

ROADWAY SAFETY INSTITUTE

Advancing roadway safety with user-centered solutions

Program Progress Performance Report for University Transportation Centers

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CONTENTS

Accomplishments.....	1
Major goals and objectives of the program.....	1
Accomplishments.....	3
Opportunities for training and professional development	6
Dissemination	6
Plans for next reporting period	8
Products.....	9
Publications, conference papers, and presentations	9
Websites or other Internet sites.....	9
Technologies or techniques.....	10
Inventions, patent applications, and/or licenses.....	10
Other products.....	10
Participants and Other Collaborating Organizations	10
Organizations that have been involved as partners.....	10
Other collaborators or contacts	11
Impact	11
Impact on the development of the principal discipline(s) of the program.....	11
Impact on other disciplines	11
Impact on physical, institutional, and information resources	12
Impact on transportation workforce development and human resources	12
Impact on technology transfer	12
Impact on society beyond science and technology	12
Changes/Problems.....	12
Changes in approach and reasons for change	12
Actual or anticipated problems or delays and actions or plans to resolve	13
Changes that have significant impact on expenditures	13
Significant changes in use of care of human subjects, vertebrate animals, and/or biohazards.....	13
Change of primary performance site location from that originally proposed.....	13

ACCOMPLISHMENTS

Major goals and objectives of the program

The Roadway Safety Institute (RSI) draws on highly innovative researchers located across Region 5 to focus on targeted research, education, and technology transfer activities aimed at determining and delivering the next wave of transportation safety improvements.

Our objective is simple: improve safety for those who use the network, regardless of where they live or how they travel on it. To that end, user-centered transportation systems will be developed and deployed to focus our work on specific users of the system and on how systematic improvements can affect both key user groups and broader groups of travelers.

This objective will be accomplished by meeting the following goals in research, education and workforce development, and technology transfer activities as well as through collaboration and diversity.

Research

The Institute will focus on traffic safety system approaches by researching design- and operation-related safety solutions that reduce fatalities and life-changing injuries across the nation. In addition, RSI will address the following MAP-21 priorities to improve highway safety: rural road safety measures, human factor studies and measures, data collection and analysis, and safety policy studies. Research projects will, for example, examine enhanced law enforcement strategies, rail grade crossings, and operational safety in intersections.

The Institute will also focus on high-risk road users by addressing key safety issues for these groups through research and by examining public engagement strategies to help improve safety on tribal lands. Those at higher risk include vulnerable road users (for example, older drivers and visually impaired pedestrians), commercial truck drivers, impaired drivers, pedestrians, and bicyclists.

Countermeasures are effective tools for practitioners to use to improve roadway safety and our research will work to develop these strategies that can be put to use. In addition, our research will investigate methodologies, metrics, and measures, in particular related to pedestrian and bicycle travel. Results of this work will provide practitioners with tools for better decision making, ultimately improving safety for those roadway users.

Education and workforce development

RSI will develop a variety of activities targeted to primary and secondary students throughout Region 5 that raise awareness of transportation safety topics and identify exciting career opportunities in related fields. Goals include leveraging the existing Transportation YOU program (a hands-on mentoring program supported by WTS that introduces girls to transportation careers) to encourage young female students throughout our region to pursue transportation-related degrees; demonstrating safe driving concepts to students in STEM summer



camps using educational tools such as our Distraction Dodger game; and developing a roadway-safety-themed museum exhibit to be displayed at science, children's, and transportation museums throughout Region 5.

We will continue to demonstrate a commitment to workforce development through activities that engage both students and practicing professionals. For students, we will enhance our university degree-granting programs by supporting user-centered transportation safety curriculum development that prepares students to take an integrated approach to this pressing transportation and public health issue. The Institute will also continue and adapt our transportation internship program to connect students to transportation employers in Region 5. For practitioners, we will provide continuing education for professionals through a seminar series and through programs with the Local Technical Assistance Programs in our region.

