



PACTRANS

UNIVERSITY TRANSPORTATION CENTER NEWSLETTER

*Safe and Sustainable Solutions for the Diverse
Transportation Needs of the Pacific Northwest*

PacTrans Region 10
Transportation Conference

SPECIAL ISSUE
November 2013

Transportation Decision Making in the Big Data World

October 18, 2013

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Dr. Yin Hai Wang,
PacTrans director,
welcomes confer-
ence attendees.

The Pacific Northwest Transportation Consortium (PacTrans), USDOT University Transportation Center for Federal Region 10, uses advanced technologies to develop data-driven, safe and sustainable solutions for the diverse transportation needs of the Pacific Northwest. The PacTrans Annual Conference on October 18th drew more than 160 participants representing Northwest transportation agencies, universities, and private sector organizations from Alaska, Idaho, Oregon, and Washington.

In his welcome remarks, Dr. Yin Hai Wang, director of PacTrans, highlighted the goal to use modern technology to collect and share data for developing better decision-making and planning tools for transportation professionals. The conference served as a solid step toward achieving this goal by providing a venue for researchers and planners to meet and exchange ideas. Throughout the day, private sector leaders explained how they can add value to the distribution and use of public data through technology innovations and applications.

PacTrans serves as a focal point within Region 10 to help coordinate UTC transportation research and education programs with regional needs and initiatives. It performs as a research engine for addressing transportation challenges across the region. Furthermore, PacTrans universities and transportation agencies work together synergistically to assess changing needs, showcase new technology, further innovation in research and education, and support workforce development.

– Conference Agenda –

- 8:30 – 8:35 **Welcome and Opening Remarks** – Yin Hai Wang, Director of PacTrans
- 8:35 – 9:15 **Keynote Session**
 Cam Gilmour, Deputy Secretary, Washington State Department of Transportation – *WSDOT Looks Ahead*
 Dr. Kumares Sinha, Purdue University – *Use of Big Data Research in Transportation Asset Management*
- 9:20 – 11:30 **Plenary Session: Open Data Opportunities and Issues** (two panels)
Public agencies have a treasure trove of data. Those data are highly useful to more than the agencies themselves. The plenary session brings together representatives of the public and private sectors to talk about their perspectives on open data in the transportation world. What are the opportunities they see, what are the risks, and what role do they see for universities in promoting and optimizing the use of our public data resources?
- 9:20 – 10:10 **Panel Discussion 1: Public Agency Perspectives**
 Michael Berman, Sound Transit – *Using Open Data to Provide Transportation Rider Technologies*
 Bill Schrier, Office of the Chief Information Officer, State of Washington – *Mashing the Public in Transportation Data*
- 10:25 – 11:25 **Panel Discussion 2: Private Sector Perspectives**
 Safouen Rabah, Socrata (<http://www.socrata.com/>) – *Open Data: Changing the Way We Move*
 Matthew Ginsberg, Green Driver (<http://imagreendriver.com>) – *What the Public Agencies Don't Tell Folks*
 Edward Mantey, Toyota Collaborative Safety Research Center – *Big Data Requires Collaboration: What Toyota Is Doing at Its Collaborative Safety Research Center*
- 11:30 – 12:00 **Introduction to Posters** by the PacTrans Consortium
Explore the exciting research being performed by the PacTrans Universities
 Christopher Bell, Oregon State University • Keith Cunningham, University of Alaska Fairbanks;
 Karen Den Braven, University of Idaho • Linda Boyle, University of Washington • Haifeng Wen, Washington State Univ.
- 12 – 1:30 pm **Lunch and Poster Session**
 Display of University of Idaho Snowmobile and University of Washington Electric and Gas Race Car, HUB Lawn
- 1:30 – 2:45 **Workforce Development**
In this session, PacTrans partners will pass along their insights into the skills required to meet the changing workforce needs of the transportation industry, and provide suggestions on how PacTrans can help provide needed training to the those in or looking to enter the profession.
 Bruce Haldors, Transpo Group – *Characteristics of High Potential Talent/Leaders*
 Kevin Chang, University of Idaho – *Addressing the Evolving Needs of the Workplace Employee*
 Leni Oman, Washington State Department of Transportation – *Managing Knowledge in a Dynamic Workforce*
 Amanda Holland, Alaska Department of Transportation and Public Facilities – *Working Today and Tomorrow at Alaska's Transportation Department*
- 3:00 – 4:15 **From Research to Application: Success Stories and Lessons Learned**
Presenters in this session will describe what it takes to successfully push research results out into the workplace, whether that means applying for and receiving patents, starting companies, or getting your research results adopted into agency practice.
 Steven Muench (UW), Greenroads and University of Washington – *Greenroads: From Research to Company*
 Michael Bufalino, Oregon Department of Transportation – *Intermodal Oregon: Using More of the Tool Box*
 Beth Ebel, Harborview Injury Prevention Research Center – *Distracted Driving: Holding Back the Tide*
 Richard Wall; University of Idaho Advanced Pedestrian Signals – *Birth of a Smart Button*
- 4:15 – 4:30 **Conference Summary and Closing**

