Center for Transportation Studies
University of Minnesota
200 Transportation and Safety Building
511 Washington Avenue S.E.
Minneapolis, MN 55455-0375
Phone: 612-626-1077
Fax: 612-625-6381
E-mail: cts@umn.edu
Web: www.cts.umn.edu

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Center for Transportation Studies

2008 Annual Report

This publication contains highlights of transportation research, education, and outreach activities conducted by the Center for Transportation Studies and its affiliated programs for the period July 2007 through June 2008 (fiscal year 2008).

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In 1986 two professors planted the seed for a transportation research center at the University of Minnesota. The idea took root, and today the Center for Transportation Studies is a nationally recognized leader in transportation innovation.

CTS opened its doors in 1987 with a single employee—founding director Richard P. Braun, a former commissioner of the Minnesota Department of Transportation—and a one-time state allocation of $2.7 million. Today CTS coordinates approximately $20 million annually for research, education, and outreach activities at the University.

Much has happened between then and now. Our research program broadened from pavements, bridges, and traffic into arenas such as policy, finance, land use, and energy. More than 75 faculty from 25 departments are now involved.

CTS brings these diverse fields together to tackle complex transportation issues. For example, a recent study led by the American Institute of Architects looked at how transportation can enhance community design, while an effort...
funded by the state legislature explored ways to reduce greenhouse gas emissions from the transportation sector.

CTS has steadily added new capabilities with components such as the federally funded Intelligent Transportation Systems Institute and the Minnesota Local Technical Assistance Program. We also partner with other organizations in programs such as the Center for Excellence in Rural Safety and the Transportation Engineering Road Research Alliance.

Throughout its history, CTS has served as a resource and neutral facilitator, helping University researchers share their knowledge with professionals and policymakers and inform public debate. This role—public engagement—has grown in scope and importance, evidenced by an array of events, publications and Web sites, and media outreach.

We are proud to have reached the upper echelon of the nation’s transportation centers. CTS is a proven performer, thanks to the contributions of the many people and organizations that have supported us. We look forward to what the next 20 years may bring.

Robert C. Johns, Director
Center for Transportation Studies
20 years...

600 research reports

www.cts.umn.edu/Research
Interdisciplinary studies

Reducing greenhouse gas emissions
CTS received an appropriation in 2007 from the Minnesota Legislature to assess public policy and technology options for reducing greenhouse gas (GHG) emissions from the transportation sector in Minnesota. To address the interdisciplinary issues raised by this study, CTS assembled and led a research team drawn from multiple fields including mechanical engineering, public policy, and civil engineering. Principal investigators were Professor David Kittelson from the Department of Mechanical Engineering, Assistant Professor Julian Marshall from the Department of Civil Engineering, and Assistant Professor Elizabeth Wilson from the Hubert H. Humphrey Institute of Public Affairs.

The team found that the transportation sector can meet its share of the state’s goals for reducing GHG emissions in 2015 and can possibly exceed them in 2025—but action must start now. According to the final report, meeting the goals will require a combination of strategies targeted to reduce fuel consumption, vehicle-miles traveled, and fuel carbon content.

Mapping accessibility
CTS published three research reports in the Access to Destinations study. Access to Destinations is an interdisciplinary research and outreach effort coordinated by CTS with support from sponsors including the Minnesota Department of Transportation, Hennepin County, the Metropolitan Council, and the McKnight Foundation. A synthesis of the study research will be published in 2009.

The Second International Access to Destinations Conference was held in August 2007 (see page 25).

Improving community design and livability
Final reports were published for the Moving Communities Forward study. The pioneering study analyzed more than 30 different transportation projects from every corner of the country, exploring how they affect their communities’ economic progress, environmental health, public safety, level of citizen participation, and overall aesthetics and livability. The American Institute of Architects (AIA) selected CTS in 2006 to conduct the study. Funding was derived from a grant to the AIA from the Federal Highway Administration, authorized by Congress in the 2005 federal surface transportation bill.
FY08 research project sampler

Analyzing traffic patterns
The collapse of the I-35W bridge over the Mississippi River on August 1, 2007, sparked a number of research studies. In the weeks immediately following the collapse, David Levinson, the Braun/CTS Chair in Transportation Engineering, and three other researchers—civil engineering assistant professors Henry Liu and Nikolas Geroliminis and human factors researcher Kathleen Harder—received funding from the National Science Foundation’s Small Grants for Exploratory Research program to study how metropolitan travel patterns respond to the sudden loss of a major transportation link. They found that traffic adapted well to the bridge collapse. Most drivers did not see a change in travel time after they chose alternative routes for their trips, but some saw an increase and a smaller number experienced a reduction in their travel time.

Building bridges more quickly
Civil engineering researchers confirmed the durability and performance over time of a system for constructing bridges more quickly and with less impact on the environment. The project, sponsored by the Minnesota Department of Transportation, focused on systems that eliminate the need to place and remove formwork, thus accelerating on-site construction and improving safety. For the research, the University team—led by Professors Catherine French and Carol Shield—instrumented and monitored two Minnesota bridges. They also constructed and tested a two-span test bridge in the Structures Laboratory at the University of Minnesota. (The project received the 2008 CTS Research Partnership Award; see page 29.)