Technology Transfer

RSI will expand our existing partnerships to foster research innovation and deployment that includes increasing public agency and private sector partners, and we will continue to pursue patents and license agreements with the private sector. We will also communicate research findings to the transportation community for their successful implementation. Our goals include creating a consortium website, electronic newsletter, policy briefs, research videos, and an Institute summary report at the completion of the grant. In addition, RSI will leverage numerous channels to exchange information among partners and provide resources to practitioners, researchers, agencies, and other stakeholders in Region 5. Specific efforts will include communicating information at regional conferences, seminars, and workshops and through presentations and social media outlets.

Collaboration

The Institute will bring together the diverse strengths, knowledge, and experience of our consortium members to work toward the shared goal of reducing fatalities and injuries on our roadways. Through collaboration, RSI will draw on and expand our many successful partnerships with public, private, academic, and not-for-profit entities. Our goal is to advance the roadway safety knowledge base, address critical workforce needs, implement research activities, and transfer research findings using our established relationships.

RSI will create a University Partners Committee to facilitate collaboration and communication with our researchers. An advisory board will also be created to convene regional and national leaders from a variety of external organizations to guide and oversee the delivery of our work. In addition, RSI will coordinate collaborative activities with other safety-related UTCs.

Diversity

RSI will broaden participation and enhance diversity in the transportation sector by supporting female and minority STEM faculty, leveraging the existing Transportation YOU programs in our region, and expanding STEM opportunities for American Indians. Efforts will include identifying ways to support leadership development and recruitment, hiring, promotion, and retention of female and minority STEM graduate students and faculty, and connecting with tribal middle and high schools in Region 5 to engage students in STEM-related activities.

Accomplishments

Research

Our consortium will draw on our members' safety-related expertise and complementary research strengths to achieve measurable gains in safety. Several accomplishments have been documented during this reporting period related to the RSI research program.

RSI principal investigators (PIs) have been confirmed, and workplans are being developed, for the following research projects:

- Alcohol-Related Hot Spot Analysis and Prediction for Improving DWI/OVI Law Enforcement: William Schneider, University of Akron
- Collaborating with American Indian Communities to Reinterpret and Strategize about Transportation Safety Risks in Tribal Lands: Kathryn Quick, University of Minnesota
- Design of In-Vehicle Dynamic Messages to Improve Driver Awareness of Hazardous Traffic Conditions: Janet Creaser, University of Minnesota
- Developing and Validating a Model of Left-Turn Crashes to Support Safety Design and Operations: Gary Davis, University of Minnesota
- Development and Demonstration of Merge-Assist System Using Connected Vehicle Technology, Imran Hayee, University of Minnesota–Duluth
- Directional Rumble Strips for Reducing Wrong-Way Driving Freeway Entries: Albert Luo, Southern Illinois University Edwardsville
- Evaluation of a High-Visibility Pedestrian Enforcement Program that Includes Engineering and Community Feedback Elements in Michigan Cities: Ron Van Houten, Western Michigan University
- Exploring Links Between Medical Conditions and Safety Performance in Tractor Trailer Drivers: Stephen Burks, University of Minnesota–Morris
- GIS Data Acquisition and Spatial Analysis of Factors Affecting Traffic Crashes on Tribal Lands: Tom Horan
- Identifying Driver Warning Strategies to Prevent Bus-Pedestrian Crashes at Left-Turn Intersections: Chris Edwards, University of Minnesota
- Identifying and Reconciling Stakeholder Perspectives in Deploying Automated Speed Enforcement: Frank Douma, University of Minnesota
- Implementation of a V2I Highway Safety System and Connected Vehicle Testbed: John Hourdos, University of Minnesota
- Integrated Approach to Improve Railroad Grade Crossing Safety at Regional Level, Component 1—Accident Prediction Models Using Macro and Micro Scale: Ray Benekohal, University of Illinois at Urbana–Champaign
- Integrated Approach to Improve Railroad Grade Crossing Safety at Regional Level, Component 2—Accurate Prediction of Train Arrival Times for Emergency Response Management and Driver Decision Support: Yanfeng Ouyang, University of Illinois at Urbana–Champaign