– Keynote Session –

WSDOT Looks Ahead

Cam Gilmore, Deputy Secretary, Washington State Department of Transportation

Transportation is in a transition period influenced in part by national trends. WSDOT is discussing changes needed in regard to diminished resources, practical design considerations, traffic congestion, sustainability, and use of open data/big data. On the data front, goals are to share data, derive more meaning from current data, and use crowdsourcing to extend knowledge.

Research helps system operations integrate new technologies and analytics. WSDOT sees research as helping to make smart investment choices, manage assets wisely, improve reliability and performance of transportation systems, fit needs within the community context, tread lightly on the environment, and develop the future workforce. WSDOT is eager to tap the creativity and expertise of the PacTrans network.



U.S. Trends Affecting Transportation Demand

- An aging population / Y generation do not consider owning a car or driving essential
- Transit ridership continues to increase
- VMT and GDP uncoupled
- Smart everything: autonomous vehicles and roadways

Use of Big Data Research in Transportation Asset Management

Dr. Kumares Sinha, Professor Emeritus, Purdue University
Fellow, National Academy of Engineering

Dr. Sinha spoke about big data in the context of the transportation asset life cycle of planning, design, construction, operations, and maintenance and preservation. Asset management decisions require data that are reliable and readily available.

Big data is rapidly changing the way transportation asset management decisions are made. In a dynamic data environment, analytic approaches are increasingly data driven. GPS and sensor data are transforming short-term traffic planning and operations. Mobile phone and social media data can lead to more innovative and less costly approaches to long-range land use and transportation planning processes. More research and institutional innovations are needed to realize the full potential of big data.



Big Data: Cloud Computing in ITS

Li, Chen, & Wang (2011)

Open Data Opportunities and Issues

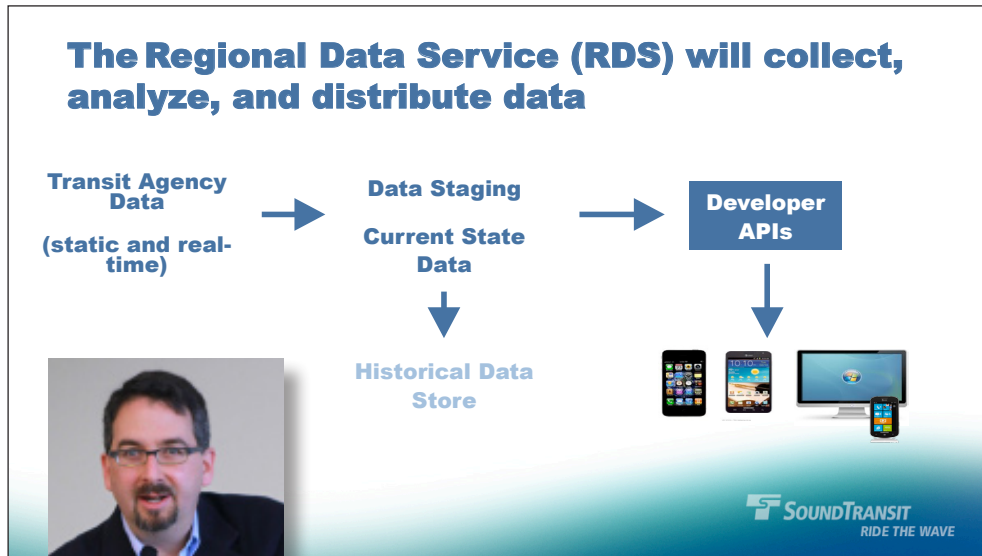
– Panel Discussion – Public Agency Perspectives

Using Open Data to Provide Transportation Rider Technologies

Michael Berman, Program Manager, Research and Technology, Sound Transit

Sound Transit is developing a suite of transit rider products, guided by open source and open data principles, and will build them with support from the region's transit agencies. Sophisticated travelers expect more from transit agencies at a time when the agencies are expected to do more with less, and when they must continue to serve transit-dependent populations.