Studying the effects of alcohol
Researchers in the HumanFIRST Program and the Intelligent Vehicle (IV) Lab collaborated to study the effects of alcohol on motorcyclists, taking advantage of the programs’ access to unique research facilities and expertise in monitoring driver performance. The IV Lab researchers, led by director Craig Shankwitz, instrumented a motorcycle that could be operated safely by a study subject while under the influence of alcohol. HumanFIRST researchers, including research fellows Janet Creaser and Michael (Mick) Rakauskas, conducted test sessions during which study participants either drank alcohol or were given a placebo. The analysis revealed that some impairment was evident in motorcycle riders at the .05 blood-alcohol level, below the .08 level used by law enforcement for drunk driving arrests. The research was funded by the National Highway Traffic Safety Administration. The HumanFIRST Program and the IV Lab are components of the Intelligent Transportation Systems (ITS) Institute, directed by Professor Max Donath.
Keeping road pollutants out of lakes and rivers
A research team developed a new procedure to assess the performance of underground storm water treatment devices. Funded by the Minnesota Local Road Research Board and the Twin Cities Metropolitan Council, researchers at the St. Anthony Falls Laboratory (SAFL) determined the sediment removal efficiency of several devices. SAFL director Omid Mohseni and co-investigator John Gulliver, professor of civil engineering, developed the new procedure during the research. The procedure was incorporated into the Minnesota Stormwater Best Management Practices (BMP) Performance Assessment Protocol through funding from the Minnesota Pollution Control Agency. In addition, the American Society for Testing and Materials (ASTM) International developed a new standard for testing hydrodynamic separators based on the research.

Researchers tested storm water treatment devices to gauge how well they remove sediment.
Deployment and implementation

- Bringing home the facts of traffic fatalities

Researchers in the Center for Excellence in Rural Safety (CERS) mapped out every traffic-related fatality in the nation for 2006 with details on each death. Users can type in an address at SafeRoadMaps.org to see a map or satellite image of all of the road fatalities that have occurred in the area. Plus, users have the ability to narrow down their search to see the age of the driver, whether speeding or drinking was a factor, and if the driver was wearing a seat belt. The new tool, says CERS research director Tom Horan, also illustrates which life-saving public policies, such as strong seat belt laws, are in the chosen area. CERS, established by the 2005 federal transportation act, is a joint program between the State and Local Policy Program at the Hubert H. Humphrey Institute of Public Affairs and CTS.

- Smoothing traffic flow

A system was implemented on 11 signals along busy France Avenue in Edina and Bloomington, Minnesota, that may one day allow traffic signals on arterial streets to adjust automatically based on traffic conditions. The system, called SMART-Signals (short for "Systematic Monitoring of Arterial Road Traffic Signals"), was developed by a team led by assistant civil engineering professor Henry Liu. The effort was funded by the ITS Institute and the Minnesota Local Road Research Board, with significant in-kind support from Hennepin County.
Designing technology to aid drivers

Driver-assistive technologies—including head-up displays, vibrating seats, and steering control developed by director Craig Shankwitz and research staff in the Intelligent Vehicles Laboratory—were installed in snowplows and buses. For example, three vehicles (and a fourth planned) have been deployed in Alaska, where high snowfall rates and dry, blowing snow routinely cause whiteout conditions and zero visibility. Two snowplows in St. Louis County, Minn., are also instrumented with the technologies.

Monitoring public spaces

The Department of Homeland Security and the Transportation Security Administration deployed a mass transit surveillance and early warning system developed by Professor Nikolaos Papanikolopoulos and program director Vassilios Morellas of the Department of Computer Science and Engineering. The system, in the Amtrak Station in Philadelphia, Penn., uses computer vision techniques to monitor activities. Papanikolopoulos is the director of SECTTRA (Security in Transportation Technology Research and Applications), a joint effort of the Department of Computer Science and Engineering and CTS.

Rating bridges

The Mn/DOT Bridge Office implemented a procedure and an associated computer program for ranking steel bridges with fatigue- or fracture-critical details. The procedure was developed during a research project led by Professor Art Schultz in the Department of Civil Engineering.

Research funds—and sources—have grown over time, a sign of the increased interest in addressing transportation challenges through research. In FY08, 45 diverse sources provided nearly $13.5 million for transportation research.
Major awards/grants received in FY08

Understanding the causes and costs of the collapse
The National Science Foundation (NSF) awarded a two-year, $300,000 grant to University of Minnesota researchers to study travel behavior changes after the collapse of the I-35W bridge in August 2007 and its reopening in September 2008. The research team consists of principal investigator Henry Liu, assistant professor in the Department of Civil Engineering (CE), and co-investigators David Levinson, Braun/CTS Chair in Transportation Engineering, and Kathleen Harder, research associate with the Center for Human Factors Systems Research and Design. The project is a continuation of their previous NSF Small Grants for Exploratory Research project (see page 6). CE assistant professor Nikolas Geroliminis is also involved with this new project, which will analyze how an extensive traffic system responds to a sudden, major network disruption.

The Minnesota Department of Transportation is also funding a project related to the bridge collapse. Using data collected from in-vehicle GPS units, David Levinson and other researchers are developing models of travel behavior before and after the bridge reopening. Using these models and observations of travel pattern changes, the researchers will attempt to estimate road-user costs associated with the collapse.

In addition, NSF funded a study of the structural factors that may have contributed to the collapse. The team includes civil engineering faculty Taichiro Okazaki, Roberto Ballarini, Art Schultz, and Ted Galambos.
Research

Reducing congestion
The Intelligent Transportation Systems (ITS) Institute received $5.3 million to help Minnesota Valley Transit Authority (MVTA) buses better navigate shoulder lanes using lane-guidance technology and improve traffic flow on Cedar Avenue (Trunk Highway 77) and I-35W. The money is part of a $133.3 million award to the state through the USDOT’s Urban Partnership Agreement program. Two units of the ITS Institute—the Intelligent Vehicles Lab, led by Craig Shankwitz, and the HumanFIRST Program, led by Mike Manser—are collaborating in the work. The IV Lab will deploy lane-guidance technology, which it had developed and tested in earlier research, on 10 MVTA buses. The HumanFIRST Program will help the MVTA procure and prepare a driver training simulator and develop the training protocol.

Another UPA research element is a study of telecommuting by Adeel Lari, research fellow with the Humphrey Institute of Public Affairs.

Collecting and archiving traffic data
CE assistant professor Henry Liu received $111,000 to extend his work on “SMART-Signal” technologies and algorithms for oversaturated signalized intersections. This research is drawing national attention for its promising new approach to collect and archive real-time traffic data on arterials (see page 8). The research is part of a $600,000 grant from the National Cooperative Highway Research Program to consultant Kimley-Horn.

