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1. ACCOMPLISHMENTS

A. Goals and Objectives

CM² is committed to advancing research, education, and technology transfer initiatives to improve mobility, promote equity, and enhance the economic competitiveness of urban and rural communities in megaregions.

- We aim to become a leading Tier 1 center specialized in megaregion mobility research. Our goal is to offer advice on strategic transportation planning, smart infrastructure investments, and informed policy-making.
- We provide high-quality transportation education and workforce development and work to connect research with practical actions.
- We promote multimodality ranging from HSR to slow-moving transportation such as walking and bicycling for diverse populations and communities. We facilitate public-private partnerships for freight mobility planning and operation efficiency.

B. Accomplishments under These Goals

i. *Research Accomplishments*

Throughout this reporting period, the grant funded 22 researchers and 50 students conducting ongoing research projects for CM². Research teams were involved in a series of projects analyzing data, laws, policies, and technologies as well as developing solutions through modeling and analysis for cooperative mobility in megaregions. Table 1 outlines the projects completed by the end of this reporting period.

Table 1: Completed Projects by Partner Institutions and PIs

Project Title	Partner	Principal Investigator	Funding Year	Project Status
Mobilizing Investment in America's Transportation Infrastructure	Penn	Multi – Marilyn Taylor & Robert Yaro	Year 1	Complete
Develop a GIS-based Megaregion Transportation Planning Model	TSU	Qisheng Pan	Year 2	Complete
Advancing Transformational Infrastructure Projects Across Political Boundaries in the Northeast	Penn	Multi – Marilyn Taylor & Robert Yaro	Year 2	Complete
Seizing the Opportunity: A Vision for CBD Tolling in New York City	Penn	Multi – Marilyn Taylor & Robert Yaro	Year 3	Complete

The COVID-19 pandemic altered the timing of the most recent project selection process for new and ongoing research proposals by the Consortium for Year 5 (FY2020). PIs were invited to submit proposals for new research projects in November of last year with a final submission deadline of March 2021. Each institution completed an internal review process to select final proposals. All proposals received a mix of double-blind reviews and single-blind reviews. The CM² Director also

evaluated each submitting PI's previous record of completing CM² projects, including delivering planned outputs and spending project budgets in a timely fashion. Based on the institutional reviews of the submitted proposals, the CM² Director asked PIs to revise proposal submissions to respond to a synthesis of reviewer comments and evaluation scores. Once completed, the CM² Director approved the final selection of proposals and disseminated awards to member institutions.

ii. Education Accomplishments

CM² Partners selected Rydell Walthall for the UTC Outstanding Student of the Year in 2021. CM² co-sponsored this nomination with CTR. Rydell Walthall is a PhD candidate with Dr. Michael Walton who has obtained dual masters degrees in Public Affairs and Transportation Engineering from the University of Texas at Austin. He has performed freight research for the Austin District of TxDOT, TxDOT's Freight Division, the Capital Area Metropolitan Planning Organization, and the Cooperative Mobility for Competitive Megaregions consortium. Rydell specializes in travel demand modeling, transportation economics, alternative energy policy, and freight rail energy modeling.

Josiah Lindquist, a Master's student with the University of Texas at Austin Community & Regional Planning program under the direction Dr. Junfeng Jiao, was selected as a Fulbright Research Award recipient for the 2020-2021 academic year. Mr. Lindquist will complete a project in the southern province of Guangdong, China that aims to examine the lived experience of residents in internationally-planned and binational new-and-eco town.

Shunhua Bai is a Ph.D. student in the Community and Regional Planning program at the University of Texas at Austin with a concentration in transportation planning and urban informatics. He is now a graduate research assistant in the Urban Information Laboratory (UIL) under Dr. Junfeng Jiao using Geographic Information Science (GIS) and emerging data-driven techniques to study urban transportation systems. In Fall 2020, Mr. Bai was selected for the 2020 American Planning Association (APA) Central Texas Chapter Student Scholarship.

Jordan McGee, a Master's student with the University of Texas at Austin Community & Regional Planning program under the direction of Dr. Gian-Claudia Sciara was selected as an Eno Fellow for the 2020 Transportation Leadership Development Conference (LDC) program. The Eno Center for Transportation is a non-profit leader in transportation policy, research, and professional development. Their competitive fellowship provides 20 graduate students from a nationwide pool of nominations the opportunity to attend the LDC in Washington D.C. Due to the COVID-19 pandemic, the conference has been postponed until June 2021.

iii. Outreach/Engagement Accomplishments

The COVID-19 pandemic altered the ways in which CM² was able to complete outreach/engagement activities for the entirety of 2020. Any in-person events that were originally scheduled on site at the University of Texas at Austin were shifted to online platforms such as Zoom and secondary event-specific websites.

On Thursday October 1, 2020 CM² researchers Frederick Steiner and Lisa Loftus-Otway participated in the panel discussion “Innovative Transportation Policies to Advance Megaregion Development” as part of the Megaregion Transportation Policy Symposium *Advancing Megaregion Development Through Innovation in Transportation* hosted by Young Professionals in Transportation (YPT). CM² researcher Junfeng Jiao was a panelist for the 2020 Region 10 Transportation Conference hosted by the Pacific Northwest Transportation Consortium (PacTrans), and the Center for Safety Equity in Transportation Consortium (CSET) in early October as well.

