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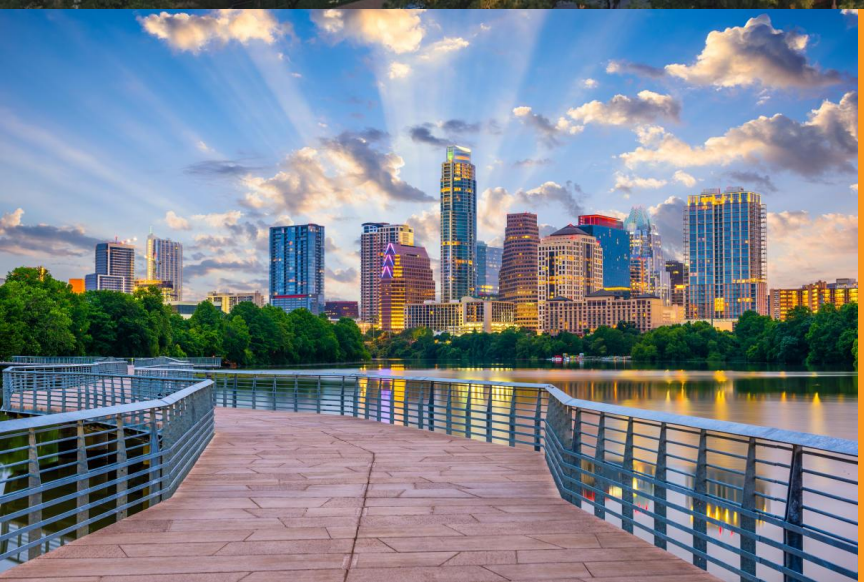

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PRAESIDIUM

DISCIPLINA

CIVITATIS

Dr. Gian-Claudia Sciara

CM² Cooperative Mobility for Competitive Megaregions

Gian-Claudia Sciara is Assistant Professor of Community and Regional Planning and Fellow of the Hampton K. and Margaret Frye Snell Endowed Chair in Transportation. She researches and writes about transportation planning, policy, and decision making, particularly as relates to transportation finance and to connections between transportation and land use. Regional transportation institutions are a longstanding focus of her work.

Dr. Sciara's current research assesses the extent to which metropolitan planning organizations represent broad modal interests, including regional airports and transit operators, and to what extent these regional organizations pursue integrated land use and transportation planning to reduce reliance on cars and decrease GHG emissions. Her complementary work examines state practices for allocating transportation revenues and concludes that such practices fail to reflect regional smart growth and climate action objectives. Dr. Sciara recently led an interdisciplinary team researching innovative organizational practices and routines for advance environmental mitigation. This study, involving ecologists, economists, and transportation planners, was selected by the California Association of Environmental Professionals for its 2018 Outstanding Resource Document award. The study has also informed the California legislature in its recent decision to dedicate $120 million over four years for a revolving fund that supports advance mitigation.

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EXECUTIVE SUMMARY – *updated September 2021*

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MPO ROLES IN SUPPORTING LOCAL SMART GROWTH

MPO Roles in Supporting Local Smart Growth (#CM2-61)

Dr. Gian-Claudia Sciara / Dr. Michael Oden, University of Texas at Austin

06/01/2021 -08/30/2022

Project Information Form: https://tinyurl.com/5ekb6krr

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Regional transportation planning bodies known as MPOs increasingly use incentives to influence local development. These "smart growth grant programs" emblematize contemporary growth management's emphasis on regional efforts, and on carrots - not sticks - to nudge Sustainable Growth. Yet, researchers have largely overlooked incentive programs. This study will compare the experiences of MPOs with such programs in two states, California and Texas, each with different approaches to state-level policy on smart or sustainable urban growth. Using program and award-level data, the study will examine how incentives work and what they accomplish.

The work aims to illuminate how upstream incentives catalyze land use change downstream and how transportation planners, working through regional MPOs and COGs, might structure incentives to manage growth more sustainably.

This study was funded by the consortium of Cooperative Mobility for Competitive Megaregions (CM²). CM² is a USDOT Tier-1 University Transportation Center (UTC). CM²'s consortium partners include The University of Texas at Austin, Louisiana State University, Texas Southern University, and the University of Pennsylvania, with affiliates at Cornell University and Rutgers University.

Dr. Chandra Bhat

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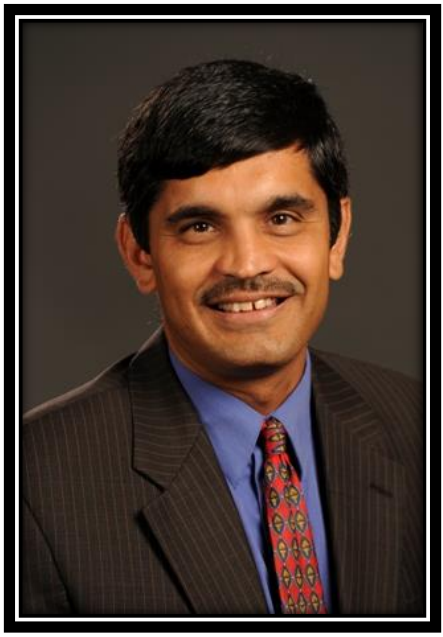
Dr. Chandra R. Bhat is the Director of the Data-Supported Transportation Operations and Planning (D-STOP) Tier 1 USDOT University Transportation Center and the Joe J. King Chair in Engineering at The University of Texas at Austin, where he teaches courses in transportation systems analysis and transportation planning. He also served as the Associate Chairman of the Department of Civil, Architectural and Environmental Engineering, and Director of the Center for Transportation Research.



Dr. Bhat is recognized nationally and internationally as a leading expert in the area of travel demand modeling and travel behavior analysis. His substantive research interests include land-use and travel demand modeling, activity-based travel modeling, policy evaluation of the effect of transportation control and congestion pricing measures on traffic congestion and mobile-source emissions, marketing research of competitive positioning strategies for transportation services, use of non-motorized modes of travel, and physical health and transportation. His methodological research interests and expertise are in the areas of econometric and mathematical modeling of consumer behavior, including discrete choice analysis, discrete-continuous econometric systems, and hazard duration models.