Planning for disaster evacuation
Shashi Shekhar, a McKnight Distinguished University Professor of Computer Science, and Henry Liu, a civil engineering assistant professor, received a $450,000 grant from the National Science Foundation to investigate an interdisciplinary approach for “Spatio-Temporal Network Databases for Transportation Science.” The grant is to further research into scalable computational methods for determining routes, schedules, and traffic management plans for evacuating metropolitan areas. Shekhar’s research team previously completed a system to coordinate local emergency evacuation plans in multiple communities.

Designing better pavements
The University’s Pavement Research Institute (PRI) partnered with Mn/DOT, Applied Research Associates, and the University of California, Davis to attract $4 million from the second Strategic Highway Research Program (SHRP 2) to conduct a research study on composite pavement systems in Minnesota. Team members are PRI director Mike Darter, CE associate professors Lev Khazanovich and Mihai Marasteanu, and PRI associate director Derek Tompkins.
Research

Research reports published in FY08

These reports are available in PDF format at www.cts.umn.edu/Publications/ResearchReports.

Transportation and the Economy research

Local Road Funding History in Minnesota
Barry Ryan, Thomas Stinson
Mn/DOT 2007-26

Transportation as Catalyst for Community Economic Development
John S. Adams, Barbara J. VanDrasek
CTS 07-07

Transportation Safety and Traffic Flow research

Access to Destinations: Travel Time Estimation on Arterials
Gary A. Davis, Hui Xiong
Mn/DOT 2007-35

Access to Destinations: Twin Cities Metro-wide Traffic Micro-simulation Feasibility Investigation
John Hourdos, Panos Michalopoulos
Mn/DOT 2008-15

Benefit-Cost Analysis for Intersection Decision Support
Mike Corbett, David M. Levinson, Xi Zou
Mn/DOT 2007-32

Cross Median Crashes: Identification and Countermeasures
Gary A. Davis
Mn/DOT 2008-17

Developing Driving Support Systems to Mitigate Behavioral Risk Patterns Among Teen Drivers
Shawn Brovold, Nic Ward, Max Donath, Stephen Simon
CTS 07-05

Driving Performance During 511 Information Retrieval: Cell Phone 2
Mick Rakauskas, Nic Ward
Mn/DOT 2007-48

Employment of the Traffic Management Lab for the Evaluation and Improvement of Stratified Metering System—Phase IV
Henry Liu, Xinkai Wu, Panos Michalopoulos, John Hourdos
Mn/DOT 2007-51

Evaluation of Minnesota’s Operation NightCAP Program
Janet Creaser, William Affleje, Flavia Nardi
Mn/DOT 2007-29

Freeway Network Traffic Detection and Monitoring Incidents
A. Joshi, Stefan Atev, D. Fehr, A. Drenner, Robert Bodor, Osama Masoud, Nikolaos P. Papankolopoulos
Mn/DOT 2007-40

Freight Performance Measure Systems (FPMS)
System Evaluation and Data Analysis
Chen-Fu Liao
CTS 08-01

Integration of Infrared Imaging for a Head Up Display Lane Keeping and Collision Avoidance System
Pi-Ming Cheng, Craig Shankwitz
CTS 08-09

Intersection Decision Support Surveillance System: Design, Performance and Initial Driver Behavior Quantization
Lee Alexander, Pi-Ming Cheng, Max Donath, Alec Gorjestani, Arvind Menon, Craig Shankwitz
Mn/DOT 2007-30

Intersection Decision Support: An Overview
Max Donath, Craig Shankwitz, Nic Ward, Janet Creaser
Mn/DOT 2007-33

Multi-Camera Monitoring of Human Activities at Critical Transportation Infrastructure Sites
Evan Ribnick, A. Joshi, Nikolaos P. Papankolopoulos
CTS 08-08

Review of Georgia’s Rural Intersection Crashes: Application of Methodology for Identifying Intersections for Intersection Decision Support (IDS)
Howard Preston, Richard Storm, Max Donath, Craig Shankwitz
Mn/DOT 2007-28

Review of Iowa’s Rural Intersection Crashes: Application of Methodology for Identifying Intersections for Intersection Decision Support (IDS)
Howard Preston, Richard Storm, Max Donath, Craig Shankwitz
Mn/DOT 2007-27

Rural and Urban Safety Cultures: Human-Centered Interventions Toward Zero Deaths in Rural Minnesota
Mick Rakauskas, Nic Ward, Susan G. Gerberich, Bruce H. Alexander
Mn/DOT 2007-41

A Simulator-Based Evaluation of Smart Infrastructure Concepts for Intersection Decision Support for Rural Thru-STOP Intersections
Janet Creaser, Mick Rakauskas, Nic Ward, Jason Laberge
Mn/DOT 2007-31

Traffic Safety Methodologies
Gary A. Davis
CTS 07-11

Using Archived ITS Data to Improve Transit Performance and Management
Ahmed M. El-Geneidy, Jessica Horning, Kevin Krizek
Mn/DOT 2007-44

Transportation Infrastructure research

Adaptation of the 2002 Guide for the Design of Minnesota Low-Volume Portland Cement Concrete Pavements
Ilia Yut, Shariq Husein, Carly Turgeon, Lev Khazanovich
Mn/DOT 2007-23

Automated Winter Road Maintenance Using Road Surface Condition Measurements
Gurkan Erdogan, Lee Alexander, Piyush Agrawal, Rajesh Rajamani
Mn/DOT 2007-37

Cone Penetration Testing in Pavement Design
William Dehler, Joseph F. Labuz
Mn/DOT 2007-36

Determination of Optimum Time for the Application of Surface Treatments to Asphalt Concrete Pavements—Phase II
Mihai O. Marasteanu, Raul Velasquez, William Herb, John Tweet, Mugur Turos, Mark Watson, Heinz G. Stefan
Mn/DOT 2008-16

