SAPR Report for University Transportation Centers

This is a semi-annual report of program progress and performance for the Collaborative Sciences Center for Road Safety, a national UTC focused on safety.

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Table of Contents

1. Accomplishments

1.1 What are the major goals and objectives of the program?

CSCRS's Strategic Roadmap outlines our goals and objectives detailed in this report.

1.2 What was accomplished under these goals?

Selected highlights for this performance period include:

- Selected the sixth Outstanding Student of the Year, Aqshems Nichols of the University of California, Berkeley (UCB), who was honored at the Council of University Transportation Center's Annual Outstanding Student of the Year Awards ceremony in Jan. 2023.
- Showcased accomplishments of several other students including Nandi Taylor, PhD student in the UNC Gillings School of Global Public Health, Department of Epidemiology, who was lead author on a journal article about the connections between historical redlining and pedestrian fatalities.
- Engaged in about 50 activities at the 2023 Transportation Research Board (TRB) Annual Meeting in Jan. 2023.
- Held the fourth Safety Sunday @ TRB reception in conjunction with the TRB Annual Meeting in Jan. 2023.
- Held a CSCRS Advisory Board meeting in conjunction with the TRB Annual Meeting in Jan. 2023.
- Created a top 10 list of Safe System dos and don'ts.
- Released new research briefs outlining considerations to launch Vision Zero initiatives.
- Debuted a one-page summary that offers guidance on reframing crash reporting.
- Continued CSCRS's Research to Practice Bytes online learning series with 6 new sessions.
- Generated dozens of CSCRS research-related peer-reviewed publications and presentations.
- Continued work on research projects and concluded other projects.
- Taught 15 transportation safety-related university courses and engaged hundreds of undergraduate, graduate, and doctoral students in CSCRS research, education, and professional development projects.

The bulleted sections below describe the accomplishments according to specific goals and objectives of CSCRS.

Goal 1:

To support Goal 1—ensuring that Safe Systems and systems science principles and approaches are shared, understood, and adopted by traffic safety professionals—we performed activities related to the following objectives:

Objective 1-1: Conduct research to generate a model(s) for what a Safe Systems approach, enhanced with systems science tools, can look like now and in the future and identify promising policies/practices that can be adopted to reduce fatalities and serious injuries.

Work continued on this project:

- R40: A Safe Systems approach to motorcycle safety
  - PI: Eric Dumbaugh, Florida Atlantic University (FAU)
  - Final report almost complete.

The following projects are near completion:

- R24: Developing a framework to combine the different protective features of a Safe System
  - PI: Offer Grembek, University of California, UCB
- R39: Integrating systems thinking tools into Vision Zero and Safe Systems approaches
  - PI: Becky Naumann, UNC Injury Prevention Research Center (UNC IPRC)

Objective 1-2: Lead training, outreach, and professional development related to Safe Systems approach and related policies and practices.

Key examples:

- CSCRS continued its webinar series through this reporting period with 6 new webinars:
  - What Can We Learn from Fatal Automated Vehicle Crashes? A Closer Look at Crash Narratives in Media, Mar. 22, 2023 (82 attendees; 28 video views)
  - Peer Influence and the Perceptions of Safety, Feb. 22, 2023 (108 attendees; 34 video views) *(Note: One attendee commented: "Thanks for today's intriguing look at how to get past assumptions and to folks' actual preferences. I hope to keep this in mind as we design the process for the city of Albany's Active Transportation Plan update, due to launch in a year or so.")*
  - Reframing Crash Reporting in News Media: A How-to Guide for Road Safety Professionals, Jan. 25, 2023 (136 attendees; 91 video views)
  - How to get Safe Systems wrong AND right, Part II: Responding to your questions, Dec. 14, 2022 (84 attendees; 50 video views)
  - How to get Safe Systems wrong … and how to get it right, Nov. 16, 2022 (165 attendees; 264 video views)
  - Case studies from across the U.S. on using systems thinking tools to inform Safe System partnership, strategic planning, and research, Oct. 26, 2022 (92 attendees; 100 video views)
- CSCRS research was showcased in dozens of workshops, lectern presentations, posters, and more at the TRB Annual Meeting in Jan. 2023. Examples of topics include:
  - Micromobility, Bicycles, and the Future of Cities
  - Beyond Adoption of Electric Vehicles
  - Last, but Not Least: Post-Crash Care and the Safe System Approach
- CSCRS continued the Road Safety 101 program during this period. The multi-week course covered road safety principles, safety data and analysis, processes for diagnosing and solving problems, human factors and behavior, and emerging issues. The 12 participants included planners, engineers, and researchers from the Charlotte Department of Transportation.

Objective 1-3: Integrate Safe Systems principles into other road safety/public health/planning initiatives.

- The Road to Zero Coalition asked CSCRS's collaborative UNC team of the UNC Highway Safety Research Center (UNC HSRC), UNC IPRC, and the UNC Department of City and Regional Planning (UNC DCRP) to assume leadership of its Safe System Working Group. CSCRS researchers at UNC have been members of the working group for years under ITE's leadership and have supported the coalition's effort to compile Safe System resources and embed the Safe System concept into roadway safety practice. When leading the working group, the UNC team will aim to disseminate the very best Safe System-aligned practices to practitioners and the public throughout the United States, connect communities to Safe System technical expertise, and dispel myths and identify barriers to Safe System implementation. Other members of the working group include several CSCRS Advisory Board members.