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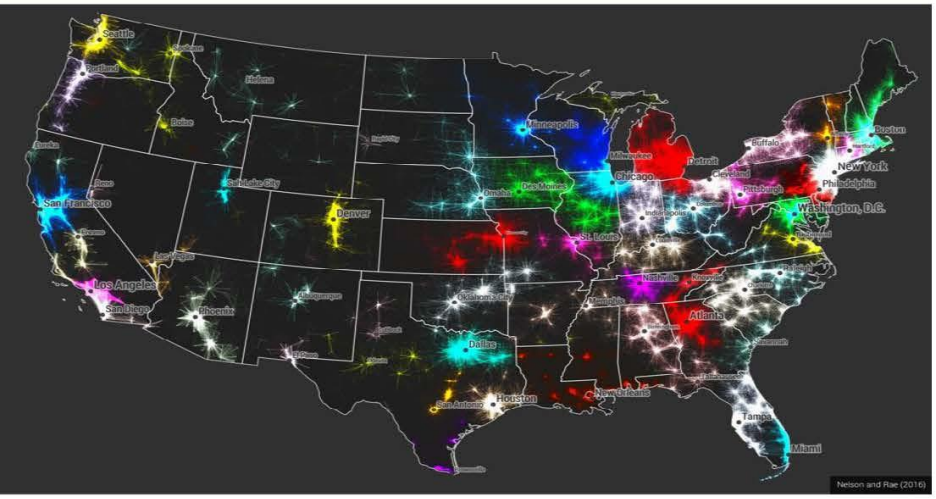
Commuter Megaregions of the United States



SPATIAL TRAVEL MODE CHOICE MODEL FOR MEGAREGIONS IN AN AUTONOMOUS DRIVING WORLD

There is an increasing interest in incorporating spatial dependency among decision-makers in understanding travel mode choice effects, especially the uptake and use of non-motorized modes (walking and bicycling). Such spatial dependency may be caused by the spillover of neighborhood-level proximity-based unobserved effects. This is because more information regarding consumer preferences can be extracted if the individuals are asked to rank alternatives based on a preference ordering, instead of being asked to pick only the most preferred one. In particular, the additional information from a preference ranking can be exploited to achieve a certain desired precision in choice model estimation with a much smaller sample size, making ranked data surveys much more cost-effective than single-choice surveys. This is particularly important when investigating built environment, demographic, and mode level of service attributes in an emerging autonomous world, because sample sizes for such analyses are based on stated preference experiments that typically collect information from only a small sample size of individuals.

The project will examine the implications of the results for the use of non-

motorized modes, especially the potential of AV modes to capture share away from walking and bicycling modes and possible countermeasures to offset any such effects in mega-regions. In addition, interaction effects of neighborhood-level and individual-level effects will be carefully studied, as will likely effects on vehicle miles of travel and traffic congestion in mega-regions.

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Spatial Travel Mode Choice Model for Megaregions in an Autonomous Driving World (CM2-67)

Dr. Chandra Bhat
University of Texas at Austin
School of Architecture

10/01/2022 - 07/31/2023

Project Information Form:
shorturl.at/azBOY

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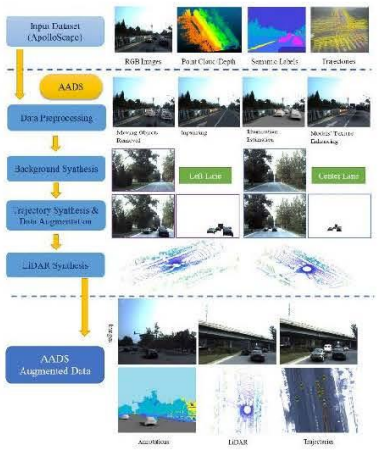

Data Management Plan Regarding Autonomous Vehicles

This study was funded by the consortium of Cooperative Mobility for Competitive Megaregions (CM²). CM² is a USDOT Tier-1 University Transportation Center (UTC). CM²'s consortium partners include the University of Texas at Austin, Louisiana State University, Texas Southern University, and the University of Pennsylvania.

Reflections and Takeaways

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Spatial Travel Mode Choice Model for Mega-Regions in an Autonomous Driving World

Dr. Chandra Bhat (PI)

An initial methodology for a rank-ordered mode choice model that accommodates spatial dependency has been developed.

Spatial dependency is potentially important to consider in analysing built environment effects on mode choice in general, and particularly non-motorized mode use. In particular, if there is a positive spatial spill-over effect, ignoring this will lead to an under-estimation of the benefits of investing in a neo-urbanist built environment (such as high density build up, mixed land-use, and good non-motorized infrastructure).

Mode choice studies abound in the literature, though there have been much fewer of these that consider spatial dependency. A literature review has been undertaken. Even the few studies that recognize spatial dependency do so in a restrictive manner and within a single-choice context.

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Dr. Carol Abel Lewis

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Carol Abel Lewis, Ph.D., educates students in fundamentals of transportation and urban transportation issues, as well as conducts operational and policy related transportation research. Prior to joining Texas Southern University in 1992, Lewis spent 15 years as manager and director of planning at the Metropolitan Transit Authority of Harris County (METRO). Lewis currently serves as appointee of Mayor Annise Parker to the Gulf Coast Rail District.

She served as a METRO Board Member from 2002 to early 2004 and as Executive Assistant to Mayor Bill White for Transportation Planning 2005 to 2009. Lewis holds a Master's degree in planning and the Ph.D. in Political Science with an emphasis in Public Policy and Public Administration.

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Dr. Gwendolyn Goodwin

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Gwendolyn C. Goodwin is a Research Assistant Professor with Texas Southern University's Center for Transportation Training and Research (CTTR). She has over 27 years of experience in project management and policy planning. At CTTR, Goodwin is responsible for conducting research, developing and implementing surveys, developing and conducting training, preparing publications and transferring findings into the public domain. Goodwin's research also seeks to find sustainable and safe solutions to transportation and mobility issues. Goodwin also coordinates public involvement, meeting logistics, and media activities for Center projects. She is certified by the International Association of Public Participation (IAP2). Goodwin conducted a walkability assessment of several communities in the Greater Houston area for her dissertation.