The Regional Data Service (RDS) will collect, analyze, and distribute data. Sound Transit will build applications for real-time signs and mobile apps, and will make data available to app developers. Big data is not pristine, and RDS also will provide feedback to agencies on data quality and availability. Shared services at shared locations will improve transit riders' experience. Sound Transit will deploy the first generation of RDS in 2014.



Mashing the Public in Transportation Data

Bill Schrier, Office of the Chief Information Officer, State of Washington



An avowed “open data evangelist,” Bill Schrier talked about successes and principles for “stuff from the future.” The federal executive order of 2009 mandates open and transparent government data, leading to a Washington DC Data site and a Citizens Briefing Book (change.gov.) Another good source is cities.data.gov. Schrier described numerous successful apps for transportation users, such as Seattle Traveler’s Mobile App and One Bus Away. In the public safety arena, apps for Seattle include My Neighborhood Map, Snowplow Tracker, and one for tracking responses to emergencies. Schrier advocates for federal legislation to standardize data protocols so all cities, counties, and states can be part of a “convergence portal.” For the future, “find it and fix it (FiFi)” is the model for texting problems and photos to agencies and receiving response notifications every step of the way. Transportation is no longer just about getting around, it’s about the data mashup.

Principle 3: Street Cred

Whenever possible, get your data from people “on the street” or “in the know”

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Principle 4: Standardization

Open data is only useful if standardized and with metadata, aka “by their standards necks you will hold them”

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Futurestuff – Open Data

- Data standards
- Crime Reports
- Legislation in Progress
- Cities and Counties and State – a state convergence portal

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– Panel Discussion –
Private Sector Perspectives

Open Data: Changing the Way We Move

Safouen Rahah, Vice President of Product, Socrata



Socrata is a Seattle-based startup whose mission is to democratize access to government data and to help governments access and market data useful to citizens, policymakers, app developers, and academia. Customers include local governments and federal programs and agencies such as Medicare and the White House, and nongovernmental organizations.

Rahah noted that open data is the “new default” and is changing transportation. Socrata is helping create the “applification” of government through use of crowdsourcing data for solutions to urban problems. Crowdsourcing has amazing potential if you consider that Seattle’s 600,000 citizens can be “inspectors and reporters.” An example of open data use is an app that tracks vacant spaces in parking facilities in New York City. In Boston, sensors in cars capture the bumpiness of roads so the city can determine when specific roads need repair.

What the Public Agencies Don’t Tell Folks

Matthew Ginsberg, CEO, Chairman and Founder, Green Driver



Green Driver is a Eugene, Oregon, company that provides traffic signal state and predictive information to drivers, automakers, and interested groups. Its vision is to help drivers save gas through applications that let phones or cars know when lights will change. Tests show fuel savings range from 3–5%. However, Ginsburg noted that most drivers don’t particularly care about saving gas, but are primarily concerned about knowing how much time they have for texting while waiting for a light to change.

Ginsberg envisions a free smart phone app with real-time traffic signal data for 250 US cities. He pointed out that such systems also could help save lives by warning the driver about a potential crash or by automatically applying the brakes. The problem? It’s hard to get cities to provide traffic light data because they worry about liability suits from drivers involved in accidents. He is advocating for federal legislation that will relieve cities of any liability if they provide traffic light data to the public.

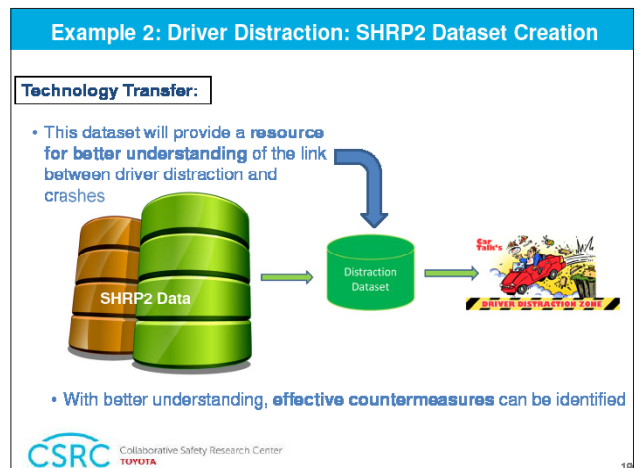
Big Data Requires Collaboration: What Toyota Is Doing

Edward Mantey, Vice President for Engineering, Toyota Technical Center

Toyota’s Collaborative Safety Research Center works with leading universities, federal agencies, and hospitals to conduct research and share vehicle crash data — a \$50 million, five-year effort. The goal is to improve safety for at-risk populations including children,



pedestrians, and seniors. Projects focus on on accident avoidance, damage mitigation, passenger protection, emergency response, and education. Specific areas of research include biomechanics and human modeling, pre- and post-crash automated data collection, driver distraction studies, and automatic pedestrian detection and alert systems. Sharing results is an important component.



