



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	3
1.1 What are the major goals and objectives of the program?	3
1.2 What was accomplished under these goals?	3
1.3 What opportunities for training and professional development has the program provided?	9
1.4 How have the results been disseminated?	9
1.5 What do you plan to do during the next reporting period?.....	9
2. Participants and Collaborating Organizations	10
2.1 What organizations have been involved as partners?	10
2.2 Have other collaborators or contacts been involved?	11
3. Outputs	11
3.1 Publications, conference papers, and presentations	12
3.2 Policy Papers	12
3.3 Website(s) or other Internet site(s).....	12
3.4 New methodologies, technologies, or techniques.....	13
3.5 Inventions, patent applications, and/or licenses	13
3.6 Other products	13
4. Outcomes.....	13
4.1 Increased understanding and awareness of transportation issues.....	13
4.2 Passage of new policies, regulation, rulemaking, or legislation.....	14
4.3 Increases in the body of knowledge.....	14
4.4 Improved processes, technologies, techniques, and skills in addressing transportation issues.....	15
4.5 Enlargement of the pool of trained transportation professionals	15
4.6 Adoption of new technologies, techniques, or practices.....	15
5. Impacts	15
5.1 Impact on the effectiveness of the transportation system.....	15
5.2 Impact on the adoption of new practices, or instances where research outcomes have led to the initiation of a start-up company.....	16
5.3 Impact on the body of scientific knowledge	16
5.4 Impact on transportation workforce development	18
6. Changes/Problems.....	18
6.1 Changes in approach and reasons for change.....	18
6.2 Actual or anticipated problems or delays	18
6.3 Changes that have a significant impact on expenditures.....	18
6.4 Significant changes in use or care of animals, human subjects, and/or biohazards	19
7. Special Reporting Requirements	19

1. Accomplishments

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

CSCRS's [Strategic Roadmap](#) provides context for our accomplishments in this document.

1.2 What was accomplished under these goals?

Selected highlights for this performance period include:

- Continued CSCRS's online learning series, renamed the [Research to Practice Bytes series](#), with 3 new sessions.
- Featured University of Tennessee, Knoxville (UTK) work related to artificial intelligence in the first U.S. Department of Transportation (USDOT) University Transportation Center (UTC) ["Research, Development, and Technology Forum on AI in Transportation."](#)
- Curated and posted a new collection of resources called the [Creating Safer Systems and Healthier Communities: Resource Hub](#).
- Hosted/managed the virtual fall 2021 North Carolina Department of Transportation (NCDOT) [Research & Innovation Summit](#), attended by 347 people.
- Chose the 2021 Student of the Year, [Emma Vinella-Brusher, UNC DCRP](#).
- Generated dozens of CSCRS research-related peer-reviewed publications and multiple presentations.
- Presented and/or participated in approximately [72](#) lectern and poster sessions, panel discussions, and committee meetings as part of the 2022 Transportation Research Board (TRB) Annual Meeting.
- Continued work on new [research projects](#) launched in 2021 and concluded several other projects.
- Taught 12 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 these projects:

- [R35](#): Using Safe Systems approach to assess traffic impact and land development
 - PI: Tab Combs, UNC Department of City and Regional Planning (DCRP)
 - Completed analysis and development of a safe systems framework for development impact assessment. Working on final deliverables.
- [R39](#): Integrating systems thinking tools into Vision Zero and Safe Systems approaches
 - PI: Becky Naumann, UNC Injury Prevention Research Center (IPRC)
 - Completed systems thinking content development and testing with three sites. 2 more testing sites/workshops will take place in the next few months.
- [R40](#): A Safe Systems approach to motorcycle safety
 - PI: Eric Dumbaugh, Florida Atlantic University (FAU)
 - Descriptive analysis nearing completion. Models in development.

