



Semi-Annual Progress Report #5

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1. Accomplishments

Major goals of the program

The Pacific Southwest Region UTC (PSR) addresses the transportation issues of Region 9 through an integrated, multidisciplinary program of research, education, and technology transfer aimed at FAST Act research priority area 1: improving the mobility of people and goods throughout the region. The goal of PSR is to improve passenger and freight transportation throughout Region 9.

Our consortium of universities and community colleges, together with partnerships with state Departments of Transportation (DOTs), Metropolitan Planning Organizations (MPOs), and industry leaders, forms a comprehensive, region-wide network. The University of Southern California (USC) leads the consortium. Partners include Long Beach State University (LBSU); University of California, Davis (UCD); University of California, Irvine (UCI); University of California, Los Angeles (UCLA); University of Hawai'i at Manoa (UH); Northern Arizona University (NAU); and Pima Community College (Pima). USC and LBSU are both partners in the METRANS Transportation Center, the entity that houses the PSR UTC.

The regional UTC must reach beyond the consortium, offering connections to all transport stakeholders within the region. In order to fulfill its goal, the PSR:

- Established a region-wide advisory council of government, academic, and industry leaders to provide guidance on all aspects of the center's activities
- Executes a research program informed by the needs of the region
- Is establishing a web-based clearinghouse for degree and non-degree curricula
- Develops training and workforce development programs transferable across the region
- Holds an annual Region 9 Congress to share research and best practices
- Conducts a comprehensive program of information dissemination, technical assistance, and communications

Accomplishments under these goals

Our accomplishments are categorized under research, education, and outreach.

A. Research Accomplishments

The goal of our Center is to address regional issues and provide public policy advisement, technical assistance to state and local agencies, and innovative workforce development strategies. Our multi-modal, multi-disciplinary research program is organized around four themes that are derived from the transportation needs assessment conducted during the proposal preparation process: 1) technology for improved mobility, 2) improving mobility for disadvantaged populations, 3) improving resilience and protecting the environment, and 4) managing mobility in high growth cities and regions.

Our research program has three parts: 1) research conducted by PSR faculty; 2) research conducted by researchers inside or outside PSR but within Region 9; and 3) a graduate research fellowship program. We have reserved a small pool fund for a Region 9-wide solicitation. Its purpose is to promote broader participation across the states and territories, in keeping with the purpose of a regional UTC.

The current total initiated project count for PSR is 70. USC has 23 projects (including 3 regional projects at UCSB and 1 at UCR), LBSU has 3, UCLA has 8, UCD has 14, UCI has 12, UH has 5, and NAU has 1.

PSR completed 4 projects and issued 4 reports during the reporting period. Table 1 lists the projects.

Table 1: Projects completed during current reporting period

Partner	Project No.	PI	Title	Funding Source
UCD	17-03	Yueyue Fan	Next-Generation Transit System Design Under Revolution of Shared Mobility	USDOT
UCD	17-13	Fraser Shilling	Automated Analysis of Wildlife-Vehicle Conflict Hotspots Using Carcass and Collision Data	USDOT
UCSB	18-09	Konstadinos Goulias	An Analysis of Accessibility, Social Interaction, and Activity-Travel Fragmentation in California	USDOT
UCD	18-23	Austin Brown	California Climate Change Target Setting White Paper	USDOT

Additionally, ITS-Davis’ first PSR-supported dissertation was completed in June 2019 by Dr. Cory Parker, titled, “Homeless Negotiations of Public Space in Two California Cities.”

Requests for Proposals (RFPs)

PSR issued a coordinated RFP 3 during the spring of 2019. From this RFP, 24 projects were selected for funding: 6 at USC, 7 at UCI, 4 at UCD, 4 at UCLA, 1 at UH, 1 at NAU, and 1 extra-consortium project at UCSB as a sub-award from USC. Of the 24 projects selected, 8 will be funded by DOT, the remaining 16 are funded by Caltrans. Most of the selected projects will begin in January 2020. We plan to issue a Year 4 RFP in February 2020.

Match funding

PSR has the following match funding priority rankings: new funding, match from other existing research projects, and in-kind match. We have focused on obtaining new funding. First, the University of California partners were awarded a new source of state funding, SB1, which increased the California fuel tax by 12 cents per gallon. A portion of SB1 funding is allocated to the UC Institute of Transportation Studies (ITS). UCD, UCLA, and UCI are part of ITS and receive SB1 funds. Some of these funds are used for PSR match. Second, Caltrans has committed to a 50% match for PSR. Third, USC has obtained research funding from local industry and agencies for specific projects. NAU has continued to receive in-kind match funding from the Arizona Board of Regents Research Innovation Fund for research aimed at increasing freight safety and mobility along the I-10 corridor. UH requires each research project to provide its own match; the match is mainly in-kind.

New projects

A total of 6 new projects were started during the reporting period. Table 2 lists the new projects and their funding sources.

Table 2: New research projects initiated during current reporting period

Partner	Project No.	PI	Title	Funding Source
USC	18-SP90	Genevieve Giuliano	Implementation of Action 6 of the California Sustainable Freight Action Plan (CSFAP) Phase 3: Tracking Economic Competitiveness	Caltrans

USC	19-02	Marlon Boarnet	A National Study of Dockless Transportation: Land Use and Demographic Correlates of Trip Hotspots and Mode Shift	Caltrans
USC	19-06	Ketan Savla	Implications of Information Structure in Control of Urban Traffic Networks	Caltrans
USC	19-08	Andrii Parkhomenko	Optimal Density Restrictions in the Los Angeles-Long Beach CSA	Caltrans
USC	19-09	Tridib Banerjee	Increasing Access, Mobility, and Shelter Opportunities for Disadvantaged Populations: Affordable Housing in Transit-Oriented Developments	Caltrans
UH	19-70	Suwan Shen	Developing an Analytical Framework for Optimizing Disaster Relief Preparedness to Coastal Hazards: A Preliminary Investigation of Factors Affecting Supply Chain Resilience in Hawaii	USDOT

Student opportunities for research

Student support is an important component of research project selection. USC, LBSU, and UCD require that research projects include student support.

ITS-Davis awarded a dissertation research grant titled, “Utilizing Geo-Statistical Algorithms to Improve Urban Scale Traffic-Related Air Pollution Measurement for Public Health Exposure Assessments.” UCLA produced 14 PSR-funded graduates in Spring and Summer 2019: 1 PhD Urban Planning, 1 MPP, and 12 MURP. The capstone projects produced from these graduates can be [viewed online](#).

UCI awarded 5 PSR UTC Graduate Student Fellowships for the winter and spring quarters of 2019, and 6 fellowships fall 2019. UCLA awarded fellowships to 17 incoming and continuing students for fall 2019: 7 PhD Urban Planning, 1 PhD Civil Engineering, 1 PhD Social Welfare, 1 MPP, 7 MURP.

Student conference support

ITS-Davis supported student attendance at the 6th International Conference on Women’s Issues in Transportation in Irvine, CA, in September 2019. UCLA ITS supported 1 student to present and 10 students to attend the Annual Meeting of the Transportation Research Board in Washington DC, 1 student to attend and present work at the Transportation, Air Quality, and Health Symposium in Austin, TX, and 1 student to present at the Women In Transportation annual conference in Irvine, CA on Sept 12, 2019. In addition, UCLA supported 1 undergraduate student to attend the Institute of Transportation Engineers Western District Annual Meeting from June 23-26, 2019.

i. Research dissemination

Dissemination of our research results takes place via research reports and research briefs, scholarly publications, popular publications, conference presentations, and media.

PSR funds were used to provide support for ITS-Davis’ Asilomar 2019, the 17th Biennial Conference on Transportation and Energy—Big Ideas, Big Solutions: Future of Mobility. The conference, which took place July 9-12, 2019, in Pacific Grove, CA, highlighted emerging revolutions in transportation—electrification, automation, and sharing—with far-reaching implications for the environment, equity, and the economy. It offered attendees an unparalleled opportunity to confer and collaborate on the business and policy models needed to address these transformations—and direct them toward the public interest.

