



Program Progress Performance Report for University Transportation Centers

Prepared for the USDOT Office of the Assistant Secretary for Research and Technology (OST-R)

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Project title: **Pacific Northwest Transportation Consortium (PacTrans): Providing Data-Driven Solutions for the Diverse Mobility Challenges of the Pacific Northwest**

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Report Term: Semi-Annual

Accomplishments

What are the major goals and objectives of the program?

Pacific Northwest Transportation Consortium (PacTrans) consists of institutions from all four states in our region with the University of Washington (UW) as the lead and Oregon State University (OSU), University of Alaska Fairbanks (UAF), University of Idaho (UI), and Washington State University (WSU) as partner institutions; and Boise State University (BSU) and Gonzaga University (GU) as educational partners. PacTrans' theme centers on "Providing Data-Driven Solutions for the Diverse Mobility Challenges of the Pacific Northwest". PacTrans will serve as a focal point within Region 10 to develop initiatives and facilitate collaborative activities with regional partners to maximize the effectiveness of their collective services and programs toward the U.S. Department of Transportation (USDOT) strategic goal of mobility. Major goals and objectives of PacTrans include:

Research – serving as Region 10's research engine, PacTrans is committed to funding research in both the categories of advanced and, more importantly, applied research.

Technology Transfer – PacTrans strives to be an applied technology showcase, providing additional funds to projects that are deemed as "Success Stories" to ensure dissemination of results to policy makers, educators, practitioners, other transportation professionals, and the general public.

Education – As a consortium of five prestigious universities, PacTrans is devoted to being an education leader. This involves continued evaluation and evolution of our transportation engineering programs as well as providing state-of-the-art research laboratories, student conferences and seminars, mentoring, and scholarship opportunities for our students and future workforce trainees.

Workforce Development – PacTrans endeavors to be a workforce development base: hosting activities that focus on the development of transportation professionals, building strong partnerships with transportation agencies and companies in our region, and designing training programs to address the workforce development needs, while connecting our students with quality jobs where they can implement the knowledge they gained through their education.

Outreach – Throughout all of these other goals and objectives, PacTrans seeks to be in a continual process of outreach: promoting and building the educational student base, making new industry and agency partners, attracting new research, and providing opportunities to share and learn about key outcomes and achievements that have been learned through research.

Collaboration – PacTrans desires to be a platform for participation and is always on the lookout for potential new partner and new opportunities with current partners to collaborate on transportation related endeavors.

What was accomplished under these goals?

During the period from November 30, 2017 – May 30, 2017, PacTrans was actively preparing to ensure that each and every one of the major goals and objectives described above will be achieved by the Center over the next five years. This past March, the PacTrans Board of Directors met for a two-day

retreat in Fairbanks, AK, to discuss the strengths and weaknesses of our previous (SAFETY-LU) and current (MAP-21) centers, and explore the opportunities and threats to this new (FAST Act) center moving forward. Below we will briefly describe the agreed upon structures and current state of each objective.

Research

As Region 10's research engine, PacTrans has been actively engaged in two broader categories of research projects. We engage in multi-institutional research projects that require participation from at least two consortium universities, and typically have a larger budget. Such projects include multi-institutional general research projects (coded with MG), multi-institutional educational projects (coded with ME), and multi-institutional outreach projects (coded with MO). We also engage in single institutional projects (referred to as small research projects) that only require participation from a single consortium university and typically have smaller budgets. Such projects are coded with SR and university acronym. Both categories of research are geared towards the goal of advancing the region's transportation research.

New to this center, will be the option for PIs to utilize a two year performance period for their research. It was the experience of each member of our board, during previous iterations of the center where only a one year performance period was used, that it was extremely difficult to time the performance periods for success. The center had to try and balance conflicting academic calendars between universities, lining up student research assistants for projects, and difference with regard to the pace at which each consortium partner can get their subawards and budgets prepared. These issues led to a number of PIs needing extensions to their performance period through no fault of their own. To remedy this, PIs can now specify the length of their performance period between 12 and 24 months.

