UTC Semi-Annual Progress Report (SAPR) #7

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1. ACCOMPLISHMENTS

A. Goals and Objectives

CM^2 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 19 researchers and 29 students. 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
Coordination within a Megaregion for Freight Planning: Stakeholder Outreach	UT CTR	Michael Walton	Year 4	Complete
Significance and Prospects of Transportation Planning at the Megaregional Scale	UT CTR	Michael Oden & Gian-Claudia Sciara	Year 1	Complete
Application of Equity Rubric Showing Purpose and Need for Rural and Low Density Communities Near Megaregions: IH 10 East Corridor, Houston the Texas State Line	TSU	Carol Lewis	Year 3	Complete
Freight Megaregional Planning and Financial Policy	UT CTR	Michael Walton	Year 3	Complete
A Philadelphia ride-share story: An Investigation of ride-share's impact on transit	UPenn	Erick Guerra	Year 3	Complete
Special Legislation and Megaregion Transit Planning	UT CTR	Lisa Loftus-Otway	Year 3	Complete

During the project selection stage, we practiced a double-blind peer-review process. CM^2 Executive Committee members reviewed and ranked the submitted proposals with all author information and affiliation removed. To ensure the quality of the final reports, CM^2 researchers and external peer reviewers were invited to attend the annual CM^2 Fall Exhibition and the 2019 Summer Forum hosted by consortium partner Texas State University (TSU) in Houston Texas. They reviewed project presentations and provided comments and suggestions that offered valuable feedback and were used by research teams to refine the final project reports.

ii. Education Accomplishments

David Seunglee Park, Sustainable Transportation & Infrastructure Planning; Camille Boggan; Sustainable Transportation & Infrastructure Planning; Emily Kennedy, Sustainable Transportation & Infrastructure Planning; and Kate Sutton, Transportation and Spatial Data Science; University of Pennsylvania.

CM^2 UTC partner institution the University of Pennsylvania (UPenn) won the ITS America's *Emerging Leaders Program Global Challenge*. UPenn team members Camille Boggan, Emily Kennedy, Kate Sutton, and CM^2 GRA David Seunglee Park won the America's regional award for their inclusive mobility plan, *Move! Philadelphia*. The Emerging Leaders Program strives to discover the "new age" of the transportation workforce by engaging students and developing young professionals globally to become involved in the field of mobility and transportation through competition and exposure. Teams from thirteen universities in the United States and Canada submitted designs for an inclusive mobility model for an urban environment in their areas. A team of fifteen subject matter experts representing public, private, and academic sectors reviewed the papers and recommended three to advance to the regional finals.

CM^2 Graduate Research Assistant Jordan McGee was selected as fellow to the Future Leaders Development Conference (LDC), organized by the Eno Transportation Foundation. The Conference allows twenty of the nation's top graduate students in transportation to have a first-hand look at how national transportation policies are developed. Students apply to the program early in the year, and selected "Eno Fellows" travel to Washington, DC for a week each spring. Due to the disruption to national and international travel cause by the COVID-19 pandemic, Ms. McGee will participate in this weeklong program in 2021. During this weeklong intensive

Jordan McGee, University of Texas at Austin Mater of Community & Regional Planning Candidate.

program, the Fellows meet with federal, state, and local officials, as well as public, private, and non-profit leaders across the industry. They get to see how transportation policy is made, while engaging with leaders to discuss the latest developments and trends in the industry.

On May 23, 2020, the University of Texas at Austin School of Architecture recognized the award-winning students, faculty, and staff at the school's first-ever virtual commencement ceremony. CM^2 Administrative Graduate Research Assistant Samira Binte Bashar received the American Institute of Certified Planners (AICP) Award for Outstanding Student 2020. This award recognizes exceptional attainment in the study of planning by a student graduating from a Planning Accreditation Board-accredited program. Additionally, Ms. Bashar and CM^2 Administrative Graduate Research Assistant Nadia Carlson received the "Community and Regional Planning Engaged Practice Award 2020" with the members of their Racial Equity Practicum class for their thesis project *Making Equity Flow: Proposals for Advancing Racial Equity Through Water Department Practices* by the University of Texas at Austin School of Architecture.