The following project is near completion:

- [R24](#): Developing a framework to combine the different protective features of a Safe System
 - PI: Offer Grembek, University of California, Berkeley (UCB)

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 3 new webinars:
 - [Building a MVC injury system of linked data: Lessons learned & questions answered about pedestrian injuries](#), Jan. 26 (95 participants; 57 recording views)
 - [Exploring micromobility user safety behavior](#), Feb. 23 (72 participants; 36 recording views)
 - [Reports from the battle for the curb: Using social media to understand safety challenges faced by urban delivery drivers](#), Mar. 23 (23 participants; 36 recording views)
 - CSCRS research [was showcased](#) in dozens of workshops, lectern presentations, posters, and more at the TRB Annual Meeting in Jan. 2022. Examples of topics include:
 - Making Safe Systems a Reality: Planning to Implementation
 - Livability Versus Safety Trade-Offs in the Urban Road Design Context
 - Planning for Accessible, Equitable Cities
 - In conjunction with the Highway Safety Research Center (UNC HSRC), CSCRS co-managed the third annual [NCDOT Research & Innovation Summit](#) in Oct. 2021. The Summit featured a [plenary address](#) exploring key themes of CSCRS's [Summer Learning Series](#). The plenary panelists were:
 - Elyse Keefe, UNC
 - Seth LaJeunesse, Senior Research Associate, UNC HSRC
 - Noreen McDonald, UNC DCRP
 - Becky Naumann, UNC IPRC
- Other CSCRS-related sessions during the NCDOT Summit:
- [An Innovative Approach for Characterizing Child Pedestrian Injury: An Underestimated and Understudied Problem in NC](#), Katie Harmon, HSRC
 - [As Seen on TV: Media Coverage of Traffic Crashes and Opportunities to Reshape the Dialogue Around Road User Injury](#), Stephen Heiny, HSRC

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

- CSCRS members of the [Road to Zero Coalition](#) leadership committee continued their work with that group, which recently awarded six Community Traffic Safety grants. Plus, CSCRS researcher Wes Kumfer continued leading the Road to Zero working group *Connecting Prioritizing Safety with Transportation Equity*, which met regularly during this period to compile information to be disseminated on the organization's website.
- CSCRS continued to participate in the Safe Systems Consortium, a working group convened by the [Johns Hopkins Center for Injury Research & Policy](#) and ITE that includes CSCRS researchers and Advisory Board members that discussed principles of a systems approach to road safety.

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. For 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
 - Gathered background information, conducted/analyzed interviews with planners in 12 cities, and began analysis of ped/bike counts for our treatment and control cities.
- [R36](#): Laying the Groundwork for a National Pedestrian Injury Surveillance System
 - PI: Katherine Harmon, UNC HSRC
 - Summarized informant interviews, obtained data sources, developed pedestrian injury indicators for FARS and state crash data. Indicators underway for CDC WISQARS, EMS, and hospital discharge data.
- [R42](#): Advancing crash investigation with connected and automated vehicle data – Phase 2
 - PI: Asad Khattak, UTK
- [R43](#): Applying AI to data sources to improve driver-pedestrian interactions at intersections
 - PI: Subhadeep Chakraborty, University of Tennessee, Knoxville (UTK)

The following projects are either 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

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
 - Annotated literature on pluralistic ignorance, goal theory, and values theory; developed the pluralistic ignorance survey instrument and administrative protocol and secured IRB approval.
- [R44](#): Safety enhancement by detecting driver impairment through analysis of real-time volatilities
 - PI: Asad Khattak, UTK

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 IPRC

- Completed transcription and coding of interviews, analyzed themes, and writing manuscript. Conducted web-based assessments of 18 mid-sized cities with Vision Zero. Released 8 briefs on various aspects of Vision Zero.
- [R37](#): Applying AcciMap to e-Scooter Crashes: A Safe Systems approach to analyzing micromobility
 - PI: Katie Harmon, UNC HSRC
 - Started literature review.
- [RR2](#): US Vision Zero implementation
 - PI: Kelly Evenson, UNC Gillings School of Public Health / 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 many efforts to disseminate research, specifically relating to systems-oriented projects.

Another standout example is [UTK's inclusion](#) in USDOT's new UTC ["Research, Development, and Technology Forum on AI in Transportation."](#)

Other instances:

- CSCRS researcher Seth LaJeunesse, HSRC, took part in the Oct. 6, 2021, roundtable discussion [Safe Roads](#) hosted by the [National Transportation Safety Board](#) (NTSB) and moderated by Jennifer Homendy, NTSB Chair. Jeff Paniati, CSCRS Advisory Board member and Executive Director and CEO, [Institute of Transportation Engineers](#) (ITE), also participated on the panel.
- CSCRS Director Laura Sandt presented on ["Data Justice in AV Research and Simulation"](#) during the Oct. 2021 Safety Research Using Simulation (SAFER-SIM) Virtual Symposium – Panel Discussion on Emerging Transportation Safety Themes.
- On Nov. 4, 2021, Laura Sandt was also the closing plenary speaker for the [Gulf Coast Safe Streets Hybrid Summit](#).
- On Feb. 1, 2022, CSCRS Director Laura Sandt gave an invited presentation to the [National Highway Traffic Safety Administration](#) (NHTSA), summarizing e-scooter safety issues from CSCRS and synergistic research projects.