Objective 1-4: Facilitate states and cities in implementing a Safe Systems approach in different contexts, utilizing the tools and research from CSCRS.

CSCRS continues to engage with multiple agencies, particularly in consortium member states and cities, to determine the needs of state and local governments in implementing Safe Systems. In addition to the previously mentioned Road Safety 101 program, the following activities contributed in this area:

- CSCRS researchers released 4 new research briefs for agencies looking to implement Vision Zero initiatives.
- FAU researchers continued working with the Florida Department of Transportation to integrate fundings from R31 into state planning and design practice.
- CSCRS has representatives on the North Carolina Executive Committee for Highway Safety; work on this committee has included creating white papers for the NC Strategic Highway Safety Plan.

For additional specific projects bridging research to local practice, see Objective 2-3.

Goal 2:

To support Goal 2—ensuring that cutting-edge research, tools, data, and resources compatible with a Safe Systems approach are developed and utilized—we performed activities related to the following objectives:

Objective 2-1: Perform road safety research that explores core safety issues and transformational changes (i.e., from technology, ride-sharing services, etc.) and integrates public health concepts and methods.

Work continued on these projects:

- R34: COVID-19 streets: Mobility justice and the rapid rollout of pedestrian and bicyclist improvements
  - PI: Tab Combs, UNC DCRP
  - Wrapping up final analysis.
- R36: Laying the Groundwork for a National Pedestrian Injury Surveillance System
  - PI: Katherine Harmon, UNC HSRC
  - Wrapping up final analysis.
- R42: Advancing crash investigation with connected and automated vehicle data – Phase 2
  - PI: Asad Khattak, University of Tennessee, Knoxville (UTK)
  - 2 questionnaires are being designed. Potential participants have been selected. Data will be collected.
- R43: Applying AI to data sources to improve driver-pedestrian interactions at intersections
  - PI: Subhadeep Chakraborty, UTK
  - Traffic data was analyzed, and a synthetic pedestrian database and YOLO detection model were created.

The following projects are complete or near completion:

- R27: Safety testing for connected and automated vehicles through physical and digital iterative deployment
  - PI: Subhadeep Chakraborty, UTK / Co-Investigator: Asad J. Khattak, UTK
- R28: Reducing motorcyclist injuries: Engaging stakeholders to apply evidence-based countermeasures
  - Jerry Everett, UTK / Co-PI: Asad Khattak, UTK

In addition, work continued on a project funded with matching funds from CSCRS partner AAA Foundation for Safety. The project, "Predicting Automated Vehicle Safety in an Uncertain Future," aims to develop a configurable model and interface representing how the numbers of crashes and fatal and nonfatal injuries change over time because of different advanced driver-assistance system (ADAS) diffusion scenarios on U.S. roadways.

Objective 2-2: Develop research-driven tools, resources, and data sets to support problem identification and understanding.

Work continued on these projects:

- R38: Assessing how private beliefs conflict with public action on Safe Systems

  - PI: Seth LaJeunesse, UNC HSRC
  - Wrapping up final analysis.
- R44: Safety enhancement by detecting driver impairment through analysis of real-time volatilities
  - PI: Asad Khattak, UTK
  - A balanced distracted driving dataset was created, and a bag-of-words-based feature classifier called WEASEL-MUSE was used to classify distracted vs. undistracted driving data.

Objective 2-3: Translate research knowledge to support the development of comprehensive programs, policies, and practices that are proven to reduce fatalities and severe injuries.

Work continued on these projects:

- R33: US Regional Vision Zero Implementation
  - PI: Kelly Evenson, UNC Gillings School of Global Public Health Department of Epidemiology
  - Published 3 papers from the project and several new research briefs. Updated Vision Zero plan library and website.
- R37: Applying AcciMap to e-Scooter Crashes: A Safe Systems approach to analyzing micromobility
  - PI: Katie Harmon, UNC HSRC
  - Wrapping up final analysis.
- RR2: US Vision Zero implementation
  - PI: Kelly Evenson, UNC Gillings School of Global Public Health Department of Epidemiology/ Co-I's: Seth LaJeunesse, UNC HSRC, and Becky Naumann, UNC IPRC
  - (Work on this project is connected to R33.)

Objective 2-4: Broadly disseminate research products and findings, with emphasis on reaching new and non-traditional audiences.

Objective 1-2 covered efforts to disseminate research, specifically relating to systems-oriented projects.

In addition to CSCRS's substantial presence at the TRB Annual Meeting, the Center engaged in several other dissemination efforts during this reporting period:

- Several UNC HSRC researchers presented during the Mar. 2023 NCDOT Research and Innovation Summit. CSCRS-related presentations included:
  - Advancing a Safe Systems Approach to Assessing the Traffic Impacts of Land Development
  - Systemic Safety Analysis for Vision Zero: Lessons from Montgomery County
- Nandi Taylor, UNC public health PhD student, delivered the virtual session "Safe system approach and equity to advance pedestrian safety" to about 30 attendees at the Program and Research Division, National Highway Traffic Safety Administration.
- Krista Nordback, UNC HSRC, presented during the Dec. 1, 2022, Institute of Transportation Engineers (ITE) webinar "Pedestrian and Bicycle Data and Performance Measures."
- On Oct. 17, 2022, Becky Naumann, UNC IPRC, delivered an in-person seminar at Columbia University on "Integrating Systems Thinking Tools into Road Safety Research and Practice," which highlighted several examples of CSCRS research and was attended by both students and faculty at the university, as well as city and state public health and transportation practitioners.