As a planner with the City of Austin, she coordinated neighborhood strategic plans, coordinated 1990 Census Awareness Programs and contributed to development of Austin's comprehensive plan. At the City of Houston's Planning and Development Department, her responsibilities included leading research and publication for housing and transportation documents as preparation for a comprehensive plan.

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EXECUTIVE SUMMARY - *updated September 2021*

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COMPILATION: A STATEMENT OF VULNERABILITY REGARDING TEXAS' MEGAREGION CORRIDORS

Compilation: A Statement of Vulnerability Regarding Texas' Megaregion Corridors (#CM2-64)

Carol Abel Lewis, Ph.D. and Gwen Goodwin, Ph.D., Texas Southern University

01/01/2021 - 07/31/2022

Project Information Form:

https://tinyurl.com/pf6ypeje.pdf

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Megaregional travel crosses the lines of political jurisdictions and typical planning boundaries. Public transportation planning work is often done with little or no attention to the needs of vulnerable populations. As new plans for high-speed rail and other mobility options continue to develop in the Texas Triangle and Gulf Coast megaregions, minorities and those with low incomes, particularly people living in rural and suburban communities, face the greatest risks in being left out of the conversation. This research aims to assist decision making by providing an assessment tool to identify the location of vulnerable populations and determine the travel needs that can be met in the megaregion - outside traditional jurisdictional boundaries.

The study team developed a composite vulnerability index (CVI) that collected variables of ethnicity, female-headed households, languages-spoken, as well as percent of income spent on transportation. Two travel corridors showed high regional levels of vulnerability - US290 from Houston to Austin; and IH10 from Houston to the Texas state line. Individuals and families in these areas must spend a larger portion of their incomes moving around, leaving less for addressing all other needs. Increased access to public transportation could provide a solution.

The public entities expected to recognize and address the gap between need and available transit service are MPOs, COGs, and rural transit providers. These agencies require the assessment of purpose and need as a starting point to address mobility gaps. The year 5 research will assemble findings from all previous years to present the perspective of vulnerability proximate to each Texas Megaregion corridor.

This study was funded by the consortium of Cooperative Mobility for Competitive Megaregions (CM²). CM² is a USDOT Tier-1 University Transportation Center (UTC). CM²'s consortium partners include The University of Texas at Austin, Louisiana State University, Texas Southern University, and the University of Pennsylvania, with affiliates at Cornell University and Rutgers University.

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Potential Description of Services: Using the Compositive Vulnerability Index to Identify Needed Transportation Connections

Dr. Carol Abel Lewis
Dr. Gwen Goodwin
Texas Southern University

01/01/2022 - 07/31/2023

Project Information Form: shorturl.at/nDJTY

POTENTIAL DESCRIPTION OF SERVICES: USING THE COMPOSITIVE VULNERABILITY INDEX TO IDENTIFY NEEDED TRANSPORTATION CONNECTIONS

Many low-income residents are not concentrated in central cities. In many cases, rural communities may identify with their nearest large city. For Texas, data show the largest cities are Houston, San Antonio, Dallas and Austin and these cities form the Texas Triangle. Small urban cities, such as Beaumont and Corpus Christi along the Gulf Coast megaregion also offer improved opportunities for nearby rural resident. The location of these cities forms a triangle in the state's interior. Good transportation is essential to rural areas as a link to jobs, to facilitate the movement of goods, to access health care and educational opportunities, and to provide links to food and necessary social services. Transportation supports businesses and is a critical contributor to a community's quality of life. Inadequate transportation and total reliance on a personal vehicle for travel leaves many rural residents lacking in needed levels of connectivity.

The objective of this workshop and research is to ascertain the travel movements of vulnerable megaregion resident and conduct a longitudinal assessment of these movements. The methodology will begin with the collection of data from the American Community Survey for the most recent year available and a year roughly 10 years prior. Also data will be solicited from MPOs and COGs for each area. The opportunity for a focus group will be explored, depending on the state of COVID and safety protocols. The data will be reviewed, synthesized and a technical report prepared for discussion at a national web-based workshop.

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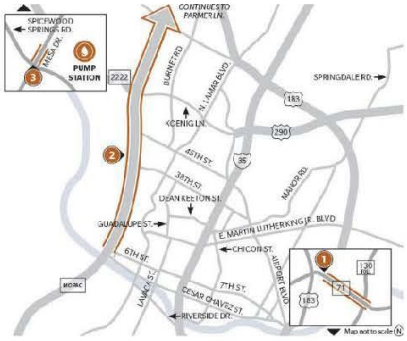

Potential Transportation Connections in Austin, Tx

This study was funded by the consortium of Cooperative Mobility for Competitive Megaregions (CM²). CM² is a USDOT Tier-1 University Transportation Center (UTC). CM²'s consortium partners include the University of Texas at Austin, Louisiana State University, Texas Southern University, and the University of Pennsylvania.

Dr. Bumseok Chun

CM² Cooperative Mobility for Competitive Megaregions

Dr. Bumseok Chun Ph.D., is an Associate Professor in the Department of Urban Planning and Environmental Policy at Texas Southern University.

His research focuses on developing practically preventive intervention based on advanced scientific understanding of the environmental determinants by geospatial and statistical modeling. It also includes UHI modeling and analysis, urban climate change management, and 3-D environmental simulation. For the area of urban climate, he is currently working on GIS-based UHI analysis to resolve diverse environmental problems based on the relationships between three-dimensional urban form and LST (land surface temperature) in the micro scale.

Prior to joining this place, he was a post-doctoral researcher in Center for Geographic Information Systems and a research scientist in Urban Climate Lab at Georgia Institute of Technology. He received his PhD from City and Regional Planning and MS from Civil, Environmental and Geodetic Engineering at The Ohio State University.