In December 2020, CM² hosted a Fall Exhibition where PIs and students were invited to present their ongoing research projects for the CM² grant. In previous years this in-person exhibition was limited to faculty, students, and guests in the Austin area, but due to the pandemic restrictions



Fall Exhibition 2020

<https://cm2fall exhibition.squarespace.com>



CM²Fall Exhibition 2020 Digital Flyer

of in-person events, CM² was able to transition the exhibition to an online platform, and was able to open the invitation for greater participation from researchers and students across the Consortium. In addition to our faculty and student researchers, representatives from our Support Partner Program as well as members from the CM² Advisory Committee were invited to participate in the digital exhibition event. The exhibition was hosted on a temporary

website (<https://cm2fall exhibition.squarespace.com/>), which featured a digital poster session for new and ongoing CM² research projects. Students, faculty, and guests could discuss the research topics, research design, challenges, and current/expected findings during the month-long online exhibition event.

In early December, CM² hosted a two-day digital symposium. The symposium featured a virtual workshop co-hosted by the Lincoln Institute of Land Policy (LILP) to discuss the soon-to-be published manuscript *Megaregions and America’s Future* by Drs. Frederick Steiner, Robert Yaro, and Ming Zhang. Invited experts from the United States and Canada provided feedback and insights on the manuscript that the authors used to further refine their work as the move through the publication process. The symposium event also featured four panel discussions: “The Evolution of the Megaregion Concept”, “The state of Megaregion Research”, “Megaregions for Social Equity”, and “Megaregions and the Green New Deal”.

Following the success of their first series of workshops focused on developing a vulnerable community rubric to multiple megaregional corridors in the state of Texas, Texas Southern University (TSU) researchers Drs. Carol Lewis and Gwendolyn Goodwin hosted a megaregion workshop for the South Texas region in December 2020. This workshop brought together Metropolitan Planning Organizations (MPOs), public transit agencies, and social service agencies with the charge of thinking about vulnerable communities and incorporating megaregion equity variables in the MPO decision making process.

Several researchers and students attended the 60th Annual ACSP Conference held online in November 2020. Dr. Ming Zhang and UT Austin PhD candidate Ziqi Liu participated in the Roundtable Discussion “Megaregional Disparities: Measurement and Policy Challenges in the Presence of Modifiable Areal Unit Problem”. Dr. Junfeng Jiao and PhD candidate Yefu Chen presented their paper in the “Displacements and Transit Equity: Linkage Between Gentrification and Transit Deserts”. Dr. Gian-Claudia Sciara led the roundtable discussion “15.7 Implications of Urban Transportation Policies”. Both Drs. Erick Guerra and Sandi Rosenbloom acted as facilitators for the sessions “15.21 Traffic Safety: Built Environments and Crashes” and “15.2 Aging Society and Travel”, respectively.

Many of our researchers and graduate research students attended the 100th Annual Transportation Research Board (TRB) meeting and conference held virtually in January of this year. Several researchers and students presented their work with CM² in various sub-committee meetings and panel discussions: Drs. Gian-Claudia Sciara and Michael Oden presented their work “The Saliency of Megaregional Geographies for Inter-Metropolitan Transportation Planning and Policy Making”; PhD candidate Shunhua Bai and Dr. Junfeng Jiao presented two (2) papers – “Mining Heterogeneous Impact of Destination Attributes in Travel Demand Forecast for Different Urban Districts: A Deep Learning Approach,” and “Mapping the Intercounty Transmission Risk of COVID-19 In New York State Via Historical Commute Data”. From Texas Southern University, Dr. Carol Lewis acted as a moderator for the TRB panel “How Are COVID-19 and Social Equity Shifting the Mobility Transformation?”, while TSU graduate student Lydia Ndagire presented her poster “Autonomous Vehicles and Transit Operations”. The CM² center created a schedule with all of the presentations from CM² researchers and the administration team sent it out in the 2020 Fall Newsletter.

iv. Administrative Accomplishments

Data analytics have shown steady growth in the [CM² website](#) activity over the past six months. Audience page views showed 2,304 users with 2,276 new users (an increase of 42% from the previous reporting period), and 5,348 page views. A little over half of the CM² website audience are users from the United States (52.28% users), while the remaining users are from a variety of countries including Canada, Peru, Australia, and China.

We have continued developing our [Twitter account](#) to disseminate news and information about CM² related events. The account earned over 22,289 new impressions since the previous reporting period, which is defined as the number of times users saw our tweets on Twitter. Our account has 189 followers (a 9.8% increase since the previous reporting period) and 2,082 profile visits, which is an incredible 528% increase from the last reporting period of 329 profile visits.

The [CM² LinkedIn company page](#), and the [CM² LinkedIn Group](#) serve as a space where CM² researchers, GRAs (past and present) and partners can connect with each other, share recent developments in research, mention professional accomplishments, and list awards. At submission of this report, the LinkedIn Group has 100 members, while the company page has

increased from 153 to 183 members over the past six months. Additionally, the CM² administration team published the Fall 2020 newsletter during this reporting period. Our current newsletter email list has 187 subscribers (a 4% increase from the last reporting period).

The CM² administration and research team will continue to ensure that all activities, reports, news feeds, and articles are promptly posted to the website. They will also actively strive to bring traffic to the website to highlight center activities and engender public and private sector participation and discussion. The CM² administration and research team will continue to focus on growing our social media base by regularly posting current and interesting content that crosses disciplines and reflects the mission of CM². We will continue to utilize and expand our Twitter platform as well as the CM² LinkedIn company page, CM² LinkedIn Group, and our [Facebook page](#).

C. Dissemination of Results

The results of work completed to date has included four (4) final project reports disseminated on the CM² website. CM² researchers gave seventeen (17) presentations at conferences and lectures, primarily online at virtual events. Twenty (20) refereed journal papers have been published and six (6) are under consideration. Peer-reviewed articles from our researchers have been cited approximately 608 times in the reporting period according to Google Scholar. All items are explored in more detail under Section 3.

