Cooperative Mobility for Competitive Megaregions

UTC Semi-Annual Progress Report (SAPR) #6

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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 26 researchers and 58 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.

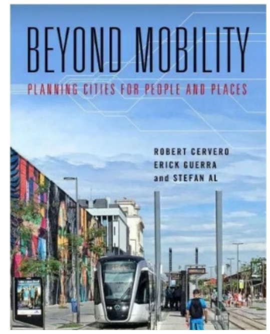
Table 1: Completed Projects by Partner Institutions and PIs

Project Title	Partner	Principal Investigator	Funding Year	Project Status
Multi-Modal Modelling: BIM Templates for Hub Design and Networks	UT	Danelle Briscoe	Year 1	Complete
Multi-Modal Modelling: BIM Template for Hub Connectivity and Networks	UT	Danelle Briscoe	Year 3	Complete
The Role of Transportation Networking Companies in Megaregion Mobility	Multi - UT SOA, Penn, TSU	Multi - J. Jiao, E. Guerra, Q. Pan	Year 3	Complete
Megaregional Transportation System Resilience Planning	UT CTR	Lisa Loftus-Otway	Year 3	Complete
Application of the Equity Rubric for Purpose and Need to a Demonstration Corridor in the Texas Megaregion	TSU	Carol Lewis	Year 2	Complete
Transportation and land use across US and Mexican cities and megaregions	UPenn	Erick Guerra	Year 2	Complete
Transportation and land use across US and Mexican cities and megaregions	UPenn	Erick Guerra	Year 3	Complete

During the project selection stage, we practiced a double-blind peer-review process. CM² 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 Summer Forum. 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

The National Urban Design Awards celebrate the best in the design of towns and cities, streets and spaces. There are 5 categories: Practice Project, Public Sector, Student, Book, and Lifetime Achievement. Dr. Erick Guerra won awards in the Urban Design Group 2019 book category for his book 'Beyond Mobility, Planning Cities for People and Places' co-authored by Robert Cervero and Stefan Al. The book acknowledged the support of CM2.



Book Cover of awarded book

Luke Hassall, Award recipient

CM^2 Partners selected Luke Hassall, a master's student in City Planning at the University of Pennsylvania, for the UTC Outstanding Student of the Year in 2019. CM^2 co-sponsored this with CTR. His current research is on Transportation Planning and Policy, as well as Infrastructure Systems, with a particular focus on public transit and bike and pedestrian planning. Luke's thesis is on is based on a CM^2 supported Studio Project on Congestion Pricing in New York. He also helped write and edit a paper on comparative bicycle travel behavior in US and Mexican metropolitan areas which is was presented at the TRB Annual Meeting in January 2020.

Nadia Carlson, one of the Graduate Research Assistants for Administration, was awarded the Women in Transportation Helen M. Memorial Scholarship from the Heart of Texas Chapter. Nadia is a Master's student at UT and she is interested in sustainable transportation planning. She was recognized by the chapter for her work at CM^2, as well as her participation in the Bicycle Advisory Council with the City of Austin.

Nadia Carlson, Award recipient

iii. Outreach/Engagement Accomplishments

On Friday, November 15, CM^2 researchers gathered at UT to present their ongoing research projects for the CM^2 grant. In addition to our faculty and student researchers, representatives from our Support Partner Program as well as members from the

CM^2 Advisory Committee were invited. The exhibition included a poster session for new and ongoing CM^2 research projects, during which students, faculty, and guests could discuss the research topics, research design, challenges, and current/expected findings. Researchers were also divided into small teams for trivia where they were tested on their knowledge of the center regions and megaregional research. Researchers commented on how engaging the event was and how the posters presented critical findings.

Attendees of 2019 Fall Exhibition

CM^2 had an informational table at the Texas American Planning Association conference on November 6-8, 2019 in Waco Texas. Conference participants were able to learn about the center and our research as well as hear about how our research is impacting transportation systems across the country. Additionally, Professor Ming Zhang presented his research on the Georgetown Bicycle Master Plan with a representative from the City of Georgetown's planning department.