Development of Improved Test Rolling Methods for Roadway Embankment Construction
J. P. Hambleton, Andrew Drescher
Mn/DOT 2008-08

Development of a PC-Based Eight-Channel WIM System
Taek Mu Kwon, Bibhu Aryal
Mn/DOT 2007-45

Effects of Seasonal Changes on Ride Quality at MnROAD
Lev Khazanovich, Peter Bly, Atika Shamin, Randal J. Barnes
Mn/DOT 2008-23

Implementation of Ground Penetrating Radar
Yueqian Cao, Shongtao Dai, Joseph F. Labuz, John Pantelis
Mn/DOT 2007-34

Incorporation of Fatigue Detail Classification of Steel Bridges into the Minnesota Department of Transportation Database
Adam Y. Lindberg, Arturo E. Schultz
Mn/DOT 2007-22
A patent for a “virtual mirror” was granted to Professor Max Donath, Intelligent Vehicles Lab director Craig Shankwitz, and research staff Pi-Ming Cheng and Sameer Pardhy of the Department of Mechanical Engineering. The technology, originally developed to help bus drivers operate on narrow road shoulders, has also been applied on snowplows. The virtual mirror uses a lidar (laser-based) side-scanning unit to detect vehicles, which are then tracked by the onboard computer and displayed as icons on a small electronic panel display.
20 years...

70 faculty in 25 departments

www.cts.umn.edu/FacultyStaff
CTS Faculty and Research Scholars Program

CTS works with CTS Faculty and Research Scholars from a variety of University of Minnesota departments to address transportation issues. Scholars have joint appointments at CTS as well as in their own departments.

2008 Faculty and Research Scholars

Bridge Engineering

Catherine French
Professor; Civil Engineering

Shashi Shekhar
Professor; Computer Science and Engineering

Gerard McCullough
Associate Professor; Applied Economics

Human Factors

John Bloomfield
Research Associate, Center for Human Factors Systems Research and Design, College of Design

Janet Creaser
Research Fellow, HumanFIRST Program, ITS Institute

Karen Donohue
Associate Professor; Operations and Management Sciences, Carlson School of Management

Environmental Impacts

Zhirong (Jerry) Zhao
Assistant Professor; Humphrey Institute of Public Affairs

David Biesboer
Professor; Plant Biology

Kathleen Harder
Senior Research Associate, Center for Human Factors Systems Research and Design, College of Design

Data Systems

Arturo Schultz
Professor; Civil Engineering

Saif Benjaafar
Professor; Mechanical Engineering

Environmental Impacts

Diwakar Gupta
Professor; Mechanical Engineering

Paul Bloom
Professor; Soil, Water, and Climate

Michael Manser
Director, HumanFIRST Program, ITS Institute

Carol Shield
Professor; Civil Engineering

Jerry Fruin
Associate Professor; Applied Economics

John Gulliver
Professor; Civil Engineering

Michael (Mick) Rakauskas
Research Fellow, HumanFIRST Program, ITS Institute

Chen-Fu Liao
Educational Systems Manager, Minnesota Traffic Observatory, ITS Institute

Karen Donohue
Associate Professor; Operations and Management Sciences, Carlson School of Management

Environmental Impacts

Robert Johns
Director; Center for Transportation Studies

Julian Marshall
Assistant Professor; Civil Engineering

Pavement Engineering

Vassilios Morellas
Director; Safety, Security, and Rescue Research Center; Computer Science and Engineering

Robert Johns
Director; Center for Transportation Studies

Michael Darter
Director; Pavement Research Institute

Nikolaos Papanikolopoulos
Professor; Computer Science and Engineering

Alfred Marcus
Professor; Carlson School of Management

Bruce Wilson
Professor; Bioproducts and Biosystems Engineering

Andrew Drescher
Professor; Civil Engineering
Four new faces with transportation experience were added to the University talent pool: Yingling Fan, assistant professor in the Humphrey Institute of Public Affairs; Nikolas Geroliminis, assistant professor in the Department of Civil Engineering; Keith Knapp, research manager with the Center for Excellence in Rural Safety; and Greg Lindsey, associate dean of the Humphrey Institute and professor in the urban and regional planning program.
Awards & Honors

• Access to Destinations study faculty David Levinson (the Braun/CTS Chair in Transportation Engineering) and Kevin Krizek (now with the University of Colorado, formerly with the Humphrey Institute of Public Affairs) co-authored their first book, Planning for Place and Plexus. The book aims to take many of the ideas emerging from recent research beyond the university classroom and into contemporary policy discussions.

• Assistant Professor Henry Liu of the Department of Civil Engineering was the recipient of the 2007 New Faculty Award from the Council of University Transportation Centers and the American Road and Transportation Builders Association.

• Professor Rajesh Rajamani of the Department of Mechanical Engineering received the Ralph R. Teeter Award from the Society of Automotive Engineers for contributions to automotive research and education.

• Elizabeth Wilson, assistant professor at the Humphrey Institute, was a recipient of a 2008 McKnight Land-Grant Professorship.