Antonio Bento (USC) gave a presentation to the Southern California Association of Governments Regional Council regarding challenges and opportunities for sustainable development in Southern California. Bento's presentation focused on the Regional Housing Needs Assessment (RHNA) process and how an economic, market-based approach could efficiently allocate housing units across jurisdictions. The Regional Council is the governing board of the Southern California Association of Governments and consists of 86 elected officials representing 191 cities, six counties, county transportation commissions, transportation corridor agencies, tribal governments and air districts in Southern California.

Professor Dan Wei (USC) presented a webinar on the "California Sustainable Freight Action Plan (CSFAP) Economic Impact Analysis" on September 23, 2019. The presentation focused on the use of a regional economic impact modeling to estimate the impacts of GHG reduction policies in the freight sector. Webinar attendees included numerous agency and industry representatives from across California including Caltrans, Air Resources Board, CA Energy Commission, and the ports of Long Beach, Los Angeles, Hueneme, and Oakland.

Professor Genevieve Giuliano (USC) led a working group meeting of Go-Biz, the Governor's Office of Business and Economic Development, in Sacramento, California on August 9, 2019. At the meeting, Giuliano presented her research on "Economic Competitiveness" metrics for the CSFAP. METRANS is supporting Go-Biz and Caltrans in the implementation of the CSFAP.

NAU has disseminated our results through the Annual Meeting of the Transportation Research Board, the National Rural ITS/ITS Arizona Conference, The Institute for Operations Research and the Management Sciences (IMFORMS) Annual Meeting, Transportation Research Record, Accident Analysis and Prevention, Frontiers of Earth Science, The Arizona ITE/IMSA Spring Conference, and the Arizona Roads and Streets Conference.

ITS-Davis hired a Policy Director to support institution-wide engagement activities, including for the PSR portfolio of research at UC Davis. This position assists with linking PSR research and researchers to policymakers, working to further disseminate research results and findings to appropriate stakeholders. The new Policy Director will serve as an instrumental player in ensuring that research is timely, relevant, and valuable to policymaker and practitioner audiences and stakeholders.

USC seminars

- Emerald Archer (Mount St. Mary's). "Testimonies & Witness: A Compelling Voice for Education and Action." April 11, 2019.
- Laetitia DaBlanc (IFSTTAR). "Accommodating Urban Warehouses in City Planning." July 24, 2019.
- Qi Alfred Chen (UCI). "Ghost Cars and Fake Obstacles: Automated Security Analysis of Emerging Smart Transportation Systems." April 10, 2019.
- Tyler Reeb (LBSU), Austin Brown (UCD), Carol Zabin (UC Berkeley). "Empowering the New Mobility Workforce." May 21, 2019.

UCI seminars

- Anita Bhappu (UC Merced). "Service Delivery in the Sharing Economy: Assumptions and Technology Affordances for Service Interactions on Ridesharing Platforms." Apr 5, 2019.
- Ann Campbell (Iowa). "The Impact of Parking on the Use of Autonomous Vehicles in Urban Delivery." April 19, 2019.

- Ashish Verma (Indian Institute of Science). “The Kumbh Mela Experiment (KME): Measuring and Understanding the dynamics of mankind's largest crowd - Experiences from Kumbh Mela 2016 in Ujjain.” September 10, 2019.
- Avipsa Roy (ASU). “The role of crowdsourced big data in detecting mobility patterns from active transportation modes in urban areas.” May 24, 2019.
- Carlos A. Ortiz (Advantec Consulting Engineers). “Preparing a Region for Connected/Automated Vehicles Deployment.” April 26, 2019.
- Kara Kockelman (UT Austin). “Anticipating a World of Autonomous Vehicles: Implications & Opportunities for our Communities.” June 7, 2019.
- Linda Hill (UCSD). “Findings from the AAA LongROAD study of older drivers and An Overview of Public Health Intervention from UCSD Training Research and Education for Driving Safety.” May 3, 2019.

UCLA seminars

- Adam Millard-Ball (UC Santa Cruz), “Unintended Consequences of Autonomous Vehicles.” April 17, 2019.
- Alex Zaman (Citi), “Financing California’s Transportation Infrastructure: A Capital Markets Perspective.” June 4, 2019.
- Joshua Schank (Metro), “Bringing Congestion Pricing to LA.” May 21, 2019.
- Megan Ryerson (Penn), “Building Traveler-Centric Methods to Design Safe and Functional Urban and Intercity Transportation Infrastructure.” May 22, 2019.
- Mikhail Cheste (ASU), “Towards Resilient Infrastructure for a Changing Climate and Future.” May 1, 2019.
- Tierra Bills (Michigan), “Representing the Underrepresented: Making the Case for Digital and Inclusive Data for Travel Activity Studies.” May 29, 2019.
- Timothy Brathwaite (Lyft), “Model Checking in a Time of Simulation.” May 8, 2019.

PSR funds were used to support the May 10th ITS-Davis Friday Seminar with invited speaker Mike Manville, Associate Professor of Urban Planning at UCLA. Dr. Manville spoke on “Measure M and the (Potential) Transformation of Mobility in Los Angeles”. Recording of the seminar is available to view at <https://its.ucdavis.edu/seminar/may-10-2019/>.

Media coverage

During the current reporting period, a number of PSR faculty associates were covered in the media. Examples include: Antonio Bento (*LA Times*), Brian Taylor (KCRW, CityLab), Michael Manville (*LA Times*), Miguel Jaller (*Business Insider*), and Fraser Shilling (*Sacramento Bee*).

ii. Plans for next reporting period

The next reporting period is October 1, 2019 through April 30, 2020. We plan to issue a coordinated RFP in February to solicit projects for Year 4 funding. We have 23 projects from our RFP 3 that will start during the next reporting period. We anticipate completing 20 currently active projects.

PSR will hold its 2020 Congress in Honolulu, Hawaii on March 23-24. We will also continue the PSR seminar series at USC, UCD, UCLA, and UCI. We will hold our second annual Emerging Scholars Symposium in March.

METRANS will hold the biennial International Urban Freight (INUF) Conference in Long Beach, California in October. INUF will be part of a new Smart Freight Week, which will include a Town Hall meeting, a policy workshop, and a field trip to the harbor complex of Long Beach and Los Angeles.

PSR funds will be used to support ITS-Davis' second annual 3 Revolutions Future Mobility Research Workshop in Davis, CA, October 8-9, 2019. The workshop brings together policymakers, practitioners, and industry to review and discuss the latest research and findings from the 3 Revolutions Future Mobility Program, covering everything from shared mobility, automation, micromobility, and case studies on international efforts.

B. Educational Accomplishments

PSR's education goal is to foster education and training to produce the next generation of academic scholars, professionals, and skilled workers. PSR seeks to:

- Attract large numbers of the best students from non-traditional transportation fields – especially those from underrepresented groups – into transportation careers through personal and targeted recruitment from high-schools, community colleges, and universities
- Expand and enhance the multidisciplinary aspects of our transportation education programs, and student exchanges among campuses
- Conduct a comprehensive workforce development program

NAU fellowships: NAU continued supporting undergraduate and graduate transportation students through paid internships, fellowships, and support for conference travel, as well as engage in outreach activities. This period, they awarded 3 one-year graduate student fellowships.

Data Camp: UCLA ITS offered an introductory workshop in data science using Python for transportation researchers in September 2019. UCLA ITS did not use PSR funds to produce this workshop; however, students receiving PSR funds attended and will incorporate new skills into their capstone projects.

METRANS Mentor Program: In this program at USC, transportation practitioners (mentors) guide students to make informed career decisions and to develop into well-rounded professionals. 29 students were mentored during the reporting period (22 female, 21 are both female and members of underrepresented groups - Hispanic/Latina and Asian/Pacific Islander).

Get the Job: This professional development speaker series was launched at USC during 2018 to meet the demand for specific job-seeking guidance that could not be met by our practitioner lunch series and mentor programs alone. It is designed to provide a small group environment in which students receive advice from active practitioners on securing employment. We hold one "Get the Job" event each semester; during the reporting period we held two events for a combined audience of 63 participants. The first event, "Mentoring for Success" was held on September 18, 2019 with speakers Shalonda Baldwin and Patrice McElroy both from LA Metro. On September 24th, we held, "Mentoring for Success" with Professor Rebecca Weintraub of the USC Annenberg School for Communication and Journalism.