CM2 GRA, Nadia Carlson at APA Texas

Many of our researchers attended this year's TRB conference in Washington D.C. from January 12-16. Several researchers presented their work with CM^2, like Dr. Gian-Claudia Sciara, Dr. Michael Oden from UT, and CM^2 Advisory Committee Member James Garland, who presented a lectern session called "Planning for Megaregions: New initiatives and Technical Approaches to address Complex Issues and Foster Productive Partnerships." The CM^2 center created a schedule with all of the presentations from CM^2 researchers and the administration team sent it out in the 2019 Fall Newsletter.

CM2 Researchers at TRB

iv. Administrative Accomplishments

The CM^2 website has been redesigned to provide more information in an organized way to the viewers. Dr. Sandi Rosenbloom's activities are also highlighted through the new page 'Safe & Healthy Aging Lab' on the CM^2 website. Data analytics have shown steady growth in the CM^2 website activity over the past six months. Audience page views showed 1,599 users (an increase of 54% from last reporting period) with 1,553 new users (+58% from last reporting period), and 4,506 page views (+21%).

The CM^2 administration team also created a promotional video for the center in collaboration with Bevo Video Production from Moody College of Communication at the University of Texas at Austin. The video is posted on the CM^2 website and highlights the goals, objectives, research, and associated activities of the center. The video helps deliver key information about the center in a short amount of time to page visitors. The CM^2 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.

A clip from the promotional video

We have continued developing our [Twitter account.] The account earned over 34,000 new impressions since the previous reporting period, which is defined as the number of times users saw our tweets on Twitter. Our account has 149 followers (a 20% increase) and 329 profile visits. We will continue to utilize and expand this platform, as well as the [CM^2 LinkedIn company page], [CM^2 LinkedIn Group,] and our [Facebook page.]

Additionally, the administration published the Fall 2019 newsletter during this reporting period. Our current newsletter email list has 168 subscribers (+11%).

CM2 Fall Newsletter 2019

C. Dissemination of Results

The results of work completed to date has included **7 final project reports** disseminated on the CM^2 website. CM^2 researchers gave **27 presentations** at **conferences** and **lectures** both in the US and abroad. **17 refereed** journal papers have been published, **2 are forthcoming,** and **2 are under consideration**. Peer-reviewed articles from our researchers have been cited approximately **508 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

The next reporting period, the CM^2 consortium expects to see **20 completed projects** with final reports. The administrative team will continue to conduct outreach and to grow this program of matching funds.

Due to the COVID-19 pandemic, CM^2 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. Despite the challenges and cancelations that have come with this crisis, our researchers continue to find ways to stay involved and focused on future projects. Megan Ryerson at The University of Pennsylvania has already set out to complete a project titled "Virtually There: Estimating the Potential of Teleconference to Reduce Travel within and between Megaregions in the Aftermath of a Global Pandemic." We are excited to see how our researchers will find creative ways to adapt and stay connected to their research with these new circumstances.

Additionally, Dr. Michael Walton continues to work on a connected vehicle pilot project as part of his year four project involving coordination across a megaregion. We expect to see many projects like this in the coming year that will impact the transportation field and body of knowledge. 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.

Special issue on megaregions of "Transportation Research Part D: Transport and Environment" (TR-D) received 15 proposal submissions. Two papers are currently under revision and the issue is expected to be published in Spring 2020.

Consortium researchers will continue to share the findings of their research through conference presentations and journal publications. 10 researchers already have plans to attend several conferences including ACSP, WSTLUR, TRB, WRSA, and others 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 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

B. Other Collaborators or Contacts

During the reporting period, Danelle Briscoe collaborated with PAGE Architects, Austin, to develop a BIM componentry that could supplement their transportation user-based scenarios of that development. During this reporting period, Dr. Qisheng Pan also collaborated with Professor Genevieve Giuliano and Dr. Peter Gordon from the University of Southern California for his research related to CM^2.

The CM^2 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.