D. Plans for Next Reporting Period

Despite the challenges and cancelations that have come with the ongoing pandemic, our researchers continue to find ways to stay involved and focused on future projects. During the next reporting period the CM² consortium expects to see ten (10) completed projects with final reports. Consortium researchers will continue to share the findings of their research through conference presentations, workshops, and journal publications. Three (3) manuscripts are currently under revision during this reporting period, and two (2) manuscripts will be developed during the next reporting periods. We are excited to see how our researchers will find creative ways to adapt and stay connected to their research with these new circumstances that have been developed in response to the ongoing COVID-19 pandemic.



The CM² 2021 Summer Forum Flyer

Due to the COVID-19 pandemic, CM² partners will not be convening in person at Louisiana State University this year for the Summer Forum that is usually held over the summer session, but instead will meet virtually in June 2021. The three-day forum is entitled “Resilient Transportation, Policy, Planning and Management in Megaregions” and will feature a keynote address by Dr. Karl Kimm, Professor of Urban and Regional Planning at the University of Hawai’i and the Executive Director of the National Disaster Preparedness Training Center.

Consortium researchers will continue to share the findings of their research through conference presentations and journal publications. Presently, five (5) researchers already have plans to attend eight (8) conferences in the next reporting period.

2. PARTICIPANTS & COLLABORATING ORGANIZATIONS

A. Organizations Involved as Partners

The members of the consortium include The University of Texas at Austin, Louisiana State University, Texas Southern University, and the University of Pennsylvania. Additionally, Table 2 presents a list of current CM² partners.

Table 2: Current CM² Partners

Organization Name	Location	Contribution
Texas Department of Transportation (TXDOT)	Austin, TX	Data, In-kind Support
City of Austin (Austin Transportation Department)	Austin, TX	Data Support, Research
City of Houston (City Planning Department)	Houston, TX	Data Support
City of Dallas	Dallas, TX	Data Support
City of Austin Senior Centers	Austin, TX	Facilities, In-kind Support
Austin Asian- American Resource Center	Austin, TX	Facilities, In-kind Support
San Antonio Senior Sections	San Antonio, TX	Facilities, In-kind Support
City of Georgetown	Georgetown, TX	Data, In-kind Support
Houston Metro	Houston, TX	Data Support
City of Philadelphia: Office of Transportation, Infrastructure, and Sustainability	Philadelphia, PA	Data Support
Southern Pennsylvania Transportation Authority (SEPTA)	Philadelphia, PA	Data Support, Teaching support
Delaware Valley Regional Planning Commission	Philadelphia, PA	Data, In-kind Support
Alamo Area Metropolitan Planning Organization	San Antonio, TX	Data Support
North Central Texas Council of Governments (NCTCOG)	Dallas, TX	Data Support
Houston Galveston Area Council (H-CAC)	Houston, TX	Data, In-kind Support
Capital Area Metropolitan Planning Organization (CAMPO)	Austin, TX	Data Support
Capital Metro- Austin Public Transit	Austin, TX	Data Support, Research
Houston APA Chapter	Houston, TX	Data, In-kind Support
Texas APA Chapter	TX	Student, In-kind Support
University of Southern California	Los Angeles, CA	Research
Florida Department of Transportation	Tallahassee, FL	Data support
Center for Transportation; Smart City Lab, University of Texas at Austin	Austin, TX	Research
Stephenson Disaster Management Institute at Louisiana Emerging Technology Center	Baton Rouge, LA	Facilities, Technical Contributions

Clemson University	Clemson, SC	Research
Embry-Riddle Aeronautical University	Randolph AFB, TX	Research, Technical Contributions
WTS (HoT Chapters, South West Region)	TX, OK, NM, AL, AK	In-Kind Support
Girlstart	TX	In-Kind Support
Georgia Institute of Technology	Atlanta, GA	Research
Jewish Community Center	Austin, TX	Facilities, In-kind Support
Tokyo Government	Tokyo, Japan	Student Support, Research
Tokyo Olympic Game Committee	Tokyo, Japan	Student Support, Research
Tokyo Metropolitan University	Tokyo, Japan	Student Support, Research
City of Austin Traffic Management Center	Austin, TX	Student Support
Austin Bergstrom International Airport	Austin, TX	Student support, Data Support
Central Texas Regional Mobility Authority	Austin, TX	Student Support
Amazon SAT-2 Distribution Center	San Marcos, TX	Student Support
Lincoln Institute of Land Policy	Cambridge, MA	Research, Publishing Support
UT Good Systems Grand Challenge; University of Texas at Austin	Austin, TX	Research
Florida State University	Tallahassee, FL	Research

B. Other Collaborators or Contacts

The CM² team has consistently promoted multi-jurisdictional collaboration between consortium members by setting aside funds specifically for multi-institutional proposals. There are four multi-institutional projects currently in progress. Dr. Ming Zhang and Dr. Brian Wolshon are currently collaborating on the 2021 CM² Summer Forum meeting to be held June 8 – 10, 2021 in a virtual format via Zoom.

In November 2020, CM² welcomed Michael Morris, P.E. as the newest Advisory Committee member to our organization. Mr. Morris is the Director of Transportation for the North Central Texas Council of Governments (NCTCOG) and has been on staff in the Transportation Department of the North Central Texas Council of Governments, the Metropolitan Planning Organization for the Dallas-Fort Worth area, since 1979. The CM² Advisory Committee is a group of transportation leaders that advise the CM² Executive Committee on research, education/workforce development and technology transfer activities.



CM² Advisory Committee member Michael Morris, P.E.

3. OUTPUTS

Table 3 summarizes output performance metrics for the reporting period, as identified in the CM² Technology Transfer Plan. Subsections A-G provide a specific list of outputs.