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EXECUTIVE SUMMARY - updated August 2021

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POTENTIAL IMPACT ANALYSIS OF DRIVERLESS CARS ON MEGAREGION TRAFFIC FLOW PATTERNS

Potential Impact Analysis of Driverless-Cars on Megaregion Traffic Flow Patterns (#CM2-62)

Bumseok Chun
Texas Southern University

01/01/2021 - 07/31/2022

Project Information Form:

https://tinyurl.com/9ww6c9a8

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The emerging mobility industry is rapidly changing and holds promise for greater sustainability in transportation, reducing emissions and energy use while increasing traffic efficiency. Existing forecasts for the impact of this trend have tended to focus almost exclusively on driverless car studies and through limited scenario-based simulations. This proposal will develop a diverse analytical framework for driverless cars as well as traditional passenger and freight flows to more comprehensively predict the near future travel patterns in Texas megacities, especially Dallas-Fort Worth and Houston.

This study aims to further our previous research, GIS-based Megaregion Transportation Planning Model, by developing more informed planning strategies for self-driving vehicles. The Year 1 to 3 proposals focused on creating a database of freight mobility and identifying its travel patterns. The Year 4 to 5 proposed research will comprehensively summarize previous literatures related to the operation of driverless cars and the impact of this new mode on future travel patterns. Then, it will attempt to understand patterns of traditional and emerging mobility in the same framework. The model framework will be based on a four-step travel demand modeling, including trip generation, distribution, mode split, and assignment, that was already implemented for the previous research outputs.

The findings of this study could help create applications allowing decision-makers and planners to gain a better understanding of the potential impacts of driverless cars on policies, plans, and events in the megaregion.

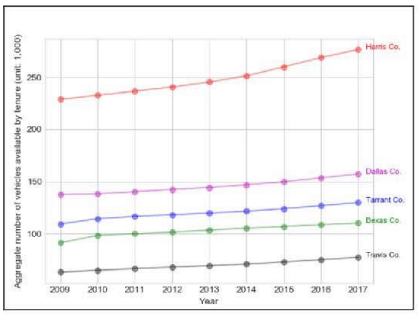

Figure 1. Growing patterns of number of vehicles in Texas Triangle's four major counties

This study was funded by the consortium of Cooperative Mobility for Competitive Megaregions (CM²). CM² is a USDOT Tier-1 University Transportation Center (UTC). CM²'s consortium partners include The University of Texas at Austin, Louisiana State University, Texas Southern University, and the University of Pennsylvania, with affiliates at Cornell University and Rutgers University.

Reflections and Takeaways

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Potential Impact Analysis of Driverless Cars on Megaregion Traffic Flow Patterns

Dr. Bumseok Chun (PI)

The emerging mobility industry is rapidly changing and holds promise for greater sustainability in transportation, reducing emissions and energy use while increasing traffic efficiency. This study aims to further our previous research, GIS-based Megaregion Transportation Planning Model, by developing more informed planning strategies for self-driving vehicles. The Year 4 to 5 proposed research will comprehensively summarize previous literatures related to the operation of driverless cars and the impact of this new mode on future travel patterns. Then, it will attempt to understand patterns of traditional and emerging mobility in the same framework. The findings of this study could help create applications allowing decision-makers and planners to gain a better understanding of the potential impacts of driverless cars on policies, plans, and events in the megaregion.

Figure 1. New and Emerging Technologies

(Source: https://www.transportation.gov/new-and-emerging-technologies)

EXECUTIVE SUMMARY - updated October 2021

CM2 Cooperative Mobility for Competitive Megaregions

The Extensions and Applications of Megaregional Transportation Planning Model (CM2-70)

Dr. Qisheng Pan
Dr. Bumseok Chun
Texas Southern University

05/01/2022 - 04/30/2023

Project Information Form: https://rb.gy/jia8pa

THE EXTENSIONS AND APPLICATIONS OF MEGAREGIONAL TRANSPORTATION PLANNING MODEL

Megaregions have become important engines for national economic growth and played a significant role in emerging economies all over the world. The 40 megaregions identified by Florida et al. (2008) accounted for 66 percent of the global economic activities. The economic competitiveness of megaregions in national and international markets has become a major concern due to the increasing connections between the urban areas in globalization (Pan and Chun 2021, Florida et al. 2008). However, there are few models designated for economic and environmental analysis in megaregions. To fill the gaps in literature on megaregion economic and environmental analysis, this research intends to further extend the MTPM by adding functions for economic impact analysis as well as its application for understanding environmental impacts predicted by the output of MTPM.

As a Lowry-type spatial planning model, the extended MTPM aims to conduct input-output analysis for megaregions and report results in MAZ with considerable spatial detail by combining the functions of economic impact analysis, spatial allocation, and transportation modeling. The analytical framework of the extended model consists of multiple components, including input-output analysis module, transportation network modeling module, and spatial interaction analysis module, etc. The input-output analysis module reports the direct, indirect, and induced effects of events. The direct effects are allocated to the directly impacted areas, the indirect effects are allocated to the areas according to the base-year proportions of employment, and the induced effects yielded by household expenditure changes.

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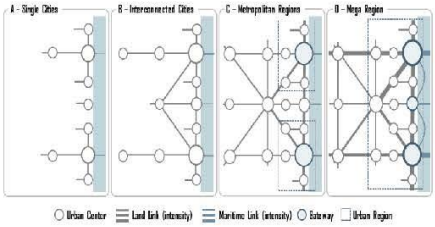

Potential Mega Region Transportation Model

This study was funded by the consortium of Cooperative Mobility for Competitive Megaregions (CM²). CM² is a USDOT Tier-1 University Transportation Center (UTC). CM²'s consortium partners include the University of Texas at Austin, Louisiana State University, Texas Southern University, and the University of Pennsylvania.

Reflections and Takeaways

CM² Cooperative Mobility for Competitive Megaregions

The Extensions and Applications of Megaregional Transportation Planning Model

Dr. Bumseok Chun (PI)
Dr. Qisheng Pan (Co-Pi)

Megaregions have become important engines for national and international economic growth. As a part of routine work by government agencies, economic development has been regularly extensively at regional, state, and national level. This research intends to extend the Megaregion Transportation Planning Model (MTPM) we developed in previous project to incorporate economic and environmental impact analysis functions. The direct, indirect, and induced effects of policy, plan, and project can be examined by the extended MTPM. Texas Triangle is selected as an empirical case for the development and implementation of the extended MTPM.

