websites or other Internet sites

Nothing to report

### Media

Nothing to report

### Technologies or techniques

Nothing to report

### Inventions, patent applications, and licenses

Nothing to report

**Other products**

Nothing to report

**3. Participants & Other Collaborating Organizations**

**Organizations that have been involved as partners**

Nothing to report

**Other collaborators or contacts that have been involved**

Nothing to report

**4. Impact**

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

Nothing to report

**The impact on other disciplines**

Nothing to report

**The impact on the development of transportation workforce development**

Nothing to report

**The impact on physical, institutional, and information resources at your university or other partner institutions**

Nothing to report

### **The impact on technology transfer**

Nothing to report

### **The impact on society beyond science and technology**

Nothing to report

## **5. CHANGES/PROBLEMS**

Nothing to report.

### **Additional information regarding Products and Impacts**

Nothing to report

### **Outputs**

Nothing to report.

### **Outcomes**

Nothing to report.

### **Impacts**

Nothing to report.