Table 3: Output Performance Metrics

Performance Metrics: Output	Annual Target	Actual for 10/1/2020 - 3/31/2021
1. Publications, conference papers, presentations, or final project reports	10	41 (20 journal publications, 4 final reports, 17 presentations)
1.1 Publications: diversity of fields/journals submitted to (e.g. engineering, modeling, law, policy, geography, economics, infrastructure, etc.)	3	4 (Transportation, Planning, Land-Use, Travel Behavior)
1.2 Conferences: by entity (e.g. TRB, APA, ASCE, WTS, SXSW, etc.)	2	6 (ACSP, CSET, IACP, PacTrans, TRB, YPT)
2. Workshops, seminars in collaboration with or participation of MPOs and transportation agencies	2	1
2.1 Type of activity	2	1
2.2 Type of professional organizations involved	2	2
2.3 Event scales/number of attendees (small (up to 10), medium (11-29), large (30 and up))	2	2
3. Web Presence	n/a	n/a
3.1 Website visits/page views	3,000	5,348
3.2 Number of impressions on Twitter	30,000	22,289
3.3 Number of additional members in LinkedIn Group	20	1

A. Publications

i. Journal Publications

- Sciara, G.C., Rahman, M., & Walthall, R. “Representing Public Transportation Providers in Metropolitan Planning.” Transportation Policy. [Under review; submitted September 2020].
- Oden, M., and Sciara, G.C. “Searching for a Spatial Fix: Patterns of Inter-Metropolitan Collaboration in Transportation Planning and Policy Making.” Journal of Planning Education and Research [Under review; submitted August 2020]
- Rahman, M. & Sciara, G.C. “Causal Relationships among Self-Selection, Travel Behavior and the Built Environment: A Review of Theories and Empirical Research.” Transportation Policy. [Under review; submitted Oct. 2020; comments received.]
- Parr, S., B. Wolshon, P. Murray-Tuite, and T. Lomax, “Multi-State Assessment of Roadway

Travel, Social Separation, and COVID-19 Cases,” *Journal of Transportation Engineering*, Part A: Systems, Vol. 147, No. 5, May 2021.

<https://ascelibrary.org/doi/10.1061/JTEPBS.0000528>

- Ming Zhang, Megaregional approaches to address the mega-challenges of transportation and environment. *Transportation Research Part D: Transport and Environment*, Volume 89, 2020, 102610, ISSN 1361-9209, <https://doi.org/10.1016/j.trd.2020.102610>.
- Liwen Liu, Ming Zhang, Tao Xu. A conceptual framework and implementation tool for land use planning for corridor transit oriented development. *Cities*, Volume 107, 2020, 102939, ISSN 0264-2751, <https://doi.org/10.1016/j.cities.2020.102939>.
- Li, W., Feng, T., Timmermans, H., Li, Z., Zhang, M., and Li, B. 2020. Analysis of citizens' motivation and participation intention in urban planning. *Cities*. 106. DOI: <https://doi.org/10.1016/j.cities.2020.102921>.
- Guerra E, Li S, Reyes A. How do low-income commuters get to work in US and Mexican cities? A comparative empirical assessment. *Urban Studies*. December 2020. <https://doi.org/10.1177/0042098020965442>.
- Guerra, E., Zhang, H., Hassall, L., Wang, J., & Cheyette, A. (2020). Who cycles to work and where? A comparative multilevel analysis of urban commuters in the US and Mexico. *Transportation Research Part D: Transport and Environment*, 87, 102554. <https://doi.org/10.1016/j.trd.2020.102554>
- Guerra, E., & Li, M. (2021). The relationship between urban form and mode choice in US and Mexican cities: A comparative analysis of workers' commutes. *Journal of Transport and Land Use*, 14(1). <https://doi.org/10.5198/jtlu.2021.1789>
- Jiao, J., Azimian, A., (2021). Exploring the Factors Affecting Travel Behaviors During the Second Phase of the COVID-19 Pandemic in the United States. *Transportation Letters: the International Journal of Transportation Research*.
- Jiao, J., Hansen, K., Azimian, A., (2021). Land Value Impacts of Airbnb Listings on Single-Family Homes in Austin, Texas, USA. *International Journal of Housing Markets and Analysis*.
- Jiao, J., Bhat, M., Azimian, A., (2021). Measuring Travel Behavior in Houston, Texas with Mobility Data During the 2020 COVID-19 Outbreak. *Transportation Letters: the International Journal of Transportation Research*.
- Bai, S., & Jiao, J. (2021). Mining Heterogeneous Impact of Destination Attributes in Travel Demand Forecast for Different Urban Districts: A Deep Learning Approach. *Transportation Research Record: Journal of Transportation Research Board*.
- Feng, C., Jiao, J. and Wang, H. (2020). Estimating e-scooter traffic flow using big data to support planning for micromobility. *Journal of Urban Technology*. <https://doi.org/10.1080/10630732.2020.1843384>.
- Bai, S. & Jiao, J. (2020). From Shared Micro-Mobility to Shared Responsibility: Using

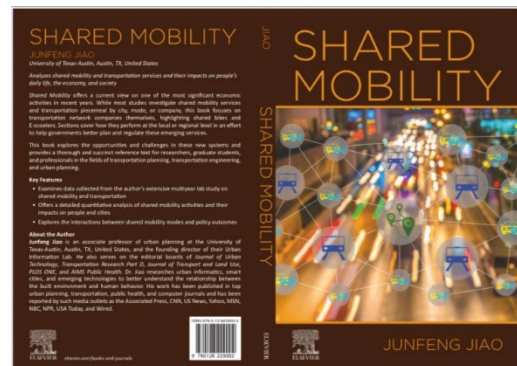
Crowdsourcing to Understand Dockless Vehicle Violations in Austin, Texas. *Journal of Urban Affairs*. <https://doi.org/10.1080/07352166.2020.1798244>.