iii. Outreach/Engagement Accomplishments

The limitations imposed by the COVID-19 pandemic has had a marked impact on the outreach and engagement activities CM^2 researchers were able to accomplish during this reporting period. Many professional conferences and other in-person events were either postponed or outright canceled by host organizations. Due to university travel restrictions and in-person capacity limitations for the University of Texas and Austin and Louisiana State University, the CM2 Summer Forum 2020, which was scheduled to take place at Louisiana State University in June 2020, has been postponed until the summer of 2021. LSU will host CM2 Summer Forum in 2021 at Baton Rouge, Louisiana. CM2

Professor Ming Zhang and Lisa Loftus-Otway from the University of Texas at Austin virtually attended the FHWA TRB Sub-Committee on Megaregions webinar meeting on September 9, 2020. Lisa Loftus-Otway updated the sub-committee on CM2 outreach activities from the previous reporting period, specifically discussing the outcomes of the joint class trip organized by the University of Texas at Austin and the University of Pennsylvania to the Netherlands and Germany for students to learn about mobility in the Randstad and Ruhr megaregions, a trip which took place pre-pandemic in February 2020.

iv. Administrative Accomplishments

Data analytics have shown steady activity in the CM^2 website over the past six months. Audience page views showed 1,630 users (an increase of 2% from last reporting period) with 1,603 new users visiting the website (+3% from last reporting period), and 3,813 page-views. While the

majority of views came from the United States (79%), the audience for the website are located in 67 countries.

We have utilized our Twitter account to increase social media engagement with CM^2 audiences throughout the current reporting period. The account earned over 20,972 new impressions since the previous reporting period, which is defined as the number of times users saw our tweets on Twitter. Our account has a total of 172 followers (a 15% increase from the last reporting period) and has received 329 profile visits. We will continue to utilize and expand upon this platform, as well as our Facebook page.

CM2 Twitter account profile.

The CM^2 LinkedIn company page and CM^2 LinkedIn Group serve as a space where CM^2 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 99 members, and the company page has 153 members, which is a 42% increase in membership from the last reporting period. Additionally, the CM^2 administration team published the Spring and Summer 2020 newsletters during this reporting period. Our current newsletter email list has 179 subscribers (a 7% increase from the last reporting period). The CM^2 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 CM^2.

CM^2 administration launched the third year of the Support Partner Program (SPP). We are presently waiting to hear back from potential industry partners. The program helps support CM^2 research, student scholarships, and workforce development. Support partners are also welcome to attend several of our CM^2 events, such as our monthly brown bag series and the annual Fall Exhibition event.

In May 2020, Sandra Ciarletta joined CM^2 as the Assistant Director for the Administration, replacing Inessa Ach in the role.

C. Dissemination of Results

Despite the challenges and cancelations that have come with the COVID-19 pandemic, CM^2 researchers continued to disseminate research results through publication activities. The results of work completed to date includes 6 final project reports disseminated on the CM^2 website.

During this period, 18 refereed journal papers have been published, and 4 are forthcoming. According to Google Scholar, peer-reviewed articles from our researchers have been cited approximately 215 times in the reporting period. All items are explored in greater detail under Section 3.

D. Plans for Next Reporting Period

During the next reporting period the CM^2 consortium expects to see 8 completed projects with final reports. Consortium researchers will continue to share the findings of their research through conference presentations, workshops, and journal publications. Three manuscripts are currently under revision during this reporting period, and four additional manuscripts will be developed during the next reporting period. 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.

On Thursday October 1, 2020 CM^2 researchers Frederick Steiner (acting as panel moderator) and Lisa Loftus-Otway (acting as a panelist) will participate 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). CM^2 researcher Jungfeng Jiao will be 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.

"Innovative Transportation Policies to Advance Megaregion Development" panel contributors, Frederick Steiner (moderator), and panelists Lisa Loftus-Otway, Robert Puentes, and Petra Todorovich Messick.