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

Table 1: Select CSCRS outreach highlights

FAU	Dumbaugh, E. Safe Roads: A Shared Responsibility. Florida Department of Transportation TransPlex Webinar. Oct. 15, 2021.
	Dumbaugh, E. The Safety Impacts of Introducing Passenger Transit on Urban Freight Rail Systems. Tran-Set Webinar Series: Improving Safety and Reliability of Rails. Dec. 9, 2021.
	Dumbaugh, E. Land Use, Transportation, and Road Safety. Florida Department of Transportation's Fundamentals of Transportation Training Program. Mar. 22, 2022.
UCB	On Dec. 13, 2021, Offer Grembek presented virtually at the Israel Road Safety Conference about the Safe System approach to Road Safety.
UNC	Tab Combs contributed to the MIT EdX course, Leveraging urban mobility disruptions to create better cities (launched Feb. 2022).

Tab Combs guest lectured in GEOG5300 Geography of Transportation at Ohio State University (75 students) and BIO397 Biology of COVID19 at Davidson College (20 students).
Combs, T. COVID-19 Mobility Adaptations: building a knowledge base for new practices. Presented at the RELI Seminar, George Mason University, Oct. 15 2021.
Greenidge, H., Siebenaler, K., Taylor, N. One size does not fit all: Transportation equity in the 21st century. Workshop at the Lifesavers Annual Conference. Mar. 13, 2022.
Keefe, E. Creating Safer Systems and Healthier Communities: A Resource Hub. NC Executive Committee for Highway Safety. Jan. 14, 2022.
Keefe, E. NC Vision Zero Panel Discussion. BikeWalk NC Conference Nov. 5, 2021.
McDonald, N. The Transport Agenda in the US. Chartered Institute of Highway and Transportation (UK) Young Professionals Conference. Dec. 2021.
Naumann, R.B. Explaining the rise in pedestrian fatalities, a systems approach (Phase 1) and Examining pedestrian safety impacts of congestion pricing policies using a system dynamics approach (Phase 2) Research Findings. Collaborative Sciences Center for Road Safety Research Presentation. Nov. 10, 2021.
Naumann, R.B., Keefe, E., Hassmiller Lich, K., LaJeunesse, S., Heiny, S. Chapel Hill Vision Zero Executive Committee Meetings: Goal and Action Alignment Mapping. Feb. 2, 2022.
Naumann, R.B., LaJeunesse, S., Keefe, S. Supporting and connecting Vision Zero community initiatives to advance Safe System efforts. Lifesavers Conference. Mar. 13-15, 2022.
Naumann, R.B., Sabounchi, N.S., Kuhlberg, J., Singichetti, B., Marshall, S.W., Hassmiller Lich, K. Using a system dynamics approach to examine congestion pricing policy impacts on pedestrian injury. Society for Advancement of Violence and Injury Prevention Conference. Mar. 31, 2022.
Pullen-Seufert, N. A Safe System Approach to Protecting Child Road Users. Lifesavers Conference. Mar. 13-15, 2022.
Singichetti, B., Hassmiller Lich, K., Conklin, J., Dodd, A., Sabounchi, N.S., Naumann, R.B. Congestion pricing policies: trends, insights, and safety impacts. Society for Advancement of Violence and Injury Prevention Conference. Mar. 30, 2022.
Tom Flood presented the Nov. 2022 keynote lecture in the UNC DCRP roadways for a safer future lecture series, titled " Results Not Accidents: Reframing and Rehumanizing Road Safety. " 34 in-person attendees, 224 virtual registrants (103 in attendance).