- Bai, S. & Jiao, J. (2020). Dockless E-scooter Usage Patterns and Urban Built Environments: A Comparison Study of Austin, TX, and Minneapolis, MN. *Travel Behavior and Society*. 20, 264-272.
- Cai, M., Jiao, J., Liu, Y., and Luo, M., (2020). Identifying Transit Deserts for Low-Income Commuters in Wuhan Metropolitan Area, China. *Transportation Research Part D*. 82, 1-11.
- Jiao, J. & Wang, F. (2020). Shared Mobility and Transit-dependent Population: A New Equity Opportunity or Issue? *International Journal of Sustainable Transportation*. <https://doi.org/10.1080/15568318.2020.1747578>.
- Wu, H., Chen, Y., Zhang, Z., and Jiao, J. (2020). The impact of street characteristics on older pedestrians' perceived safety in Shanghai, China. *Journal of Transport and Land Use*. <https://doi.org/10.5198/jtlu.2020.1588>.
- Russel, H., S. Parr, B. Wolshon, and F. Kristiansson, "Methodology to Quantify the Resiliency of Transportation Systems," submitted for publication in the *Transportation Research Record*, August 2020.
- Parr, S., L. Acevedo, P. Murray-Tuite, and B. Wolshon, "Methodology to Quantify Statewide Evacuations," submitted for publication in the *Transportation Research Record*, August 2020.
- Gudishala R., C. Wilmot, and B. Wolshon, "Freeway Incident Diversion Behavior as a Measure of Transportation Network Resiliency," submitted for publication in the *Transportation Research Record*, August 2020.

ii. *Books or other non-periodical, one-time publications*

Drs. Frederick Steiner, Robert Yaro, and Ming Zhang completed the book manuscript for their upcoming book *Megaregions and America's Future* for the Lincoln Institute of Land Policy (LILP). The manuscript is currently under review with Lincoln, and in the coming year will be distributed by Columbia University Press. As part of finalizing the book manuscript, the authors conducted a virtual workshop which took place during the CM² Symposium in December 2020 to allow experts in the field to provide feedback to the authors to help refine the manuscript.

CM² researcher Dr. Junfeng Jiao completed the manuscript for his first forthcoming book entitled *Shared Mobility*. The book will examine various shared mobility modes and will pull from research Dr. Jiao



An image of the cover for the manuscript "Shared Mobility" by CM² researcher Dr. Junfeng Jiao

conducted using CM² research funds. The manuscript is currently under review by Elsevier.

In March 2021, the Transportation Research Record (TRR) celebrated Women's History Month by launching a special collection on Gender Issues in Transportation. The collection will include influential papers previously published in TRR, and feature an introduction and analysis by CM² researcher, Dr. Sandi Rosenbloom.

Due to the impact of COVID-19 pandemic, the publication of Dr. John Landis forthcoming book *Megaprojects for Megaregions* has been postponed, tentatively rescheduled for Spring 2022.

iii. Other publications, conference papers, presentations, and working papers

- Rosenbloom, S., Matteo-Babiano, D., & Nixon, H. (eds). (2021). Insights, Inclusion, and Impact: Framing the Future for Women in Transportation. Transportation Research Board Circular E-C268. January 2021.
- Rosenbloom, S. (2021). Women's Travel Patterns, Attitudes, and Constraints around the world, Chapter 14, Vol, VII in Vickerman, R. (2021). International Encyclopedia of Transportation, Elsevier, ISBN 9780081026717
- Chen, Y., & Jiao, J. (2020). Displacements and Transit Equity: Linkage Between Gentrification and Transit Deserts. Paper presented at the 60th Association of Collegiate Schools of Planning (ACSP) Conference, November 5-8, 2020, Virtual Conference.
- Huang, J., & Jiao, J. (2020). Drunk Driving and The Built Environment- Toward Travel Safety by Studying Crashes Data in Austin, Texas. Paper presented at the 60th Association of Collegiate Schools of Planning (ACSP) Conference, November 5-8, 2020, Virtual Conference.
- Feng, C., & Jiao, J. (2020). Predicting Health Outcomes and Health Behaviors For Four Major Cities in Texas: A Machine-Learning Approach. Paper presented at the 60th Association of Collegiate Schools of Planning (ACSP) Conference, November 5-8, 2020, Virtual Conference.
- Guerra: American Collegiate Schools of Planning Annual Conference, online. "Commute patterns of low-income workers in US and Mexican cities"
- Jiao, J. (2020). Artificial Intelligence and Smart City, Texas Global Artificial Intelligence Dialogues, October 12, 2020, Virtual Talk. (Invited by Dr. Sonia Feigenbaum)
- Jiao, J. (2020). Austin AI Housing Analysis. Texas Smart City Summit. October 14, 2020, Virtual Talk. (Invited by Mr. Charles Purma).
- Jiao, J. (2020). Electric and Shared Micromobility: New Travel Behavior Patterns and Trends. 2020 Region 10 Transportation Conference. October 19, 2020, Virtual Talk. (Invited by Dr. Haizhong Wang)
- Jiao, J. (2020). Austin AI Housing Analysis. Texas Smart City Summit. October 14, 2020, Virtual Talk. (Invited by Mr. Charles Purma).
- Jiao, J. (2020). Electric and Shared Micromobility: New Travel Behavior Patterns and Trends. 2020 Region 10 Transportation Conference. October 19, 2020, Virtual Talk. (Invited by Dr. Haizhong Wang)