We expect to learn the effects of a given planning project, policy, or events, including their total impact and the disaggregated results in small areas.

Figure 1. Socio-economic impact of self-driving car (Source: https://www.aionlinecourse.com/blog/self-driving-car-research-topics-and-guidelines)

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Dr. Erick Guerra

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Erick Guerra is Associate Professor and Associate Chair in City and Regional Planning in the Weitzman School of Design, where he teaches courses in transportation planning and quantitative planning methods. His research focuses on the relationship between land use, transportation systems, and travel behavior with an emphasis on rapidly motorizing cities, public health outcomes, and transportation technologies. He has published recent articles on land use and transportation in Mexico and Indonesia, public transport policy, land use and traffic safety, and contemporary planning for self-driving vehicles.

As a practicing researcher and consultant, Guerra has completed projects on accessibility and transportation affordability for the Brookings Institution, the World Bank, the OECD, and the Lincoln Institute of Land Policy. He holds a Ph.D. in City and Regional Planning from the University of California Berkeley, a Master's in Urban Planning from Harvard University, and a BA in Fine Arts and French from the University of Pennsylvania. He served as a Peace Corps Volunteer in Gabon from 2002 to 2004.

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CM² Cooperative Mobility for Competitive Megaregions

Pedestrians' and cyclists' perception of and behavioral responses to driverless cars (CM2-71)

Xiaoxia Dong
Dr. Erick Guerra
University of Pennsylvania

10/01/2021 - 07/31/2023

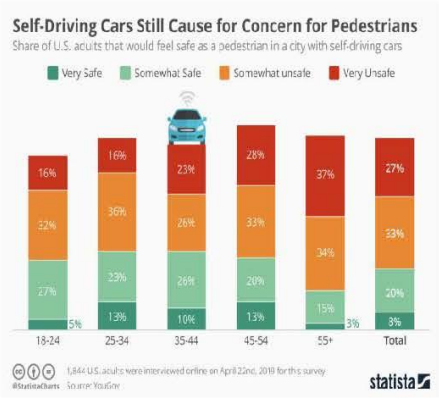
Project Information Form: https://rb.gy/jl4fzw

PEDESTRIANS' AND CYCLISTS' PERCEPTION OF AND BEHAVIORAL RESPONSES TO DRIVERLESS CARS

This research aims to investigate pedestrians' and cyclists' perceptions of and behavioral responses to driverless cars. We will conduct a survey that collects individuals demographic and socio-economic characteristics, their frequency of walking and biking, and their current perceptions of walking or biking safety. We will then ask the individuals to answer a series of stated preference questions that are intended to gauge whether their perceptions of safety and walking and biking behavior will change in the presence of driverless cars (see below for potential stated preference questions).

We will design the online survey on Qualtrics' platform and purchase a sample from Qualtrics. Survey respondents will be de-identified so the survey study will qualify for IRB exemption. We will analyze survey responses using multinomial logistic regression with respondents' preferences as the dependent variables and their socio-economic characteristics, frequency of walking and biking, and current perceptions of walking and biking safety as the independent variables.

Penn University of Pennsylvania



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ARE US CITIES AND REGIONS OVERBUILDING ROADWAYS?

Are US cities and regions overbuilding roadways in the post-Interstate era? (#CM2-60)

Erick Guerra,
University of Pennsylvania

2/1/2021-08/30/2022

Project Information Form:
http://sites.utexas.edu/cm2/files/2021/02/Year-5_Guera_OverbuildingRoadways.pdf

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Does the United States have too much urban road infrastructure? The question, for all its simplicity, remains largely unanswered and anathema to national discourses about transportation investments. Outside of a few notorious projects and the worst excesses of urban renewal, the media and politicians treat road investments as inherently productive investments in the future and even shining examples of bipartisan cooperation. The connectivity of megaregions frequently grounds arguments for increased large-scale transportation investments, whether roads, high-speed trains, or airports. Yet the residents of urban areas with the most roadway per capita are generally the poorest, spend the most on transportation, have the highest likelihood of dying in a traffic collision, and generate the most transportation-related global and local pollution (Figure 1). For example, the metropolitan areas with the least roadway per capita have twice as much wealth and only a quarter as much driving.

This research project examines the interwoven questions of how, where, and why state and federal governments finance and construct large arterial and highway projects as well as whether the benefits of these projects tend to outweigh their financial, social, and environmental costs. Answering these questions will contribute to a larger inquiry into whether US cities, metropolitan areas, and megaregions have too much roadway.

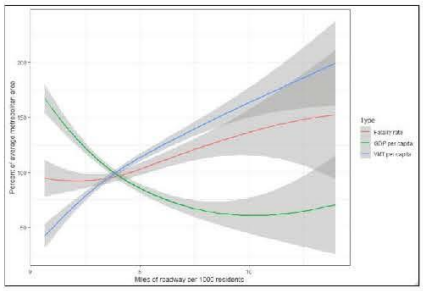

Figure 1. Traffic fatalities, GDP, and VMT per capita by the total roadway per capita in US metropolitan areas. The y-axis values are normalized by the average across metropolitan areas.