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. (Note: Some of these continued to be virtual classes.) Highlights:

- FAU Spring 2022 course: Designing the City. Instructor: Eric Dumbaugh. (60 students)
- UCB Fall 2021 - Spring 2022 courses:
 - Injury Prevention and Control. Instructors: David Ragland, Lisa Peterson & Glenn Shor. (13 students)
 - Traffic Safety and Injury Control. Instructors: David Ragland, Praveen Vayalamkhuzi & Offer Grembek. (5 students)
 - Transportation Sustainability. Instructor: Susan Shaheen. (56 students)
- UNC DCRP Spring 2022 courses:
 - Complete, Safe, Equitable Streets. Instructor: Instructor: Tab Combs. (19 students)
 - Planning for Freight. Instructor: Charles Edwards. (11 students)
- UTK Fall 2021 - Spring 2022 courses:
 - Transportation Planning Models. Instructor: Asad Khattak. (12 students)

- 5 additional courses covering engineering, geometric design, traffic engineering: operations, transportation seminar, and analysis techniques for transportation systems.

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

CSCRS was excited to announce that [Emma Vinella-Brusher](#), pursuing a dual master’s degree in Public Health and City and Regional Planning at UNC Chapel Hill, was the 2021 Outstanding Student of the Year. She was honored on Jan. 8, 2022, during the Council of University Transportation Center’s virtual 2022 Awards Banquet.

Another key highlight: In Jan. 2022, CSCRS Road Safety Fellow Ethan Ebinger, UCB, presented, “Alternative Traffic Enforcement to Re-Center Road Safety” as part of the ACS10 Research Hot Topic Contest at the TRB Annual Meeting in Washington, D.C. Ethan was also awarded 1st place for the presentation as part of the Hot Topic Contest.

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

Table 2: Select CSCRS student engagement activities

UCB	5 students enrolled in an independent research component during which they prepare a paper for publication. 1 graduate student and 1 doctoral student worked on R38.
FAU	1 master’s student and 2 postdocs worked on R45.
UNC	1 master’s student worked on R36.
	1 research assistantship for R34.
	1 research assistantship for R35.
	1 PhD research assistantship for R21.
	1 undergraduate and 1 master’s students worked on R33.
	1 PhD student and 2 master’s students worked on data linkage and Vision Zero projects.
	1 master’s student led recruitment for focus groups and analyzing qualitative data.
	1 doctoral student worked to identify and describe racial disparities among pedestrian injuries and fatalities.
UTK	1 postdoc worked with Dr. Khattak on CSCRS research.
	13 UTK-ITE meetings were held to discuss student activities accompanied with presentation by practicing engineers.
	3 doctoral students defended their dissertations with the following titles: <ul style="list-style-type: none"> • The Role of Human Factors, Driving Instability, and Roadway Environment in Safety Critical Events: A Safe System Approach (Numan Ahmed) • Exploring Potential Impacts of Connected and Automated Vehicle Technologies (Iman Mahdinia) • A Multilevel Study of Driving Behavior and System Performance- Harnessing Large-Scale Naturalistic Driving Data (Amin Mohammadnazar)

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 researchers mentored 4 graduate students as part of CSCRS Road Safety Graduate Student Fellowships, to generate high quality CSCRS research pertaining to road safety topics.
- UCB’s SafeTREC held Friday traffic safety seminars including the Oct. 29, 2021, presentation by Seth LaJeunesse, UNC HSRC, “Factors and frames that shape public discourse around road user safety” research project.” (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.

- During this period, significant planning took place for participating in the North Carolina Science Festival (see more in section 1.5).

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

Myriad teaching, training, and learning opportunities have been showcased 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 741 followers. A recent month's analytics showed almost 20,000 impressions. CSCRS's YouTube channel is updated regularly with new educational content, and staff also maintained the CSCRS Facebook page.