- Jiao, J. (2020). Society and AI, Collaborative Research with the City of Austin. The First Annual Symposium of Good System—A UT Grand Challenge. October 19, 2020, Virtual Talk. (Keynote)
- Jiao, J. (2020). Last Mile Autonomous Delivery Systems. Texas Smart City Consortium. November 24, 2020. Virtual Talk. (Invited by Dr. Weijia Xu)
- Jiao, J. (2020). A New Solution to the Last Mile Problem—Understanding The Spatial and Temporal Pattern of E-Scooter Travels. Lectures on Futures Cities, Beijing Jiaotong University, November 25, 2020, Virtual Talk. (Dr. Chun Zhang)
- Li, Y. and Zhang, M. Vehicle Usage Across Generations at Megaregion Level. IACP annual conference (online), December 8, 2020.
- Guo, J. and Zhang, M. Changing patterns of urban expansion in the Texas Triangle Megaregion. IACP annual conference (online), December 7, 2020.
- Loftus-Otway, Lisa: A Perspective on Megaregional Social Equity from the MPO Lens. Conference on Megaregions and America’s Future. University of Pennsylvania, December 3, 2020.
- Chun, Bumseok: Spatial Pattern Analysis of PM 2.5 Concentrations in Densely-Built Areas Using the Random Forest: A Case Study of Austin and Houston in Texas, ACSP Virtual Meeting, Nov. 5 – 8, 2020.
- Loftus-Otway. Lisa: Megaregion Research at CM2: Innovative Transportation Policies to Advance Megaregion Development. Young Professionals in Transportation Megaregion Transportation Policy Symposium. October 1, 2020.
- Rosenbloom, Sandi: Facilitator. 15.2 Panel – Aging Society and Travel Association of Collegiate Schools of Planning Annual Conference (Online), Nov. 5 - 8, 2020.
- Sciara, Gian-Claudia. Discussant. 15.7 Panel – Implications of Urban Transportation Policies. Association of Collegiate Schools of Planning Annual Conference (Online), Nov. 5 – 8, 2020.

B. Websites

The CM² website URL is <https://sites.utexas.edu/cm2/>. This website is used to disseminate any information related to the program. In addition, CM² has a Twitter account (<https://twitter.com/CM2.UTC>), LinkedIn group (<https://www.linkedin.com/groups/12134034/>) LinkedIn company page (<https://www.linkedin.com/company/cooperative-mobility-for-competitive-megaregions-cm2/>), as well as a company Facebook page (<https://www.facebook.com/CM2page/>).

All final project reports are also disseminated through the [TxDOT Research Library](#) website operated by the Center for Transportation Research Library at the University of Texas at Austin (UT Austin). The TxDOT Research Library serves as the official depository of the [Texas Department of Transportation \(TxDOT\) Cooperative Research Program](#) and supports the information needs of the Research and Technology Implementation Division of TxDOT.

UT Austin’s School of Architecture helps disseminate research results and the work of our center through the school’s website (<https://soa.utexas.edu/headlines/what-megaregion>), eNews (<https://mailchi.mp/utexas/february-2018-eneews-1975165?e=48aa70e157>) and Facebook page (<https://www.facebook.com/UTSOA/>). Additionally, UT Austin’s School of Architecture YouTube channel disseminates recordings of CM² outreach activities such as our monthly Brown Bag sessions, guest lecture series, workshops and seminars (https://www.youtube.com/channel/UCJS9a_AUbsZfhRYBXojeu-Q).

All LSU program activities are disseminated through (<http://www.evaccenter.lsu.edu>). In October 2020, Dr. Brian Wolshon was interviewed as an expert on evacuation for the Inc. Magazine article, [“3 Things Business Owners Need to Know About Driverless Trucks”](#). Wolshon was also interviewed as an expert on COVID-19 traffic patterns for two separate news pieces: first, for a Newsday article in November 2020, [“Fewer trips during pandemic Thanksgiving but thousands still traveling,”](#) and second for a live broadcast of the radio show [Mornings with Brian Haldane](#), WBRP 107.3 FM on March 2, 2021.

CM² related research activities from the University of Pennsylvania are disseminated through the Weitzman School of Design website (<https://www.design.upenn.edu/>), the weekly e-newsletter (<https://www.design.upenn.edu/subscribe-design-weekly-news-weitzman>) and Twitter (<https://twitter.com/WeitzmanSchool>). In December 2020, Dr. Erick Guerra was interviewed for the Penn Today article, [“How can cities become healthier, greener, and more equitable in the future?”](#). Dr Guerra was also interviewed as an expert on regional crash data for the WHYY article, [“Philly vows to slow rising traffic fatality rate with more speed enforcement — and bikes”](#) from November 2020.

C. Methodologies, Technologies or Techniques

Nothing to report.

D. Inventions, patent applications, and/or licenses

Nothing to report.



Image of CM² Tutorial Video “Build A City Out of Candy” featuring CM² researcher Lisa Loftus-Otway and Ph.D. candidate Samira Bashir

E. Outreach activities

On Saturday, February 27, 2021 CM² hosted a booth at the 2021 virtual Girl Day UT Austin. UT Austin’s Girl Day is a nationally award-winning event presented by the Women in Engineering Program (WEP) at the University of Texas at Austin that gives elementary and middle school students a chance to explore STEM through grade-appropriate, hands-on activities hosted by volunteer scientists, engineers, and STEM enthusiasts from over 100 student organizations,

research centers, corporate partners and community organizations.

CM² hosted a virtual DIY STEM session called “Build A City”, which asked participants to design their ideal cities out of household items. We challenged participants to think about the following prompts: What makes a good city? What are all the parts of a city? How do city leaders decide what to put in a city?

We are proud to report that the 2021 Girl Day at UT Austin event had over 1,200 online participants. CM² would like to say “Thank You” to our volunteers who donated their time and energy to make our virtual booth a success.