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
1. Publications, conference papers, presentations, or final project reports	10	**51** (17 journal publications, 7 final reports, 27 presentation)
1.1 Publications: diversity of fields/journals submitted to (e.g. engineering, modeling, law, policy, geography, economics, infrastructure, etc.)	3	6 (Planning, transportation, geo-information, urban design, ecology, environment)
1.2 Conferences: by entity (e.g. TRB, APA, ASCE, WTS, SXSW, etc.)	2	7 (ACSP, ACSA, ASLA, APA, ETC, IOA, TRB)
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	5
2.3 Event scales/number of attendees (small (up to 10), medium (11-29), large (30 and up))	2	1
3. Web Presence	n/a	n/a
3.1 Website visits/page views	3,000	4,506
3.2 Number of impressions on Twitter	30,000	34,000
3.3 Number of additional members in LinkedIn Group	20	0

A. Publications

i. Journal Publications

- Cai, M., Jiao, J., Liu, Y., and Luo, M., (forthcoming). Identifying Transit Deserts for Low-Income Workers in Wuhan, China. Transportation Research Part D.
- Boeing, G., Wegmann, J., & Jiao, J., (2020). Rental Housing Spot Markets: How Online Information Exchanges Can Supplement Transacted-Rents Data. Journal of Planning and Education Research. https://doi.org/10.1177/0739456X20904435.
- Oden, M., & Sciara, G. C. (2020). The salience of megaregional geographies for inter-

metropolitan transportation planning and policymaking. Transportation Research Part D: Transport and Environment, 80 (March). https://doi.org/10.1016/j.trd.2020.102262.

- Jiao, J., & Bai, S., (2020). An Empirical Analysis of Airbnb Listings in Forty Major American Cities, Cities. https://doi.org/10.1016/j.cities.2020.102618.
- 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. & 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., 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.
- McSherry, L., Steiner. F, (2019). Salt Lines: Markers of Change. Ri-Vista 1:16-21.
- Steiner, F., & McSherry, L. (2020). Erosion and deposition. Journal of Urban Design, 25(1), 31-34.
- Pang, H., and Zhang, M. 2019. Understand the multi-level effects of the built environment on trip-chaining behavior. Transportation Research Record: Journal of the Transportation Research Board of the National Academies, 2673
- Whitaker, W. and Steiner, F. 2019. Ian McHarg: An Illustrated Chronology of His Life. Socio-Ecological Practice Research 1 (3-4): 371-380.
- Xu, J., Zhang, M., Zhang, X., Wang, D., and Zhang, Y. 2019. How does city-cluster high-speed rail facilitate regional integration? Evidence from the Shanghai-Nanjing corridor. Cities, 85: 83-97.
- Briscoe, D. 2019. Queering BIM: A Changing Narrative to Digital Design Objects; Journal of Architectural Education (JAE); Volume 73 (2), pp 203-210. https://doi.org/10.1080/10464883.2019.1633200.
- Guerra, E., Ricardo, D. 2020. Electric vehicles and residential parking in an urban environment: results from a stated preference experiment. Transportation Research Part D: Transport and Environment 79: 102222
- Renne, J., Wolshon, B., Murray-Tuite, P., & Pande, A. 2019. Emergence of resilience as a framework for state Departments of Transportation (DOTs) in the United States. Transportation Research Part D: Transport and Environment.
- Zhang, Z., Wolshon, B., & Murray-Tuite, P. (2019). A conceptual framework for illustrating and assessing risk, resilience, and investment in evacuation transportation systems. Transportation research part D: Transport and Environment, 77, 525-534.
- Chun, B., Choi, K., & Pan, Q. (2020). The nexus between PM 2.5 and urban characteristics in the Texas Triangle region. Transportation Research Part D: Transport and Environment, 78, 102187.
- Wang, F. & Jiao, J. (forthcoming). Shared Mobility and Transit-dependent Population: A New Equity Opportunity or Issue? International Journal of Sustainable Transportation.
- Cai, M., Jiao, J., Liu, Y., and Luo, M., (forthcoming). Identifying Transit Deserts for Low-Income Workers in Wuhan, China. Transportation Research Part D.