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 (4/1/2022-9/30/22) to accomplish its goals:

- **Research activities planned:**
 - Completion, posting, and reporting of several current CSCRS research projects will continue.
- **Professional development activities planned:**
 - Continuation of the [CSCRS Webinar series](#); the next webinar is scheduled for Apr. 2022.
 - UNC DCRP will hold a free workshop, "Flipping the Script on Road Traffic Violence," in Apr. 2022. The aim of the workshop, which will incorporate a Chapel Hill, NC, bike tour and walking tour, is to develop student skills in communicating road safety concepts with mixed audiences and elected leaders.
 - FAU will continue collaborations with Florida Department of Transportation to link CSCRS projects outcomes into agency practices and design guidance.
 - Laura Sandt, UNC HSRC, will be a plenary speaker as part of the Aug. 2022 Traffic Records Forum.
- **Teaching and student enrichment activities planned:**
 - Participation in the 2022 North Carolina Science Festival, to take place in early Apr. 2022. This will involve 2 activities: 1) a virtual safe road demonstration for NC middle school classes, and 2) hosting a booth as part of the UNC Science Expo, an in-person event coordinated by the UNC Morehead Planetarium & Science Center.
 - Teaching several university courses, as well as incorporate CSCRS research findings and opportunities into other/existing courses and seminars.

Also, in the next reporting period, CSCRS is expecting the publication of an article highlighting CSCRS's extensive work connecting Vision Zero with the Safe System approach in the USDOT UTC Spotlight newsletter.

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

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)
SoftServe, Inc., Austin, TX (Collaborative Support)
PhD Posters, Durham, NC (Financial Support)
*New this period: Rovélo Creative, Toronto, Canada (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)
*New this period: 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)
*New this period: 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)
*New this period: Johns Hopkins Center for Injury Research & Policy, Baltimore, MD (Collaborative Support)
North Carolina State University Institute for Transportation Research and Education, Raleigh, NC (Collaborative Support)
Planning Society @ FAU, Boca Raton, FL (Collaborative Support)
Renaissance Computing Institute, Chapel Hill, NC (Collaborative Support)
University of Aveiro
University of Miami
University of Tennessee, Chattanooga, TN (Collaborative Support)
Various Jiaotong Universities in China (Collaborative Support)
North Carolina Central University, Durham, NC (Collaborative Support)
Tennessee Technological University, Cookeville, TN

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.

Following are additional select highlights of publications produced by CSCRS team members:

Table 4: Select CSCRS publications

Peer-Reviewed Publications
Berrigan, D., Dannenberg, A. L., Lee, M., Rodgers, K., Wojcik, J. R., Wali, B., . . . & Rodriguez, D. A. (2021). The 2019 Conference on Health and Active Transportation: Research Needs and Opportunities. <i>International Journal of Environmental Research and Public Health</i> , 18(22), 11842. https://doi.org/10.3390/ijerph182211842
Collaborative Sciences Center for Road Safety. (2022). Strengthening Existing and Facilitating New Vision Zero Plans. https://www.roadsafety.unc.edu/profdev/resource-hub/
Delclòs-Alió, X., Rodríguez, D. A., Medina, C., Miranda, J. J., Avila-Palencia, I., Targa, F., . . . & Quistberg, D. A. (2021). Walking for transportation in large Latin American cities: walking-only trips and total walking events and their sociodemographic correlates. <i>Transport Reviews</i> , (42)3, 1-22. https://doi.org/10.1080/01441647.2021.1966552
Dumbaugh, E., & Saha, D. (2021). The traffic safety impacts of transit service on freight corridors: a comparative examination of the Orlando SunRail and Charlotte Lynx systems. <i>Case Studies on Transport Policy</i> , 9(3), 1399-1406. https://doi.org/10.1016/j.cstp.2021.07.013
Khattak, Z. H., Rios-Torres, J., Fontaine, M. D., & Khattak, A. J. (2022). Inferring safety critical events from vehicle kinematics in naturalistic driving environment: Application of deep learning Algorithms. <i>Journal of Intelligent Transportation Systems</i> , 1-18. https://doi.org/10.1080/15472450.2022.2048655
Lyons, T., & N. McDonald. (in press). Last Mile Strategies for Urban Freight Delivery: A Systematic Review. <i>Transportation Research Record</i> .
Naumann, R.B., Sabounchi, N.S., Kuhlberg, J., Singichetti, B., Marshall, S.W., & Hassmiller Lich, K. (2022). Simulating congestion pricing policy impacts on pedestrian safety using a system dynamics approach. <i>Accident Analysis and Prevention</i> , 171, 106662. https://doi.org/10.1016/j.aap.2022.106662
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3.2 Policy Papers

- None during this reporting period.

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

- CSCRS debuted this new [Resource Hub](#) for tools to support a Safe System approach to Vision Zero.
- The [Shifting Streets Dataset](#) continues to be updated with new data.