F. Courses and Workshops

Professor Ming Zhang taught three (3) courses for the Fall 2020 and Spring 2021 academic calendar: a Transportation Practicum course, and two CRP 384 courses, “Planning for Megaregions” and “Metropolitan Transportation Studies”.

Researcher Junfeng Jiao taught three (3) courses related to his work with CM². The first course, CRP 386, was an Urban GIS course. “BDP 101 Introduction to Smart City” is an undergraduate forum seminar course focused on the Bridging Discipline Program. Finally, “UGS 302 Ethics of AI” is an undergraduate seminar.

Dr. Sandra Rosenbloom taught two (3) courses for the Fall 2020 and Spring 2021. CRP 384 is a graduate course on Transportation Planning and Policy, while the course “Women’s Issues in Transportation” in Spring 2020 is based on her work generated for CM² sponsored conference on Women’s Travel Issues, September 2019.

Dr. Erick Guerra taught three (3) courses attended by 80 students at the University of Pennsylvania. The first course is titled ‘Introduction to Transportation Planning’. The second is a course on multimodal transportation planning. Finally, Dr. Guerra led a studio course developing an intergrated transit and land use plan for Ciudad del Este, Paraguay.

Dr. Bumseok Chun taught the course UPEP 744.01 Special Topics: Urban Sustainability at Texas Southern University.

Dr. Brian Wolshon at Louisiana Stat University taught two (2) courses: “CE 3600 Principles of Highway and Traffic Engineering” and “CE 4600 Geometric Design of Highways and Airports”.

G. Other products

Each month researchers at UT Austin gather for monthly Brown Bag sessions to present their current projects and discuss their findings with fellow researchers and students. During these events, students and faculty researchers have an opportunity to share their progress on current CM² research and receive feedback on research methods and design. Due to the limitations imposed on in-person events by the COVID-19 pandemic, CM² transitioned these Brown Bags to be virtual presentations, which allowed us to invite researchers and students across the

Consortium to participate. All materials and video recordings are available on [the Brown Bag Lunch Discussion Page of our website](#) and [Texas Architecture YouTube Channel](#).

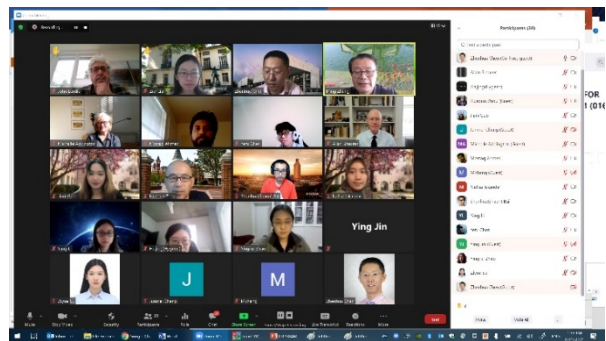


Image of March 2020 Brown Bag digital flyer

For our October 2020 Brown Bag event, UT Austin Ph.D. candidate Rydell Walthall presented his research under Dr. Michael Walton “Transportation Financing: Differences in the Fuel Tax at the State Level”, and UT Austin Ph.D. candidate Jooyong Lee presented his work “Strategic evacuation for hurricanes and other regional events: with and without autonomous vehicles” under CM² researcher Dr. Kara Kockelman. On the November Brown Bag 2020 event, Masters student Lydia Ndagire from Texas Southern University presented

her work under Drs. Carol Lewis and Gwendolyn Goodwin “Application of Equity Rubric Showing Purpose and Need for Rural and Low-Density Communities Near Megaregions: IH-10 East Corridor, Houston and the Texas State Line”, and the University of Pennsylvania research team Camille Boggan, Emily Kennedy, Kate Sutton, and David Seunglee Park presented their award-winning inclusive mobility plan, “Move! Philadelphia”. The March 2021 Brown Bag session hosted UT Austin Ph.D. student Mashrur Rahman as he presented his work under the joint-collaboration of Dr. Megan Ryerson (University of Pennsylvania) and Dr. Gian-Claudia Sciara (University of Texas at Austin) “Airport Governance and Megaregional Planning”. Dr. Erick Guerra from University of Pennsylvania also presented at the March Brown Bag his work “What the heck is a choice rider? A theoretical framework and empirical model”.

In addition to Brown Bag events, CM² hosted a guest lecture series in conjunction with Dr. Ming Zhang’s Spring 2020 Planning for Megaregions academic course. Dr. Zhenhua Chen, assistant professor at Ohio State University, presented his work “Regional Impact of the High-Speed Rail System: Lessons for the U.S.”, where he analyzed the regional impacts of High-Speed Rail (HSR) using China as an example for U.S. transportation planners to understand the benefits of HSR investment on regional development. Additional guest lectures by Dr. Ethan Seltzer (Portland State University), Professor Jonathan Barnett (University of Pennsylvania), and Dr. Gian-Claudia Sciara (University of Texas at Austin) will be presented in April 2021 and discussed in the upcoming SAPR #9.



Screenshare image of Dr. Zhenhua Chen’s guest lecture presentation on March 31, 2021

4. [OUTCOMES](#)

Table 4 summarizes output performance metrics for the reporting period, as identified in the CM² Technology Transfer Plan. Subsections A-G provide a specific list of outputs.