Affiliated Faculty

Aerospace Engineering and Mechanics
Demoz Gebre-Egziabher*
William Garrard
Yiyuan Zhao

Agronomy and Plant Genetics
Roger Becker
Nancy Ehike
Donald Wyse

Applied Economics
Jerry Fruin*
William Gartner
Gerard McCullough*
Tom Stinson
Douglas Tiffany

Biosystems and Agricultural Engineering
Jonathan Chaplin
John Nieber
Gary Sands
Bruce Wilson*

Carlson School of Management
Fred Beier
Karen Donohue*
Alfred Marcus*
Mahmood Zaidi

Child Development
Herbert Pick
Albert Yonas

Civil Engineering
Roberto Ballarini
Randal Barnes
Paul Bergson
Gary Davis*
Andrew Drescher*
Cathy French*
Ted Galambos
Nikolas Geroliminis*
John Gulliver*

Bojan Guzina*
Kimberly Hill
Miki Hondo
John Houros*
Mike Iacono*
Lev Khazanovich*
Joseph Labuz*
David Levinson*
Chen-Fu Liao*
Henry Liu*
Mihai Marasteanu*
Bernadette Marion
Julian Marshall*
Panos Michalopoulos*
Ted Morris
Arturo Schultz*
Carol Shield*
Gene Skok
Karl Smith
Henryk Sosnarski
Vaughan Voller

College of Design
John Bloomfield*
John Carmody
Kathleen Harder*
Lance Neckar*
Robert Sykes
Mary Vogel*

Computer Science and Engineering
Mats Heimdahl
Ravi Janardan
Vassilios Morelas*
Nikolaos Papanikolopoulos*
Shashi Shekhar*
Jim Stagle
Richard Voyles

Economics
Patrick Bajari

Electrical and Computer Engineering
Vladimir Cherkassky
Ahmed Tewfik

Francis Harvey
Rod Squires
Barbara VanDrasek*

Horticulture Science
Susan Galatowitsch

Humphrey Institute of Public Affairs
John Adams*
Richard Bolan
John Bryson
Jason Cao*
Barbara Crosby
Frank Douma*
Yingling Fan*
Tom Horan
Keith Knapp*
Adeel Lari*
Barbara Lukermann*
Lee Munnich*
Carissa Schively-Slotterback*
Melissa Stone
Elizabeth Wilson*
Zhiqiu (Jerry) Zhao*

Kinesiology
Mary Jo Kane
Thomas Smith
Michael Wade

Law School
Stephen Simon

Mechanical Engineering
Lee Alexander
Safiahallah Benjaafar*
Pi-Ming Cheng
Janet Creaser*
Max Donath*
William Durfee
Peter Easterlund
Alec Gorjestani
Diwakar Gupta*
David Kittelson*
Perry Li

Michael Manser*
Avind Menon
Bryan Newsroom
Curt Olson
Rajesh Rajamani*
Mick Rakauskas*
Craig Shankwitz*
Patrick Starr

Civil Engineering
Eil Kwon*

Computer Science
Carolyn Crouch
Donald Crouch
Richard Maclin
Peter Willemsen

Electrical and Computer Engineering
Stanley Burns
Mohammed Hasan
Taek Kwon*
Hua Tang
Jiann-Shiou Yang

Geography
Stacey Stark

Mathematics and Statistics
Zhuangri Liu
Harlan Streek

Mechanical/Industrial Engineering
Robert Feyer
Richard Lindeke
Ryan Rosandich
David Wyrick
Xun Yu

Natural Resources Research Institute (NRRI)
Brian Brashaw
Kurt Johnson
Ron Moen
Gary Niemi
Lawrence Zanko

Physics
Michael Sydor

*denotes CTS Faculty and Research Scholars as of December 1, 2008
20 years...

12,000 students
(FY08, approx.)

www.cts.umn.edu/Education
Creating high school curricula
Pre-college students are being exposed to transportation engineering issues through an online intersection control game aimed at high school science classrooms. The game was integrated into a high school curriculum that was used and tested at the University of Minnesota’s Institute of Technology Summer Exploration in Engineering, Science and Math Camp. The camp, for women and diverse students, was held in the summer of 2008. The game was created by Chen-Fu Liao, the senior educational systems engineer with the Minnesota Traffic Observatory (a lab within the ITS Institute).

Hosting teachers and potential students
Several groups visited the University to learn about careers in transportation and see demos of current research technologies, including approximately 75 high school students enrolled in a summer transportation camp through the Fond du Lac Tribal and Community College; students and teachers from the Blaine High School Center for Engineering, Math, and Science; and students in the St. Cloud Summer Transportation Academy.

Sparking interest in transportation careers
A prototype narrow commuter vehicle being developed by University of Minnesota researchers with ITS Institute funding proved a popular attraction at the University’s Institute of Technology Alumni Society annual TechFest. The event, which aims to interest grade-school-age students in science and technology, is held every year at The Works, a “hands-on” science and technology museum for children aged 5 to 15. This year’s event drew more than 1,000 visitors—the largest one-day attendance in the museum’s history. Lee Alexander, a member of the team of engineers developing the vehicle, accompanied the prototype and explained the vehicle’s cutting-edge features to children and their parents.
Undergraduate and graduate students

- **Developing course modules**
  Chen-Fu Liao, the Minnesota Traffic Observatory’s senior educational systems engineer, developed several interactive course modules to help students understand complex ITS topics such as intersection signal control and vehicle guidance. The Online Application for Signal Intersection Simulation (OASIS) and Roadway Online Application for Design (ROAD) have been incorporated into the curriculum of the civil engineering department’s Introduction to Transportation Engineering course.

- **Strengthening undergraduate courses**
  Assistant Professor Henry Liu, Braun/CTS Chair David Levinson, and Chen-Fu Liao were funded by the National Science Foundation (NSF) to develop Web-based simulation modules to improve instruction in the Introduction to Transportation Engineering course that is a standard part of undergraduate civil engineering programs. The modules will be evaluated and tested in course offerings from civil engineering programs across the country and will be disseminated to the general public through interactive exhibits at venues such as the Minnesota Transportation Museum and the Minnesota State Fair.