During these past six months, PacTrans has issued a request for proposals for multi-institution projects. We received 23 initial abstracts, and a total of 10 full proposals for this category of projects. Those proposals recently went through the internal/external review process, and the board met to select the awarded projects. Ultimately 3 multi-institution projects were selected. Further, each institutional partner is currently in the process of identifying its single-institution projects for this same research performance period. PacTrans is currently scheduled to have subawards distributed by the time our consortium partners begin their academic school years. The three multi-institution projects include:

1. 2017-MG-OSU-3 | Chris Parrish | An Airborne Lidar Scanning and Deep Learning System for Real-time Event Extraction and Control Policies in Urban Transportation Networks
2. 2017-MG-UW-2 | Ed McCormack | Developing Design Guidelines for Commercial Vehicle Envelopes on Urban Streets
3. 2017-MG-WSU-1 | Xianming Shi | Exploring Weather-related Connected Vehicle Applications for Improved Winter Travel in Pacific Northwest

The education and outreach multi-institution projects will be discussed in the workforce development and outreach subsections of this section, respectively.

Technology Transfer

During this past retreat, the PacTrans board affirmed its current primary methods of technology transfer that we will continue to utilize in this next iteration of the center. These methods include:

- **Multi-Institution Projects:** Each selected multi-institutional project is required to deliver a product for tech transfer. Approximately \$20,000 technology transfer funds are reserved for the potential technology transfer activities upon the successful completion of the proposed research for each multi-institutional project.
- **Success Stories:** Once a sufficient pool of projects have been completed, the center will solicit submissions for “success stories.” Success stories are just that, research that merits the added funding and effort to make sure that the findings and conclusions of the project are disseminated to the appropriate entities. Thus PIs will submit proposals on how they would further disseminate and/or apply their findings in thoughtful and useful ways. Then PacTrans board of directors and advisory committees will select a handful of projects to receive sufficient funding to execute the proposed activity(s).
- **The annual Regional Transportation Conference:** Each year, PacTrans hosts a regional conference that has recently been attracting over two hundred attendees. This has shown to be proven venue for PacTrans researchers to present meaningful research findings to industry and agencies in the region.
- **Engage New Mobility Partners:** PacTrans is making efforts to engage new partners in the mobility and data areas for potential technology transfer. Meetings with companies such as Paccar and Verizon have been scheduled.

Further, PacTrans PIs are regularly continually engaged in a variety of seminars, conferences, symposia, round tables, workshops, etc., that offer unique opportunities to share their expertise and specifically their research findings. The PacTrans board will continue encouraging and even supporting these efforts when needed.

Finally, one new component that has been proposed, that is currently still in the works, is to have PacTrans funded PIs do either a webinar and/or a podcast at the conclusion of their projects. These would then be posted on our website. This would offer a substantial archive to research outcomes for industry and agencies to review at their convenience.

Education

PacTrans consortium partners have done an exceptional job over the past five years, supporting each of our transportation programs. The following is a list of ways PacTrans has, and will continue to support education in our institutions:

- **Region 10 Student Transportation Conference:** Each year, subsequent to the regional transportation conference, the PacTrans Student Leadership Council organizes its own conference. Here students get to hear from academic researchers, public agencies, and industry professionals, as well as recent graduates. They also have a poster session that encourages students to share their research with one another.
- **Travel Funds for Student Presentations at Conferences:** Each year PacTrans sends most of its

graduate students to conferences all around the country to present research findings. Most significantly, PacTrans usually funds the travel expenses for roughly 35 students to attend the Transportation Research Board Annual Conference.

- **PacTrans Fellows:** Each of our consortium partners uses its student support a little differently but one effective way has been with a fellowship program where PacTrans and the particular institution's department split the cost of a graduate student. This program has helped several of our institutions persuade outstanding undergraduate students to go on to further education and also persuaded many top candidates in the country to come to our institutions.
- **Seminars:** PacTrans hosts three types of seminars. Each quarter, we host the Regional Transportation Conference, which is streamed live so that students and faculty for all over the region can attend. We usually host a few local seminars each quarter which typically pertain to a very specific lab within a university's transportation program. PacTrans also host a leadership seminar where working professional are brought in to talk specifically about leadership within the transportation field.
- **The Michael Kyte Outstanding Student of the Year Award:** Each year, PacTrans offer asks its board members to nominate outstanding students from our consortium institutions. This award is given each year in recognition of the region X student who displays superior abilities and effort in the areas of: technical merit and research, academic performance, and professionalism and leadership.
- **Student Competition Teams:** PacTrans has, and will continue to support the many student competition teams from our respective universities. Some of these teams include: concrete canoe, steel bridge, big beam, hyperloop, clean snowmobile, and others.