CM^2 will co-host a virtual Workshop Symposium *Megaregions and America's Future* with Lincoln Institute of Land Policy (LILP). This event will feature two days of workshops and panel discussions focused on the future of the megaregion in the United States. CM^2 consortium partner the Center for Transportation Training and Research (CTTR) of Texas State University will host a virtual Megaregions Workshop in early December as well.

Dr. John Landis is working with publishers to finalize publishing contracts for 'Megaprojects for Megaregion' book contract with an anticipated date of publishing in Spring 2021. Dr. Gian-Claudia Sciara plans to continue to work on developing her research around airport representation in MPO planning to help expand research around airports' role in megaregional planning.

The CM^2 partners at the University of Texas at Austin will also hold its annual Fall Exhibition during the next reporting period. The exhibition represents a unique opportunity for researchers to come together, reflect on the research that has been done, and share findings with interested faculty, local professionals, and students in order to plan for future iterations of megaregional research. We are excited to host this event in a virtual format for the first time this Fall.

Researchers already have plans to attend several virtual conferences including ACSP, WSTLUR, TRB, WRSA, and others during the next reporting period. Dr. Jungfeng Jiao has two papers accepted for TRB presentation this year *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*, which is also being considered for publication by TRR. Dr. Michael Walton's research paper, *Coordinating Stakeholder Outreach within a Megaregion: A Case Study*, has also been accepted for TRB presentation this year.

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 CM^2 partners.

Table 2: Current CM^2 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
Central Texas Regional Mobility Authority	Austin, TX	Student Support
Amazon SAT-2 Distribution Center	San Marcos, TX	Student Support
University of Texas at Arlington	Arlington, TX	Research
Johns Hopkins University	Baltimore, MD	Research

B. Other Collaborators or Contacts

The CM^2 research team has consistently promoted multi-jurisdictional collaboration between consortium members by setting aside funds specifically for multi-institutional proposals. There are five multi-institutional projects currently in progress. Researcher Qisheng Pan transferred from Texas State University to the University of Texas at Arlington in September 2020, and has already begun collaborating with UT Arlington and Johns Hopkins University.

3. OUTPUTS

Table 3 summarizes output performance metrics for the reporting period, as identified in the CM^2 Technology Transfer Plan. Subsections A-G provide a specific list of outputs.

Table 3: Output Performance Metrics

Performance Metrics: Output	Annual Target	Actual for 10/1/19-3/31/20	Actual for 4/1/20-9/30/20	Actual Annual Total
1. Publications, conference papers, presentations, or final project reports	10	**48** (17 journal publications, 4 final reports, 27 presentation)	**30** (22 journal publications, 6 final reports, 2 presentations)	**78**
1.1 Publications: diversity of fields/journals submitted to (e.g. engineering, modelling, law, policy, geography, economics, infrastructure, etc.)	3	**6** (**Planning, transportation, geo-information, urban design, ecology, environment**)	**3**(**Law**, Geo-Information, Planning, Transportation, **Education**, **Design**)	**9**
1.2 Conferences: by entity (e.g. TRB, APA, ASCE, WTS, SXSW, etc.)	2	**7** (ACSP, ACSA, ASLA, APA, ETC, IOA, TRB)	0	**7**
2. Workshops, seminars in collaboration with or participation of MPOs and transportation agencies	2	1	0	**1**
2.1 Type of activity	2	1	0	**1**
2.2 Type of professional organizations involved	2	5	0	**5**
2.3 Event scales/number of attendees (small (up to 10), medium (11-29), large (30 and up))	2	1	0	**1**
3. Web Presence	n/a	n/a	n/a	**n/a**
3.1 Website visits/page views	3,000	4,506	3,813	**8,319**
3.2 Number of impressions on Twitter	30,000	34,000	20,972	**54,972**
3.3 Number of additional members in LinkedIn Group	20	0	6	**6**