### Graduate Certificate in Transportation Studies

#### FY08 Recipients

<table>
<thead>
<tr>
<th>Graduate Certificate in Transportation Studies FY08 Recipients</th>
<th>William Chester</th>
<th>Thomas More</th>
<th>Xinkai Wu</th>
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<tr>
<td>Rueben Collins</td>
<td>Pavithra Kandadai</td>
<td>Feng Xie</td>
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<td>Jose Fischer</td>
<td>Parthasarathi</td>
<td>Hui Xiong</td>
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<td>Cole Hiniker</td>
<td>Andrew Schlack</td>
<td>Hongbing Zhang</td>
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<td>Jessica Horning</td>
<td>HunWen Tao</td>
<td>Shanjing Zhu</td>
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<td>Yan Huang</td>
<td>Nebiyou Tilahun</td>
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<td>David Kmiec</td>
<td>Ryan Wilson</td>
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### Research universities provide two resources crucial for today’s global economy: new knowledge and a pool of educated professionals.
**STUDENT AWARDS**

- **ITS Institute Student of the Year:**
  Michael (Mick) Rakauskas, a doctoral student in the University of Minnesota’s Cognitive and Biological Psychology program, was presented the ITS Institute’s 2007 Outstanding Student of the Year Award. The award is sponsored by the USDOT Research and Innovative Technology Administration.

- **Huber Award:** Nebiyou Tilahun, a student in the University’s civil engineering Ph.D. program under Braun/CTS Chair David Levinson, was one of two recipients of this year’s Matthew J. Huber Award for Excellence in Transportation Research and Education. Tilahun’s work on the value of different features of bicycle facilities, which made up his master’s thesis, was incorporated into National Cooperative Highway Research Program (NCHRP) report 552, *Guidelines for Analysis of Investments in Bicycle Facilities*.

  The other Huber winner this year was Raul Velasquez, who is also working toward his Ph.D. in civil engineering, under advisor Mihai Marasteanu. Velasquez has worked as a research assistant on many projects related to pavement engineering and pavement design and was a teaching assistant in civil engineering classes.

**INTERDISCIPLINARY TRANSPORTATION STUDENT ORGANIZATION, CAREER EXPO**

- CTS assisted the Interdisciplinary Transportation Student Organization in planning its Fourth Annual Student Paper Conference. The conference concluded with a luncheon sponsored by the North Central chapter of the Institute of Transportation Engineers, during which guest speakers discussed speed management in Minnesota. The annual CTS Transportation Career expo followed the conference.
Education

FY08 CTS STUDENT AFFILIATES AND ADVISORS

UNDERGRADUATE STUDENTS
Lucas Andryusk, BS, Wood Science, Iowa State (Brian Brashaw)
Emma Burgstahler, BS, Biomedical Engineering (William Durfee)
Brian Bell, BS, Civil Engineering (Omid Mohseni)
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Chris Wayand, BS, Civil Engineering (Julian Marshall)

M ASTER’S STUDENTS
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Bibhu Aryal, MS, Electrical and Computer Engineering–UMD (Tae Kwon)
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Scott Klar, MS, Electrical and Computer Engineering–UMD (Tae Kwon)
Kate Ko, MPP, Humphrey Institute (Frank Douma)
Nikhil Kirshnan, MS, Electrical and Computer Engineering (Ahmed Tewfi)
Dustin Kuchera, MS, Industrial and Systems Engineering (Diwakar Gupta)
Harish Loganathan, MS, Computer Science (Henry Liu)
E. Magisson, MS, Bioprocdures and Biosystems Engineering (Jonathan Chaplin)
Jason Manard, MA, Anthropology (Francis Harvey)
Katie Meyer, MPP, Humphrey Institute (Elizabeth Wilson)
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Alec Moore, MPP, Humphrey Institute and Civil Engineering (Frank Douma)
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Any Peterson, MS, Industrial and Systems Engineering (Diwakar Gupta)
Aditya Pulometta, MS, Computer Science–UMD (Carolyn Crouch)

Ph.D., Civil Engineering (John Gulliver; Omid Mohseni)
Andrew Sandor, MS, Civil Engineering (Heinz G. Stefan)
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Luke Thompson, MS, Civil Engineering (Joe Labuz)
Hoang Ton, MPP, Humphrey Institute (Frank Douma)
Mugurel Turos, MS, Civil Engineering (Mihai Marasteanu)
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Madhinava Vasudavan, MS, Electrical and Computer Engineering (Ahmed Tewfi)
R. Warma, MS, Engineering Management (Richard Lindeke)
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DOCTORAL STUDENTS
Romeo Aacho, Ph.D., Aerospace Engineering and Mechanics (Demoz Gebre-Egziabher)
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Elena Beyhaut, Ph.D., Soil, Water, and Climate (Peter Graham)
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Xiaozheng He, Ph.D., Civil Engineering (Henry Liu)
Heng Hu, Ph.D, Civil Engineering (Henry Liu)
Professional development

Linking alumni and students
CTS created a database of University of Minnesota transportation alumni who want to stay in touch with their alma mater and with each other. By joining the Transportation Alumni Group, members receive electronic updates about student activities, special events, and other transportation-related news at the University. Graduates of other institutions are welcome to join. Joining also gives alumni a way to support current students by becoming a mentor or speaking to student groups.

Providing lifelong learning
CTS launched its Fall Transportation Seminar Series in September 2007. The series combines the following:
- CTS Research Seminars, held as part of CTS research council meetings.
- Advanced Transportation Technologies Seminars, sponsored by the Intelligent Transportation Systems (ITS) Institute each fall semester. (The seminars are offered for credit and are required as a course for the Graduate Certificate in Transportation Studies.)
- Access to Destinations Study workshops, communicating findings of this interdisciplinary research effort.

Each seminar qualifies for one professional development hour (PDH). Seminars are broadcast live on the Web and are available for later viewing.

Educating the workforce
Technical assistance and customized training courses continue to be an important part of CTS. Professional development hours (PDHs) are offered at a number of events, workshops, and seminars.

The Minnesota Local Technical Assistance Program (LTAP) offered workshops on topics ranging from seal coat operations to bridge maintenance. Fifteen students graduated from LTAP’s Roads Scholar program, which has an enrollment of more than 1,800 students. The Circuit Training and Assistance Program (CTAP) delivered technical assistance and training to 2,964 state and local agency personnel in two topic areas: work-zone traffic control and flagger safety, and snow and ice material applications/environmental impacts.

