CTS: Celebrating 30 years of innovation

Minnesota’s quality of life depends on transportation. That was true 30 years ago, when CTS was established, and it’s true today.

CTS has been a catalyst for innovation in all facets of transportation: traffic flow and safety; pavements, bridges, and other infrastructure; planning and economic issues; the environment and energy; and more.

Much progress has been made. Practitioners have new tools and techniques to improve transportation systems, and policymakers and elected officials have objective data to inform their

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Transportation spending: How does Minnesota compare with other states?

Transportation funding continues to be a contentious issue in Minnesota: Are we spending enough, too little, too much? One way to help answer that question is to compare spending with other states.

“A simple comparison, however, may not accurately reflect the real level of transportation funding across the states,” says Jerry Zhao, an associate professor in the Humphrey School of Public Affairs. “States face different levels of demand and costs due to different geographic, demographic, or labor market conditions.”

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According to the results of a new study, bicycle commuting in the Twin Cities metropolitan area reduces chronic illness and preventable deaths, saving millions of dollars annually in medical costs.

The findings are one component of a multifaceted project funded by the Minnesota Department of Transportation (MnDOT). In the final report, researchers in several U of M departments provide a comprehensive understanding of the economic impact and health effects of bicycling in Minnesota.

“MnDOT has long identified bicycling as an important part of the state’s multimodal transportation system,” says Tim Henkel, modal planning and program management assistant commissioner. “This first-ever study generated new information that will inform policy and program strategies as we determine levels of future investment.”

Xinyi Qian, an Assistant Extension Professor in the U’s Tourism Center, was the project’s principal investigator. Dr. Mark Pereira of the School of Public Health, one of the co-investigators, led the health component of the project.

Pereira’s team began by measuring the amount of bicycle commuting among Twin Cities adults using data from the 2014 Minnesota State Survey. (The counties included were Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington.) The team found that 13.4 percent of working-age metro-area residents (244,000 adults) bicycle to work at least occasionally, and the average bicycle commuter rides 366 miles per year.

The researchers next estimated the number of deaths prevented from that amount of bicycling using the Health Economic Assessment Tool developed by the World Health Organization (WHO). Their analysis found that bicycle commuting in the metro area prevents 12 to 61 deaths per year, saving $100 million to $500 million annually. “At current levels, roughly 1 death per year is prevented for every 10,000 cyclists,” he says.

The WHO tool estimates savings from prevented deaths but not from prevented disease. To estimate the effect of bicycling commuting on illness, researchers conducted an online survey of Twin Cities cyclists; participants also included three commuter groups and a bicycle parts manufacturer.

“We learned that bicycling is linked to lower risk of metabolic syndrome, obesity, and hypertension,” Pereira says. “For example, taking three additional bicycle trips per week is associated with 46 percent lower odds of metabolic syndrome, 32 percent lower odds of obesity, and 28 percent lower odds of hypertension.”

The illness assessment provides relative risk estimates that planners can use in cost-benefit analyses. “Current methods only consider risk reductions related to death rates, so the benefit of infrastructure projects is underestimated,” Pereira says. “By providing an estimate of the risk reductions for diabetes and heart disease related to cycling, we provide an input that will help project planners more accurately represent the benefits of these projects.”

While the research was conducted in the Twin Cities, the methods can be used in other locations and to compare changes over time. “The findings also provide a foundation for transportation and health care officials to take action,” Pereira says, citing several options:

- Promote active transportation through policies and intervention programs, e.g., employer incentives.
- Develop consistent safety education and encouragement messages statewide to increase bicycle commuting.
- Continue to encourage and implement safe bicycling to school and access to bicycles for youth across the state.

Upcoming articles will report on the economic impact components of the study.
Students explore sharing economy for Minneapolis neighborhood

Last semester, 39 students in the U’s Master of Urban and Regional Planning (MURP) degree program explored ways to integrate a Minneapolis neighborhood—the North Loop (Nolo)—into the sharing economy. Located just north of downtown in the Warehouse Historic District, the neighborhood has experienced revitalization and increasing property values in recent years.

In the class (Public Affairs 5211: Urban Land Use Planning), student teams created 13 proposals on topics such as parking reallocation (see sidebar), bike sharing, and walkability. They showcased their work in more than 100 posters at an exhibit in December.