A. Publications

i. Journal Publications

- Alcorn, L. & Jiao, J. 2019. Bike Sharing Station Usage and the Surrounding Built Environments in Major Texas Cities. Journal of Planning and Education Research. https://doi.org/10.1177/0739456X19862854
- 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.
- Briscoe, D. (forthcoming). Multi-Modal Intelligence. Technology, Architecture + Design. Vol. 5, Issue 2.
- 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.
- Dong, X. 2020. Trade Uber for the Bus? Journal of the American Planning Association, 86(2), 222–235. https://doi.org/10.1080/01944363.2019.1687318
- Feng, C., Jiao, J. and Wang, H. (accepted). Estimating e-scooter traffic flow using big data to support planning for micromobility. Journal of Urban Technology.
- Guerra, E., Li, A., and Reyes Sánchez, A.I., (forthcoming). Commute patterns of low-income workers in US and Mexican cities: a comparative empirical assessment. Urban Studies.
- Guerra, E., Zhang, H., Hassall, L., Wang, J., and 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 https://www.sciencedirect.com/science/article/pii/S1361920920307410
- Herrera, N., Parr, S., and Wolshon, B. 2020. Driver Compliance and Safety Effect of the Three-Foot Law. Research Interdisciplinary Perspectives.
- Jiao, J., & Bai, S. 2020. Understanding the Shared E-scooter Travels in Austin, TX. ISPRS International Journal of Geo-Information. 9(2), 135; https://doi.org/10.3390/ijgi9020135
- Jiao, J., Bischak, C., Hyden, S. 2020. The Impact of Shared Mobility on Trip Generation Behavior in the US: Findings from the 2017 National Household Travel Survey. Travel Behaviour and Society. 19, 1-7.
- Jiao, J. & Cai, M. 2020. Using Open Source Data to Identify Transit Deserts in Four Major Chinese Cities. ISPRS International Journal of Geo-Information. 9 (2), 100.
- 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
- Landis, J. & Li, S. (forthcoming). African-American, Latino and Poverty-based Transportation Equity Disparities Among Large U.S. Metropolitan Areas. Under review at the Journal of Planning Education and Research.
- 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
- Liu, L., Zhang, M., and Xu, T. 2020. A conceptual framework and implementation tool for land use planning for Corridor Transit Oriented Development. Cities. 107. DOI: https://doi.org/10.1016/j.cities.2020.102939
- Pan, Q., Z. Jin, and X. Liu (forthcoming). Measuring the effects of job competition and

matching on employment accessibility. Transportation Research Part D.

- Parr, S., Smith, T., and Wolshon, B. 2020. Effect of Manual Traffic Control on Evacuation Time Estimates. Transportation Research Record: Journal of the Transportation Research Board.
- Parr, S., Wolshon, B., Renne, J., and Kim, K. 2020. Traffic Impacts of the COVID-19 Pandemic: Statewide Analysis of Social Separation and Activity Restriction. Natural Hazards Review, Vol. 21, No. 3.
- Zhang, Z., Liu, F., Wolshon, B., and Sheng, Y. 2020. Virtual Traffic Signals: Safe, Rapid, and Efficient Driving Without Traffic Controls. IEEE Transactions on Intelligent Transportation Systems, doi: 10.1109/TITS.2020.2998907.
- Zhang, M. 2020. The Use and Value of Geographic Information Systems in Transportation Modeling GIS in transportation land use modeling. In Roger Vickerman (ed.) Encyclopedia of Transportation. Elsevier.

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

- Landis, J. (forthcoming). "Introducing the Northeast Megaregion Travel Demand and Investment (NEMR TD&I) Model: Model Design, Logic, and Pilot Study Results". Chapter, Moving Forward: Learning from Megaregion Research. Zhang, M., Rosenbloom, S., and Garland, J., eds.
- Rosenbloom, S. "Travel Needs of Older People." Chapter, Encyclopedia of Transportation, 33pp.