CTS managed a number of customized training courses for Mn/DOT. Topics included advanced skills for project managers, context-sensitive design, and “hear every voice” public participation.
20 years...

22,000 newsletters
(mail in FY08, approx.)

www.cts.umn.edu/Events
www.cts.umn.edu/Publications
www.cts.umn.edu/LibraryServices
CTS 20th Anniversary Celebration

CTS celebrated its 20th Anniversary in October 2007 with a special half-day forum and reception. CTS director Robert Johns gave a brief timeline of CTS. (To download the timeline, see www.cts.umn.edu/About/History.)

Johns then introduced Genevieve Giuliano, who gave the event’s keynote presentation. Giuliano, a former chair of the Transportation Research Board Executive Committee, is a professor in the School of Policy, Planning, and Development and a senior associate dean for research and technology at the University of Southern California. She shared her outlook for the future of transportation research, predicting that dramatic changes under way in the policy environment may make it harder for research to shape transportation policy in the future.

Following the keynote, two University of Minnesota faculty panels reviewed how the University has contributed to state and national transportation issues in the past two decades and suggested future research possibilities.

The celebration concluded with a reception and program moderated by CTS associate director Laurie McGinnis. A highlight was the debut of a video that introduces CTS and its programs. The video is available on the CTS Web site.

Access to Destinations Conference

CTS sponsored the Second International Access to Destinations Conference on August 23 and 24, 2007. It brought together leading researchers from 10 countries whose work examines intersections of transportation, land use, and public policy. Speakers included David Levinson and Kevin Krizek, who lead the Access to Destinations study (see page 5). Thirty-five papers were presented and published in a proceedings; the document was downloaded more than 4,500 times from the study Web site.
Oberstar Forums


The seventh Oberstar Forum, held on April 7, 2008, addressed potential directions for the next authorization of the federal transportation act, which is set to expire in 2009. The forum used as one source of information the report Transportation for Tomorrow, created by the National Surface Transportation Policy and Revenue Study Commission. The report recommends dramatic institutional reform and revamping of federal transportation programs and policy. U.S. Rep. Tim Walz was one of the forum speakers.

Other transportation events

July 2007
• Center for Excellence in Rural Safety second Summer Institute

September 2007
• Toward Zero Deaths Conference

October 2007
• Fourth annual Airport Technical Assistance Program (AirTAP) Fall Forum

November 2007
• 11th Annual Freight and Logistics Symposium

February 2008
• CTS Winter Luncheon, featuring Ronald Medford, National Highway Traffic Safety Administration
• 12th Annual Minnesota Pavement Conference

April 2008
• Minnesota Spring Maintenance Training Expo

May 2008
• CTS 19th Annual Transportation Research Conference, with opening speaker David Horner, U.S. Department of Transportation, and the CTS Spring Luncheon, featuring Stephen Schneider, Stanford University

Policy seminars

CTS continued to serve as an information resource for legislators and local elected officials. In January, a workshop was held for city and county elected officials on transportation finance. In June, CTS conducted a workshop for legislators and legislative staff that featured the results of the Greenhouse Gas study.
Digital resources

- A new Web-based academic journal, *Journal of Transport and Land Use*, was initiated by David Levinson (Braun/CTS Chair) and Kevin J. Krizek (former faculty with the Humphrey Institute of Public Affairs). The journal includes work from the fields of engineering, planning, modeling, behavior, economics, geography, regional science, sociology, architecture and design, network science, and complex systems.

- CTS expanded its offering of webinars to include all CTS, ITS Institute, Greenhouse Gas study, and Access to Destinations study seminars. One seminar, featuring research manager Keith Knapp of the Center for Excellence in Rural Safety, attracted more than 60 online participants, representing at least a dozen state DOTs.

- CTS completed a major redesign of the LTAP Web site and developed Web sites for the Minnesota Traffic Observatory, the HumanFIRST Program, and the Intelligent Vehicles Laboratory. New features were added to the CTS Web site: the capability to search for research projects by topic area; a “Meet a Researcher” feature on the Research page; CTS capabilities and expertise in the “About CTS” section; and CTS non-research projects.

- The Center for Excellence in Rural Safety, directed by Lee Munnich, and CTS were asked by the USDOT to develop and host a national Rural Highway Safety Clearinghouse Web site. Deputy Secretary Thomas Barrett participated in a media event to announce the site.
Awards and Participants

20 years…

675 council and committee volunteers

www.cts.umn.edu/About
Annual CTS awards

CTS presented the following awards at its Annual Meeting and Awards Luncheon on April 24 in Minneapolis.

Richard P. Braun Distinguished Service Award: Randy Halvorson, senior associate with Cambridge Systematics and former division director for program management at Mn/DOT

Ray L. Lappegaard Distinguished Service Award: Connie Kozlak, systems planning and programming manager for the Metropolitan Council and chair of the CTS Transportation Planning and the Environment Council

William K. Smith Distinguished Service Award: Cathy Petersen, principal for CJ Petersen & Associates, a research, training, and consulting firm, and the author of three books on international trade

Distinguished Public Leadership Award: Fred Corrigan, executive director of the Aggregate & Ready Mix Association of Minnesota and chair of the CTS Executive Committee

CTS Research Partnership Award

A system for constructing bridges more quickly and with less impact on the environment garnered the 2008 CTS Research Partnership Award. The project—“Full-Depth Precast Concrete Bridge Deck System”—was sponsored by Mn/DOT. It focused on systems that eliminate the need to place and remove formwork, thus accelerating on-site construction and improving safety.

The partnership resulted in a new system that Mn/DOT can use in place of traditional cast-in-place slab superstructures. Thanks to the project, 5 more of these bridges have been constructed in Minnesota, and 11 are in the planning stage. In addition, Mn/DOT has presented the lessons learned from the project at workshops and to the Federal Highway Administration, and the Wisconsin DOT is using the system to build a bridge.