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

Nothing to Report.

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

- Bai, S., & Jiao, J. (2020). Dockless E-scooter Usage Patterns and Urban Built Environments: A Comparison Study of Austin, TX, and Minneapolis, MN. Paper presented at the 99th Transportation Research Board (TRB) Annual Meeting, January 12-16, 2020, Washington, DC.
- Bai, S., & Jiao, J. (2019). Location Choice of Airbnb Listings in Different Cities: A Comparative Analysis in Four U.S. Cities. Paper presented at the 59th Association of Collegiate Schools of Planning (ACSP) Conference, October 24-27, 2019, Greenville, SC.
- Chen, Y., & Jiao, J. (2020). Exploring the Relationship between the Light Rail Transit and Bus: Competition Substitution or Congestion Substitution. Paper presented at the 99th Transportation Research Board (TRB) Annual Meeting, January 12-16, 2020, Washington, DC.
- Lewis, C., Determining Purpose and Need for Vulnerable Communities in the Megaregion, Poster Session: Transportation Research Board, January 14, 2020, Booth A11
- Mendenhall, A., Albert, M., Berg, R., Grigsby, S., and Steiner, F. (moderator). 2019. Inside the LA Studio with Design Workshop. American Society of Landscape Architects Annual Meeting, San Diego, November 17.
- Sciara, G. C, Rahman, M., & Walthall, R. Representing Public Transportation Providers in Metropolitan Planning. Presented at Transportation Research Board Annual Meeting, January 13, 2020, Washington, D.C.
- Sciara, G.C. Searching for a Spatial Fix: Patterns of Inter-Metropolitan Collaboration in Transportation Planning and Policy Making. Presented at Association of Collegiate Schools of Planning Annual Conference, October 25, 2019, Greenville, SC.
- Sciara, G. C. & Oden, M. The Salience of Megaregional Geographies for Inter-Metropolitan Transportation Planning and Policy Making. Presented at Transportation Research Board Annual Meeting, January 13, 2020, Washington, D.C.
- Sciara, G. C, Rahman, M., & Walthall, R. Transit Operators in Metropolitan Transportation Decision-making: The Case for Analyzing Planning Institutions. Presented at Association of Collegiate Schools of Planning Annual Conference, October 25, 2019, Greenville, SC.
- Lamba, B., Spirn, A., Van Dyke, C., Steiner, F. Design with Nature: Fifty Years Later. Presented at American Society of Landscape Architects Annual Meeting, San Diego, November 16.
- Zhang, M. Cooperative Mobility for Competitive Megaregions: A research update. Invited presentation to the Megaregion subcommittee, Transportation Research Board, January 14, 2020, Washington D.C.
- Zhang, M. Opportunities and challenges facing urban-rural planning in the era of big data and crowdsourcing. Fuzhou University, January 6, 2020, Fuzhou, China.
- Zhang, M. and Pang, H. Understand the Effects of the Built Environment on Trip-Chaining Behavior. Presented at the 15th Symposium on Space-Time Behavior and Planning, Shenzhen, China, December 13-15, 2019.