For this new iteration of PacTrans, one new and exciting component is that our board has invited two new institutions within the region, Boise State University and Gonzaga University, to join our consortium as education partners. This means that each university will receive annual PacTrans money specifically for the education initiatives listed above.

Workforce Development

As previously mentioned, one of PacTrans research categories is a multi-institution education project. This is a project where the general topic is decided upon by the board and then each of them appoints a PI from his/her institution to represent their university on the project. During the recent PacTrans board retreat, it was decided upon that for the next two years, this education project will be about building a workforce development and continuing education platform:

2017-ME-UW | Yinhai Wang | Development of PacTrans Workforce Development Institute, led by the UW and supported by all consortium partners.

PacTrans' predecessor used to have such a program with WSDOT but this was dismantled due to lack of oversight and funding during the recession. Recently, WSDOT has expressed significant interest in reestablishing such a program. Oregon State University has been assisting ODOT with such matters for several decades. The University of Idaho and University of Alaska have also been working with their state DOTs on similar initiatives. These different stakeholders, with slightly different objectives and

needs, will allow PacTrans to maximize the ease, effectiveness, and utility of a workforce development and continuing education platform, that can appeal to the broadest audience. PacTrans is also in a unique position to be able to make sure that the courses offered are updated on a regular basis to ensure that the material is relevant.

Outreach

PacTrans PIs are regularly and frequently engaged in events that spread PacTrans' name and mission to the outside world. These events offer us the opportunity to promote the Center and all of its efforts.

During the recent PacTrans retreat, the board discussed the first two year, multi-institution outreach project. There was unanimous consent that PacTrans should pursue the outreach project that was outlined in our proposal for this center:

2017-MO-UI|Ahmed Abdel-Rahim| Characterization of Underserved Population Perceptions and Mobility Needs in Smarter City Environments, led by the University of Idaho and supported by all consortium partners.

PacTrans sees tremendous opportunity for collaboration with this project. Access Alaska is an outfit that is currently trying to improve mobility of veterans and those who are handicapped throughout Alaska.

There are also many collaboration opportunities within the universities. For example, at the UW, there is a group working with social workers and disabled veterans to test new prosthetic body parts using sensors and other emerging technologies. Oregon State University is also in the process of a large project for the Veteran's Affairs Organization designing full-scale retrofits for hospitals all over the country. These efforts provide great opportunity to leverage outreach funds to maximize the impact from both PacTrans and their collaborating partners.

Collaboration

PacTrans director, Yin Hai Wang, regularly meets with representatives from private companies, public agencies, and elected officials to discuss our research, our researchers' areas of expertise, and potentially opportunities for collaboration.

Already in these first 6 months, Dr. Wang has met with representative from several companies such as Microsoft, DKS, Transpo, etc. about ways that we could leverage one another's resources and utilize our expertise to help them improving technology and practice in moving people and goods.

What opportunities for training and professional development have the program provided?

Many of the specific details of these opportunities have been discussed above. More generally, PacTrans provides training and professional development opportunities through multiple channels:

Research: Through the lifespan of this grant, PacTrans annually selected research projects that offered faculty and student researchers funding to conduct cutting edge research in a variety of areas directly tied to the USDOT strategic goals.

Education: PacTrans consortium partners offer a variety of other on-campus and online courses

designed for professional development in addition to the regular degree programs. The online programs, such as the online master's program of sustainable transportation, are particularly good for working professionals because of the flexibility in schedule and location.

Outreach: PacTrans offers training and educational opportunities to K-12 students through its outreach activities. Examples include: UW engineering discovery days, OSU undergraduate engineering expo, and Alaska Summer Research Academy (ASRA), where high school students enrolled in the ASRA Civil Engineering Module applied basic design principles of statistics and structural analysis showing how engineering principles are used to solve problems.