- Integrated Approach to Improve Railroad Grade Crossing Safety at Regional Level, Component 3—Positioning, Planning, and Operation of Emergency Response Resources and Coordination Between Jurisdictions: Daniel Work, University of Illinois at Urbana–Champaign
- Novel Collision-Avoidance System for Bicycles: Rajesh Rajamani, University of Minnesota
- Older Driver Support System (ODSS) Usability and Design Investigation: Nichole Morris, University of Minnesota
- Performance Measures for Bicycle and Pedestrian Safety—Methodologies for Traffic Monitoring and Estimating Crash Rates: Greg Lindsey, University of Minnesota
- Roadway Safety Planning and Policy: Lee Munnich, University of Minnesota
- Safety in Numbers? Accessibility, Traffic, and Safety of Active Travelers: Andrew Owen, University of Minnesota
- A Self-Organized Positioning and Mapping Methodology Using Bluetooth and Smartphone Technologies to Support Situation Awareness and Wayfinding for the Visually Impaired: Chen-Fu Liao, University of Minnesota

We have also developed and documented a process to conduct peer reviews of these projects. Draft workplans from PIs have been collected, reviewed by the RSI director, and updated accordingly. Peer reviewers have been identified for most projects and workplans are being routed for review.

Kathryn Quick met with the Advocacy Council on Tribal Transportation, a group that discusses and forwards recommendations related to improving transportation on roadways on or near Indian reservations, to present her project for future collaboration.

RSI researchers John Hourdos and Janet Creaser and director Max Donath met with the Minnesota Department of Transportation to discuss potential projects to improve safety in work zones.

In addition, matching funds have been secured from the University of Minnesota’s College of Science and Engineering, Vice President for Research, and Humphrey School of Public Affairs. The Minnesota Department of Transportation has verbally committed to providing match to the program. All partner institutions have also committed to providing match. Staff have developed and documented a process to track these non-federal match funds.

Education and workforce development

To improve safety on our roadways now and in the future, we need to attract and prepare future transportation professionals and actively expand the knowledge of current practitioners. The following accomplishments, which occurred during this reporting period, will help us meet these goals.

We held initial conversations with the Minnesota Science Museum, which provides science education to more than one million people per year, to discuss our development of an interactive



safety-themed museum exhibit to engage primary and secondary school students. A scoping meeting with museum staff is planned for May.

In addition, RSI was approached by Hennepin County (Minnesota) library staff to discuss a potential partnership to integrate STEM-related hands-on activities within a new library currently under construction. An initial meeting to brainstorm activities was held in March. County representatives were intrigued about the possibility of adapting Gridlock Buster and/or Distraction Dodger—both online educational games developed by the University of Minnesota to help teach safety messages to younger audiences—for use in the library. A follow-up meeting will be held in April.

Technology transfer

Roadway users will be safer when our research findings are put into the hands of those who can reduce fatalities and injuries, whether that means providing information to drivers, adding technology to vehicles or the transportation infrastructure, or educating practitioners and policymakers. The following accomplishments have been documented during this reporting period.

A website was created for the Institute and launched in December 2013. The site contains basic information related to RSI, and will be populated with additional data as the grant progresses. Our communications team developed a graphic identity for RSI conveying a modern, vibrant image for the Institute. This look has been applied to the Institute's website and will be incorporated into all our communications products to create a consistent, instantly recognizable brand.

Planning also began for the first issue of our electronic newsletter, *Roadway Safety Institute News*, scheduled to be launched in May. RSI staff developed a subscription form for new subscribers and posted the page to the website. So far, a distribution list of more than 1,350 individuals has been assembled for the newsletter made up of national, regional, state, and local contacts working in safety and interested in the work of the Institute.

Director Max Donath and several Institute researchers met with tribal leaders at the National Tribal Transportation Assistance Program (TTAP) meeting in October 2013 to introduce RSI to them and to begin discussions about potential collaborations on traffic safety topics of interest to the tribal nations.

Jim Grothaus, director of the Minnesota Local Technical Assistance Program (LTAP), met in March with the national LTAP and TTAP Strategic Planning Committee to build relationships and collaborations between TTAP, LTAP, and RSI.