Workforce Development

PacTrans partners passed along their insight into the skills required to meet the changing workforce needs of the transportation industry, and how PacTrans can help provide training to those in or entering the profession.



Characteristics of High Potential Talent/Leaders

Bruce Haldors, CEO, Transpo Group

Transpo manufactures and supplies “smart solution” products and new technology materials for transportation infrastructure. The company collaborates with the University of Washington to develop state-of-the-art training courses. Haldors described high-potential engineering leaders as versatile minds who create links between science, technology, and society. They take initiative and handle adversity well, which reveals their true character. In addition, such leaders have strong values in

regard to how they treat coworkers and colleagues. Being the greatest technical mind is not enough without good relationships too. Leaders are confident, creative, collaborative, and encourage and inspire others. They demonstrate a balanced, holistic perspective, and a global perspective, which are important for career advancement in today’s world. They must be continuous learners, both data miners and agents of change. Haldors summarized these assets in the analogy of a building (graphic at right).



Addressing the Evolving Needs of the Workplace Employee

Dr. Kevin Chang, Assistant Professor, University of Idaho

The current revenue environment has tempered how public agencies address workplace needs. Knowledge and information are commonly shared via supervisors, e-mail updates, webinars, conferences, word-of-mouth, and online, but all have limitations including competing priorities, scheduling issues, cost, and reliability. Differences in learning and communication style among the four generations now in the workforce (Traditional, Baby Boomer, and Generations X and Y) add to the challenge of meeting workplace educational needs. Chang emphasized that agencies must recognize the value of training, make it a priority, and invest in their employees. Universities can play an important role by sharing knowledge, engaging in collaborative partnerships, and maintaining ties with graduates.



Opportunities

- Agencies / companies must prioritize training
 - ▣ Recognize its value; employee investment
 - ▣ Managers and supervisors must be engaged
 - ▣ Allocate budget and time
- Role of universities / academics
 - ▣ Knowledge-sharing and providing insight
 - ▣ Partnerships (nexus between practitioners and researchers)
 - ▣ Build on connections and relationships with recent graduates

Managing Knowledge in a Dynamic Workforce

Leni Oman, Director, Office of Research and Library Services,
Washington State Department of Transportation



Many state DOTs are seeking transformational change while they are also experiencing a loss of knowledge upon which to build the transformation. Positions are being cut, experienced employees are retiring or resigning, and the workforce is increasingly mobile. Yet agencies must respond to increased expectations for efficiency, accountability, and open government. As the global economy transitions from an industrial to a knowledge focus, agencies need strategies to navigate these changes and become high-performing, agile organizations. Oman noted that training settings are changing, with increased interest in E-training, and just in time and personalized training. Key aspects of knowledge management include leadership and strategy, intellectual capital management, communities and collaboration, organization culture and communication, organizational learning, and knowledge operations, technologies, asset management, architecture, and assessment and evaluation.

The training setting is changing

- Pressures on the classroom setting:
 - Travel funding restrictions
 - Training funding limitations
 - Lower staff levels discourage time away from work duties
 - Curriculum currency and relevance to the local setting
 - Ability to transfer training content to user context
 - Not everybody learns the same way
- Interest in:
 - E-training
 - Just in time training
 - Nimble training capacity
 - Staying current with workforce competency needs and values
 - Incorporating the findings of research and new practices to support deployment
 - Personalized training



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Working Today and Tomorrow at Alaska's Transportation Department

Amanda Holland, Deputy Director for Administrative Services,
Alaska Department of Transportation and Public Facilities



Workforce excellence grows from the building blocks of leadership development, mentorship programs, employee recognition, strategic recruitment, generational awareness, and online resources. Underpinning all is workforce demographics. Some people entering the workforce today may not have the education or training they need for success, and the war for talent is heating up. Adding to workforce education and training challenges is the difference in technology use by members of Generation Y compared to previous generations. Gen Y uses technology at significantly greater rates — more than 95% own computers and cell phones and 73% use instant messaging. In response to these challenges, the Alaska DOT is working to transition online as much of its training and knowledge resources as possible. The next area to consider is the challenge inherent in developing inanimate repositories for the human knowledge and experience of countless brains.