Table 1 highlights additional presentations made in this reporting period to disseminate research findings to diverse groups.

Table 1: Select CSCRS outreach highlights

FAU	E. Dumbaugh and S. LaJeunesse. "10 Pitfalls of Safety Planning and How to Overcome Them." Louisiana State Highway Safety Program Regional Safety Coalition. Mar. 22, 2023.
UCB	On Oct. 12, 2022, Offer Grembek presented on the Safe System Approach to the UCB Institute of Transportation Studies Executive Committee to about 20 participants.
UNC	Incorporated project findings in a lecture entitled "A Safe and Complete System: Visioning a Just Transition." for Tab Combs, UNC DCRP, PLAN 639: Complete, Safe, Equitable Streets course on Feb. 6, 2023.
	Tab Combs organized and moderated a session at the National Bike Summit in Mar. 2023 on ways in which communities are turning COVID-streets experiences into new planning and safety practices
	Iacobucci, Evan. "Reports from the Battle for the Curb: Addressing Planning Challenges Stemming from the Rise of E-Commerce." (2023). Department of Community and Regional Planning, East Carolina University. Feb. 9. (~30 participants)
	Iacobucci, E., E. Vinella-Brusher, and N. McDonald. (2023). "Listening Session: Planning for Urban Freight in North Carolina" UNC DCRP. Mar. 28., 2022. Online. (Listening session to discuss issues, safety practices, and warehousing/distribution development surrounding urban freight in NC cities.)
	Iacobucci, E. (Presenter), N. McDonald, C.H.W. Edwards, R. Steiner. (2022). "Using Social Media to Understand Challenges Faced by US Urban Parcel Delivery Drivers: Reports from the Curb." Association of Collegiate Schools of Planning Conference, Toronto, CA, Nov. 2022.
	Evenson, KR (2023). A snapshot of Vision Zero in US Communities. Presented to the Indiana Road to Zero Academy. Feb. 14, 2023.
	Naumann, R.B., Hassmiller Lich, K., Keefe, E., & LaJeunesse, S. (2023). Implementation planning for the Burlington-Graham MPO Transportation Safety Plan. A 2-part planning workshop series. Burlington, NC. Mar. 9 & April 14, 2023.

Goal 3:

To support Goal 3—to ensure that a growing body of students and future leaders are engaged and well-trained in road safety principles, Safe Systems approaches, and systems science methods—we performed activities related to the following objectives:

Objective 3-1: Develop and deliver courses at consortium member universities that integrate CSCRS concepts. Highlights from Fall 2022 to Spring 2023 that include graduate courses:

- FAU course: Designing the City. Instructor: Eric Dumbaugh. (60 students)
- UCB courses:
    - Injury Prevention and Control. Instructors: David Ragland, Lisa Peterson & Glenn Shor. (5 students)
    - Traffic Safety and Injury Control. Instructor: David Ragland. (7 students)
    - Transportation Sustainability. Instructor: Susan Shaheen. (46 students)
    - UCB graduate courses:
        - Active Transportation (34 students)
        - Quantitative Reasoning (45 students)
        - Capstone projects (47 students)
- UNC DCRP course: Complete, Safe, Equitable Streets. Instructor: Tab Combs. (31 students)
- UNC Public Health course: Injury as a Public Health Problem. Instructor: Steve Marshall, with CSCRS researchers as guest speakers. (18 students)
- UTK courses:
    - Intelligent Transportation Systems. Instructor: Asad Khattak. (11 students)
    - Transportation Safety. Instructor: Asad Khattak. (21 students)
    - Sustainable Transportation. Instructor: Chris Cherry. (30 students)
    - 4 additional courses covering transportation engineering, traffic, and rail.

Objective 3-2: Engage students through student-directed activities and professional opportunities.

This reporting period was particularly rich with CSCRS student accomplishments. Prime example: Nandi Taylor, UNC public health PhD student, was lead author of "Structural racism and pedestrian safety: measuring the association between historical redlining and contemporary pedestrian fatalities across the United States, 2010–2019," published in the *American Journal of Public Health* in Mar. 2023. She also presented the session "Examining the connections between Historical Redlining and Present-Day Pedestrian Fatalities Across the United States, 2010-2019" at the 2023 Society for the Advancement of Violence & Injury Research (SAVIR) Annual Conference in Apr. 2023.

Additionally, Bhavna Singichetti, UNC PhD Injury Epidemiology student supported through CSCRS, defended her dissertation on Mar. 23 ("Examining factors that influence initial and repeated alcohol driving while intoxicated license suspensions and future crash events in North Carolina, 2006-2016.") Singichetti was since offered a position at the CDC's prestigious EIS program, demonstrating CSCRS's influence on shaping the next generation of leaders

And as mentioned, CSCRS was excited to announce Aqshems Nichols, a UCB civil engineering doctoral student with a focus on transportation engineering, as its 2022 Outstanding Student of the Year. In Nov. 2022, fellow UCB students Meiqing Li and Cheng-Kai Hsu received the Wendy Tao International Smart Cities Fellowship. The fellowship program supports innovative research projects related to sustainable transport and smart cities that have relevance for California. The scholarship honors Tao's legacy as a business innovator, gifted scholar, and a global leader in sustainable transport and smart cities.