Professional development opportunities

PSR partners with WTS Los Angeles (WTS-LA) and WTS Orange County (WTS-OC) to facilitate and sponsor membership and attendance at WTS events and with WTS-LA to promote student participation in the transportation resume book. PSR Associate Director of Education and Professional Development Victoria Deguzman is the WTS-LA chapter University Liaison and a WTS-OC Mentor, and conducts

outreach for both chapters to high schools and institutions of higher learning throughout the greater LA region; a graduate-level transportation student at USC serves as the WTS-LA and WTS-OC chapter Student Liaison. We also continue to offer career services to students interested in a transportation related career, and facilitate connections with students and industry. NAU, Pima, UCI, UCLA, and UH provide numerous professional development opportunities for students and professionals in the transportation field through lectures, conferences, workshops, and internships.

Workforce development

Pima finalized the online content for all 11 logistics classes, developed GIS curriculum (currently under College review), and developed an Autonomous Vehicle certificate program. Pima is currently in the process of converting two truck driver classes to an online format (TDT 116, TDT 118).

Pima's truck driver training had its first female Pascua Yaqui tribe member complete her Class A CDL training. The student was the first Pascua Yaqui CDL completer funded by the Native American Career and Technical Education Program.

i. Education goals for next reporting period

UH plans to increase the number of locations reached for the FEMA certified courses specifically associated with transportation resilience (MGT- 461: Evacuation Planning Strategies and Solutions) by increasing deliveries of the training course. UH will certify and deliver the course material for "Stormwater Management for Transportation Planners and Engineers."

Pima will continue to promote the Autonomous Vehicle, Logistics, and GIS (when approved) programs. Missy Blair, the Program Manager overseeing the project, will participate in conferences and press tours with support from industry partner TuSimple. The Dean of Workforce Development and Pima staff will begin meeting with two tribes, the Pascua Yaqui Tribe and the Tohono O'odham Nation, to discuss providing grant supported classes to tribal members.

LBSU will continue to develop the concept paper and modules for their Softskills webinar.

Geospatial Technology Education

LBSU and Pima will develop an introductory, interdisciplinary GIS course. The course will integrate with Pima's Associate's Degree in Logistics and Supply Chain Management with potential for expanding to other degree programs. A related train-the-trainer initiative will teach high school and community college instructors how to incorporate geospatial technology and transportation concepts into their curricula.

Online Commercial Driver's License (CDL) Training

LBSU and Pima will develop and deploy a webinar series on best practices for migrating non-credit courses to the online environment. With a focus on CDL training, the series will present ways to eliminate barriers to entry to underserved populations such as women, veterans, tribal communities, and nonnative English speakers. LBSU's scope of work includes curriculum development, online coordination, outreach and marking to potential participants in instructional design and trucking, and follow-up evaluations and interviews.

C. Outreach Accomplishments

Pima Community College hosted the annual PSR Congress, which was held in Tucson, Arizona on April 8-9, 2019. Students, researchers, and administrators from all consortium members were in attendance along with industry and agency representatives from the region. The congress was an opportunity to learn about the transportation challenges and developments in the Tucson area with a focus on workforce development, which is a strength of Pima. The congress began with a reception and speech at the Pima Association of Governments in downtown Tucson on April 8. The congress continued on April 9 with a full day of talks, panels, and research/poster presentations. The day concluded with a site visit to TuSimple, an autonomous trucking technology company. The congress included a meeting of the PSR Advisory Council, which is comprised of leaders of industry and agency organizations throughout the Pacific Southwest Region.



PSR Congress attendees visit technology company TuSimple



Kome Ajise, Executive Director of Southern California Association of Governments, greets Deputy Assistant Secretary Diana Furchtgott-Roth

On September 13, 2019, USC hosted a PSR Symposium in honor of Deputy Assistant Secretary Diana Furchtgott-Roth's visit. The Symposium brought together students, faculty, and administrators from across the consortium to discuss and present the activities of PSR. Additionally, several senior leaders from our industry and agency partner organizations were in attendance to discuss the transportation challenges facing Region 9.

The METRANS Transportation Center held its semi-annual Advisory Board meeting on April 4, 2019 on the campus of California State University, Long Beach. The meeting was well attended by senior leaders from the Center's industry and agency stakeholders. The meeting allowed METRANS to provide updates on its research, education and outreach activities during the prior six months. Additionally, the meeting allowed for discourse between the Center and its stakeholders, which will inform future Center activities and efforts. METRANS Advisory Board members are listed on our website: <https://www.metrans.org/advisory-board>

UH co-hosted the Pacific Risk Management Ohana (PRiMO) 2019 Meeting in American Samoa. The objective of this meeting was to discuss disaster Pre-Recovery Planning with American Samoa Government, NGOs and others. An after-action report will be created and disseminated.

On June 7, 2019, Seiji Steimetz (LBSU) received a Go Long Beach Award for his contributions to the city's economic understanding and policies, specifically the annual Long Beach Regional Economic Update and the first-ever Long Beach Latino Economic Report. On June 20, 2019, CITT (LBSU) was awarded the American Planning Association (APA) Los Angeles Chapter Opportunity & Empowerment Award for their work in developing the "Transportation in Geographic Information Systems (GIS)" pilot class in partnership with the Los Angeles Trade Technical College (LATTC) under the Federal Highway Administration's National Transportation Career Pathways Initiative (NTCPI). CITT (LBSU), jointly with the Port of Long Beach, was awarded the University Professional and Continuing Education Association (UPCEA) Engagement Award at both the regional and national level for the Academy of Global Logistics.

Pima's truck driver training program continues to conduct the bi-annual Truck Transportation merit badge via the Boy Scouts Catalina Council. Female Scouts have also participated in the last two merit badge sessions.

UCI hosted two groups of high school students for a presentation on careers in transportation and a demonstration of research into advanced truck classification using inductive loop signature and LiDAR technologies. Visiting high schools included Anaheim Transportation Academy (Anaheim, CA) and Mark Keppel High School, (Alhambra, CA).

AZTrans: NAU supports STEM outreach activities which provide exposure to transportation to K-12 students and members of the public. *AZTrans* graduate student Emmanuel James operated a transportation focused exhibit at a STEM celebration which took place at an Arizona Diamondbacks game in July 2019. *AZTrans* also operated an exhibit at the 2019 NAU Science and Engineering Day (which was part of the Flagstaff Festival of Science) entitled "Behind the Scenes: How Our Roadways are Designed & Operated" on Saturday, September 21, 2019. The transportation-focused exhibit had equipment set up to show how traffic signal systems detect vehicles and efficiently move traffic through intersections. There was also a display showing how traffic simulation software is used to analyze signal timing before it's implemented in the field as well as an example of a real-time camera setup used for traffic data collection. Finally, there was a traffic-related game for children ages K-8 to play where they could create their own traffic signal timing plans. Participants had the opportunity to examine equipment and software used in real-world traffic engineering applications in order to provide safe and efficient transportation of people and goods. The exhibit was staffed by Civil Engineering faculty Brendan Russo, graduate student Emmanuel James (NAU ITE Chapter Treasurer), and undergraduate student Katherine Riffle (NAU ITE Chapter President).

Lake Arrowhead Symposium (UCLA): UCLA has wrapped up planning for the UCLA Lake Arrowhead Symposium on the Transportation–Environment–Land Use Connection, which will be held from October 20 to 22, 2019. The theme will be "Routes to Opportunity: Connecting Equity and Transportation." The event will be attended by over 180 guests including academics, practitioners, and elected officials. UCLA has been meeting with the Lake Arrowhead steering committee since 2018 to execute this event.

Logistics Peer Exchange: LBSU compiled a list of potential participants from their network of municipal and MPO-level planners. Ongoing conference attendance, site visits, and research on best practices in logistics planning and distance-based learning is ongoing and will inform the webinar content.

METRANS on the Move: This is a weekly e-newsletter written and produced by USC students with staff guidance. Over 3,000 subscribers receive this weekly publication containing transportation news, and notice of transportation events and opportunities, such as conferences, seminars, webinars, scholarships, internships, and job listings. Twenty-six issues were published during the reporting period. Students and alums from USC, UCLA, UC Davis and UC Irvine participated as authors of feature stories.