- Zhang, M. Re-construct the conceptual framework and empirical base for understanding the built environment-travel behavior relationship. Presented at the 250th Salon on Smart Urbanization, Tongji University, December 25, 2019, Shanghai, China.
- Zhang, M., Miller, R., and Waggoner, N. 2019. Bike planning and funding for small cities in metropolitan suburbs. Presented at American Planning Association Texas Chapter annual conference, November 6-8, 2019, Waco, TX
- Briscoe, D. Multi-Modal Mingling: Queering BIM through Transportation Hub Design and Networks. Presented at BLACK BOX: Articulating Architecture's Core in the Post-Digital Era 2019 ACSA 107th Annual Meeting, Pittsburgh, PA, March 28-30, 2019.
- Guerra, E. Urban form and commuting behavior of the working poor: a comparison between the US and Mexico. Presented at the 59th American Collegiate Schools of Planning Annual Conference, Greenville, SC, October 2019.
- Guerra, E. The relationship between urban form and mode choice in US and Mexican cities: A comparative analysis of workers' commutes. Presented at the 59th American Collegiate Schools of Planning Annual Conference, Greenville, SC, October 2019.
- Guerra, E. Who cycles to work, and where? A comparative multilevel analysis of urban commuters in the US and Mexico. Presented as a poster at the 99th Annual Meeting of the Transportation Research Board, Washington, DC, January 2020.
- Rosenbloom, S. Seniors, and the shared economy. Presented at the 59th American Collegiate Schools of Planning Annual Conference, Greenville, SC, October 2019.
- Rosenbloom, S. Equity in Meeting the Transportation Needs of Seniors. Presented at the 99th Annual Meeting of the Transportation Research Board, Washington, DC, January 2020.
- Rosenbloom, S. Keynote Speaker, Santa Clara (CA) County Aging Network (IOA) Annual Priority Setting Conference, Feb. 5 – 6, 2020.
- Wolshon, B. Creating a Resilient Transportation System: Policy, Planning, and Implementation. Presented at the European Transportation Conference, Dublin, Ireland, October 2019.
- Wolshon, B. Sensitivity of Evacuation Time Estimates to Population. Presented at the Session 1351, 99th Annual Meeting of the Transportation Research Board, Washington, DC, January 2020.
- Wolshon, B. Impact of Manual Traffic Control on Evacuation Time Estimates. Presented at the Session 1351, 99th Annual Meeting of the Transportation Research Board, Washington, DC, January 2020.
- Pan, Q., Chun, B., Jin, Z. Megaregion Truck Flow Estimation Model. Presented at the 99th Annual Meeting of the Transportation Research Board, Washington, DC, January 2020.
- Pan, Q., Jin, Z. The Impacts of Light Rail Expansion on Residential Property Values: A Case Study on the Houston's Light Rail System. Presented at the Transportation/Infrastructure Sustainable Development Forum, Dec. 30, 2019, Shanghai, China.
- Pan, Q., Jin, Z. The Impacts of Light Rail Expansion on Residential Property Values: A Case Study on the Houston's Light Rail System. Presented at the 59th American Collegiate Schools of Planning Annual Conference, Greenville, SC, October 2019.

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-enews-1975165?e=48aa70e157) and Facebook page (https://www.facebook.com/UTSOA/). All LSU program activities are disseminated through (http://www.evaccenter.lsu.edu).

Dr. Junfeng Jiao's research on transit deserts was highlighted in an article called "Gentrification in the D.C. area pushes people from homes and away from transit" in the Washington Post. https://www.washingtonpost.com/opinions/local-opinions/gentrification-pushes-people-from-homes-and-away-from-transit/2020/02/13/04342628-4cff-11ea-bf44-f5043eb3918a_story.html.

Dr. Ming Zhang's practicum class was recognized in several publications for their work in helping develop the Georgetown Bicycle Master Plan - https://soa.utexas.edu/headlines/crp-students-develop-georgetown-bicycle-master-plan.

Dr. Gian-Claudia Sciara was interviewed on October 2, 2019, to talk about the impact of the bond election on the state's transportation system - https://www.texastribune.org/2019/10/02/houston-austin-transit-bond-elections-ride-texas-traffic-frustrations/

C. Methodologies, Technologies or Techniques

Dr. Carol Lewis and Dr. Gwendolyn Goodwin at Texas Southern University developed a composite index for practitioners to use that shows the purpose and need for transportation projects in vulnerable communities. The composite index works to increase the competitiveness of vulnerable communities in the allocation of resources. Dr. Qisheng Pan developed 'Megaregion Transportation Planning model' by extending a metropolitan planning model.

Dr. Danelle Briscoe developed a BIM design template that can be used at the scale of transportation networks. Dr. Erick Guerra has created a comparable dataset of urban form and commute made choice in US and Mexico urban areas that will be made public in the next reporting period. Dr. John Landis is working to make the TransCAD programming scripts, modeling procedures, and datasets developed as part of the 'Northeast Megaregion Travel Demand and Investment Model' available to interested MPOs via CM2 website.