Furthermore, multiple students from consortium universities have presented webinars as part of CSCRS's Research to Practice Bytes series.

Table 2 describes additional key student engagement and awards offered during this reporting period.

Table 2: Select CSCRS student engagement activities

UCB	2 students enrolled in an independent research component during which they prepare a paper for publication.
	4 CSCRS Road Safety Graduate Student Fellows conducted road safety research.
UNC	1 dual MPH/MCRP student assisting with the maintenance of the micromodes.org website, as well as creating a new dashboard for e-bike fatalities.
	1 MPH students and 1 MCRP student assisting with Vision Zero material creation.
	1 undergraduate student who assisted with research briefs.
	1 PhD Injury Epidemiology student led research to examine COVID-related road safety trends across both health and transportation data sources. The preliminary results were presented at the 2023 SAVIR conference in Apr. 2023.
	Capstone team of 4 MPH students developed a Vision Zero resource library with a focus on coalition building and multisector collaboration and provide recommendations for long-term plans for hosting the material repository. The project was to be featured in an Apr. 2023 CSCRS webinar.
	1 graduate journalism school student worked on CSCRS communications projects.
UTK	1 postdoc worked with Dr. Khattak on CSCRS research.
	1 graduate student worked with Dr. Khattak (faculty in Civil & Env. Eng.) on CSCRS research.
	4 PhD students defended their dissertations related to transportation safety.

Objective 3-3: Develop mentorship and internship opportunities for students to engage in critical thinking about road safety issues from a variety of perspectives and connect with traditional and non-traditional partners.

- UCB's SafeTREC continued its Friday traffic safety seminars for students. Example: On Dec. 9, 2023, Postdoctoral Researcher Soheil Sohrabi presented "Inequity in Roadway Safety" to about 13 participants.
- CSCRS continued to update its Jobs Board of student and post-graduation opportunities.

Objective 3-4: Provide exposure to road safety principles in K-12 settings, to enhance early interest in traffic safety.

Planning is underway for CSCRS researchers to participate in TigerFest at Chapel Hill High School in May 2023. The annual TigerFest is an alternative educational day where students can take classes on a variety of subjects that aren't traditionally offered during the school year. The CSCRS session, titled "Crossy Road, only real life: You design a safe road for walking and biking" (playing off the name of the popular video game), will invite students to participate in a hands-on exercise to design a safe roadway.

1.3 What opportunities for training and professional development has the program provided?

Myriad teaching, training, and learning opportunities have been highlighted in this report (see Table 1 and 2).

1.4 How have the results been disseminated?

Results are being disseminated in accordance with the CSCRS Technology Transfer Plan. Consortium members coordinated to co-promote CSCRS news/updates on their websites, in newsletters, and on social media. Communications staff continuously maintained the CSCRS Twitter feed, which now has 815 followers. CSCRS's YouTube channel is updated regularly with new educational content.

CSCRS staff updated project descriptions, titles, and end dates on the CSCRS website and in the TRB Research in Progress (RiP) Database, tagged as UTC research. CSCRS researchers engaged with the Advisory Board. Project-related publications and presentations from this reporting period are listed in the Products section.

1.5 What do you plan to do during the next reporting period?

CSCRS will continue implementation of its strategic research agenda. The following section provides additional examples of what CSCRS plans to complete during the next reporting period (4/1/2023-9/30/23) to accomplish its goals:

- **Research activities planned**:
  - Completion, posting, and reporting of several current CSCRS research projects will continue.
  - Work will continue on additional projects supported with matching funds.
- **Professional development activities planned**:
  - Continuation of the CSCRS Webinar series; the next 2 webinars scheduled for Apr. and May 2023 will focus on Vision Zero resources and processes for COVID street transformations. (The May session will likely be the last in this series.)
  - Participation in multiple transportation-related conferences over summer 2023.
- **Teaching and student enrichment activities planned**:
  - Planning for the May 2023 TigerFest event in Chapel Hill, NC.
  - Teaching several university courses, as well as incorporating CSCRS research findings and opportunities into other/existing courses and seminars.

In addition to activities specific to the 3 goals, we will continue conducting administrative functions that support all Center activities, including sending out newsletters, managing the Center's website, communications platforms, engaging with the Advisory Board, and responding to USDOT or other requests.

2. Participants and Collaborating Organizations

2.1 What organizations have been involved as partners?

The following organizations have been involved as CSCRS partners:

Table 3: Select CSCRS Collaborator and Sponsor Organizations

Business
AT&T Fleet Complete, Atlanta, GA (Financial Support)
Bird, Inc. (Collaborative Support)
PhD Posters, Durham, NC (Financial Support)
Rovélo Creative, Toronto, Canada (Collaborative Support)
SoftServe, Inc., Austin, TX (Collaborative Support)
Toyota Motor North America, Saline, MI (Financial Support)
Uber, San Francisco, CA (Financial Support)
VHB, Watertown, MA (Financial Support)
Volkswagen Group of America, Herndon, VA (Collaborative Support)
Foundation
AAA Foundation for Traffic Safety, Washington, DC (Collaborative Support)
de Beaumont Foundation, Bethesda, MD (Collaborative Support)
Health Foundation of South Florida, Miami, FL (Collaborative Support)
John D. and Catherine T. MacArthur Foundation, Chicago, IL (Financial Support)
Local Government
Town of Chapel Hill Staff, Chapel Hill, NC (Collaborative Support)
Other Non-Profits
American Institute of Architects, Miami, FL (Collaborative Support)
America Walks, Portland, OR (Collaborative Support)
American Planning Association, Chicago, IL, and Washington, DC (Collaborative Support)
American Public Health Association, Washington, DC (Collaborative Support)
Association of Pedestrian and Bicycle Professionals, Lexington, KY (Collaborative Support)
Broward Metropolitan Planning Organization, Fort Lauderdale, FL (Collaborative Support)
Dream in Green, Miami, FL (Collaborative Support)
Greater Nashville Regional Council, Nashville, TN (Collaborative Support)
Institute of Transportation Engineers, Washington, DC (Collaborative Support)
Insurance Institute for Highway Safety, Vehicle Research Center, Ruckersville, VA (Collaborative Support)
The Miami Center for Architecture and Design, Miami, FL (Collaborative Support)
Miami-Dade Transportation Planning Organization, Miami, FL (Collaborative Support)
Mobility Lab, Arlington, VA (Collaborative Support)
National Association of City Transportation Officials, New York, NY (Collaborative Support)
National Cooperative Highway Research Program, Washington, DC (Financial Support)
National Indian Justice Center, Santa Rosa, CA (Collaborative Support)
National Local Technical Assistance Program Association, US (Collaborative Support)
North Carolina Center for Automotive Research, Garysburg, NC (Collaborative Support)
Palm Beach Transportation Planning Agency, West Palm Beach, FL (Collaborative Support)
Palm Beach Planning Congress, Palm Beach, FL (Collaborative Support)
The Road to Zero Coalition/The National Safety Council, Itasca, IL (Financial and Collaborative Support)
Transportation Research Board Standing Committee on Pedestrians, Washington, DC (Collaborative Support)
Safe States, Atlanta, GA (Collaborative Support)
Transportation Research Board Standing Committee on Transportation Safety Management, Washington, DC (Collaborative Support)
Urban Impact Lab, Miami FL (Collaborative Support)
Vision Zero Network, San Francisco, CA (Collaborative Support)
WTS International, Washington, DC (Collaborative Support)
School District
Knox County School District, Knoxville, TN (Collaborative Support)
State Government
California Emergency Medical Systems Authority (Collaborative Support, Data Request)

California Center for Medical Outcomes, California Department of Public Health, Sacramento, CA (Collaborative Support, Data Request)
Florida Department of Transportation (Collaborative Support)
North Carolina Division of Public Health, Raleigh, NC (Collaborative Support)
North Carolina Department of Transportation, Raleigh, NC (Financial Support)
North Carolina Governor's Highway Safety Program, Raleigh, NC (Collaborative and Financial Support)
North Carolina Turnpike Authority, Raleigh, NC (Collaborative Support)
Tennessee Department of Transportation, Nashville, TN (Matching Request & Data)
Tennessee Dept. of Safety & Homeland Security, Nashville, TN (Data Request)
Tennessee Department of Health, Nashville, TN (Data Request)
Tennessee Technology Access Program, Nashville, TN (Collaborative Support)
U.S. Agency
National Science Foundation, Washington, DC (Sponsor of Projects)
Centers for Disease Control and Prevention, Atlanta, GA (Collaborative Support)
U.S. Facility
Oak Ridge National Laboratory, Oak Ridge, TN (Collaborative Support)
U.S. Government
U.S. Dept. of Energy, Washington, DC (Collaborative Support)
U.S. Dept. of Transportation, Washington, DC (Sponsor of Projects & Collaborative Support)
University
Duke Initiative for Science & Society Science Policy Tracking Program, Durham, NC (Financial Support)
East Tennessee State University, Johnson City, TN (Collaborative Support)
Johns Hopkins Center for Injury Research & Policy, Baltimore, MD (Collaborative Support)
North Carolina Central University, Durham, NC (Collaborative Support)
North Carolina State University Institute for Transportation Research and Education, Raleigh, NC (Collaborative Support)
Planning Society @ FAU, Boca Raton, FL (Collaborative Support)
Queensland University of Technology (CARRS-Q) (Collaborative Support)
Renaissance Computing Institute, Chapel Hill, NC (Collaborative Support)
Tennessee Technological University, Cookville, TN (Collaborative Support)
University of Aveiro (Collaborative Support)
University of Miami (Collaborative Support)
University of Tennessee, Chattanooga, TN (Collaborative Support)
Various Jiaotong Universities in China (Collaborative Support)

2.2 Have other collaborators or contacts been involved?

Nothing to report beyond the table above.

3. Outputs

CSCRS included 2 performance measures related to outputs in its Technology Transfer Plan:

- Organize and hold conferences and/or other events through 2023.
- Annual journal manuscripts, publications, articles, posts, media stories, etc.

Sections 3.1-3.3 present the considerable number of outputs related to CSCRS research and tech transfer.

3.1 Publications, conference papers, and presentations

Presentations given during this reporting period are summarized in Table 1 of this report.