Speaker Series (UCLA): In the spring of 2019, UCLA brought national experts to the UCLA Luskin School to discuss new research and best practices around public transit, transportation finance, innovative mobility, and much more. The videos from these lectures can be found on the UCLA Institute of Transportation Studies Website: www.its.ucla.edu as well as the YouTube channel: <https://www.youtube.com/channel/UCYgWr1zI9uFlip1nwmckhOQUCLA>

Transfers Magazine: The third issue of *Transfers Magazine* was issued in May 2019. The magazine hosted four articles and an opinion column representing writers from nearly all of the PSR campuses. The website (hyperlink: <https://transfersmagazine.org/>) features regularly updated blogs with news, research, and events related to transportation from around the world. The next issue is set to release in November 2019. The goal of the magazine is to translate the research of faculty, staff, and students at the PSR campuses into highly accessible content for an audience of elected officials, transportation planners, members of the media, and the general public.



i. Outreach plans for the next reporting period

USC will hold its biennial **International Urban Freight Conference (INUF)** in Long Beach, CA. Attendees will include over 200 academics, industry and agency practitioners. UCLA will hold the **Lake Arrowhead Symposium** in October. Estimated attendance is 180 academics, practitioners, and elected officials.

Logistics Peer Exchange

LBSU will leverage experience in logistics programs for in-person and online audiences at regional and statewide planning organizations to host two virtual peer exchanges on freight and logistics as part of local and regional plans. LBSU will facilitate the discussion by preparing content specific to the regional audience (e.g. cross-border trade logistics in Arizona and California) and will incorporate existing distance-based teaching tools and offer access to industry practitioners who will serve as virtual mentors.

2. Participants & Collaborating Organizations

Participants contribute to the work of the PSR through financial or other support, or directly in research, education, or technology transfer. Collaborating organizations participate in Center activities, provide advisement, or support the center.

A. Financial support

The following organizations provide match funding for PSR projects:

- State of California, California Department of Transportation, Los Angeles County Metropolitan Transportation Authority, South Coast Air Quality Management District, Port of Long Beach,

Southern California Association of Governments, Los Angeles World Airports, Bosch LCC, California Foundation, Volvo Research and Education Foundation

CITT at LBSU works with several external transportation-related trade and industry associations. Three of these (**Los Angeles Transportation Club, Harbor Transportation Club, Harbor Association of Industry and Commerce**) have established endowments with CITT that are used to provide scholarships for educational opportunities in professional development programs. These are important resources for non-traditional students pursuing non-credit programs who are often not eligible for other kinds of financial support. Total contributions amount to \$583,231.

The **Intermodal Association of North America (IANA)**, has designated CITT (LBSU) as one of only nine programs in the country to be part of its scholarship program and the only one focused on professional development offerings. The IANA scholarship money is made available on a competitive basis to students on the LBSU campus pursuing degree programs who would also benefit from the logistics industry exposure offered by CITT's Global Logistics Specialist and Marine Terminal Operations Professional programs. A portion of the money also allows both undergraduate and graduate students on campus to gain research experience on applied research projects being undertaken by CITT, including those that are part of the PSR research program.



B. Other support

The following organizations provide indirect or in-kind support to PSR:

- **California:** MetroLink; Foothill Transit; Ceres/Yusen Terminals; Port of Los Angeles; Majestic Realty; Council of Supply Chain Management Professionals (CSMCP); Long Beach Transit; City of Anaheim; Orange County Transportation Authority (OCTA); California Energy Commission (CEC); Governor's Office of Business and Economic Development (GO-Biz); UC Institute of Transportation Studies (UC-ITS); City of Davis; Amtrak Capitol Corridor; Cool Davis; UC Davis Unitrans; UC Davis Feminist Research Institute; UC Davis Policy Institute for Energy, Environment, and the Economy; Kiwi Inc.; City of Anaheim; Southern California Association of Governments (SCAG); Santa Clara County Assessor's Office; California Transit Association; San Francisco Metropolitan Transportation Commission; Los Angeles Department of City Planning; Los Angeles Department of City Planning; Toole Design Group; AECOM (Los Angeles); San Francisco Municipal Transportation Agency; Southern California Edison
- **Arizona:** Arizona Board of Regents, Pima Association of Governments, Southern Arizona Anti-Trafficking United Response Network (SAATURN), Northern Arizona University
- **Hawaii:** University of Hawaii
- **Others:** Staff from state DOTs in California, Nevada, Maine, Minnesota, Colorado, and Virginia; King County Metro (Seattle, WA)

Arizona Technology Park: Pima partners with the University of Arizona Technology Park in a Smart Vehicle Innovation Team (SVIT), which seeks to bring economic developers and academic researchers together to attract autonomous vehicle manufactures to southern Arizona. Dr. Ian Roark, and our Dean of Applied Technologies, Mr. Gregory Wilson, serve on the committee.

Center for Urban Transportation Research, University of South Florida: UH is in discussion with the CUTR to jointly develop training sessions/courses targeting DOT and transit agency personnel (ensuring consistency with the National Incident Management System and Incident Command System), local governments, etc. CUTR and UH will jointly develop material, and the training course would be both FEMA and FTA certified. The course will be delivered to both FEMA and FTA audiences. UH is also working towards establishing a “point of delivery” (POD) at CUTR to deliver newly certified evacuation planning and strategies course.

Council of University Transportation Centers (CUTC): Thomas O’Brien (LBSU) was recently elected president of CUTC. Center Director Genevieve Giuliano (USC) is a past president and past executive committee member.

Institute of Transportation Studies (ITS): ITS is the University of California transportation research institute. It has branches at UC Berkeley, UC Davis, UC Irvine, and UCLA. ITS is funded in-part by the state of California, as well as by Caltrans research contracts. There are several statewide research collaborations taking place through ITS. ITS has provided match funding support to initiate the Year 3 Faculty Research Projects and administer the PSR Publication at UCLA.

Long Beach Unified School District: LBUSD partners with CITT on the Academy of Global Logistics (AGL), which serves as a testing ground for many of the tools, programs and workforce initiatives developed through PSR.

Maricopa Association of Governments: NAU signed a Master Services Agreement with Maricopa Association of Governments to be independent evaluators (along with ASU and U of A) of pilot smart technology deployments in the MAG region. An evaluation of pilot projects is expected to begin during the next period.

MetroFreight Center of Excellence: METRANS is the home of the Volvo Foundation for Education and Research (VREF) Center of Excellence on urban freight. MetroFreight seeks to improve the sustainability of goods movement in metropolitan areas around the world. It is an international consortium that includes the University Transportation Research Center (Region 2 UTC), Institute of Science and Technology for Transport (IFSTTAR), and the Korean Transport Institute (KOTI). MetroFreight has greatly expanded our international linkages, and offers many opportunities for collaboration and partnerships.

National Center for Sustainable Transportation: The National Center for Sustainable Transportation (NCST) UTC was established in 2013 and renewed 2016. Led by University of California, Davis, consortium partners include METRANS (USC and LBSU); University of California, Riverside; Georgia Institute of Technology; and the University of Vermont. METRANS’ role is sustainable freight transport, which links well with MetroFreight. The NCST Director, Susan Handy, also serves as the UC Davis PSR Associate Director, and the NCST Program Manager also serves as the UC Davis PSR Program Manager. This overlap helps to facilitate coordination and collaboration among the UTCs.

Southwest Transportation Workforce Center: SWTWC (LBSU) is one of five regional centers in the FHWA-funded National Network for Transportation Workforce (NNTW). The five centers (University of Vermont, University of Memphis, University of Wisconsin, and Montana State University) work together to provide a more strategic and efficient approach to transportation workforce development. SWTWC and its partners provide significant infrastructure and professional capacity in support of workforce development programs for PSR. SWTWC seeks to connect and empower the 21st century transportation

workforce through research, education, and industry engagement. SWTWC is led by LBSU, with USC, Texas A&M Transportation Institute (TTI), ICF International, and the National Occupational Competency Testing Institute as partners. The partnership of LBSU and Pima began within the SWTWC, and led to Pima joining the PSR consortium.

The Center for International Trade and Transportation: CITT (LBSU) acts as a media sponsor, using its media and social media channels to announce events and other opportunities to a network of students and industry and government partners.

TuSimple: Autonomous trucking company TuSimple works closely with the College's transportation programs and was one of the key partners in developing and promoting the new Autonomous Vehicle Driver and Operations Specialist certificate program. TuSimple offers priority hiring to the program graduates.