Funding assistance: PacTrans has supported student education and research activities. Beyond our PacTrans fellows, for whom we fund tuition, we also give a significant amount of assistance to students to participate in competitions, conferences, and seminars such as the Hyperloop competition, IEEE Smart Cities Conference, the Oregon State University hosted Northwest Transportation Conference, and the Transportation Research Board Annual Meeting. This aides them with funds for presentation materials, travel expenses, and registration fees.

Seminars, workshops, and conferences: As outlined above, PacTrans offers many opportunities for training and professional development through its seminar series and various workshops. Furthermore, PacTrans also uses its Region 10 Transportation Conference and Region 10 Student Conference as important opportunities for training and professional development.

Internships: PacTrans internship program offers students training opportunities by partnering with local agencies and private industries. We have internship programs with WSDOT, Seattle DOT, Bellevue Transportation Department, Transpo Group, FEHR & PEERS, Parsons Brinckerhoff, Puget Sound Regional Council, ODOT, etc. Additionally, PacTrans also offers intern opportunities for both graduate and undergraduate students to work in university labs to gain hands on experience in transportation.

Partnerships: PacTrans has a partnership program with Institute of Transportation Engineers (ITE). PacTrans has developed strong partnerships with local ITE chapters in student mentoring and training. ITE Washington has a mentor program for university students. They offer student fellowships and also host events for student training.

How have the results been disseminated? If so, in what way/s?

PacTrans' previous centers have had a strong outreach program to local and state transportation agencies and private partners in the region, where PacTrans research outcomes are presented and demonstrated. Research outcomes have been posted on the PacTrans website, distributed through our *quarterly newsletter* and *annual reports*, and promoted through social media such as *Facebook* and *Twitter* and the University of Washington *press media*. We also regularly disseminate news, events and results via our website at www.pactrans.org. These endeavors will continue into this new center, and we are hoping to hire an undergraduate civil engineer to act as our social media person.

The second large component of our dissemination efforts have surrounded facilitating and attending various seminars, workshops and conferences. During this reporting period, PacTrans was well represented by faculty and students at the TRB annual meeting in Washington D.C. PacTrans PIs gave a

total of 19 lectures, 56 poster presentations, hosted 5 workshops, and chaired 9 committees/subcommittees.

As has been mentioned above PacTrans also encourages new, innovative dissemination materials through the identification of success stories, where PacTrans offers limited additional funds to projects that have results with potentially strong impacts. These funds can then be used to explore new and innovative opportunities to get knowledge, methods, and products gained, into the hands of practitioners.

Finally, per our obligation as a UTC, research results will be posted on our website and are disseminated to all of the required repositories that include, TRID, USDOT, Transportation Library, Volpe National Transportation Systems Center, Federal Highway Administration Research Library and the US Department of Commerce National Technical Information Service.

What do you plan to do during the next reporting period to accomplish the goals and objectives?

PacTrans is excited for the busy season ahead. Below are the center's identified plans and strategies for accomplishing its goals and objectives over the next reporting period.

Research

PacTrans will be starting the performance period for our first cycle of funded research, and we will likely be putting out a new RFP for the second cycle of funded research. One of the new items that we hope to implement here regards the selection process for research projects. Currently the board relies primarily on the external reviews of project proposals for selection. In the recent board retreat, we discussed adding a number of other criteria to the selection process that include things like PI responsiveness, PI timeliness, PI productivity, etc. These would allow the board to continue making objective selection decisions but based on a more robust set of criteria.

Technology Transfer

PacTrans is currently preparing to host the first regional transportation conference sponsored by this new mobility center. We are very excited at the prospect of inviting new potential collaborators whose missions did not fit our previous center's safety focus but are very interested in joining us to solve the mobility issues facing the diverse Pacific Northwest.

The DRIVE Net technology developed by the PacTrans STAR Lab is being applied for SR-99's real-time performance measurement in Seattle. This project funded by Seattle DOT is expected to complete by the end of September.

PacTrans expects to see attendance in the mid-200s this year with great and balanced representation from private industry, public agencies, and academia, from all four states within the region.