The following are select highlights of publications produced by CSCRS team members:

Table 4: Select CSCRS publications

Peer-Reviewed Publications
Ahmad, N., Arvin, R., & Khattak, A. J. (2023). Exploring pathways from driving errors and violations to crashes: The role of instability in driving. *Accident Analysis and Prevention, 179,* 106876.
Ahmad, N., Arvin, R., & Khattak, A. J. (2023). How is the duration of distraction related to safety-critical events? Harnessing naturalistic driving data to explore the role of driving instability. *Journal of Safety Research, 27*.
Ahmad, N., Wali, B., & Khattak, A. J. (2023). Heterogeneous ensemble learning for enhanced crash forecasts—A frequentist and machine learning based stacking framework. *Journal of Safety Research, 84,* 418–434. https://doi.org/10.1016/j.jsr.2022.12.005
Bagli, H., Shay, E., & Combs, T. (2022). Automated vehicles: Use, share, own? Young adults' perceptions of automated vehicles. *Transportation Research Record: Journal of the Transportation Research Board, 2676*(11).
Beck, J., Arvin, R., Lee, S., Khattak, A., & Chakraborty, S. (2023). Automated vehicle data pipeline for accident reconstruction: New insights from LiDAR, camera, and radar data. *Accident Analysis and Prevention, 180,* 106923.
Cochran, A., McDonald, N., Prunkl, L., Vinella-Brusher, E., Wang, J., Oluyede, L., & Wolfe, J. (2022). Transportation barriers to care among frequent health care users during the COVID pandemic. *BMC Public Health, 22,* 1783.
Evenson, K. R., LaJeunesse, S., Keefe, E., & Naumann, R. B. (2023). Mixed-methods approach to describing Vision Zero initiatives in United States' municipalities. *Accident Analysis and Prevention, 184,* 107012.
Evenson, K. R., Naumann, R. B., Taylor, N. L., LaJeunesse, S., & Combs, T. S. (2023). Mixed method assessment of built environment and policy responses to the COVID-19 pandemic by United States municipalities focusing on walking and bicycling actions. *Journal of Transport and Health, 28,* 101557.
Evenson, K. R., Naumann, R. B., Taylor, N. L., LaJeunesse, S., & Combs, T. S. (2023). Mixed method assessment of built environment and policy responses to the COVID-19 pandemic by United States municipalities focusing on walking and bicycling actions. *Journal of Transport and Health, 28*, 101557.
Evenson, K., Keefe, E., LaJeunesse, S., & Naumann, R. B. (2023). Creating a community-level document library: Application using Vision Zero plans. *Journal of Public Health Management and Practice, 29*(3), 284–286.
Gu, Y., Liu, D., Arvin, R., Khattak, A. J., & Han, L. D. (2023). Predicting intersection crash frequency using connected vehicle data: A framework for geographical random forest. *Accident Analysis and Prevention, 179,* 106880. https://doi.org/10.1016/j.aap.2022.106880
Iacobucci, E., McDonald, N., Edwards, C. H. W., & Steiner, R. (2022). Using social media to understand challenges faced by US urban parcel delivery drivers: Reports from the curb. *Transport Policy, 126*, 96–106. https://doi.org/10.1016/j.tranpol.2022.07.013
Iacobucci, E., McDonald, N., Edwards, C. H. W., Steiner, R., & Griffith, J. (2022). Stemming the tide: Approaching urban freight in the era of e-commerce. *ITE Journal 92*, (8), 27–32.
Iacobucci, E., McDonald, N., Naumann, R., & Kucera, K. (2023) Examining injury trends in parcel delivery drivers in the United States: Challenges and opportunities. *American Journal of Industrial Medicine*. https://onlinelibrary.wiley.com/doi/abs/10.1002/ajim.23473
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3.2 Policy Papers

- None during this reporting period.

3.3 Website(s) or other Internet site(s)

- The UTK team provided multiple training resources at the sites ctr.utk.edu and tesp.utk.edu/ite/.
- Other CSCRS resources were updated with new data and information during this period:
  - Micromodes.org
  - Resource Hub
  - Shifting Streets Dataset
  - Vision Zero Plan Guide repository.
  - National Pedestrian and Bicycle Safety Data Clearinghouse.

3.4 New methodologies, technologies, or techniques

The matching project "Predicting Automated Vehicle Safety in an Uncertain Future," which continued during this period, aims to develop a configurable model and interface representing how the numbers of crashes and fatal and nonfatal injuries change over time as a result of different advanced driver-assistance system (ADAS) diffusion scenarios on U.S. roadways.

3.5 Inventions, patent applications, and/or licenses

None to report for this period.

3.6 Other products

None to report for this period.

4. Outcomes

CSCRS included 2 performance measures related to outcomes in its Technology Transfer Plan:

- Average annual number of opportunities/instances to share transportation safety expertise at conferences, professional meetings and through media. (Please see presentations listed in Section 3.1 and media described in Section 4.1.)
- Annual number of adoptions, use or reference to CSCRS products, or influence on national or state research agendas (see Section 4.6).