UCLA Lewis Center for Regional Policy Studies: Deputy Director, Madeline Brozen is a researcher on the Year 2 Faculty Research Project, "Public Transportation Among University Students." The Lewis Center also provides workspace and matching funds researchers and staff at the UCLA Institute of Transportation Studies.

UH partnership for transportation resilience: Through its involvement with the Transportation Research Board's Standing Committee on Emergency Evacuation, UH has partnered with Louisiana State University, Florida Atlantic University, and the Gulf Coast Center for Evacuation and Transportation Resiliency (MarTREC UTC, University of Arkansas) to examine opportunities to increase and improve transportation resilience.

C. Collaborations

NAU has begun a collaboration with a faculty member in the Department of Geography, Planning, and Recreation: Steven Gehrke, an Assistant Professor whose research areas include sustainable transportation planning and travel behavior, with a focus on walking, cycling, and emerging mobility services. Additionally, NAU continues its collaboration with Iowa State University, offering a study abroad course in Summer 2020 in Italy titled, Infrastructure Systems Abroad.

Dr. Brian Wolshon (LSU) and Dr. John Renne (FAU) are part of the MarTREC UTC. They are collaborating with UH researchers the "Visualizing Sea Level Rise Impacts in Transportation Planning" project. The project areas of interest are Fort Lauderdale, Florida and Waikiki, Honolulu, Hawaii.

UCD, USC, and UCLA are collaborating on the Southeast Los Angeles (SELA) Initiative (PSR match project). The SELA region is 62 square miles and includes 11 cities, 4 unincorporated areas, a high proportion of manufacturing and warehousing, and major highway and rail facilities serving port related freight. The population is majority Hispanic, generally low income, and classified by the state's primary environmental burden mapping tool, CalEnviroScreen, as having high pollution burden. This case study is motivated by and leverages an earlier analysis of the area conducted by USC in 2017 in collaboration with the CSULA Pat Brown Institute and the SELA Collaborative, a partnership of 11 community and non-profit organizations. The purpose of the research is to improve transit service and mitigate truck related problems in order to improve mobility and safety in the SELA area.

3. Outputs

PSR outputs include publications, reports, papers, presentations, media, and others. Our target for peer-reviewed publications is 5 per year. During this reporting period, we have achieved 5 publications, meeting our target.

A. Publications

Tyler Reeb (LBSU) released a new edited book, “Empowering the New Mobility Workforce: Educating, Training, and Inspiring Future Transportation Professionals.” The book gives readers a clear sense of the broad range of transformational technologies and socioeconomic trends that leaders in industry, government, and education must address to prepare the new mobility workforce. The book provides proven methods to prepare the next generation of transportation professionals to design, develop, operate, and maintain the transportation systems of the future. PSR-affiliated researchers and practitioners who contributed to the book include: Dan Sperling (UCD), Austin Brown, (UCD) Lee D. Lambert (Pima), Ian R. Roark (Pima), Genevieve Giuliano (USC), Marlon Boarnet (USC), Gary Painter (USC), Phillip Washington (CEO, LA Metro), Joanne Peterson, (LA Metro), Dave Stumpo (CEO, APTREX, SCRRTC), Thomas O'Brien (LBSU), and Scott Jakovich (National Transportation Career Pathways Initiative).

Peer-reviewed publications

- Francis, O., Kim, K., and Pant, P. (2019). Stakeholder Assessment of Coastal Risks and Mitigation Strategies. *Ocean and Coastal Management*, 179:1
<https://doi.org/10.1016/j.ocecoaman.2019.104844>.
- Kim, K. and Bui, L. (2019). Learning from Hurricane Maria: Island Ports and Supply Chain Resilience. *International Journal of Disaster Risk Reduction*, 39,
<https://doi.org/10.1016/j.ijdrr.2019.101244>.
- Kim, K., Ghimire, J., Pant, P., and Yamashita, E. Self-reported Handheld Device use while Driving. *Accident Analysis & Prevention*, Vol. 125, 2019, 106-115.
<https://doi.org/10.1016/j.aap.2019.01.032>
- Reeb, T. (ed) (2019). *Empowering the New Mobility Workforce*. Elsevier: Cambridge, MA.
- Zochmann, E., M. Hofer, M. Lerch, S. Pratschner, L. Bernado, R. Blumenstein, S. Caban, S. Sangodoyin, H. Groll, T. Zemen, A. Prokesch, M. Rupp, A. F. Molisch, and C. F. Mecklenbrauker, “Position-Specific Statistics of 60 GHz Vehicular Channels During Overtaking”, *IEEE Access*, 7, 14216-14232 (2019).

Other publications

- Brown, A., Fulton, L., & Dominguez-Faus, R. (2019). California Climate Change Target Setting: A Workshop Report and Recommendations to the State of California Based on the Third California Climate Policy Modeling Dialogue and Workshop. *UC Davis: Institute of Transportation Studies*.
<http://dx.doi.org/10.7922/G21G0JGB>. White Paper. Published by institute.
- Fan, Y., & Zhang, Y. (2019). Next-Generation Transit System Design During a Revolution of Shared Mobility. *UC Davis: Institute of Transportation Studies*.
<http://dx.doi.org/10.7922/G2N8780X>. Published by institute.
- Handy, Susan. "Commute Time as Quality Time." *Transfers Magazine*, Spring 2019.
<https://transfersmagazine.org/commute-time-as-quality-time/>

- Jaller, Miguel, Carlos Otero and Anmol Pahwa. "Automation and Electrification in Urban Freight: Opportunities and Challenges." 11th International Conference on City Logistics. Dubrovnik, Croatia. 12-14 June 2019.
- McCullough, S. R, Lugo, A., & Stokkum, R. V. (2019). Making Bicycling Equitable: Lessons from Sociocultural Research. *UC Davis: Institute of Transportation Studies*. <http://dx.doi.org/10.7922/G22R3PWK>. Published by institute.
- Miles, J. Strybel, T. & Chomppf, R. (2019). "A review of performance costs following driver takeovers of automated driving systems (ADS)." A white paper technical report summarizing the impact of several factors on performance of drivers following takeovers from fully automated vehicles work.
- O'Brien, Tom and Reeb, Tyler. "A Resilient Transportation System Needs as Resilient Workforce." *Eno Transportation Weekly*. August 27, 2019.
- Parker, C. A. (2019). Homeless Negotiations of Public Space in Two California Cities. *UC Davis: Institute of Transportation Studies*. Dissertation. Retrieved from <https://escholarship.org/uc/item/9x77627p>. Dissertation. Published.
- Shilling, F., Denney, C., & Waetjen, D. (2019). Automated Analysis of Wildlife-Vehicle Conflict Hotspots Using Carcass and Collision Data. *UC Davis: Institute of Transportation Studies*. <http://dx.doi.org/10.7922/G27D2SCT>. Published by institute.
- Shilling, Fraser. "The Upgraded Road from Big WVC Datasets to Analyses." International Conference on Ecology & Transportation. Sacramento, CA. 24 September 2019.
- Stokkum, Rebecca van, and Sarah McCullough. "Gendered and racialized behavior in bicycle planning organizations." 2019 Annual Meeting of the American Association of Geographers. Washington, DC. 8 April 2019.
- Stokkum, Rebecca van. "Equity, Justice, and Sociocultural Research on Bicycling Transportation." PSR Congress 2019: The Transportation Workforce of the Future. Tucson, AZ. 9 April 2019.
- Waetjen, David. "Automated Recording and Analysis of Wildlife-Vehicle Conflict." International Conference on Ecology & Transportation. Sacramento, CA. 26 September 2019.

B. Final reports and research briefs

See [Table 1](#) for a list of the 4 final reports that were completed during the reporting period.