- Continued to update [Vision Zero Plan Guide repository](#). The library is included on the [Vision Zero Network website](#).
- Implemented updates and improvements to the [National Pedestrian and Bicycle Safety Data Clearinghouse](#).
- Updated the [e-scooter crash database](#) and planned efforts to design a more interactive data visualization tool.

3.4 New methodologies, technologies, or techniques

Other recent technologies or techniques 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.

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:

- Chris Cherry, UTK, was featured in the following articles:
 - Nov. 11, 2021, [“Cherry Peers into Chicago’s Micromobility Sharing Programs”](#) for the UTK site.
 - Jan. 14, 2022, [“Cities Want Ebikes to Stay in Their Lane—but Which One?”](#) for Wired.
 - Mar. 15, 2022, [“It’s Time to Treat E-Bikes Like Vehicles”](#) for Bloomberg City Lab.
- Offer Grembek, UCB, was interviewed for the following news outlets:
 - Oct. 12, 2021, [“How to Make Streets Safer for Pedestrians as Fatalities Rise”](#) for Forum on KQED.
 - Oct. 15, 2021, [“Why Cars Don’t Deserve the Right of Way”](#) in The Atlantic. (UCB CSCRS Road Safety Fellow Alumni Eva Vaillancourt was also interviewed for this.)
 - On Dec. 17, 2021, [“Fatal crashes persisted on Bay area roadways even as traffic dramatically declined” in the San Francisco Chronicle.](#)
 - On Jan. 1, 2022, [“Safe Streets”](#) in Diablo Magazine.
- Noreen McDonald, UNC DCRP, was interviewed for [“NC set to get \\$457 million for bridge replacement and repairs from federal infrastructure bill”](#) Nov. 8, 2021, for CBS17.
- Seth LaJeunesse, UNC HSRC, was interviewed for this article: [“The Deadly Myth That Human Error Causes Most Car Crashes.”](#) Nov. 26, 2021, in The Atlantic.
- Wes Kumfer, UNC HSRC, participated in [this WFAE 90.7 panel discussion](#) on Dec. 7, 2021, that explored traffic deaths in Charlotte.
- Laura Sandt, UNC HSRC, was interviewed for this article: [“Keeping Pedestrians Safe”](#) Mar. 2, 2022, for The Well.

- Praveen Vayalamkhuzi, UCB, was interviewed for [“CPH: Marin County highway deaths drop sharply”](#) Feb. 13, 2022, for the Marin Independent Journal.
- Eric Dumbaugh, FAU, was interviewed for [“Brightline looks to capitalize on more riders with soaring gas prices”](#) Mar. 10, 2022, for WPTV.
- Julia Griswold, UCB, was interviewed for [“Traffic safety crisis marked by spike in hit-and-run deaths”](#) Mar. 31, 2022 for CNN Business.

In addition, CSCRS publications related to automated vehicles and pedestrian safety, as well as COVID mobility changes, received several academic citations. Beyond that, CSCRS continues to coordinate with other key stakeholder groups and national initiatives to share research and to increase understanding of key transportation issues.

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

The passage of the bipartisan Infrastructure Investment and Jobs Act was a major step forward for the Safe System approach. It contains many provisions CSCRS and its partners and advisory board members have been providing information and conducting research around for years and have been the focus of multiple CSCRS research projects as well as a [Safe Systems Consortium recommendations report](#), which involved many CSCRS representatives. Key examples:

- Implementation of the Safe System approach in roadway design, acknowledging that people make mistakes, and the cost of those mistakes should not be death.
- Prioritizing safe mobility for all roadway users, including vulnerable road users like pedestrians and cyclists
- A Safe Streets and Roads for All grant program that will provide funding to states and localities to develop or implement Vision Zero and Toward Zero Deaths plans.