D. Inventions, patent applications, and/or licenses

Nothing to report.

E. Outreach activities

CM^2 and the Women's Transportation Seminar Heart of Texas Chapter hosted a session at Girl Day UT called "Building a City out of Candy." Girl Day is an event organized by the Women in Engineering Program (WEP). The event gives elementary and middle school students a chance to explore STEM subjects through hands-on activities. CM^2 hosted a session that allowed young girls to design mini cities out of gumdrops, toothpicks, Twizzlers, and many other types of candy. Girls toyed with the idea of urbanism and what makes a good city. They constructed parks, bridges, roads, houses, and bike paths. The event was one of the more popular sessions with over 250 participants and a line out the door most of the day. COX McLain Environmental Consulting, AECOM, Alliance Transportation Group, and Lisa Loftus-Otway all donated to help purchase the supplies which made this event possible. Graduate students from the UT Austin Community and Regional Planning department and members of the WTS HOT chapter helped volunteer during this event.

Inessa Ach helping young girls in building a city on Girl Day at UT

Dr. Gian Claudia Sciara was invited to participate in a workshop at the Eno Transportation Center on New Governance Models for Sustainable Transportation. The group met in Tarrytown, New York from February 13-15.

Dr. John Landis presented his work on "African-American, Latino and Poverty-based Transportation Equity Disparities Among Large U.S. Metropolitan Areas" to Ph.D. Seminars and graduate classes at University College London, University of Pennsylvania, and the University of Washington.

Dr. Sandra Rosenbloom discussed "Talking Aging and Transportation" in a podcast 'Talk Policy To Me' at UC Berkeley Institute for Young Americans on March 18, 2020. Https://gspp.berkeley.edu/news/podcast/episode-310-talking-aging-and-transportation.

Dr. Qisheng Pan was invited to talk about the "Impacts of Light Rail on Residential Poverty Values: A Case Study of the Houston METRORail Transit Line and its Expansion" on February 24, 2019, at the Kinder Institute for Urban Research, Rice University where 20 attendees took part.

F. Courses and Workshops

Professor Erick Guerra at the University of Pennsylvania taught a graduate course 'Introduction to Transportation Planning Class' in Fall 2019. Leslie Roche, Planning Manager at AECOM (Architecture, Engineering, Consulting, Operations, and Maintainance) and Ryan Judge, Senior Long Range Planner at SEPTA (Southeastern Pennsylvania Transportation Authority) walked this class through a role-playing exercise to identify key factors in selecting a locally preferred alternative for [SEPTA's proposed rail extension to King of Prussia, PA.]

Students engaged in role playing exercise in the 'Introduction to Transportation Planning Class'

Planning for Megaregion class trip: Emscher park in Duisburg, Germany

Congestion Pricing Studio trip in London

Professor Bob Yaro and Marilyn Taylor at The University of Pennsylvania taught a studio this semester based on their CM2 research around congestion pricing. The Congestion Pricing studio provides a vision for the successful implementation of New York City's forthcoming "Central Business District (CBD) Tolling" program. The students put forth strategies to enhance mobility and reallocate street space towards public transportation, biking, walking, and public realm improvements. Their recommendations are informed by spatial analysis of expected travel behavior shifts from implementation of CBD Tolling. The photo to the left is from their trip to London earlier this semester, where they learned about the city's success with congestion pricing and new developments including the recently implemented Ultra Low Emissions Zone (ULEZ). Rich Barone, Associate Vice President, Landrum & Brown; Foster Nichols, Principal, WPS; Mark Pisano, Professor of Practice, University of Southern California Sol Price School of Public Policy and Aaron Sugiura, Director of Transit Policy and Planning, New York City Department of Transportation served as the advisors for this studio.