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

- Lewis, C. (forthcoming). Creating a Framework to Determine Purpose and Need for Increased Travel Options in the Megaregion for Vulnerable Non-Urban Communities. USDOT.
- Pan., Q. (forthcoming). Presentation of the Impacts of Light Rail on Residential Property Values: A Case Study of the Houston METRORail Transit Line and its Expansion. Kinder Institute for Urban Research, Rice University.
- Rosenbloom, S. (editor). 2020. Transportation Research Board Circular. 6th International Conference on Women's Transportation Patterns.
- Zhang, M. (moderator). CM2 Student-Led Symposium: Learning from the Randstad and Rhine-Ruhr: Implications for the Texas Triangle. May 6, 2020.

B. Websites

The CM^2 website URL is https://sites.utexas.edu/cm2/. This website is used to disseminate any information related to the program. In addition, CM^2 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/).

As mentioned in the previous reporting period, the newly created page 'Safe & Healthy Aging Lab' on the CM^2 website. During this reporting period, CM^2 published four Policy Briefs based on

Dr. Rosenbloom's research activities on the Safe & Healthy Aging Lab, and highlighted each on our social media accounts:

- Safe & Healthy Aging Lab: Policy Brief #1, "Senior Texans Drive More, Walk Less than Their National Counterparts" (https://sites.utexas.edu/cm2/policy-brief-1/)
- Safe & Healthy Aging Lab: Policy Brief #2, "ADA Paratransit Services Costs Soar for Seniors and People with Disabilities in Texas – A Bleak Future?" (https://sites.utexas.edu/cm2/policy-brief-2/)
- Safe & Healthy Aging Lab: Policy Brief #3, "Do Texas Seniors Just Love Their Cars? The Relationship Between Population Density and Private Vehicle Use" (https://sites.utexas.edu/cm2/policy-brief-3/)
- Safe & Healthy Aging Lab: Policy Brief #4, "Texas Senior Pedestrians More at Risk Every Year" (https://sites.utexas.edu/cm2/policy-brief-4/)

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-enews-1975165?e=48aa70e157) and Facebook page (https://www.facebook.com/UTSOA/). Recently, the School of Architecture highlighted a study by Dr. Jiao and team on the comparison of current and pre-Covid19 vehicle miles traveled (VMT) to better understand the conditions the nation's roads are experiencing during the pandemic (https://soa.utexas.edu/headlines/impacts-vmt-us-counties-during-covid-19-pandemic).

A newly developed website dedicated to Dr. Jungfeng Jiao's research has been launched during this reporting period, highlighting Jiao and team's investigations into the transit deserts across 52 U.S. cities, among other projects (https://sites.utexas.edu/uil/).

All LSU program activities are disseminated through (http://www.evaccenter.lsu.edu). The LSU School of Engineering highlighted the research Dr. Wolshon and a group of fellow researchers conducted on the impact of social distancing directives on human travel behavior, using highway volume data as a representation of personal activity and interaction (https://www.lsu.edu/eng/news/2020/04/wolshoncoronatravelpatterns.php). The group's initial findings are detailed in a paper titled, *Traffic Impacts of the COVID-19 Pandemic: A Statewide Analysis* which was published in the American Society of Civil Engineers' journal, Natural Hazards Review in July of this year.

Furthermore, Dr. Brian Wolshon (LSU) was quoted as expert in evacuation and the effects of the COVID-19 pandemic in an article entitled "Coronavirus Raises Concerns Over Response to Natural Disasters," published by Bloomberg Government online media

(https://about.bgov.com/news/coronavirus-raises-concerns-over-response-to-natural-disasters/).

Dr. Brian Wolshon speaking on an episode of "Strange Evidence" on the Science Channel.

Dr. Wolshon also participated in a series of televised interviews as an engineering expert for multiple episodes of the fourth season for the television series Strange Evidence on the Science Channel:

- Strange Evidence, The Science Channel. Season 4, Episode 7, Segment 3, "Blue Christmas," Broadcast date: July 16, 2020. Available online at: https://www.sciencechannel.com/tv-shows/strange-evidence/full-episodes/underwater-godzilla (32:15 mark of 53:32)
- Season 4, Episode 5, Segment 2, "Missing Dead," Broadcast date: July 9, 2020. Available online at: https://www.sciencechannel.com/tv-shows/strange-evidence/full-episodes/curse-of-the-zombie-graveyard (13:20 mark of 47:57)
- Season 4, Episode 4, Segment 2, "Fury Road," Broadcast date: July 2, 2020. Available online at: https://www.sciencechannel.com/tv-shows/strange-evidence/full-episodes/church-of-the-death-eaters (12:30 mark of 51:25)
- Season 4, Episode 2, Segment 6, "Sky City," Broadcast date: June 18, 2020. Available online at: https://www.sciencechannel.com/tv-shows/strange-evidence/full-episodes/escobars-ghost (37:25 mark of 44:24)
- Season 4, Episode 2, Segment 5, "Sky City," Broadcast date: June 18, 2020. Available online at: https://www.sciencechannel.com/tv-shows/strange-evidence/full-episodes/escobars-ghost (37:25 mark of 44:24)
- Season 4, Episode 2, Segment 3, "Beast on the Streets" Broadcast date: June 18, 2020. Available online at: https://www.sciencechannel.com/tv-shows/strange-evidence/full-episodes/escobars-ghost (20:31 mark of 44:24)
- Season 4, Episode 2, Segment 1, "Flame Thrower," Broadcast date: June 18, 2020. Available online at: https://www.sciencechannel.com/tv-shows/strange-evidence/full-episodes/escobars-ghost (2:13 mark of 44:24)
- Season 4, Episode 1, Segment 2, "Human Torch," Broadcast date: June 11, 2020. Available online at: https://www.sciencechannel.com/tv-shows/strange-evidence/full-episodes/nuclear-mummy-demon (12:53 mark of 1:36:03)

C. Methodologies, Technologies or Techniques

Dr. Jungfeng Jiao's method of identifying transit deserts has been expanded upon in an updated iteration referred to as the Transit Desert 2.0 Method. Dr. Jiao has been developing methods to identify transit deserts at the Block Group level using different GIS data sets, Google Transit

Feeds, and Open street maps. Results from a COVID-19 traffic study which implemented this method are available for viewing on the recently launched website for Jiao's research.

D. Inventions, patent applications, and/or licenses

Nothing to report.

E. Outreach activities

The limitations imposed by the COVID-19 pandemic has had a marked impact on the outreach and engagement activities CM2 researchers were able to accomplish during this reporting period. Many professional conferences, workshops, and other in-person events were either postponed or outright canceled by host organizations during this reporting period.

F. Courses and Workshops

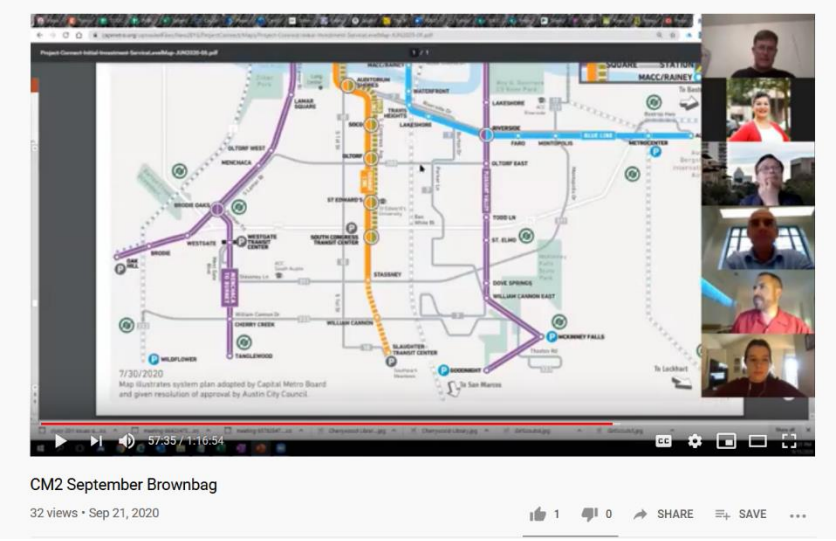
The limitations imposed by the COVID-19 pandemic has had a marked impact on the outreach and engagement activities CM2 researchers were able to accomplish during this reporting period. Many workshops and courses planned to take place during the Summer 2020 academic semester were canceled by institutions during this reporting period due to restrictions for in-person contact. Professor Erick Guerra at the University of Pennsylvania taught the graduate course, 'Introduction to Transportation Planning Class,' during the Spring 2020 academic term with 20 students enrolled in the course.