Knowledge Challenges



More than 80% of a company's information exists in individual hard drives and in personal files



Employees get 50%-75% of their relevant information directly from other people



Individuals hold the key to the knowledge economy and most of it is lost when they leave the enterprise

From Research to Application Success Stories and Lessons Learned



Greenroads: From Research to Company

Dr. Steven Muench, Associate Professor, University of Washington

Greenroads is a third-party sustainability rating system for roadway design and construction. It awards points for sustainable practices and can help quantify and communicate the sustainable attributes of design. The company evolved from work at the University of Washington. Muench

noted that research funding supports data dissemination but not implementation, and that researchers need to take their work into the private sector, which requires embracing marketing. Achieving success might require five to ten years, and it is important to take the long view. Greenroad's "big audacious goal" is to change the way roads are built to promote sustainability. To date the company has certified seven projects, with 39 in progress. It has customers in seven US states and in Canada and New Zealand, and projects represent more than \$4 billion in construction value.



Intermodal Oregon: Using More of the Tool Box

Michael Bufalino, Research Program Manager, Oregon Department of Transportation

From the start of a research project, Oregon DOT places strong emphasis on planning for implementation. They want to put results into the hands of planning offices, field employees, construction crews, and department of motor vehicle offices. Implementation planning

begins when setting up research contracts by considering how the results will be disseminated and used, and project budgets may include some funding for this purpose. A technical advisory committee prepares an implementation plan and assists with disseminating the recommendations. Results are given to department leadership and intermodal teams. Education is a big part of the effort, and training considerations are also part of the process. Successful research projects involve the professionals who will implement them. Bufalino gave several examples of putting research into practice, including evaluation of the Safety Edge application in Oregon.

Evaluation of the Safety Edge_{SM} Application in Oregon

- Many rural Oregon crashes involve a vehicle that runs off the road or at least has two tires that exit the highway.
- It is preferred, of course, for such a vehicle to safely return to the road without incident or injury.
- One relatively low cost solution, the **Safety Edge_{SM}** is a paving technique that improves the angle between the roadway edge and graded shoulder to minimize the vertical pavement edge drop-off and improve the chance of errant vehicle recovery.
- Research identified common characteristics of locations where the Safety Edge_{SM} could be deployed and
- Provided guidance for the deployment of the Safety Edge_{SM} by the Oregon Department of Transportation (ODOT) and local agencies in Oregon.

Distraction and Injury: Holding Back the Tide

Dr. Beth Ebel, Director, Harborview Injury Prevention & Research Center and Associate Professor of Pediatrics, University of Washington



RISE IN DISTRACTION

- More mobile phones than people in the US (2011).
- Up to 28% of vehicle crash risk attributable to distraction from cell phone use or text messaging.



RELATIVE RISK OF TEXTING & DRIVING

- **Risk of distraction**
 - Naturalistic study of truckers
 - Cell phone use was more common than texting, so greater overall risk.
 - Relative crash risk highest for texting.
 - Text messaging had the longest duration of eyes off road (VTM)

Relative Risk of Near Crash Event



Activity	Relative Risk
blood alcohol .08	4
Cell phone	4
Text messaging	23.2
blood alcohol 0.19	21.3

Distracted driving is a growing public health problem but information on crash risk does not change behavior. Research on distracted drivers led by Dr. Ebel has found that 45% are distracted by texting, 21% by talking to a phone held in front, 21% talking to a phone held to ear, and 13% talking hands-free. Studies show that drivers know that texting and talking on a hand-held cell phone are dangerous and illegal, and they are irritated at the distracted drivers around them, but they continue to talk and text while driving. Barriers to change include driver beliefs that they are safer drivers than others, that their calls are “important,” and also the compulsive nature of their distractive habits. Studies show that compulsive cell phone use increases the risk of crashes.

Ebel proposed that strategies for reducing distracted driving should be multi-pronged and focus on changing behaviors through more public education, strengthening laws and enforcement (higher fines, patrols, and ticket writing), and adopting technology solutions for both mobile phones and vehicles. Changing social norms is important too, and we can learn from the campaigns to increase seat belt use and decrease drunk driving.