Planning for Megaregion class trip: Emscher park in Duisburg, Germany

Professor Ming Zhang and Lisa Loftus-Otway from the University of Texas at Austin and Professor Ellen Neises from the University of Pennsylvania organized a joint class trip to the Netherlands and Germany to learn about mobility in the Randstad and Ruhr megaregions. 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. The class met with transportation and planning professionals in both countries to learn about strategies they use to create integrated mobility and planning strategies. Students visited a federal bicycle highway in Germany which connects 10 cities and continues over 60 miles. The host told students about some of the challenges around creating the first-ever federal bike highway like coming up with rules for riders on the new infrastructure. Students are working on a report on megaregions using the information they learned from the trip.

Researchers Carol Lewis at Texas Southern University taught a class titled Fundamentals of Transportation where students spent a week learning about Megregional Transportation Planning. Students spent the week reading CM^2 research projects and discussing transportation planning at the megaregional scale. Dr. Qisheng Pan taught two courses 'Advanced Planning Analysis (I)' and 'Application of GIS in Urban Planning' based on his CM^2 related work.

Researcher Junfeng Jiao taught two courses related to his work with CM^2. The first course, CRP 386, was an Urban GIS course. The second course, CRP 585D, was a practicum course in the Fall of 2019 where 15 students went to Tokyo and learned about Tokyo Water Bus Planning. Dr. Sandra Rosenbloom taught a course 'CRP 383: Women and Transportation' in Fall 2019 based on her work generated for CM^2 sponsored conference on Women's Travel Issues, September 2019.

Dr. Fredrick Steiner, at the University of Pennsylvania, taught a class called Environmental Readings or ARCH 685-401 related to his research at CM^2. Dr. Erick Guerra taught a class titled 'Introduction to Transportation Planning' for 35 students. SEPTA GM Leslie Richards taught 'Transportation Policy' for 25 students and drew on insights from the researches of UPenn researchers at CM^2.

G. Other products

Each month 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.](#) For our October 2019 Brownbag event, Anthony Jones from USDOT Federal Highway Administration presented insights about the design and construction of the new US 181 Harbor bridge project and its implications on the livability issues and community connection. Dr. Lisa Loftus-Otway also presented her research on the role of MPOs in megaregional transportation system resilience planning. On the November Brownbag

Ashley McLain presenting at the March Brownbag 2020

2019 event, two Ph.D. students Shunhua Bai and Ziqi Liu from the University of Texas at Austin presented their research on shared mobility and the role of high-speed rail in addressing spatial inequality in megaregions. Our March Brownbag 2020 event hosted Ashley McLain, principal of our support partner Cox-McLain Environmental Consulting Inc. who provided some basics about NEPA, environmental regulations and what impacts those have on transportation project approval. Ph.D. student Yefu Chen also shared his study that explores the relationship between bus and LRT in the March Brownbag 2020.

Transportation students and faculty learning about high speed rail in Texas from Holly Reed

In addition to Brownbag events, we co-hosted two guest lectures with City Forum during this reporting period. Guest lectures included professionals in the transportation field that came to speak with students about exciting and promising transportation initiatives and related issues. Dr. Anne Vernez Moudon from the University of Washington focused on timely issues related to urban form, mobility patterns and transportation systems, including how facilitating active and two-wheeled travel is linked to supporting individual health and safety along with how new shared mobility options can contribute to improved urban mobility at the neighborhood and the regional levels. Dr. Susan Handy from the University of California at Davis reflected on ideas that dominate transportation planning thought. CM^2 also hosted a guest lecture with Holly Reed from Texas Central, where she laid the foundation of the proposed high-speed rail project to connect Houston and Dallas by explaining how the size of the cities and the number of annual car trips made between them makes it an ideal site for the project.

On Wednesday, March 4th CM^2 co-hosted a webinar with Tran-set to talk about Innovative Techniques to Optimize, Enhance, and Facilitate Freight Movement. Dr. Michael Walton and Ph.D. Student Rydell Walthall presented on their research with CM^2.