Professor Ming Zhang from the University of Texas at Austin taught the graduate course 'Planning for Megaregions' which had 10 graduate students enrolled. Students reviewed megaregional and large scale regional planning activities in these areas and saw a 30-year plan in the Ruhr valley coming to fruition.

Researcher Carol Lewis at Texas Southern University taught a class titled 'Application of Geographic Information Systems in Urban Planning' for six students.

G. Other products

During the Spring and Fall 2020 academic terms researchers at UT Austin gather for monthly Brown Bag Lunch Discussions 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 CM^2 research and receive feedback on research methods and design. All materials and video recordings are available on the Brown Bag Lunch Discussion Page of our website.



Still of Lonny Stern's (CapMetro) presentation during the September 2020 CM2 Brownbag.

During the current reporting period, CM2 hosted our Brown Bag Lunch Discussion events virtually via Zoom. For the September 2020 Brown Bag, we invited guest speaker Lonny Stern, the Community Engagement Administrator at Capital Metro, to present on the newly approved transportation system plan for the Austin region called Project Connect. Lonny discussed details of the plan, which includes a transition to an all-electric fleet, and the addition of new light rail and commuter rail features. Additionally, Masters student Maxwell Bernhard of UT Austin presented his research on a pedestrian crash fatality analysis report for TxDOT under the supervision of Dr. Kara Kockelman.

In May 2020, CM2 organized a virtual student-led symposium 'Learning from the Randstad and Rhine-Ruhr: Implications for the Texas Triangle' with Dr. Ming Zhang and Lisa Loftus-Otway's Planning for Megaregion class. The class took a trip to the Netherlands and Germany in February, to learn about "super-city' regions in the European context. They later applied those learnings in the transportation planning and megaregion policies and practices for the Texas triangle region. The symposium featured presentations developed under two research project themes: transportation planning, and megaregional policies and practices. The virtual symposium was recorded and disseminated on the CM2 website through the University of Texas at Austin School of Architecture Vimeo page.

Itinerary for the May 6, 2020 CM2 student-led symposium.

4. OUTCOMES

Table 4 summarizes output performance metrics for the reporting period, as identified in the CM^2 Technology Transfer Plan.

Table 4: Outcome Performance Metrics

Performance Metrics: Outcome	Annual Target	Actual for 10/1/19-3/31/20	Actual for 4/1/20-9/30/20	Actual Annual Total
1. Enlarged pool of trained transportation professionals	n/a	n/a	n/a	**n/a**
1.1 Number of students hired by CM², broken down by degree types and levels, diversity metrics, and other social-economic measures	25	31	29	**60**
Degree type (Undergrad, Master, PhD)	n/a	3% undergrad, 58% master, 39% PhD	3% undergrad, 59% master, 38% PhD	**n/a**
Gender (male, female)	n/a	51% male, 49% female	52% male, 48% female	**n/a**
Race (Asian, Black, White, other)	n/a	3% Black, 59% Asian, 32% White, 6% Other	3% Black, 55% Asian, 34% White, 3% Other	**n/a**
First generation student (undergrad. or grad.)	n/a	2	2	**4**
1.2 Number of papers developed by students for publication	2	11	3	**14**
1.3 Number of graduates in transportation jobs	15*** for overall grant period	2	4	**6**
2. Increased cooperation by local governments and transportation agencies regarding regional and inter-regional issues	n/a	n/a	n/a	**n/a**
2.1 Number of regional or inter-regional planning activities detailed in long, medium, and short-range transportation plans	1	0	1	**1**
2.2 Development and utilization of consistent and usable planning datasets	1	3	2	**5**
2.3 Creation of megaregional forums, committees, and communications by megaregional transportation planning entities	1	0	3	**3**

Despite the pressure the COVID-19 pandemic has put on the transportation industry, we are proud to have a total of 4 students enter the workforce in the past six months and start their careers in the field of transportation. This makes the overall total of 70 graduates in transportation jobs, which exceeds our goal of having 15 students graduate and enter transportation-related jobs during the overall grant period. Moreover, 3 student researchers have had papers developed for publication during the reporting period, which exceeds our target of 2 during the overall grant period.