UCLA published 5 research briefs as part of its Fellowship program [not previously reported]:

- Abonour, R. (2018). Vision Zero's Enforcement Problem: Using Community Engagement to Craft Equitable Traffic Safety Strategies. *UCLA: Institute of Transportation Studies*. Retrieved from <https://escholarship.org/uc/item/4hq3k9g2>
- Jouliot, D. (2018). Gaining Wait? Analyzing the Congestion Impacts of Road Diets in Los Angeles. *UCLA: Institute of Transportation Studies*. Retrieved from <https://escholarship.org/uc/item/12k6r9z4>
- Lu, R. (2018). Pushed from the Curb: Optimizing Curb Space for Ride-Hail. *UCLA: Institute of Transportation Studies*. Retrieved from <https://escholarship.org/uc/item/54v1z8fb>
- O'Brien, R. (2018). Disparities in Active Transportation Safety in the SCAG Region. *UCLA: Institute of Transportation Studies*. Retrieved from <https://escholarship.org/uc/item/3zw829zm>
- Pinski, M. (2018). Bundled Parking and Travel Behavior. *UCLA: Institute of Transportation Studies*. Retrieved from <https://escholarship.org/uc/item/56b0r9f3>

C. Conference papers

- Ahuja, R., G. Ghinita, N. Krishna and C. Shahabi, Protecting Against Inference Attacks on Co-location Data, In the 28th International Conference on Computer Communications and Networks (ICCCN 2019), Valencia, Spain. July 2019.
- Koc, E., Cetiner, B., Lee, J., Nutakki, A., Soibelman, L., Taciroglu, E. (2019). System-Based Resilience Assessment of Networked Transportation Systems: Case of Greater Los Angeles. Proceedings of the 26th International Workshop on Intelligent Computing in Engineering (paper was invited for the Workshop Special Issue on the journal of Advanced Engineering Informatics). URL: <http://ceur-ws.org/Vol-2394/paper30.pdf>
- Luo, J., Wang, C., Barth, M., and Boriboonsomsin, K. (2018). "Vehicle Routing to Mitigate Human Exposure to Traffic-Related Air Pollutants." Proceedings of the 21st International IEEE Conference on Intelligent Transportation Systems, Maui, HI, November 4-7. [Not previously reported.]
- Miles, J. & M. Hollearn (in press), "Do People Mentally Represent Automated Tasks? Evidence from Task-Switching Costs Following Takeovers." Proceedings of the Human Factors and Ergonomics Society Annual Meeting. Sage CA: Los Angeles, CA: SAGE Publications.

D. Presentations

- Bento, Antonio (USC). "Challenges and opportunities for sustainable development in Southern California." USC, Los Angeles, CA. September 25, 2019.
- Boriboonsomsin, K., Luo, J., Wang, C., and Barth, M. (UCR). "Use of Connected Vehicle Technology to Reduce Human Exposure to Traffic-Related Air Pollutants." Presented at the 1st Transportation, Air Quality, and Health Symposium, Austin, TX, February 20, 2019. [Not previously reported.]
- Cetiner, B., Koc, E., Soibelman, L., Taciroglu, E., Lee, E., Nutakki, A. (UCLA). "A Granular Simulation of Bridge Closures due to a Southern California Scenario Earthquake and its Effects on the Disruption and Recovery of Freight Traffic to and from Ports of Los Angeles and Long Beach," Proceedings of the 2019 ASCE International Conference on Sustainable Infrastructure.
- Chen, Qi (UH). "Ultra-high-accuracy Digital Terrain Model Mapping for Assessing Roadway Vulnerability to Sea-level Rise and Flooding." 3R Seminar, National Disaster Preparedness Training Center, Honolulu, HI. August 29, 2019.
- Jaller, Miguel (UCD), "Automation and Electrification in Urban Freight: Opportunities and Challenges" Presented at the 11th International Conference on City Logistics, Dubrovnik, Croatia. June 2019.
- Khatun, Farzana (UCI). "What Explains Recent Trends in OCTA Bus Ridership?" PSR Annual Congress. Tucson, AZ, April 9 and 10, 2019.
- Koc, E., B. Cetiner, E.J. Lee, L. Soibelman, E. Taciroglu, and A. Nutakki. (UCLA). "System-Based Resilience Assessment of Networked Transportation Systems in Metropolitan Areas: Case of Greater Los Angeles," European Group for Intelligent Computing in Engineering (EG-ICE) 26th International Workshop on Intelligent Computing in Engineering. Leuven, Belgium, June 30 – July 3, 2019.
- Koc, E., Cetiner, B., Soibelman, L., Taciroglu, E. (UCLA). "System-Based Vulnerability and Resilience Assessment in Mega-Scale Transportation Systems: Towards Data and Model-Driven Methodologies," Proceedings of the 2019 ASCE International Conference on Computing in Civil Engineering, Atlanta, GA. June 18, 2019.

- Koc, E., Cetiner, B., Soibelman, L., Taciroglu, E., Lee, E., Nutakki, A. (UCLA). “Resilience of Mobility-Infrastructure Networks,” SCAG Modeling Task Force Meeting. Los Angeles, CA, March 27, 2019.
- Loukaitou-Sideris, Anastasia and Hao Ding (UCLA), “Public Transportation Among University Students”, Presented at 6th TRB Conference on Women’s Issues in Transportation, Irvine, CA. February 2019. [not previously reported]
- Meguro, W., R. Ogi (UH) “Waipahu Transit Oriented Development Flood Mitigation Measures”, State of Hawaii Office of Planning in cooperation with the UH School of Architecture Community Design Center. August 2019.
- Meguro, Wendy (UH). “Waipahu Transit Oriented Development Flood Mitigation Measures” State of Hawaii Office of Planning; Department of Education; Hawaii Housing Finance and Development Corporation; and Hawaii Public Housing Authority.
- Miles, J. Strybel, T. & Chomppff, R. (LBSU). “A review of performance costs following driver take-overs of automated driving systems (ADS).” Presented to METRANS personnel.
- Russo, B.J. (NAU), Mohebbi, A., and C. Aguilar, “NAU Recent ABOR Research” Presented at the 2019 Arizona Roads and Streets Conference, Tucson, AZ. April 2019.
- Saphores, JD (UCI). “What Explains Recent Trends in OCTA Bus Ridership?” PSR Symposium, USC, September 13, 2019.
- Shen, Suwan, Yi Qiang (UH). “Exploring the Social Sensitivity to Sea Level Rises Impact on Transportation Using Social Media Data and Community Mapping”, Presentation at 2019 Natural Hazard Researchers Meeting, Broomfield, CO. July 17, 2019.
- Shilling, Fraser, and D. Waetjen (UCD), “Automated Analysis of Wildlife-Vehicle Conflict Hotspots Using Carcass and Collision Data” Presented at the 2019 International Conference on Ecology and Transportation, Sacramento, CA. September 2019.
- Stanion, Austin (UCLA), “Congestion Pricing for Climate, Capacity, or Communities?” Presented at the Annual Meeting of the American Planning Association, San Francisco, CA. April 2019.
- Stokkum, Rebecca van (UCD), “Equity, Justice, and Sociocultural Research on Bicycle Transportation” Presented at PSR Congress, Tucson, AZ. April 2019.
- Stokkum, Rebecca van (UCD), “Gendered and racialized behavior in bicycle planning organizations” Presented at the Annual Meeting of the American Association of Geographers, Washington, DC. April 2019.
- Wasserman, Jacob (UCLA), “A Time and a Place for Every Rider? Geographic and Temporal Changes in Bay Area Transit Ridership”, presented at PSR Congress, Tucson, AZ. April 2019.
- Wei, D., Z. Chen, and A. Rose. (USC) “Evaluating the Role of Resilience In recovering from Disasters: A Multi-Regional Analysis of a Seaport Disruption,” International Input-Output Association Annual Meeting. Glasgow, UK, June 30–July 5, 2019.

On June 25 – 27, 2019, three LBSU CITT staff presented at the TransPORTs + American Association of Port Authorities (AAPA) Workforce Development Summit at Long Beach City College:

- Angeli Logan, Director of Trade and Transportation Programs: “Developing the Workforce Pipeline: Case Studies”
- Deanna Matsumoto, Education and Workforce Development Analyst: “Resources to Support Successful Apprenticeship Program Development”
- Tyler Reeb, Director of Research and Workforce Development: “Empowering the New Mobility Workforce”

On May 3, 2019, LBSU research assistants were selected as Student Showcase Jury Winners at the 2019 Southern California Association of Governments (SCAG) General Assembly for their story map titled “Digital Freight Matching Technology and the Role of GIS.”