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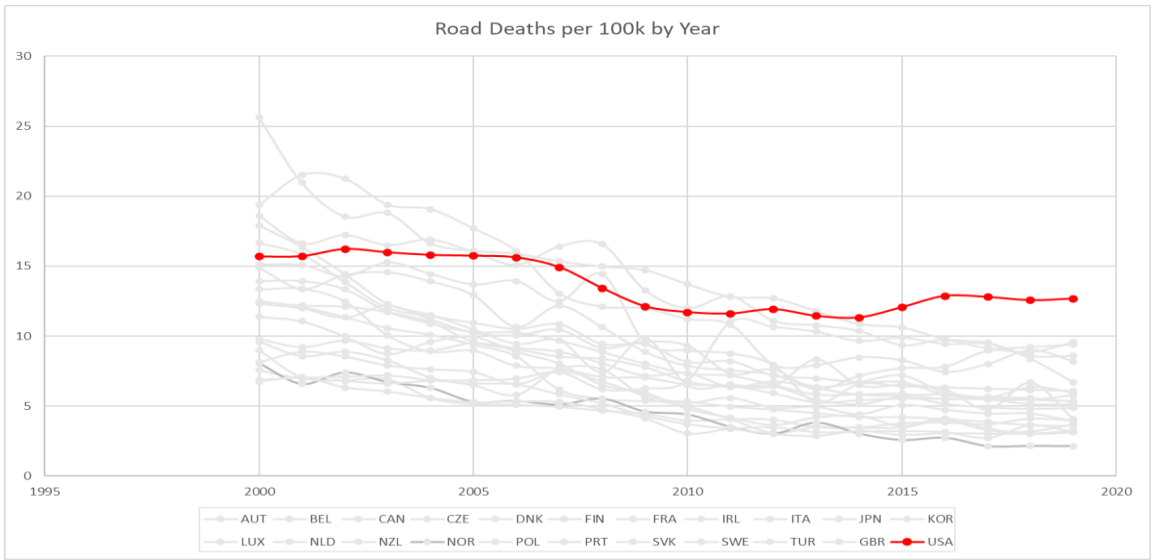
Reflections and Takeaways

Cooperative Mobility for Competitive Megaregions

Are US cities and regions overbuilding roadway in the post-Interstate era?

Erick Guerra (PI)

- Introductory chapter and book outline completed
- Manuscript proposal nearly completed and will be submitted to publishers in the coming months
- Initial research into project evaluation and environmental reviews of four major roadway projects that will feature in the book
- Cross-sectional comparisons of roadway per capita and outcome measures completed (pictured figure compares US traffic fatality rate to peer OECD countries over time.



EXECUTIVE SUMMARY - *updated September 2021*

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CM2 Cooperative Mobility for Competitive Megaregions

Vehicle travel and ownership among the U.S. older adults in the digital era

Vehicle travel and ownership among the U.S. older adults in the digital era (#CM2-66)

Erick Guerra,
University of Pennsylvania

6/1/2021-07/01/2022

Project Information Form:
https://tinyurl.com/32netbhk

The US older population is rapidly growing and becoming more socioeconomically diverse due to the aging boomers(born between 1946 and 1964). All boomers will be 65 and over within a decade. Compared to older adults in the early 2000s, today's older adults (defined as 65 and older) and near-older adults (defined as 55-64) are generally healthier, wealthier, and retire later. However, the absolute number of low-income people, those who live alone, and people of color increases rapidly among older adults.

My dissertation examines three major interwoven questions related to vehicle ownership and travel of older adults. First, how do boomers' vehicle travel different from the silent generation? The second and third questions concern the heterogeneity of vehicle ownership and travel for older people living in different locations and with different ICT usage patterns: How do income, age, and life stages relate to the joint decision of vehicle ownership and residential location among older adults? How do older adults of different ages and use ICT to supplement or replace daily travel? Answering these questions contributes to the current understanding of older adults' heterogeneous transportation needs. It also informs how federal and local governments and MPOs collaborate to address these diverse needs in their future agendas.

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This study was funded by the consortium of Cooperative Mobility for Competitive Megaregions (CM²). CM² is a USDOT Tier-1 University Transportation Center (UTC). CM²'s consortium partners include The University of Texas at Austin, Louisiana State University, Texas Southern University, and the University of Pennsylvania, with affiliates at Cornell University and Rutgers University.

Reflections and Takeaways

Cooperative Mobility for Competitive Megaregions

Vehicle travel and ownership among the US older adults in the digital era

Erick Guerra (PI)

- Current federal and local policies for older adults mainly focus on providing paratransit and reducing transit fares, which overlooks the vehicle needs of increasing number of older people who live in the suburbs and rural areas as boomers age.
- Current equity theories fail to examine the heterogeneous older adults' travel preferences. Future scholarship requires a conceptual model that identifies the interplay of transportation, built environment, and technology in advancing older adults' well-being and related factors.
- All else being equal, compared to people of the same age in 2001, boomers in 2017 do not travel more by vehicle. However, retired boomers travel more than those in the labor market and more than those in 2001. Suburban boomers travelled less by vehicle from 2001 to 2017.
- All else being equal, age does not contribute to living in car-dependent areas without cars. However, retirement is related to living in non-urban areas without cars. Additionally, African American-headed households and females who live alone are more likely to live in non-urban areas without cars. This preference is more evident among those aged 65 and over.

Dr. Zhongjie (Jeffrey) Lin

CM² Cooperative Mobility for Competitive Megaregions

Dr. Zhongjie Lin is a scholar and practitioner of urbanism. He researches and teaches urban design, ecological urbanism, utopianism, and Asian architecture and urbanism. He is also a founding director of Futurepolis, an awarding-winning international planning and design consultancy.

Dr. Lin is author or co-author of several books including Kenzo Tange and the Metabolist Movement (2010), *Vertical Urbanism* (2018), *Urban Design in the Global Perspective* (2006), *The Making of a Chinese Model New Town* (2012), and most recently *Rio de Janeiro: Urban Expansion and Environment* (2019). He is writing a new book examing the contemporary urbanization in China through the lens of its massive new town movement in the last thirty years. He also leads an interdisciplinary research project studying the "Spatial Visions Connecting China and the West," sponsored by Penn Global.