Project partners:
• University of Minnesota Department of Civil Engineering: Carol Shield, Cathy French, Matthew Smith, Charles Bell II (now with Opus)
• Mn/DOT Bridge Office: Dan Dorgan, Kevin Western, Erik Wolhowe, Paul Kivisto, Keith Molnau, Steve Ellis, Joe Fishbein, Kevin Hagen (now with Earth Tech), Jeff Erickson (now with Minnesota DNR)
• Mn/DOT Construction: Steve Kordosky, Jennifer Read
• Mn/DOT Research Services: Alan Rindels
• Federal Highway Administration: Romeo Garcia
• County Prestress: Don Hall, Don Lowe
• Lunda Construction: Dennis Behnke

Pictured left: Charles Bell, Paul Kivisto, Kevin Western, Kevin Hagen, Keith Molnau, Matthew Smith, Don Hall, Erik Wolhowe, Catherine French, Alan Rindels, and Linda Preisén

Robert Johns, Randy Halvorson, Richard Braun

Robert Johns, Connie Kozlak, Mary Hill Smith

Robert Johns, Cathy Petersen, Richard Murphy Jr.

Robert Johns, Fred Corrigan, Colleen Landkamer
Awards and Participants

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Executive Director, Aggregate & Ready Mix Association

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Associate for Public Engagement, University of Minnesota

Robert Kudrle
Professor, Humphrey Institute of Public Affairs, University of Minnesota

Khani Sahebjam
Deputy Commissioner, Mn/DOT

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CEO/President, Jefferson Lines

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Professor, College of Design, University of Minnesota

Rick Krueger
Executive Director, Minnesota Transportation Alliance

Left during FY08:
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Carol Molnau, Commissioner, Mn/DOT
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Mark Krebsbach, Dakota County
Joseph Labuz, Civil Engineering, University of Minnesota
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Jim Newland, Mn/DOT (retired)
Marthand Nookala, Hennepin County
Elliott Perovich, Anoka County
John Rodeberg, SEH
Bob Sands, Jacobs, Edwards, and Kelcey
Lea Schuster, Transit for Livable Communities

Awards and Participants
Awards and Participants

Paul Bloom, Soil, Water, and Climate, University of Minnesota
Scott Bradley, Mn/DOT
Jason Cao, Humphrey Institute of Public Affairs, University of Minnesota
Elizabeth Colburn
Frank Douma, Humphrey Institute of Public Affairs, University of Minnesota
John Gulliver, Civil Engineering, University of Minnesota
Chris Hiniker, SEH
David Kitzelson, Mechanical Engineering, University of Minnesota
Barbara Lukermann, Humphrey Institute of Public Affairs, University of Minnesota
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Lance Neckar, College of Design, University of Minnesota
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Peggy Reichert, Mn/DOT
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<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
</tr>
</thead>
<tbody>
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<td>Department Director</td>
</tr>
<tr>
<td>Gene Anderson</td>
<td>Program Director</td>
</tr>
<tr>
<td>Teresa Washington</td>
<td>Program Associate</td>
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<td>Program Administrative Specialist</td>
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<tr>
<td>Clair Daley</td>
<td>Program Administrative Specialist</td>
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<tr>
<td>Catherine Flannery</td>
<td>Program Director</td>
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<td>Julie Bodurtha</td>
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<td>Heather Dorr</td>
<td>Program Associate</td>
</tr>
<tr>
<td>Sara Van Essendelf</td>
<td>Program Administrative Specialist</td>
</tr>
<tr>
<td>Judy Linder</td>
<td>Director, Credit Certificate Programs</td>
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<td>Kelly Culhane</td>
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<td>Teresa Fruen</td>
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</tr>
</tbody>
</table>

CTS also works in partnership with CCE to administer the Graduate Certificate in Transportation Studies. CCE staff involved in the partnership are:

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
</tr>
</thead>
<tbody>
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<td>Judi Linder</td>
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</tr>
</tbody>
</table>
CTS staff

Robert C. Johns  
Director

Laurie McGinnis  
Associate Director

Cadie Wright Adhikary  
Graphic Designer

Gina Baas  
Communications and Outreach Director

Joe Barbeau  
Program Coordinator

Keith Carlson  
Operations Manager

Mindy Carlson  
Technical Transfer and Outreach Program Associate

Max Donath  
Intelligent Transportation Systems Institute Director

Amy Friebe  
Senior Editor

Jim Grothaus  
LTAP Director

Shawn Haag  
Program Coordinator

Penny Harris  
Contract Coordinator

C.J. Loosbrock  
Information Technology Professional

Jan Lucke  
Program Coordinator

Stephanie Malinoff  
Outreach and Education Coordinator

Arlene Mathison  
Information Manager/Librarian

Michael McCarthy  
Editor

Peter Park Nelson  
Editor

Linda Preisen  
Research Administration Director

Toni Prekker  
Web Coordinator

Pam Snopl  
Managing Editor

Mary Snyder  
Executive Assistant

Dawn Spanhake  
Financial Strategy and Administration Director

Left during FY08:  
Charlie Grussing-Neitzel  
Tom Helms  
Chad Rathmann

CTS student interns during FY08

Mike Anderson  
Jeff Blanchard  
Leah Brink  
Meagan Buechel  
Emily Buhrow  
Krystel Calubayan  
Kate Croswell  
Jakub Dajc  
Sandeep Dhull  
Grace Gathaara  
Victor Gauto  
Nyssa Gesch  
Marni Ginther  
Liz Giorgi  
Jim Hammerand  
Sarah Hennes  
Heather Hoffman  
Danielle Janis  
Emily Kaiser  
Ron Kelleman  
Michael Kruckow  
Mallory Kurkoski  
Jennifer Matejka  
Amber Melaney  
Alec More  
Margaret Ostrander  
Matt Rogers  
Jay Roth  
Katrina Sanders  
Marie Schneider  
Bala Sivakumar  
Nate Steffan  
Greg Summins  
Max Yang