Fernando Burga, an assistant professor in the Humphrey School of Public Affairs, is the course instructor. He shares some insights below.

How did you choose the sharing economy and the North Loop for the study?

The sharing economy is a hot topic, and it has the potential to open different horizons in land-use planning. Discussions of the sharing economy often focus on the private sector and entrepreneurs; I wanted to bring planning into stronger focus through this class. I chose the North Loop in part because it’s undergoing gentrification and lies next to racially segregated North Minneapolis. Gentrification is key: there’s concern that sharing economy enterprises lead to gentrified neighborhoods or tend to have racial bias. That was an interesting tension embedded in the scope of the class.

What are some real-world benefits of the project?

The work gives a comprehensive understanding of what Nolo is now and points to where it’s going. We developed concrete, holistic findings for the community.

What are some recommendations for educators?

I structured the class to be more like a studio than a typical lecture-based course. Instead of final reports, I ask students to create a set of narrative visuals for an exhibit where they can share their results. This helps them develop design and presentation skills and compile materials for job interviews. We also used social media successfully. We created a couple Instagram handles to promote the project, and students seemed excited, and proud, to talk about it.

To obtain a project summary and PDFs of the student proposals, please contact Burga at hfburga@umn.edu.

Turning North Loop parking into shared public spaces

One student team—Joanne Cho, Max Dickson, and Jessi Wyatt—developed a proposal for reallocating parking spaces to serve a sharing economy.

Highlights:

Parking ramps: Given the North Loop’s proximity to downtown, Nolo ramps could be converted into “rest areas” for self-driving vehicles (SDVs), providing fast and efficient service to users. Much less parking will be needed for SDVs than for existing passenger vehicles—resulting in leftover ramp space. This space could be retrofitted for a variety of uses, such as retail markets and cooperative agricultural plots on rooftops. Changes in zoning and permitting would be needed to allow for mixed-use designation.

Surface lots: These areas offer potential for green space that’s now largely absent from the North Loop. Their transition would provide a public amenity for residents and environmental benefits. Encouraging a gradual transition would start with zoning policies and incentives.

On-street parking: These 18’5” x 9’ spaces could be converted into parklets and bio-swales. Green spaces along sidewalks could enliven the streetscape and provide sitting areas—“a public oasis in a bustling city.” Policy options include an overlay district to augment regulations and incentives that discourage on-street parking, and funding allocation through capital improvement programs and community benefit subsidies.

Students explored options for additional green space in the North Loop neighborhood.
How does the ability to move freight affect the economic health of a state, region, and even a city? How are the supply chains of businesses impacted by freight flow? And what challenges and opportunities does Minnesota face when it comes to leveraging and strengthening its freight modes?

The 2016 Freight and Logistics Symposium offered a thoughtful examination of those questions and explored other topics related to improved mobility in Minnesota, including congestion, regulation, labor shortages, and the value of all freight modes to the state’s economy.

In the symposium’s first presentation, speaker Chuck Clowdis focused on the power of freight flow data in attracting industry to a location and ways to use data in making a compelling case for businesses to invest. As managing director of transportation with IHS Markit’s economics and country risk sector, Clowdis helps connect organizations, public or private, to data that maximizes their opportunities for success—whether that involves finding the optimal location for facilities, better leveraging supply chains, identifying future prospects, or attracting businesses.

“If you are wanting to attract investors, if you are wanting to attract that person who wants to put a plant or needs to put a plant in the Upper Midwest to your county or city in Minnesota, then you need reliable data,” Clowdis said.

The second session, a panel Q&A, examined the advantages, disadvantages, and opportunities related to moving freight from the perspective of Minnesota-based organizations. Participants included moderator Justin Johnson of Bay and Bay Transportation, Bruce Abbe of the Midwest Shippers Association, Jim Carver of Land O’Lakes, Patrick Murray of Cambria Company, and George Schember of Cargill.

Minnesota offers many advantages, Schember said, though the state does need to do better in attracting greater diversity in talent to the industry.

“It’s wonderful doing business in Minnesota,” he said. “We have laws. We have labor talent. We have trustworthy partners. We have data and information-exchange systems so that we can actually run our businesses. We have infrastructure that is competitive on a global scale. We’re a long way from a lot of markets, but we can get there in a fairly efficient manner.”