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CM² Cooperative Mobility for Competitive Megaregions

ASSESSING ELECTRIC VEHICLES IMPACT ON MEGAREGION EXPANSION

Assessing Electric Vehicle's Impact on Megaregion Expansion: Spatial Analysis of Beijing's Metropolitan Growth Based on Mobility Data(#CM2-59)

Zhongjie Lin,
University of Pennsylvania

2/1/2021-7/30/2022

Project Information Form:

https://tinyurl.com/4vumdx7r

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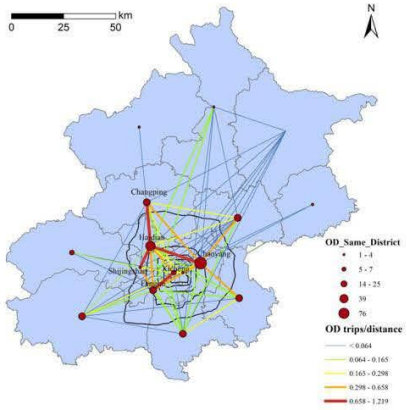
Electric vehicles (EVs) have been growing in large metropolises across the world with fundamental impacts on the spatial structure of megaregions. The purpose of this research is to examine how EV mobility influences urbanization as well as the network of metropolitan transportation across modes. This macro-scale question has to do with the micro-scale changes of the urban physical environment associated with people's travel patterns and lifestyles.

One important dimension of the research links to the estimation of EV demand for charging infrastructure. We propose a novel data-driven method to map the spatial-temporal patterns of EVs drivers' trips and their charging demands. This integrated GIS-based approach allows us to quantify the attributes of driver behaviors from spatial and temporal dimensions, and to examine the resulting impacts on the transformation of urban forms, with the ultimate goal of informing city planners in their decisions about PCS deployment in a metropolitan region. This research aims to fill the gaps in existing research by quantifying and connecting multiple elements in this dynamic and revealing the ways in which the emerging patterns of EV influence consumer choices of travel modes, support the global transition toward clean-energy transportation, and achieve models for sustainable metropolitan transportation networks.



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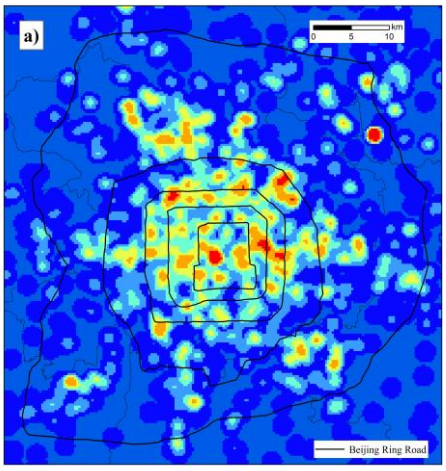
Reflections and Takeaways

CM² Cooperative Mobility for Competitive Megaregions

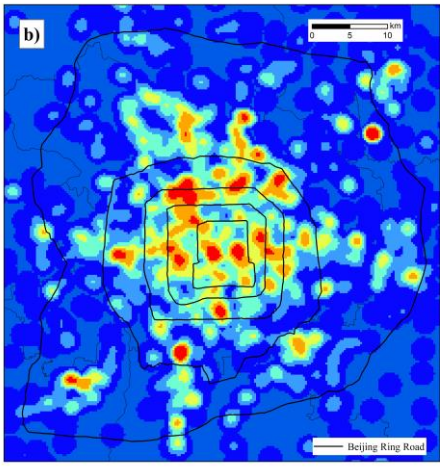
Assessing Electric Vehicles Impact on Megaregion Expansion

Zhongjie Lin (PI)

- This research employs a novel method to engage smartphone navigation data in mapping EV owners' charging activities by location and time.
- Mobile device-based Charging Demand Indicator (CDI) captures drivers completed and unmet demands.
- While the current EV infrastructure concentrates on the center, our modeling demonstrates heterogenous and dynamic patterns of charging demand distribution.
- The findings suggest high-level correlation between EV travel and other transport modes.



Charging Demand Indicator (CDI) in Beijing on weekdays



Charging Demand Indicator (CDI) in Beijing on weekends

Dr. Megan S. Ryerson

CM2
Cooperative Mobility for Competitive Megaregions

In her research, student mentoring, and teaching, Dr. Ryerson produce high-impact scholarship and to empower the next generation of planners to scrutinize, rationalize, and create new transportation planning processes and policies towards a future of resilient and sustainable transportation systems. Dr. Ryerson research focuses on three main areas: Transportation Network Resilience - Plans and Algorithms, Multimodal Transportation Planning, and Economic Development and Environmental Planning for Air Transportation.

Penn
University of Pennsylvania

Her research area aims to establish how changes to airline network structures have rendered the aviation system more vulnerable to airport outages. Investigations consider how unpredictability in the aviation system encourages airlines to operate flights inefficiently, hastening the very climate change that causes these outages. Research objectives include keeping aviation networks operational during outages and developing analytical adaptive airport reuse algorithms for aviation resilience plans.

Dr. Ryerson's research area also focuses on the impact of rail and future vehicle technologies on demand for short-distance air transportation. Projects also consider how air transportation alternatives might encourage airlines to reduce the supply of inefficient short-distance flights.

EXECUTIVE SUMMARY - *updated September 2021*

USDOT Tier-1 University Transportation Center

CM² Cooperative Mobility for Competitive Megaregions

ESTIMATING COVID-19 IMPACTS ON NORTHEAST MEGAREGION TRAVEL

Estimating the Impact of COVID-19 on Travel Behavior and Perceptions: An Investigation of Commuting Travel and Intercity Travel in the Northeast Megaregion (#CM2-58)

Megan S. Ryerson,
University of Pennsylvania

1/15/2021-07/30/2022

Project Information Form:
https://tinyurl.com/3h86rpse

The impact of COVID-19 on transportation – both for routine commuting and for less routine intercity transportation trips – has been significant and uneven across modes. As traveler concerns, beliefs, behaviors, and actual travel needs have changed, researchers have growing concern over the use of pre-COVID-19 travel data to predict travel demand going forward. The extent to which the COVID-19 pandemic will shift the propensity to travel and the mode of travel – both because of changing norms and changing needs – is an open and highly consequential question. The goal of this project is to understand future travel demands (both in trip generation and mode choice) for trips generated from a major anchor institution for both routine commuting and intercity transportation.

By surveying employees at a number of sites in the Northeast Megaregion, including more than 400 members of the faculty and staff at the University of Pennsylvania, the largest trip generator in the Delaware Valley Region, data on travel behaviors prior to the COVID-19 pandemic along with perceptions and plans for travel in the future will inform models providing new insights into the evolving prospects of commuting and intercity travel. For planners looking to incentivize sustainable behavior and control congestion to those planning scheduled transportation modes, this analysis will provide a spatial scenario analysis tool for anticipating future local, regional, and megaregional travel patterns.