Advanced Pedestrian Signals: Birth of a Smart Button

Richard Wall, Professor, University of Idaho

While riding a bike through an intersection being torn up to install new traffic signals, Wall noticed the construction pit with electrical conduits. An electrical engineer, he was struck by an idea for redesigning traffic signals as smart distributed systems. Information collecting and running the idea by others revealed that pedestrians are underserved by signals at intersections. Interestingly, pedestrians are at greater risk for injury at signaled intersections than they are in mid-block, where they tend to take more personal responsibility for crossing with care. Wall also became enthusiastic about improving safety of intersection crossings for persons who are blind. He also learned that no current infrastructure can handle the technology needed to track pedestrians crossing a street.

Wall has made connections with a businessman in Boise who develops safety products for pedestrians. Wall suggests that universities encourage the smartest electrical engineering design students to develop technologies that can improve pedestrian safety at intersections, and then transfer the technology to spinout companies for production and marketing. He is particularly interested in the potential for a “smart button” at intersections, and noted that the University of Idaho is conducting research on this concept.

Conference Scenes



Dr. Kumares Sinha delivers a keynote presentation.



At Center: Dongho Chang, Washington State ITE president and Seattle DOT traffic engineer.



Dr. Haizhong Wang (at left) from OSU discusses research with conference colleagues.



UW graduate student Jonathan Corey (front) demonstrates his research work.



Keynoter Cam Gilmore, deputy secretary of the Washington State DOT, was first speaker of the day.

Student Conference

– October 19, 2013 –



Randy McCourt is president of DKS Associates in Portland, Oregon. His work ranges over transportation planning, traffic engineering, and civil engineering projects in the Pacific Northwest and California. He chairs the Oregon State University Civil Engineering Advisory Committee and has held several offices within the Institute of Transportation Engineers.

PacTrans and the UW Student Chapter of the Institute of Transportation Engineers (ITE) jointly sponsored the Region 10 Student Conference. This conference is organized by and for students from Region 10 (Alaska, Idaho, Oregon, and Washington) schools. This year the students chose three topic areas to focus on: data-based research, sustainability and the environment, and human factors in transportation.

Randy McCourt, the president of DKS Associates, delivered the keynote speech. He challenged student attendees to find and focus on aspects of transportation where their passions lie. Over the course of his speech he also noted how transportation engineering has changed during his career. Tools of the trade have changed as technology has increasingly been applied to transportation infrastructure, and formerly disparate fields of transportation engineering have been integrated. As an example of the changes making their way through the industry, McCourt noted how studies of drivers' visual focus patterns may impact sign placement and needs for lighted and motion-activated signs. Another focus of his presentation was how human and environmental concerns are changing the focus of transportation engineering. McCourt closed his keynote speech with a look to the future challenges and opportunities students will face, including budgets, funding mechanisms, and electric vehicles.

After the keynote speech students gave presentations. Jonathan Corey of the University of Washington presented on data quality control for inductive loop detector data. Rachel Vogt of Oregon State University presented her work on predicting travel demand changes and modeling the impacts of new technologies and driver population changes on travel demand. Justin Neill of Oregon State University focused on drivers' behavior and responses in work zones.

The conference also included a poster session covering diverse topics. These ranged from a comparison of several travel time measurement technologies, such as Bluetooth-based systems and automatic license plate readers, to a modeling software platform for estimating the stress and level of service bicyclists will experience riding along the streets of a city. Additional topics included research into the effects of texting while driving and the impact of perceived safety on travel mode choice.



University of Washington students demonstrate an electric and gas race car.



University of Idaho student snowmobile team demonstrates a low-pollution snowmobile.

Student Conference Sponsors

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Thank You!

Annual Leadership Meeting

The PacTrans External Advisory Board and the PacTrans Board of Directors met on October 17th near the University of Washington campus in Seattle. The two boards hold a joint annual meeting to provide strategic guidance to PacTrans leaders. They also discussed second-year projects for the center and the interface with major transportation issues in the region.



Left to right:

Prof. Chris Bell
 Michael Bufalino
 Meghan MacKrell
 Prof. Haifang Wen
 Scott Drumm
 Clint Adler
 Billy Connor
 Wayne Kittelson
 Prof. Anne Vernez-Moudon
 Prof. Karen Den Braven
 Edward Mantey
 Prof. Yinhai Wang
 Prof. Jeremy Sage
 Leni Oman
 Prof. Linda Boyle

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