RSI also sponsored a seminar titled “Understanding Young Driver Behavior to Prevent Risk” given by Marie Claude Ouimet, assistant professor at the Faculty of Medicine and Health Sciences at the Université de Sherbrooke, Longueuil, Quebec, Canada. The event was held at the University of Minnesota on February 11.

Collaboration

Our theme of user-centered transportation safety systems is based on the premise that no single or simple solution can solve the problem of roadway fatalities and injuries: meeting the challenge requires multiple approaches from multidisciplinary perspectives. To help the Institute meet this challenge, several efforts were completed during this reporting period.

First, our staff developed and documented a process and structure for implementing the University Partners Committee. This group will be made up of the research project PIs and will meet to collaborate on Institute activities.

In addition, a structure and framework for RSI's Advisory Board was developed. The Advisory Board will convene regional and national leaders from a variety of external organizations to guide and oversee the delivery of our work. Invitations will be sent in May, with a meeting planned for the summer.

Program start-up

In addition to the accomplishments noted above, our staff also developed and documented a process to capture information for all grant requirements, including research project descriptions, program progress performance reports, performance indicators, and annual recipient share reports.

Opportunities for training and professional development

Accomplishments are reported in the education and workforce development section.

Dissemination

In order for the data-based findings and practices resulting from Institute work to effect positive change—specifically, safer roadways—these findings must be delivered to those who can effectively implement them in everyday practice. Our Institute strives to disseminate information not only broadly, but purposefully.

The Institute's website is a primary vehicle for distributing information to stakeholders. The website launched the end of 2013, and in the three months since going live, has received 421 visits and 3,837 views of individual pages. The most popular pages were the home, research, and faculty pages. The site is undergoing regular updates to its content, as well as enhancements to its design to create a more engaging and easy-to-navigate interface. We expect the website traffic to increase significantly as the approved research projects are added to the site, the first newsletter is published and distributed in May, and other activities get underway.



In addition, four PIs from our consortium captured media attention in stories highlighting their work in roadway safety.

- Ron Van Houten, professor of psychology at Western Michigan University, was interviewed by the *New York Times* as part of a story on New York City's recent efforts to reduce the number of traffic deaths, particularly pedestrians and bicyclists, on its streets. Van Houten, who has authored a series of traffic safety studies, said enhanced enforcement, particularly in high-visibility areas, can increase the rates at which drivers yield to pedestrians over the long term. However, a range of other efforts that publicly track changes in driver behavior may be most effective, Houten noted. The article was published on February 14, 2014.
- The local ABC affiliate in Minneapolis, Minnesota—KSTP-5 TV—aired a story on March 18 in which John Hourdos, director of the Minnesota Traffic Observatory (MTO) at the University of Minnesota, was interviewed about the MTO's new shock-wave warning system that uses electronic message boards with intelligent lane control signs. Hourdos was also interviewed for a KSTP-5 news story about travel lessons learned from the Atlanta snowfall on January 30; was quoted in articles in the *Star Tribune* (about a possible expansion of I-94 on October 13, 2013, and the effectiveness of smartphone traffic apps on January 29, 2014); and was interviewed by Traffic Technology Today.com about a work zone warning system on October 18, 2013.
- The University of Minnesota, Morris published an article on March 24, 2014, honoring Stephen Burks, associate professor of economics and management, for receiving the University of Minnesota, Morris Faculty Distinguished Research Award. Burks is best known in his field as the leader of the “Truckers and Turnover Project,” a multiyear study in the field of behavioral personnel economics conducted in cooperation with a large motor carrier. Burks will be conducting research for RSI looking at the relationship between commercial vehicle driver medical conditions and driver safety.
- *Atlantic Cities* and *Star Tribune* news articles on congestion and accessibility (published January 29 and March 7, respectively) featured RSI researchers Andrew Owen, director of the University of Minnesota's Accessibility Observatory, and civil engineering professor David Levinson. Owen and Levinson will be leading work to develop a risk model for pedestrian and bicycle travel in urban areas that reflects the cross-modal interactions produced by varying levels of active and motorized travel on individual road segments or intersections.

Plans for next reporting period

It is anticipated that the following activities will take place in the next reporting period (April 1, 2014 – September 30, 2014).