Other major recent Safe System developments of note include:

- In Jan. 2022, USDOT released the [National Roadway Safety Strategy](#), which promotes the Safe System approach. The document’s opening letter from Secretary Pete Buttigieg states, “At the core of this strategy is a Department-wide adoption of the Safe System Approach, which focuses on 5 key objectives: safer people, safer roads, safer vehicles, safer speeds, and post-crash care. We will launch new programs, coordinate and improve existing programs, and adopt a foundational set of principles to guide this strategy.”
- In Feb. 2022, Caltrans unveiled its new [“Director’s Policy on Road Safety,”](#) which committed the department to the Safe System approach and reaffirms the vision of reaching zero fatalities and serious injuries on state highways by 2050.
- In Mar. 2022, the USDOT Federal Highway Administration released [“Moving to a Complete Streets Design Model: A Report to Congress on Opportunities and Challenges.”](#) The report’s conclusion states, “Safety is DOT’s top priority, and the successful implementation of a Safe System approach, including safe accommodations for all modes and all users on roadways throughout the Nation, is central to the efforts that DOT is making to meet roadway safety goals.”
- Also in Mar. 2022, [The Fiscal Year 2022-2026 U.S. Department of Transportation Strategic Plan](#) was released. Safety is listed as a strategic goal, and Safe Systems as a strategic objective.

4.3 Increases in the body of knowledge

CSCRS researchers supported the increase in transportation safety knowledge in a variety of ways, documented throughout this report. Beyond these, CSCRS’s contributions to the body of scientific knowledge continue to build. Final reports (distilled down into easily digestible research briefs), numerous journal articles, regular presentations

at professional conferences, webinars, and many more dissemination avenues are continually increasing CSCRS's reach.

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

Developments in this area are documented in the Final Reports published by each completed project and highlighted in an "Research Brief" that is posted next to the Final Report on the CSCRS website.

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. The presentations and other tech transfer activities implemented are also anticipated to have expanded the number of trained professionals in the field. In addition, during this reporting period, CSCRS took steps to ramp up K-12 activities to engage young students in thinking about transportation safety.

4.6 Adoption of new technologies, techniques, or practices

As we have previously reported, 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. CSCRS leadership through the Road to Zero Coalition has directly influenced Safe Systems literature developed and shared widely by ITE, and our research reports are integrated into their Safe Systems [professional development resource hub](#) as well as their Safe Systems Action Plan.

Some projects have resulted in specific actions taken in the states in which CSCRS consortium members are performing research in collaboration with state and local partners. For example, David Ragland and other staff at UCB SafeTREC continued to participate in multiple meetings of the California Strategic Highway Safety Plan (SHSP). Meetings covered aging drivers, emergency medical systems, road departure, pedestrian safety, and equity. Through these meetings they were able to reach out and interact with partners from a large number of state agencies and various interest groups.

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

Findings from CSCRS research projects provided insights into Safe Systems practices and evidence of effectiveness around the world. CSCRS continues seeing engagement with decision-makers in the transportation safety realm and adoption of Safe Systems methods and tools developed by our consortium members (described in Section 4.6). The ability to estimate specific impacts of these policy changes will require time and additional resources, but we anticipate positive safety effects based on prior research findings and the experiences in other countries.

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

As mentioned, CSCRS team members from UNC HSRC, UTK, and UCB, working with other partner organizations, developed a proposal to add codes to the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) describing injuries related to e-bikes. This proposal was approved by the ICD-10 Coordination and Maintenance Committee in late 2021, and the e-bike-specific codes will be incorporated into the FY2023 version of ICD-10-CM (expected to be released in Oct. 2022).

CSCRS team members were also part of a group that was previously successful in getting a series of ICD-10-CM codes for categorizing injuries related to e-scooters and other micromobility devices officially adopted as part of the FY2021 version of ICD-10-CM. The [poster](#) “Micromobility Modes, New Codes!” was created to aid healthcare professionals in accurately applying these codes in medical facilities.

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.

During this reporting period former CSCRS researcher Missy Cummings began her work as a senior adviser for safety at NHTSA. Cummings’s CSCRS research on automated driving systems has been widely respected and acknowledged in the road safety field. CSCRS submitted a [letter of support](#) for her appointment in Dec. 2021.

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. New appointments this reporting period, as well as other recognitions of our work, include:

- Laura Sandt, UNC HSRC, was appointed to serve 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 Council of State and Territorial Epidemiologists’ E-scooter Exploratory Indicator Subgroup.
 - Coauthor for an NCHRP Research Needs Statement, entitled “Determining the state of the practice for how crash data systems collect and analyze data relevant to an enhanced understanding of crash outcomes through a social equity perspective (e.g., income, insurance coverage, race/ethnicity, disability status, unsheltered status)” as a friend of the TRB Pedestrian Committee.
- Tab Combs, UNC DCRP, was invited to join the Urban Mobility and Transportation Domain of the 100 Questions Initiative.
- As mentioned, David Ragland and other staff at UCB SafeTREC participated in multiple meeting of the California SHSP.