4.1 Increased understanding and awareness of transportation issues

CSCRS staff engaged with high-profile and local media outlets. Key examples:

- Laura Sandt, UNC HSRC, was interviewed for the Mar. 24, 2023, piece "Infrastructure needed for e-scooter safety" for UNC's The Well.
- On Mar. 15, 2023 Daniel Rodriguez, UCB, was interviewed by the Washington Post for "Inside the Movement to remake America's city streets."
- On Feb. 9, 2023 Julia Griswold, UCB, was interviewed by CBS Sacramento for "Search continues for killer in Modesto after deadly hit-and-run."
- Eric Dumbaugh, FAU, was interviewed for 2 Jan. 2023 pieces for WPTV:
    - "Frustration mounts as traffic delays grow on Northlake Boulevard"
    - "3 tractor-trailers involved in deadly crash on Florida's Turnpike in Martin County"
- On Oct. 24, 2023 Daniel Rodriguez, UCB, was interviewed by the San Francisco Chronicle for "Has Berkeley declared a 'war on cars'? One bike lane has come to symbolize a larger battle."
- Wes Kumfer, UNC HSRC, was interviewed for the Oct. 10, 2022, article "Creating Safer Communities Amid a Rise in Risky Driving" for UNC Research.
- On Oct. 4, 2022 David Ragland, UCB, was interviewed by the Daily Californian for "Freedom to Walk Act to decriminalize jaywalking in California."

CSCRS continues to coordinate with other key media and national initiatives to share research and to increase understanding of key transportation issues.

4.2 Passage of new policies, regulation, rulemaking, or legislation

CSCRS has engaged in several activities in this area:

- The Federal Highway Administration continued the Vision Zero Community Pairing Program, modeled after CSCRS's work in partnership with the Governor's Highway Safety Program; the program recently solicited new applications for communities interested in participating.
- As mentioned earlier, after the Feb. 2023 CSCRS webinar "Peer Influence and the Perceptions of Safety," an attendee sent presenter Jill Cooper this note: "Thanks for today's intriguing look at how to get past assumptions and to folks' actual preferences. I hope to keep this in mind as we design the process for the city of Albany's Active Transportation Plan update, due to launch in a year or so."
- Eric Dumbaugh, FAU, is continuing his work with the Florida Department of Transportation on a study examining the characteristics of pedestrians and bicyclists involved in crashes in lower income areas in Broward and Palm Beach counties, as well as the environmental factors that contribute to their risks. The work is related to CSCRS research project R31.

4.3 Increases in the body of knowledge

A key activity during this period that aimed to boil down the basics of the Safe System approach were 2 Research to Practice Bytes sessions in Nov. and Dec. 2022 that dove deep into how to get Safe Systems both wrong and right. The Nov. 16 session outlined 10 common pitfalls of Safe System implementation, and the Dec. 14 session continued

the discussion by answering participants' questions and offering real-life examples of communities innovating their ways to authentic Safe System approaches. Both sessions featured presenters Eric Dumbaugh, FAU, Seth LaJeunesse, UNC HSRC. A key output of those discussions was the "Top 10 Safe System implementation pitfalls, and suggestions for how to avoid them."

These sessions fit in with CSCRS's efforts to apply public health principles and systems science to equip transportation professionals and communities with more effective tools to solve safety challenges. Also during this time we continued widely sharing our 6-year anniversary video, report, and executive summary that demonstrate CSCRSs foundational research that furthers the Safe System approach.

4.4 Improved processes, technologies, techniques, and skills in addressing transportation issues

As part of UTK's R43 project, a synthetic pedestrian database and YOLO detection model were created for pedestrian detection. Other developments in this area are documented in the final reports published by each completed project and highlighted in a Research Brief that is posted next to the Final Report on the CSCRS website.

And as mentioned, the matching project, "Predicting Automated Vehicle Safety in an Uncertain Future," aims to develop a configurable model and interface representing how the numbers of U.S. crashes and fatal and nonfatal injuries change over time.

4.5 Enlargement of the pool of trained transportation professionals

CSCRS's university programs and student activities continue to attract new students to each campus and enlarge the pool of future professionals that are invested in improving safety. This reporting period the results of these efforts, with several CSCRS showcasing their impressive expertise in multiple ways (see Objective 3-2 for more info).

4.6 Adoption of new technologies, techniques, or practices

We continue to see a deepening of Safe Systems and systems thinking principles, literature, and tools that emerged from CSCRS being integrated broadly into policies and practices observed at national, state, and local levels. A key example from this reporting period is the Federal Highway Administration's continuation of the Vision Zero Community Pairing Program.

5. Impacts

CSCRS included 2 performance measures related to impacts in its Technology Transfer Plan:

- Annual instances integrating CSCRS research results into agency or stakeholder practices that demonstrate use of research results in practice (see Section 5.1).
- Annual instances integrating CSCRS research results into organizational/workforce capacity building that demonstrate use of research results in capacity building activities conducted by local, regional, state, or national level agencies (see Section 5.2).

5.1 Impact on the effectiveness of the transportation system

The fresh approach CSCRS has taken over the last 6 years to apply public health principles and systems science to provide more effective tools for solving complex safety challenges advances Safe System concepts through research, education, workforce development, and techology transfer. Seeing these concepts codified into state and national legislation and policy is a testament to the effectiveness of CSCRS's efforts.