E. Websites

The [PSR website](#) is the central, authoritative source of information regarding our center. Our consortium members also maintain additional sites that contain information relevant to PSR’s research and activities. Some of these sites are:

- eScholarship (UCD, UCI, UCLA): <https://escholarship.org/>
- ITS-Davis: <https://its.ucdavis.edu/>
- NAU PSR UTC site: <https://in.nau.edu/aztrans/psr-region-9/>
- Transfers Magazine: <http://www.transfersmagazine.org/>
- UC Davis Feminist Research Institute: <https://fri.ucdavis.edu/>
- UC Davis Policy Institute for Energy, Environment, and the Economy: <https://policyinstitute.ucdavis.edu/>
- UCLA ITS YouTube channel: <https://www.youtube.com/channel/UCYgWr1zI9uFlip1nwmcKhOQUCLA>
- UCLA ITS: <http://www.its.ucla.edu>
- UCLA Lake Arrowhead Symposium: <http://www.uclaarrowheadsymposium.org>

F. New methodologies, technologies or techniques

Dr. Michael Zhang (UCD, PSR-18-21) and his research team are developing a machine learning-based variable speed limit approach to develop a more effective VSL control for highways with multiple bottlenecks. The specific approach is deep reinforced learning, a new method to do VSL.

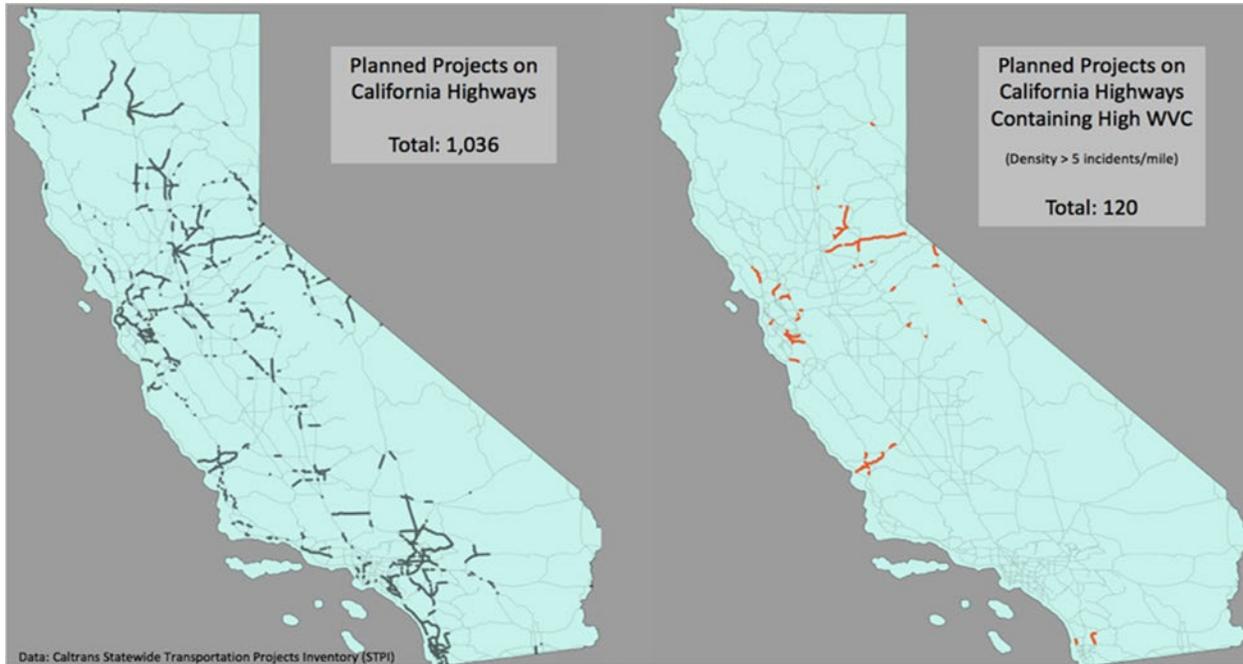
Dr. Maged Dessouky (USC, PSR-18-02) has developed a cost-sharing mechanism based on the previously developed Proportional Online Cost Sharing (POCS) mechanism which was developed for shuttle services and made it applicable for ridesharing services where the driver also has a desired destination instead of being just a professional driver. Dessouky has considered two different mechanisms: one in which all the expenses of the trip are covered by the passengers and another where the driver covers a portion of the expenses. Dessouky and his research team have also considered a situation where both the passenger and driver have time constraints.

Dr. Andreas Molisch (USC, PSR-18-08) is developing a new platform for V2V mmWave channel sounding. The platform consists of a rotational scanning mirror, and a mechanically fixed antenna and mmWave RF chain. The rotating mirror is illuminated by the directional circularly-polarized fixed-position Horn antenna. By rotating the mirror and keeping the antenna fixed, the research team can scan the full azimuth without degrading the phase stability of the system.

Dr. Fraser Shilling’s project (UCD, PSR-17-13), “Automated Analysis of Wildlife-Vehicle Conflict Hotspots Using Carcass and Collision Data,” developed an automated method for identifying and analyzing hotspots of wildlife-vehicle collisions that can run independently as well as on web-systems that are used to manage WVC data. The web-system at <https://roadecology.ucdavis.edu/hotspots> provides the interface for the user to upload data and receive analysis outputs for the data they have uploaded. It handles all user interactions through an account and allows the user to store and manage data and analytical accounts, including deleting them once they have finished. The tool was designed for a variety

of users, with varying interests and levels of technical skills. Figure 1 shows an application of the web-based tool.

Figure 1: Examples of proposed CA projects and projects with high WVC



Qi Chen (UH, project PSR-18-41) was the first to use LiDAR data for sea level rise analysis. This technique could lead to improved methods for measuring and analyzing sea level rise.

LBSU developed a driver simulation test-bed for ongoing driver research in the Human Factors Graduate Program. Further simulations, including a program for the analysis of lane-change performance, are already being developed. Insights from the results of the simulator driving study will provide a better understanding of how highly automated vehicles will impact driver safety and related traffic congestion. Specifically, the research identifies performance costs associated with driver takeovers from highly automated vehicles in emergency situations. Identification of these performance costs may guide better design of takeover request (TOR) systems as well as contributed to projections of crash rates and traffic congestion following the adoption of high automated (level 4) systems.

The ongoing project (UCD, PSR-18-21), "Get More Out of Variable Speed Limit Control: An Integrated Approach to Manage Traffic Corridors with Multiple Bottlenecks," led by Dr. Michael Zhang, selected the SUMO simulator for VSL evaluation, and established a SUMO road network of I-80 freeway through Davis, CA, as the testbed. Preliminary results show that speed limit that lowers the mainline speed does significantly reduce fuel consumption and emissions, along with increase in travel time. The optimal speed limit for emissions and fuel consumption is 45 mph. Additional results show that by restricting sharp acceleration, variable speed limit (VSL) can still improve fuel economy and emissions. In freeway systems with consecutive on-ramps and off-ramps, maximizing throughput locally can result in congestion mitigated to the downstream bottleneck, and eventually neutralize any benefit from maximizing throughput locally at the bottleneck. This project is expected to be completed during the next reporting period and a final report with finalized results will be available soon afterwards.

Professor Jim Miles (LBSU, PSR-17-11) completed development of a dynamic driving simulator in a virtual reality environment. The simulator is currently being used to collect data on driver performance costs associated with manual takeovers of fully automated vehicles in emergency highway traffic situations. Professor Miles will draft a report on driver performance costs associated with manual takeovers of fully automated vehicles in emergency highway traffic situations. The report will show the analyzed results related to performance costs associated with driver takeover from automated vehicle systems.

Research by Scott Samuelsen (UCI) and Brian Taroja conducted a study of electric drivetrains for transit buses and found that both battery electric and hydrogen fuel cell drivetrains offer notable environmental benefits compared to conventional drivetrains, though the specific improvements for hydrogen-based solutions depend on how the hydrogen is sourced. However, the total cost of these solutions are 15-17% higher than conventional in the present day and would therefore need incentivization to facilitate deployment by agencies.

G. Other products

E-blasts: CITT at LBSU also produces two monthly e-blasts, one for CITT-specific news and one for METRANS, which includes PSR updates. Each e-blast usually contains three brief articles covering CITT- or METRANS-related awards, presentations, events, and project descriptions as they appear. The e-blasts essentially function as a more frequent and localized version of METRANS News. They are distributed as e-mails to CITT and METRANS members, partners, and subscribers.