- Becky Naumann, UNC IPRC, was invited back to guest lecture again on systems thinking and road safety practice at Clemson University.
- Eric Dumbaugh, FAU, was invited to assist the Florida Department of Transportation with updating the project planning and development practices to account for crash risk experienced by lower-income populations.
 - Dumbaugh is also a member of ITE's Transportation Safety Council and Vision Zero Standing Committee.
- Wes Kumfer, UNC HSRC, was invited to be the Transport Safety Section Editor for the upcoming article collection [“Vision Zero: The safe system approach and traffic safety culture”](#) for the journal *Frontiers in Future Transportation*.
- 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.
- UCB's David Ragland, Offer Grembek, Katherine Chen, Lisa Peterson, and Julia Griswold participated on sub working groups as part of the CalSTA IJIA Transportation Implementation effort and to assist in developing a statewide implementation action plan. Topics for subgroups staff members are participating in include safety, tribal government, equity, active transportation.
- 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; 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:
 - SAE's Powered Micromobility Committee.
 - Bird's Global Safety Advisory Board.
 - TRB's Emerging Vehicles for Low Speed Transportation joint subcommittee.
- Subhadeep Chakraborty, UTK, served as a member of IEEE.

5.4 Impact on transportation workforce development

CSCRS's workforce development activities continue going in new directions, breaking down siloes and recognizing roles that a wide variety of previously overlooked disciplines play in safe transportation. With the [Research to Practice Bytes series](#), CSCRS's reimagined virtual seminar series focusing on real-life applications of our work, we continued expanding connections with new audiences.

In addition, CSCRS's continuing work with the [NC Transportation Center of Excellence in Advanced Technology Safety and Policy](#), in collaboration with other NC UTCs and state universities, leverages multi-disciplinary skills and knowledge towards a long-term view and cutting-edge approaches in transportation research and implementation.

In a related effort, the virtual [2021 NCDOT Research & Innovation Summit](#) held in Oct. 2021 brought together different stakeholders from across the state and beyond to discuss innovative research, technologies, and other issues. We will continue our outreach via webinars, virtual events, and other campus-specific seminars.

6. Changes/Problems

6.1 Changes in approach and reasons for change

COVID-19 pandemic effects lessened on CSCRS activities during this reporting period. Researchers began attending live conferences again (such as the TRB Annual Meeting), though on a smaller scale than before the pandemic. And other activities returned to a more "normal," pre-pandemic pace. Still, CSCRS continued hosting and attending some virtual and hybrid events, such as the 2021 NCDOT Research & Innovation Summit.

Some CSCRS staff changes that took shape during this reporting period will provide the opportunity to bring in new voices and expand connections. Michael Clamann left UNC HSRC to pursue new opportunities at Waymo, and UNC HSRC's Director Randa Radwan also departed, with Laura Sandt and Caroline Mazingo appointed as Interim Co-Directors of HSRC. Missy Cummings resigned her post as the CSCRS Associate Director representing Duke University as she transitioned to the NHTSA safety advisory role. Several consortium universities have re-opened hiring such that post-doc positions and existing staff vacancies can now be filled.

6.2 Actual or anticipated problems or delays

The COVID-19 case surges caused by new variants during this period continued to affect student and staff health and work schedules, particularly in relation to January TRB Annual Meeting travel plans. International student recruitment continues to be affected to some degree, though domestic student recruitment has not been affected. Some projects that experienced lengthy delays in the ability to collect field or human subject data are now being resumed with COVID-19 safety protocols in place.

The project R41: *Bike-sharing as a safety intervention: Evidence from 9 large US cities*, which was to have involved partnering with Johns Hopkins University, is unable to proceed because of unforeseen external circumstances. No funds were expended on this effort, so CSCRS is going through the process of cancelling the project and redirecting the research funding.

Also, as mentioned, the departure of UNC HSRC's director in Oct. 2021 temporarily caused delays, including those related to CSCRS reporting requirements. Moving forward, new leadership and administrative staff are in place and this change is not expected to cause additional delays.

6.3 Changes that have a significant impact on expenditures

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](#).