4. OUTCOMES

Table 4 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 4: Output Performance Metrics

Performance Metrics: Outcome	Annual Target	Actual for 10/1/19-3/31/20
1. Enlarged pool of trained transportation professionals	n/a	n/a
1.1 Number of students hired by CM^2, broken down by degree types and levels, diversity metrics, and other social-economic measures	25	31

Degree type (Undergrad, Master, PhD)	n/a	3% undergrad, 58% master, 39% PhD
Gender (male, female)	n/a	51% male, 49% female
Race (Asian, Black, White, other)	n/a	3% Black, 59% Asian, 32% White, 6% Other
First-generation student (undergrad. or grad.)	n/a	2
1.2 Number of papers developed by students for publication	2	11
1.2 Number of graduates in transportation jobs	15 -overall grant period	2
2. Increased cooperation by local governments and transportation agencies regarding regional and inter-regional issues	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
2.2 Development and utilization of consistent and usable planning datasets	1	3
2.3 Creation of megaregional forums, committees, and communications by megaregional transportation planning entities	1	0

While most of our student researchers graduate during the April - September reporting period, we are proud to have a total of 2 students enter the workforce in the past six months and start their careers in the field of transportation. This makes the overall total of 66 graduates in transportation jobs, which exceeds our goal of having 15 students graduate and enter transportation-related jobs during the overall grant period. Some examples of student employment following their time with the consortium include:

- Olivia Posner (GRA for Ming Zhang, former GRA for Administration) employed by Noblis
- Aaron Sessions (GRA to Sandi Rosenbloom) employed by Noblis

Moreover, 11 student researchers have had papers developed for publication during the reporting period, which exceeds our target of two.

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. Jiao from UT Austin developed partnerships with the Tokyo Government, the Tokyo Olympic Game Committee, and Tokyo Metropolitan University during this last reporting period. Dr. Erick Guerra provided expert insights to the City of Philadelphia Policy Advisory and Data and Prioritization Committee for Strategic Transportation Plan. The insights from Dr. Sandra Rosenbloom's CM^2 projects were adopted by the officials from Santa Clara County, California for their annual agenda.

To ensure that the datasets and research are useful for their intended audience, researchers collaborate in mega regionally-focused working groups on inter-regional planning activities. Many researchers met 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 CM^2 Technology Transfer Plan.

Table 5: Impact Performance Metrics

Performance Metrics: Impact	Annual Target	Actual for 10/1/19-3/31/20
1. Enhanced knowledge base	n/a	n/a
1.1 Development of books/handbooks	3 - overall grant period	0
1.2 Journal publications in academic or professional journals	5	17
1.3 Special issues of academic or professional journals	1	0
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
2.1 Number and extensiveness of social media coverage of CM^2 research, education, and outreach activities	1	3
3. Informed decision making on public policy and transportation infrastructure investments	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

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. For example, researcher Ming Zhang and his students worked with the city of Georgetown, Texas to develop a bicycle master plan in the Fall of 2018. The bicycle master plan was officially adopted by the city on December 10, 2020, and this plan will impact their bicycle infrastructure and policies for years to come. The plan is the blueprint for a safe and well-connected bicycle network in Georgetown.

Dr. Michael Walton created a database of MPO governance structures and planning capabilities that has improved the effectiveness of accessing this information around the country. Dr. Gian-Claudia Sciara created an MPO Governance & Transit Representation database through one of her Year 1 projects which is now utilized by researchers and professionals in the transportation field. The composite index developed by Dr. Carol Lewis and Dr. Gwendolyn Goodwin works to increase the competitiveness of vulnerable communities in the allocation of resources.

‘Megaregion Transportation Planning model’ developed by Dr. Qisheng Pan can help to improve the mobility and accessibility of passenger and goods movement in megaregion, which has the potential to improve the operation and safety of the transportation system.

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. In March 2020 Jonathan Barnett published a book called “Designing the Megaregion: Meeting Urban Challenges at a New Scale.” In his book, Barnett describes how to redesign regions for megaregional growth and he highlights the importance of reorganizing our transportation systems to pull together larger regions. Publications like this demonstrates how the work we are doing at CM^2 is part of a larger conversation around the future for transportation planning. 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. Moreover, we saw an increase in guest presentations this reporting period which is outlined in section 3G of this report. 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. 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

Nothing to report.

7. SPECIAL REPORTING REQUIREMENTS

Nothing to report.