5.2 Impact on the adoption of new practices, or instances where research outcomes have led to the initiation of a start-up company

Each year CSCRS finds new ways to aid the adoption of road safety practices. A recent example focuses on Vision Zero: CSCRS researchers created 4 new research briefs outlining considerations to launch Vision Zero initiatives. The briefs share research from CSCRS research projects R17: Strengthening Existing and Facilitating New Vision Zero Plans and RR2:US Vision Zero Implementation, and cover the following areas:

- Vision Zero Stakeholder Involvement
- Vision Zero in the United States (2014-2020)
- How Vision Zero Starts in US Communities
- Vision Zero Community Engagement Across the United States

5.3 Impact on the body of scientific knowledge

Using the numerous and varied methods listed previously, CSCRS is continuing efforts to contribute to the body of knowledge surrounding Safe Systems and systems-science approaches to road safety.

Evidence of our impact on the body of scientific knowledge can be found through other appointments that recognize our expertise and provide opportunities to influence scientific discourse. Key examples:

- Laura Sandt, UNC HSRC, served on the following committees or technical advisory groups:
  - NCDOT Executive Committee for Highway Safety
  - NCDOT Fully Automated Vehicle Task Force
  - NCDOT State Freight Advisory Committee
  - Chapel Hill, NC Vision Zero Executive Committee
  - FHWA *Safe System Approach for the Urban Core* project Technical Panel
  - FHWA *National Complete Streets Assessment* Project Technical Review Panel
- Katie Harmon, UNC HSRC, was involved in the following endeavors:
  - Editorial board of the Journal of Safety Research
  - Member of the following groups:
    - NC Trauma System Strategic Plan - Injury Prevention Committee
    - NC Traffic Records Coordinating Committee Access to Exercise Opportunities Workgroup
- Kelly Evenson, UNC Gillings School of Global Public Health Department of Epidemiology, was named to Clarivate's Highly Cited Researchers list in Nov. 2022.
- Nancy Lefler, UNC HSRC, served as co-chair of the NC Traffic Records Coordinating Committee.
- David Ragland and other staff at UCB SafeTREC participated in multiple meetings of the California SHSP.
- Eric Dumbaugh, FAU, was involved in the following organizations:
  - Member of ITE's Transportation Safety Council and Vision Zero Standing Committee
  - Panel Member, TRB of the National Academies of Science, NCHRP 17-118: Understanding the Impacts of Operational Changes on Safety Performance
- Offer Grembek, UCB, served as a member of the following organizations:
  - Steering Committee, California SHSP
  - Bay Area Vision Zero Working Group
  - Metropolitan Transportation Commission (MTC)
  - Road to Zero Safe System Implementation Working Group
  - ITE

    - TRB Standing Committee on Transportation Safety Management Systems
    - NCHRP Project Panel on Speed Management Solutions and Strategies to Improve Pedestrian and Bicyclist Safety on Arterial Roadways
    - NCHRP Project Panel on Institutionalizing Safe Systems and Safety Culture in the Transportation Planning Process
- David Ragland, UCB, served on the Advisory Group for CMOD (California Medical Outcomes Data) and the Traffic Records Coordinating Committee.
- Asad Khattak, UTK, continued serving as a Board Member of TennSMART, a consortium of transportation CEOs, research institutions, and government officials. Dr. Khattak's leadership activities also include:
    - Participating in Tennessee Pedestrian Task Force meeting to provide input on the State of Tennessee Pedestrian and Bicyclist Safety Program Technical Assessment.
    - Matching projects that involve working with the Tennessee Department of Transportation (TDOT) on implementing Highway Safety Manual procedures in Tennessee.
    - Working with TDOT on connected and automated vehicle technologies; the project also involves working collaboratively with faculty from UTK Mechanical Engineering Department, Electrical Engineering Department at University of Tennessee, Chattanooga.
    - Serving as a member of TRB's Standing Committee on User Information Systems and the Standing Committee on Traveler Behavior and Values.
    - Serving as editor-in-chief of the Journal of Intelligent Transportation Systems and associate editor of the International Journal of Sustainable Transportation.
    - Serving as special adviser to the Journal of Transportation Safety & Security & Advisory Board Member of Analytic Methods in Accident Research.
    - Serving on the advisory board of TEMA, the Centre for Mechanical Technology and Automation at University of Aveiro in Portugal.
- Chris Cherry, UTK, has chaired or is a member of the following committees:
    - UN Environment Program Electric Powered Two Wheeler Task Force
    - Light Electric Vehicle Education and Research Institute
    - City of Knoxville Vision Zero Working Group
    - SAE's Powered Micromobility Committee
    - Bird's Global Safety Advisory Board
    - TRB's Emerging Vehicles for Low Speed Transportation joint subcommittee, Micromobility joint subcommittee, and Developing Country Committee
- Subhadeep Chakraborty, UTK, served as a member of IEEE.

5.4 Impact on transportation workforce development

CSCRS's continues to find new audiences with workforce development activities. Attendance at the Research to Practice Bytes seminars, has been growing steadily throughout the year, and each session has attendees from dozens of states. The Road Safety 101 program provides new opportunities to teach about the Safe System approach to cities on request.

6. Changes/Problems

6.1 Changes in approach and reasons for change

While delays caused by COVID have decreased significantly, a few research projects are continuing to play catch up.

6.2 Actual or anticipated problems or delays

CSCRS Associate Director Offer Grembek, UCB, left his position at UCB. Daniel Rodriguez replaced him as the UCB Associate Director.

6.3 Changes that have a significant impact on expenditure

Nothing to report.

6.4 Significant changes in use or care of animals, human subjects, and/or biohazards

Nothing to report.

7. Special Reporting Requirements

Nothing to report. This entire report is available on the CSCRS website.