According to Craig, infrastructure investment is important to trucking and will be a topic for discussion at the federal level. “This was a big campaign promise,” Craig said. “But I have some healthy skepticism about an infrastructure bill at the federal level.”

For Minnesota, Donahoe emphasized the importance of a united front among freight community stakeholders when approaching legislation. “If we can get everybody working together to really push legislators to increase the investments to improve the strength of the roads and bridges, we could have a real win-win for everybody,” she said.

The symposium was sponsored by CTS in cooperation with the Minnesota Department of Transportation, the Minnesota Freight Advisory Committee, the Council of Supply Chain Management Professionals, the Metropolitan Council, and the Transportation Club of Minneapolis and St. Paul. A proceedings summarizing the symposium is available at cts.umn.edu/events/freight.
Saif Benjaafar named CTS Senior Scholar

CTS Scholars are leading researchers and educators at the University of Minnesota, drawn from diverse fields. They work closely with CTS to identify new research opportunities and develop new initiatives for transportation education.

Last fall, CTS launched a new element of the program: the CTS Senior Scholar. "The CTS Senior Scholar Program provides an opportunity for a tenured faculty member who is a thought leader in the field of transportation to deepen his or her relationship with CTS and its stakeholders and apply that expertise to activities that advance the CTS mission," says Laurie McGinnis, CTS director. "The program provides a unique opportunity for a faculty member to leverage personal academic and research goals with CTS's strengths."

Saif Benjaafar, Distinguished McKnight University Professor in the Department of Industrial and Systems Engineering, has been named the first CTS Senior Scholar. He will serve a two-year term and receive some funding to support this role. The selection was made through a competitive process with guidance from the CTS Executive Committee.

Benjaafar has been engaged with CTS on a variety of projects and activities for nearly 20 years. Most recently, he has led the Initiative on the Sharing Economy, an effort established by CTS in partnership with Benjaafar and other faculty members across the University and administered by CTS.

"As Senior Scholar, I will devote time and effort to the further development of the initiative," he says. Goals of the initiative include establishing the U as a center for thought leadership on issues surrounding the sharing (and on-demand) economy and cultivating a cross-disciplinary community of faculty and researchers. The initiative will also encourage University-driven entrepreneurship and innovation and promote engagement with industry, government, and the nonprofit sector while providing balanced analysis and guidance to policymakers.

"I will also devote time to engage external communities, including cities and towns in the region, to identify opportunities where sharing economy tools—including shared mobility—could be deployed to enhance economic opportunities," he says. "Of particular interest to me are those opportunities of relevance to low-income communities and communities of color."

More about the initiative is available at sharingeconomy.umn.edu.

U of M researchers shared—and awarded—at TRB Annual Meeting

U of M researchers shared their work in more than 40 sessions at this year’s Transportation Research Board (TRB) Annual Meeting in Washington, DC, on January 8–12. Their posters and papers covered a range of topics.

One paper, coauthored by Professor Greg Lindsey of the Humphrey School of Public Affairs, was honored by the Committee on Highway Traffic Monitoring (ABJ35). The paper—"Up on the 606: Understanding Use of a New Elevated Pedestrian and Bicycle Trail in Chicago, Illinois"—was one of two selected to receive the committee’s Outstanding Paper Award for 2017.

In addition, 22 graduate students received travel awards to attend the meeting, where they presented research and networked with other attendees. Ten of the awards were funded by CTS and twelve were funded by the Roadway Safety Institute.

At the Council for University Transportation Centers Awards Reception and Banquet, held January 7 in conjunction with the TRB meeting, Chen-Fu Liao received the Milton Pikarsky Memorial Award for Outstanding Doctoral Dissertation in Science and Technology.

Liao, senior systems engineer at the U’s Minnesota Traffic Observatory, received the award for his Ph.D. dissertation, "An Integrated Assistive System to Support Wayfinding and Situation Awareness for People with Vision Impairment." The dissertation focuses on Liao’s work developing the Mobile Accessible Pedestrian Signal (MAPS) system, which uses a smartphone, GPS, and other technologies to help pedestrians with limited or no eyesight navigate signalized intersections and other locations safely.