Research

- Work will begin on all research projects.
- Research project descriptions will be posted to the website.
- Peer reviews for all research projects will be completed and research project descriptions will be updated.
- Year 1 project budgets will be approved and Year 2 project budgets will be developed.
- RSI will begin working with MnDOT to lead a pooled-fund research project on roadway safety, based on priorities identified through our discussions with state DOT safety engineers.

Education and workforce development

- A consortium seminar series will be developed and delivered starting in September 2014. The seminars will feature RSI researchers and will be streamed live via the web. The series will be marketed to students, staff, faculty, and transportation safety professionals at our partner institutions, in the states within our region, and to a national audience interested in traffic safety. The series will be offered as a one-credit course at the University of Minnesota.
- A process will be developed for recruiting and selecting student award winners across our consortium institutions for the RSI Outstanding Student of the Year award and for travel awards to attend the Transportation Research Board Annual Meeting in January 2015.
- A museum will be selected for us to work with on developing a safety-themed exhibit.
- Staff will research WTS chapters and Transportation YOU programs in Region 5 and conversations will be initiated to strengthen those programs and connections.
- RSI will sponsor a day of safety-related curriculum as part of the Summer Transportation Institute, an FHWA-funded program that seeks to share transportation disciplines and careers with students in underrepresented populations. The summer program is being delivered through the Center for Transportation Studies at the University of Minnesota.
- RSI will work with LTAP and TTAP centers in Region 5 to identify training needs.

Technology transfer

- Content will be added to the RSI website as it becomes available.
- RSI will deliver the *Roadway Safety Institute News*, an electronic newsletter in May and August. A media relations plan will be developed, and stories pitched, to targeted trade and national media outlets.

- Social media channels (such as Twitter, Facebook, YouTube, and LinkedIn) will be created; activities and results will be publicized.
- A PowerPoint template will be developed that will include the graphic identity of RSI.
- An article featuring RSI that ran in the CTS *Catalyst* newsletter will be sent in May to LTAP and TTAP centers across the region for potential inclusion in their publications.
- Planning will begin for a regional conference, to be held in conjunction with the Center for Transportation Studies (CTS) Annual Transportation Research Conference scheduled for May 2015. The event will solicit and encourage presentations from all universities in our consortium and other UTCs in our region and will be marketed throughout Region 5.

Collaboration

- The first meeting of the University Partner Committee will be held. PIs will travel to Minnesota for one in-person meeting; a second virtual meeting may be held.
- Membership of the Advisory Board will be confirmed and the first meeting will be held.
- Staff will investigate activities currently underway at other safety-related UTCs and we will begin looking for opportunities to coordinate activities.
- Conversations with safety engineers in Region 5 states will begin to identify common needs for the region.
- Collaborations with American Indian communities will continue through the Advocacy Council on Tribal Transportation.

Diversity

- RSI will support female and minority STEM faculty by initiating conversations with faculty and staff in the College of Science and Engineering at the University of Minnesota.
- RSI will connect with University of Minnesota Extension staff and other potential partners about outreach opportunities to engage with American Indian student populations on safety-related initiatives.

PRODUCTS

Publications, conference papers, and presentations

Nothing to report

Websites or other Internet sites

An initial website for RSI (www.roadwaysafety.umn.edu) has been designed and launched. The website includes information on research activities, events, news, and key personnel. We have also developed the structure to display research project descriptions and final research reports on the RSI website as they are finalized.

In addition, the Institute's website reaches a wider audience through links to it from the Center for Transportation Studies (CTS) at the University of Minnesota. CTS strives to solve persistent transportation problems in innovative new ways by convening diverse communities to brainstorm, debate, share, learn, and act. CTS also partners with local and global transportation professionals, stakeholders, businesses, and leaders to move new ideas from research to reality.

Technologies or techniques

Nothing to report

Inventions, patent applications, and/or licenses

Nothing to report

Other products

Nothing to report

PARTICIPANTS AND OTHER COLLABORATING ORGANIZATIONS

Organizations that have been involved as partners

The following partner organizations have committed to providing financial support, in terms of match funding, to the Institute.