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University of Pennsylvania

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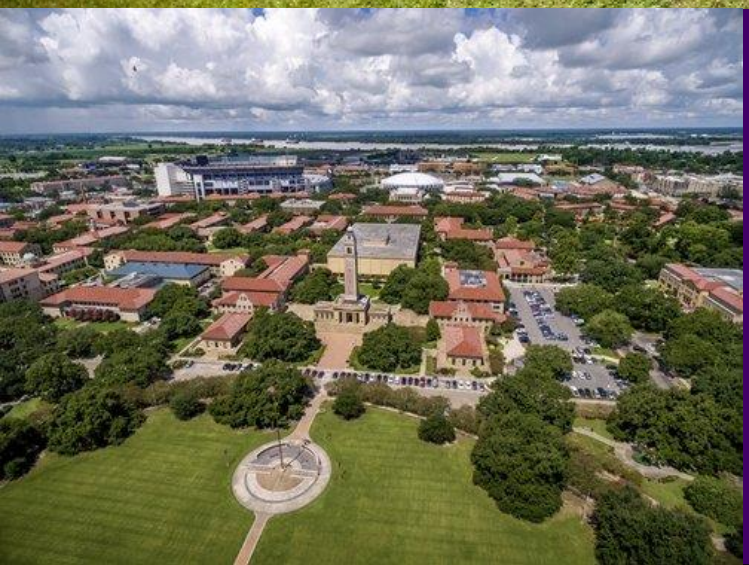
CM² Cooperative Mobility for Competitive Megaregions

Partner Institution

LSU

LOUISIANA STATE UNIVERSITY



Dr. Brian Wolshon

CM2
Cooperative Mobility for Competitive Megaregions

Dr. Brian Wolshon is the Edward A. and Karen Wax Schmitt Distinguished Professor in the Department of Civil and Environmental Engineering at Louisiana State University. He is also the Director of the United States Department of Transportation's University Transportation Center the Gulf Coast Center for Evacuation and Transportation Resiliency. Although his research and teaching expertise spans several area in the fields of highway design and traffic engineering, he is most recognized for his research in issues related to the operation, planning, and management of transportation systems during mass evacuations and, in particular, the application of non-standard traffic management techniques such reversible traffic operations under emergency and major event conditions.

Dr. Wolshon has authored scores of research papers, technical articles, and book chapters; and has served as an expert on numerous panels and committees for the Federal Highway Administration, National Academies of Science and Engineering, Institute of Transportation Engineers, and American Society of Civil Engineers. In 2000, he founded and has continued to chair the Transportation Research Board's Subcommittee on Emergency Evacuation.

LSU
LOUISIANA STATE UNIVERSITY

EXECUTIVE SUMMARY - updated October 2021

ASSESSMENT OF DRIVER ROUTE DECISION-MAKING DURING A RANGE OF INCIDENT-INDUCED TRAFFIC FLOW DISRUPTIONS

Drivers typically plan and carry out travel to most effectively utilize their time. A key component of travel planning is to select routes, times, and modes that minimize both travel duration and delay. However, such plans are based on prior experience under routine travel conditions. When infrequent, yet inevitable, incidents occur that cause congestion and delay, many drivers make decisions to increase the efficiency of their trip.

Although one of the most common driver strategies is to divert travel to alternative routes, relatively little is known about the motivation of this decision-making nor the characteristics that most acutely effect driver choice. The goal of this research is to address the need for a better understanding of route-diversion behavior by assessing driver decision-making under a range of incident, traffic, and guidance conditions. The result of this research is expected to advance both research and practice.

CM² Cooperative Mobility for Competitive Megaregions

Assessment of Driver Route Decision-Making During a Range of Incident-Induced Traffic Flow Disruptions
(CM2 -68)

Dr. Brian Wolshon
Louisiana State University

10/01/2021 - 09/30/2022

Project Information Form:
https://rb.gy/f5oavr

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Induced Traffic Flow Patterns in Fort Worth, TX

This study was funded by the consortium of Cooperative Mobility for Competitive Megaregions (CM²). CM² is a USDOT Tier-1 University Transportation Center (UTC). CM²'s consortium partners include the University of Texas at Austin, Louisiana State University, Texas Southern University, and the University of Pennsylvania.

EXECUTIVE SUMMARY - *updated August 2021*

MEGAREGIONAL TRAFFIC IMPACT OF COVID-19 PANDEMIC: ANALYSIS OF ACTIVITY RESTRICTION

The COVID-19 pandemic brought unprecedented levels of disruption to countries throughout the world. In the United States, governmental directives varied over time, beginning with voluntary stay-at-home requests and restrictions on large public gatherings, then, later, virtual statewide lockdown quarantines. However, travel in various forms continued throughout the country. Most notable of these were activities deemed essential for the public good, such as for people to access food, medical care, and other basic life necessities for public health, welfare, and safety. While the ultimate intent of these restrictions, to slow the progression
of the virus and limit fatalities, will take time to assess, other effects of travel and social interaction restriction can already be studied. Therefore, this study seeks to assess people interaction and social behavior using travel data at a megaregional level during COVID-19 pandemic which could be useful for operational and strategic planning of recovery efforts and for dealing with future pandemics.

USDOT Tier-1 University Transportation Center

CM² Cooperative Mobility for Competitive Megaregions

Megaregional Traffic Impact of COVID-19 Pandemic: Analysis of Activity Restriction (#CM2-63)

Dr. Brian Wolshon
Louisiana State University

09/01/2021-11/30/20

Project InformationForm:
https://tinyurl.com/3zhnbdvp

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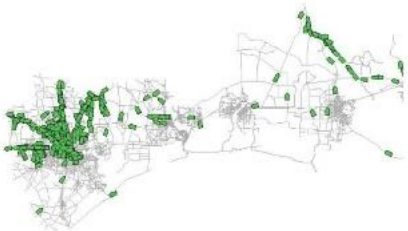

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