PacTrans also has an interesting technology transfer opportunity coming up in July. A six-person, senior management, delegation from the Shenzhen Urban Transport Planning Center will be performing a six day technology scan of the United States, very similar to the one that the Federal Highway Administration (FHWA), American Association of State Highway and Transportation Officials, and

National Cooperative Highway Research Program sponsored in Europe in 2006. PacTrans will host a one day workshop that will include state and local agencies, as well as a number of private companies and academic researchers to present some of the most innovative concepts that the US is currently working on.

Education

There will be a lot going on in the education subject during this upcoming reporting period.

1. PacTrans will welcome its newest fellows to the program.
2. PacTrans student leadership council will host the annual Region 10 Student Transportation Conference. This year, PacTrans is excited to announce that this invitation will be sent to our two new educational partners as well as all other Universities within the region that are currently participating in any University Transportation Center. We expect to see tremendous growth as a consequence.
3. PacTrans will continue sponsoring two extra transportation courses to broaden knowledge of transportation students.
4. PacTrans will be putting a call out to our consortium institutions for nominations for both the CUTC outstanding student of the year and the PacTrans Michael Kyte outstanding student of the year awards.

Workforce Development

PacTrans has a few important focuses for workforce development over this next reporting period:

1. PacTrans will have a fall quarter regional transportation seminar, speaker still to be determined.
2. The team of PIs assigned to the education project will begin compiling needs of our agency partners with regard to continuing education, they will continue exploring an appropriate platform for delivery, and they will take inventory of the courses and ways that each institution already utilizes to support its own state and local agencies.

Outreach

The center will continue sending faculty and student researchers to seminars, workshops, and conferences to further goal of making PacTrans and its research more visible to practitioners, decisions makers, students, educators and others in the transportation sector.

PacTrans will organize several mini-workshop in the summer quarter for communicating new technologies developed by PacTrans researchers to practitioners.

PacTrans plans to host a group of underrepresented students from Colorado's Educational Talent Search Program in June to demonstrate transportation technologies. Hopefully, this effort will attract some of them to study transportation.

Collaboration

The Target Zero Video Analytics partnership initiated by the City of Bellevue, PacTrans, and Microsoft generated lots of interest. The consortium will continue the development work by adding more practical functions to the dashboard of the video analytics tool.

International collaborations with Norwegian Public Road Administration (NPRA) and Shenzhen Urban Transportation Planning Center (SUTPC) are also on their way. A student challenge event will be hosted jointly with NPRA to seek for technical solutions to a practical problem NPRA is facing in their practice.

Products (reporting period: October 1, 2016 – March 31, 2017)

Nothing to report at this time

Participant and Collaborating Organizations: Who has been involved?

What individuals have worked on the program?

- PacTrans Director, **Yinhai Wang**, Ph.D., Professor of Civil and Environmental Engineering at the UW, devotes 30 percent of his time directing PacTrans. Dr. Wang has overall responsibility for program management, oversight of PacTrans operations, including the Research Committee, the Education and Workforce Development Committee, and the Outreach and Technology Transfer Committee, and Student Leadership Council. He is the regional and national leadership for PacTrans, and the contact person for management relationships with USDOT Research and Innovative Administration (RITA) and other USDOT organizations.
- PacTrans Associate Director in Research, **Jeff Ban**, Ph.D., Associate Professor of Transportation Engineering in Civil and Environmental Engineering at the UW spends 5 percent of her time managing the research program for PacTrans and coordinates the research collaboration across the five partner institutions.
- PacTrans Associate Director in Education and Workforce Development, **Anne Vernez-Moudon**, Dr. es SC, Professor of Architecture, Landscape Architecture, and Urban Design and Planning, Adjunct Professor of Epidemiology and in Civil and Environmental Engineering, devotes 5 percent of her time leading the Education and Workforce Development Committee. She is involved in curriculum changes, training program development, and educational enhancements among the partner institutions.
- PacTrans Associate Director in Oregon State University (OSU), **David Hurwitz**, Ph.D., Professor of Civil and Construction Engineering at OSU, devotes 5 percent of his time to managing and organizing the education, outreach, and research activities within OSU. He coordinates all results and outcomes with the UW on a regular basis.
- PacTrans Associate Director in the University of Alaska Fairbanks (UAF), **Billy Connor**, Director of the Alaska University Transportation Center (AUTC), devotes 5 percent of his time to managing and organizing the education, outreach, and research activities within UAF. He coordinates all results and outcomes with the UW on a regular basis.
- PacTrans Associate Director in University of Idaho (UI), **Ahmed Abdel-Rahim**, Ph.D., Associate Professor of Civil Engineering at UI, devotes 5 percent of his time to managing and organizing the education, outreach, and research activities within UI. He coordinates all results and outcomes with the UW on a regular basis.