In addition to our students' achievements, CM^2 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. Ming Zhang from UT Austin has developed a collaborative partnership with Capital Metro, the public transportation provider for Austin, TX. Dr. Erick Guerra provided expert insights to ongoing transportation projects with the City of Philadelphia and the Southeastern Pennsylvania Transportation Authority (SEPTA). Dr. Gian-Claudia Sciara and the UT Austin Community & Regional Planning class in Bicycle and Pedestrian Planning worked closely with representatives from the City of Austin to develop a student-generated proposal for active transportation improvements to the I-35 interchanges at E. Martin Luther King Jr. Boulevard, to be considered within TxDOT's larger Mobility35 Program.

5. IMPACTS

Table 5 below summarizes the impact performance metrics for the reporting period, as identified in the CM^2 Technology Transfer Plan.

Table 5: Impact Performance Metrics

Performance Metrics: Impact	Annual Target	Actual for 10/1/19-3/31/20	Actual for 4/1/20-9/30/20	Actual Annual Total
1. Enhanced knowledge base	n/a	n/a	n/a	**n/a**
1.1 Development of books/handbooks	3*** for overall grant period	0	3	**3**
1.2 Journal publications in academic or professional journals	5	17	18	**35**
1.3 Special issues of academic or professional journals	1	0	1	**1**
2. Increased societal awareness beyond transportation sector of megaregional passenger and freight transportation challenges facing megaregion	n/a	n/a	n/a	**n/a**

constituents today, and in the future				
2.1 Number and extensiveness of social media coverage of CM² research, education, and outreach activities	1	3	3	**6**
3. Informed decision making on public policy and transportation infrastructure investments	n/a	n/a	n/a	**n/a**
3.1 Number of contracted plans and projects conducted for and adapted by local and regional agencies in megaregions	1	0	3	**3**

A. Impact on the effectiveness of the transportation system

Two CM² researchers, Dr. Junfeng Jiao of UT Austin and Dr. Brian Wolshon of LSU, have already applied the research methods utilized in CM² related projects to emerging research on the impact of COVID-19 on the transportation system. The goals of these projects are to understand the early impacts of government restrictions on social interaction with the expectation that it will be possible to determine its effectiveness in limiting the timing and extent of infections and use the resulting data in future operational, strategic, and recovery planning efforts. These studies have the potential to improve megaregional transportation planning, and thereby improve operations and safety in megaregions.

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

CM^2 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 CM^2 graduates have already started working in transportation-related positions across the country. They will be able to bring their knowledge from CM^2 and implement it in their work. Additionally, the educational 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. 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.

In May 2020, Sandra Ciarletta joined CM^2 as the Assistant Director of Administration, replacing Inessa Ach in the role.

In July 2020, Dr. John Landis of UPenn officially retired. Dr. Erick Guerra took over Dr. Landis's role as the lead principal investigator for UPenn for the remainder of the grant. In September 2020, Dr. Rob Harrison of UT Austin officially retired. Dr. Harrison completed his portion of a forthcoming book written in collaboration with Dr. Qisheng Pan and Dr. Brian Wolshon.

On September 1, 2020 CM^2 researcher Qisheng Pan transferred from Texas State University to the University of Texas at Arlington. Researcher Dr. Carol Lewis replaced Dr. Pan as the lead principle investigator for TSU. Dr. Bumseok Chun replaced Dr. Pan as a member of the CM^2 Executive Committee. TSU will remain as a Consortium partner for the remainder of the grant, and UT Arlington will act a sub-awardee to TSU so that Dr. Pan may complete his research projects for the UTC.

7. SPECIAL REPORTING REQUIREMENTS

Nothing to report.