- Minnesota Department of Transportation, St. Paul, MN
- Vice President for Research, University of Minnesota, Minneapolis, MN
- College of Science and Engineering, University of Minnesota, Minneapolis, MN
- Humphrey School of Public Affairs, University of Minnesota, Minneapolis, MN
- University of Minnesota Morris, Morris, MN
- University of Minnesota Duluth, Duluth, MN
- University of Illinois at Urbana-Champaign, Urbana, IL
- Western Michigan University, Kalamazoo, MI
- Southern Illinois University Edwardsville, Edwardsville, IL
- University of Akron, Akron, OH

Other collaborators or contacts

The following organizations have been in collaboration or contact with the Institute during this reporting period.

- RSI director Max Donath has discussed partnering opportunities with the Minnesota Local Road Research board to further advance the work of our Institute and safety across our region.
- A meeting was held with the Minnesota Department of Public Safety and RSI principal investigator William Schneider from the University of Akron to discuss potential partnerships on Schneider's DUI research.
- Ron Van Houten, RSI principal investigator from Western Michigan University, has had initial conversations with Dialight, a manufacturer of LED lighting for hazardous locations, to produce signals for his work. Kathryn Quick, RSI principal investigator from the University of Minnesota, presented her research project to the Advocacy Council on Tribal Transportation for potential collaboration.
- RSI staff met with Metro Transit, a transportation service provider for the Twin Cities that offers an integrated network of buses, light rail, and commuter trains, to discuss potential partnerships aimed at reducing the incidence of collisions between left-turning buses and pedestrians.

IMPACT

Impact on the development of the principal discipline(s) of the program

The work of RSI will provide society with solutions to improve safety and public health for all users of our region's and nation's roadways. By identifying critical areas of focus such as automated speed enforcement, intersections, rail grade crossings, and speeding, our team's efforts will help to prevent fatal and serious injury crashes for those users—whether pedestrians, bicyclists, motorcyclists, commercial truck drivers, impaired drivers, or tribal land travelers—who have a greater risk propensity. Specific guidance will be created that state and national agencies can use to address these priorities and improve roadway safety.

Our work will also help state departments of transportation and other agencies implement design- and operation-related safety solutions that reduce fatalities and life-changing injuries. Specifically, we will focus on issues that have been inadequately addressed to date. Our projects will examine policy issues, operational safety, rail grade crossings, and automated speed enforcement.

Impact on other disciplines

Nothing to report

Impact on physical, institutional, and information resources

Nothing to report

Impact on transportation workforce development and human resources

RSI's education and workforce development efforts will offer opportunities to engage future transportation professionals in safety-related concepts and careers, enrich the educational experience of university students, and provide professionals with the tools and resources they need to improve roadway safety. The outcomes associated with these activities will support the development of a diverse transportation workforce.

Impact on technology transfer

RSI's technology transfer activities will lead to the implementation of research results and promote a safer transportation system. Through partnerships, RSI faculty and researchers will be successful in technology transfer.

Impact on society beyond science and technology

The Institute's work will result in real-world applications—such as policy approaches as well as engineering and technology solutions—to mitigate the human and economic toll of traffic crashes and traffic-related fatalities by improving safety on our roadways.

CHANGES/PROBLEMS

Changes in approach and reasons for change

Three changes should be noted during this reporting period:

- Henry Liu (Department of Civil Engineering at the University of Minnesota) accepted a new position at the University of Michigan and will no longer be involved with RSI.
- Michael Manser (HumanFIRST Lab at the University of Minnesota) accepted a new position at the Texas Transportation Institute and will no longer be involved with RSI. His work will be covered by other RSI staff.
- Huaguo Zhou, Co-PI on the project “Directional Rumble Strips for Wrong-Way Driving Freeway Entries,” left Southern Illinois University to take a new position at Auburn University. Albert Luo was named PI; Zhou will remain as Co-PI.



Actual or anticipated problems or delays and actions or plans to resolve

Nothing to report

Changes that have significant impact on expenditures

Nothing to report

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

Nothing to report

Change of primary performance site location from that originally proposed

Nothing to report