READ CATALYST ONLINE
for links to research reports and other resources.
To better understand the factors that influence the transportation funding level, Zhao and Professor Wen Wang at Rutgers University developed a cost-adjusted approach to systematically compare highway expenses among states. They found that while Minnesota spends more than average on highways, its spending level actually ranks low in cost-adjusted measures.

“We controlled for the effects of some major cost factors, such as demographics and natural weather conditions, which are outside of the control of state and local officials,” Zhao explains. “We found that natural weather conditions have a significant impact on highway spending—a lower winter temperature is associated with higher highway expenditures.”

The effect of population size isn’t as straightforward: “There is some impact of economy of scale, but only to a certain threshold,” he says. While urban areas have greater complexity, the higher population density is associated with less spending per capita, probably due to spreading the costs across a greater population.

The analysis also found that state and local governments tend to spend less on highways when they are under fiscal stress, and states with a higher gross domestic product (GDP) appeared to spend more on highways per capita. “Essentially, highway investment decisions may be greatly influenced by the economic fluctuations and fiscal stresses faced by a state,” he says.

According to unadjusted 2010 data, Minnesota ranks 8th on highway spending per capita and 18th on its share of statewide highway spending in GDP. “But after adjusting for those factors that are largely out of control by transportation policy, we found that Minnesota's rankings drop to 37th on highway spending per capita and 41st on the share of highway spending in GDP,” Zhao says. “This suggests that the relatively high level of highway spending in Minnesota is largely driven by the cost factors of demographics and weather conditions.”

“This study confirms what MnDOT has experienced and that transportation financing is more complicated than one would expect,” says Tracy Hatch, MnDOT deputy commissioner. “Not only is Minnesota’s transportation system significantly undercapitalized—there are considerable financial impacts from factors outside of our control.”

The analysis was conducted as part of the U’s Transportation Policy and Economic Competitiveness Program (TPEC). In previous work, TPEC researchers created the Minnesota Transportation Finance Database, which compiles data about Minnesota’s transportation finance and shows the change of transportation spending in Minnesota over time.

Transportation summer camp scheduled for July 17-28

In July, CTS will host the National Summer Transportation Institute for the third consecutive year. The free, two-week program introduces students entering grades 7–9 to transportation topics and aims to spark their interest in science, engineering, and transportation careers.

Attendees will participate in classroom and lab sessions with transportation experts, go on field trips to facilities around the Twin Cities, and build a model bridge as part of a group project.

Know any students who would like to attend? Applications are due April 17. Details are available at cts.umn.edu/summercamp.
decisions and guide priorities.

But much work still needs to be done, and our world is changing rapidly. How will people travel in 2050, or five years from now, given new technologies? What’s needed to maintain a competitive economy? How do we meet today’s challenges and stay ahead of the curve?

There’s no crystal ball. But research can help us understand our changing world and best meet public needs.

To celebrate our first 30 years, CTS will look back at highlights of our research, education, and engagement accomplishments. We’ll show how research progresses over time to lead to new knowledge, which in turn becomes the innovation that makes transportation better.

One research focus since our earliest days is improving traffic operations. Professor Emeritus Panos Michalopoulos invented Autoscope® technology to help transportation agencies capture video images of traffic and analyze the information, enabling better traffic management. Autoscope was commercialized in 1991, and the technology has been incorporated into products sold and used worldwide.

Current traffic operations research builds on this strong foundation. For example, the U’s Minnesota Traffic Observatory, directed by John Hourdos, develops data collection tools such as the Beholder camera system. The system is deployed on high-rise rooftops overlooking a stretch of I-94 in Minneapolis—an area with the highest crash frequency in Minnesota—to help the Minnesota Department of Transportation reduce congestion and improve safety.

This is just one of the stories we’ll relay during 2017 in Catalyst, on our blog (Conversations), and through other means—such as a new video about Autoscope and Beholder on our website.

And as always, we’ll continue to report on the full array of new projects and activities as we keep moving forward.
Students explore potential of SHARING ECONOMY FOR MINNEAPOLIS neighborhood.

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Bicycle commuting IMPROVES PUBLIC HEALTH, reduces medical costs.

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TRANSPORTATION SPENDING: How does MINNESOTA compare with other states?

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