- PacTrans Associate Director in Washington State University (WSU), **Eric Jessup**, Ph.D., Associate Professor and Transportation Economist in the School of Economic Sciences at Washington State University (WSU), devotes 5 percent of his time to managing and organizing the education, outreach, and research activities within WSU. He coordinates all results and outcomes with the UW on a regular basis.
- Assistant Director, **Cole Kopca**, devoted 90 percent of his time to the day-to-day operations in support of the PacTrans mission. His responsibilities include project management, grant management, events coordination and outreach, and managing the PacTrans operations team.
- PacTrans full-time Program Coordinator, **Melanie Paredes**, devoted 90 percent of her time to the Center’s fiscal matters, support with events coordination and outreach and day to day administration.
- **Ziqiang Zeng**, Ph.D., Research Associate in the PacTrans STAR Lab at the University of Washington, devotes 30 percent of his time in providing research support and oversight.
- The Student Leadership Council, composed of graduate students at all Consortium partner universities, is an active part of the PacTrans management structure. The Student Leadership Council facilitates student and center communications and plans their own activities such as the Region 10 Student Conference.
- PacTrans has 28 fulltime faculty at the UW engaged in transportation research. Our consortium partners (OSU, UI, WSU, UAF) have 41 fulltime faculty directly involved in PacTrans research.

What other organizations have been involved as partners?

While this iteration of our center is still very young, PacTrans has continuing relationships with many partners that have been cultivated over the years. The table below highlights the many partnerships that PacTrans has built over the duration of the center:

Partner	Type	Fund Match		Serve on EAB	Project Collaborator	Event Collaborator
		Financial	In Kind			
Alaska State Department of Transportation	Government	X		X		
Idaho Transportation Department	Government	X		X		
Oregon State Department of Transportation	Government	X		X		
Washington State Department of Transportation	Government	X		X		
City of Bellingham	Government					
City of Seattle	Government	X				
City of Lynnwood	Government				X	X
City of Bellevue	Government				X	X
City of Everett	Government					X
King County	Government				X	X
Snohomish County	Government					

Pierce County	Government				X	
Washington Traffic Safety Commission	Government Agency					X
Washington State Transportation Insurance Pool	Government Agency	X				X
University of Alaska, Anchorage	Educational Institution		X		X	X
Washington State Department of Ecology	Government	X				
Puget Sound Regional Council	Government			X		
Washington State Transportation Investment Board	Government Agency					X
American Society of Civil Engineers	Professional Association					X
Institute of Electrical and Electronics Engineers	Professional Association					X
Institute of Transportation Engineers	Professional Association					X
Port of Portland	Government			X		
BMW Group	Private Industry			X		
Western Trailers	Private Industry			X		
Coral Sales Co.	Private Industry	X				
National Institute for Transportation and Communities	University Transportation Center				X	X
Transportation for Livability by Integrating Vehicles and the Environment	University Transportation Center				X	X
Center for Environmentally Sustainable Transportation in Cold Climates	University Transportation Center				X	X
Aichele and Associates	Private Industry				X	
Alstom Grid Inc.	Private Industry				X	
Alta Planning and Design	Private Industry				X	
Battelle	Private Industry				X	X
Cascade Bicycle Club	Non-profit/Foundation				X	X
Feet First	Non-profit/Foundation					X
DKS Associates	Private Industry	X				X
Fehr and Peers	Private Industry				X	X

Inrix Inc.	Private Industry				X	
Transpo Group	Private Industry	X				X
Intelligent Transportation Systems of Washington	Professional Association					X
Luum	Private Industry				X	X
Kittelsohn and Associates	Private Industry			X		X
Microsoft	Private Industry				X	X
West Salem High School	Educational Institution				X	X

Impact

Nothing to report at this time.

Changes/Problems

NONE.

Special Reporting Requirements

NONE.