Table 4: Outcome Performance Metrics

Performance Metrics: Outcome	Annual Target	Actual for 10/1/20 - 3/31/21
1. Enlarged pool of trained transportation professionals	n/a	n/a
<i>1.1 Number of students hired by CM², broken down by degree types and levels, diversity metrics, and other social-economic measures</i>	25	9
<i>Degree type (Undergrad, Master, PhD)</i>	n/a	67% undergraduate, 22% master, 11% PhD
<i>Gender (male, female)</i>	n/a	67% male, 33% female
<i>Race (Asian, Black, White, other)</i>	n/a	33% Asian, 56% White, 0% Black, 11% Other
<i>First-generation student (undergrad. or grad.)</i>	n/a	2
<i>1.2 Number of papers developed by students for publication</i>	2	5
<i>1.2 Number of graduates in transportation jobs</i>	15 -overall grant period	1
2. Increased cooperation by local governments and transportation agencies regarding regional and inter-regional issues	n/a	n/a
<i>2.1 Number of regional or inter-regional planning activities detailed in long, medium, and short range transportation plans</i>	1	1
<i>2.2 Development and utilization of consistent and usable planning datasets</i>	5	1
<i>2.3 Creation of megaregional forums, committees, and communications by megaregional transportation planning entities</i>	3	3

We are proud to report that one of our students—former post-doc fellow under Dr. Junfeng Jiao, Dr. Feng Chen—recently became a research scientist in KTH Royal Institute of Technology in Sweden. This makes the overall total of 71 graduates in transportation jobs, which exceeds our goal of having 15 students graduate and enter transportation-related jobs during the overall grant period. Moreover, two (2) student researchers have had papers developed for publication during the reporting period, which meets our overall target of two.

In addition to our students’ achievements, CM² researchers also received recognition for their expertise and contributions to their fields of research. Dr. Brian Wolshon won the 2020 ASCE Outstanding Civil Engineering Educator Award, Baton Rouge Branch of the American Society of Civil Engineers.

CM² faculty researchers across all of our institutions have increased their collaboration efforts with local governments and transportation agencies regarding regional and inter-regional issues.

Dr. Junfeng Jiao is working with the City of Austin Department of Transportation (ADT) on an NSF-funded CIVIC innovation grant to design a community hub for smart mobility in the Georgian Acres neighborhood. Sandi Rosenbloom took advantage of the COVID-19 pandemic to survey the impact of the pandemic on senior travel patterns, working in tandem with the City of Austin Department of Senior Services, the Austin Jewish Community Center, Capital City Village, and the Austin Asian-American Center. Dr. Erick Guerra collaborated with the Delaware Valley Regional Planning Commission by providing data on travel times and modes at different times of day, and by providing expert insights towards potential development plans for a local equity program.

To ensure that the datasets and research are useful for their intended audience, researchers collaborate in megaregionally-focused working groups on inter-regional planning activities. Many researchers met virtually at the TRB conference in January and came together at the megaregional sub-committee meeting to talk about mega-regionally focused transportation projects.

5. IMPACTS

Table 5 below summarizes the impact performance metrics for the reporting period, as identified in the CM² Technology Transfer Plan.

Table 5: Impact Performance Metrics

Performance Metrics: Impact	Annual Target	Actual for 10/1/20 - 3/31/21
1. Enhanced knowledge base	n/a	n/a
<i>1.1 Development of books/handbooks</i>	3 - overall grant period	4
<i>1.2 Journal publications in academic or professional journals</i>	5	20
<i>1.3 Special issues of academic or professional journals</i>	1	2
2. Increased societal awareness beyond transportation sector of megaregional passenger and freight transportation challenges facing megaregion constituents today and, in the future,	n/a	n/a
<i>2.1 Number and extensiveness of social media coverage of CM² research, education, and outreach activities</i>	1	11
3. Informed decision making on public policy and transportation infrastructure investments	n/a	n/a
<i>3.1 Number of contracted plans and projects conducted for and adapted by local and regional agencies in megaregions</i>	1	1

A. Impact on the effectiveness of the transportation system

The research findings from our consortium have already had an impact on transportation system around the country. The composite index developed by Dr. Carol Lewis and Dr. Gwendolyn Goodwin continues to be expanded to include additional Texas regions and works to increase the competitiveness of vulnerable communities in the allocation of resources. Dr. Brian Wolshon has

participated in several research projects analyzing transportation network resiliency during the COVID-19 pandemic.

- B. [Impact on the adoption of new practices, or instances where research outcomes have led to the initiation of a start-up company](#)

Nothing to report.

- C. [Impact on the body of scientific knowledge](#)

The research projects and findings from the consortium are shared at academic forums, conferences, and in journal publications, as well as through social media. This has contributed to the overall awareness of the importance of megaregional study. Our principal investigators will continue producing research that shows the importance of planning from the megaregional scale to help create stronger transportation systems across the country.

- D. [Impact on transportation workforce development](#)

CM² partner universities are preparing students to enter both the public and private sectors with expertise in planning, design, project delivery, and financing strategies. Our classes engage students with experts who work on the implementation of the transportation and infrastructure projects they study. Several CM² graduates have already started working in transportation-related positions across the country. They will be able to bring their knowledge from CM² and implement it in their work. Besides, the camps and outreach activities we have conducted, and continue to plan for the next reporting period, are introducing the next generation to the transportation field.

[6. CHANGES/PROBLEMS](#)

As mentioned throughout this report, the impact of the COVID-19 pandemic affected university operations for all Consortium institutions, interrupted national and international travel for our researchers, and reduced the number of in-person outreach activities such as conferences, workshops, and symposiums. For this reporting period, Dr. Brian Wolshon of the CM² partner institution Louisiana State University had to cancel the proposed National Evacuation Conference for 2020, which was a stated output for the Consortium.

While the impact of COVID-19 did slow down certain activities during this reporting period, all Consortium member institutions were able to adapt to changes and pivot to virtual platforms such as YouTube and Zoom to reschedule the activities that were canceled or disrupted due to uncertainties around in-person events. As the COVID-19 pandemic continues, the way we conduct outreach and research dissemination will continue to evolve, and we anticipate the continued utilization for virtual communication platforms such as Zoom, YouTube, and more.

[7. SPECIAL REPORTING REQUIREMENTS](#)

Nothing to report.