METRANS YouTube: METRANS (USC/LBSU) has a YouTube channel, where we post videos of seminars and other recorded events. Many of the videos feature PSR-funded researchers and research. Videos are available here: <https://www.youtube.com/playlist?list=PLFF4D4389AC445594>

PSR/METRANS News: Published three times yearly, this newsletter summarizes METRANS (USC/LBSU) research, education, and outreach. The publication includes a special insert for **PSR News**, which highlights PSR research and researchers, conferences, events, publications, special interviews, and other newsworthy activities. The newsletter is distributed nationally to university transportation centers and faculty, and to federal, state, and local agencies and private industry.

Trade Talks: Dr. Thomas O'Brien (LBSU) hosts a quarterly television series called Trade Talks produced by LBSU's Advanced Media Production services and distributed through a regional cable network including all 23 campuses of the California State University system. The episodes are also available on YouTube. The September 2019 episode featured Fran Inman, Senior Vice President at Majestic Realty. Trade Talk episodes have been included as teaching tools in educational programs such as massive open online courses (MOOC). All episodes can be viewed here: <https://www.youtube.com/watch?v=D0ouTGwCt0o>

4. Outcomes

PSR's goal is to effectively and efficiently move research to practice so that new knowledge can be shared, acted upon, and contribute to a more efficient, sustainable, and equitable transportation system. We achieve our goal through technology transfer activities: events, communications, training, and client-based research. We define outcomes as any changes made to the transportation system, or

its regulatory, legislative, or policy framework, resulting from research and development outputs. Examples include the full-scale consideration of a new technology technique, or practice, or the passing of a new policy, regulation, rulemaking, or legislation.

Genevieve Giuliano's project (USC, PSR-18-SP90) is directly related to deployment. The economic competitiveness metrics and 2030 target are part of the requirements of the California Sustainable Freight Action Plan (CSFAP) and will be used in the ongoing evaluation of the plan outcomes.

Kanok Boriboonsomsin (UCR, project PSR-17-10) developed a strategy in his research that is being enhanced and applied to other disadvantaged communities in California as part of a research project for the California Air Resources Board.

Oceana Francis (UH, project PSR-18-42) is working with a state agency in Hawaii to develop new coastal mitigation measures for roads to lessen or prevent wave overtopping and/or wave undermining.

To address the challenge of integrating public and private mobility services to improve overall system efficiency, Dr. Yueyue Fan (UCD) and her research team focused on reevaluating and redefining the role of public transit and its design principles in the new context of technology and shared mobility in their recently completed study. Specifically, they evaluated the feasibility of an integrative system where public and private mobility services coexist to relax the conventional service coverage requirement of a transit system, so that public transit resources can be reallocated more efficiently. Feasibility was measured by cost (including user cost and agency cost), social equity (impact on different user groups), and environmental benefit (measured by energy and emission savings per person-mile-traveled). They used the transit system of Santa Clara County as a real-world case to study feasibility. Based on the results of their study and a detailed look into some specific routes and alternative routes in the neighboring areas, they concluded that building an integrated multimodal public transportation system in Santa Clara County by reallocating existing transit resources is financially feasible and environmentally favorable. However, there are still obstacles raised from legal, political, and equity concerns. The full report detailing these findings can be read at <https://escholarship.org/uc/item/77t6g3w4>.

Research by Monica Ibarra and Jean-Daniel Saphores (UCI) into the benefits of self-driving drayage trucks that use CV technology to improve traffic flow continues to receive attention from partners.

Student work completed at UCLA has made substantial contributions to understanding the nature of declining public transit ridership in California.

The ADMS LA SAFE project (USC, PSR-18-SP50) led by Genevieve Giuliano and Cyrus Shahabi is a partnership with LA Metro. The intent is to facilitate the use of archival data in planning practice. The events management project is a high priority for LA Metro, and the results will help to inform events management practices.

The hotspot analysis tool designed by Dr. Fraser Shilling (UCD, PSR-17-13) produces multiple complimentary outputs, enabling diverse stakeholders to find utility in the product. As of April 9, 2019, over 36 staff from 27 local, state, federal, and private organizations from 15 states had used the analysis tool.

UCLA's successful Downtown Forum on the Land Use–Transportation–Environment Connection in March of 2019 led to the June pilot of a tactical transit lane in downtown Los Angeles.

Education of public officials, policy-makers through attendance

Dr. Genevieve Giuliano (USC, PSR Director) presented a poster on the PSR UTC at the 2019 UTC Spotlight Conference in Washington, DC on May 14th. Numerous staff members of U.S. congresspersons attended the event.

The METRANS Executive Committee (USC, LBSU) met with David S. Kim, Secretary of the California State Transportation Agency (CalSTA), on September 26th at USC. Secretary Kim was provided with an overview of the Center's activities followed by a discussion on how CalSTA and METRANS can work together to help address the transportation problems facing the state of California. CalSTA asked to be kept apprised of the Center's research projects and outputs. METRANS provided CalSTA with a comprehensive list of projects that have been conducted, including all PSR projects. METRANS will continue to send periodic updates to CalSTA, and will plan to periodically travel to the CalSTA offices to present research findings on current transportation topics.

5. Impacts

PSR defines an impact as that which has an effect on the transportation system, or society in general, such as reduced fatalities, decreased capital or operating costs, community impacts, or environmental benefits. The journey of generating outputs and impacts is uncertain and happens over time. Therefore, performance with respect to outcomes and impacts are likely to be more a matter of judgement than of quantifiable metrics. Our contributions are judged by the PSR Advisory Council, and measured as significant or not significant.

Impact on the effectiveness of the transportation system

The report produced by Dr. Jae Hong Kim (UCI) for the project "Transportation Plans: Their Informational Content and Use Patterns in Southern California" offered a notable finding that there is little evidence for the ability of general plans to address new technologies, alternative futures or spontaneous nature of urban development processes. Given the rapidly changing nature of transportation in the face of new mobility options and the impending potential disruption of automated technologies, this finding is a warning regarding the development of general plans in the coming years to better allow communities to adapt to changing mobility. This report has been shared with the sponsors at the Southern California Association of Governments (SCAG) and they plan to offer guidance to municipalities under their jurisdiction. The former director of SCAG, Hasan Ikhata, has now moved to the San Diego Association of Governments (SANDAG) and has undertaken a complete reworking of that region's regional transportation plan including specific consideration of new mobility options and advanced technologies such as automated vehicles. Though the PSR-funded research was just one of many inputs to Director Ikhata, his new approach at SANDAG is one indication that the message is getting through to forward-thinking practitioners.

Impact on the adoption of new practices, or new companies

As part of the partnership with Maricopa Association of Governments, NAU personnel worked with ASU and UA researchers to develop a white paper on the state of Smart Region technologies, with a distinct focus on transportation technologies. Going forward, the three Arizona universities have been tasked with being the independent evaluators for Smart Region pilot deployments.

NAU faculty Brendan Russo started work in August 2019 on a project entitled "The Development of a Cooperative Safety Performance Assessment Framework for Connected and Automated Driving System-

Equipped Vehicles”. This project is a collaboration with the University of Arizona, Arizona State University, Intel, and Exponent. The goal of the project is to develop and test safety metrics for connected and automated vehicles (CAVs). This project will help advance the state of knowledge with respect to CAV safety as the number of these vehicles operating on public roadways continues to increase.

Impact on the body of scientific knowledge

All of PSR’s research products are made available to the public. These products have an immeasurable impact on the body of scientific knowledge.

Professors Gary Painter and Marlon Boarnet (USC, PSR-17-09) developed a new index of geographic opportunity that improves upon existing measures to analyze the spatial mismatch between job growth and populations in urban settings. The researchers developed a gravity model of job access that uses travel time in public transportation. Generalized Transit Feed Specification data was used to replace measures of actual commute times of workers and linear distance to produce better estimates for job accessibility for the most vulnerable populations. This study has important implications for understanding patterns of unemployment, underemployment, and access to labor markets, especially for populations with employment barriers.

Professor Petros Ioannou (USC, PSR-17-02) developed a combined variable speed limit and lane change traffic flow controller using the cell transmission traffic flow model, which was shown to provide consistent improvement in traffic mobility, safety and environmental impact. This research demonstrates the significant impact that traffic flow control could have in managing congestion during incidents and bottlenecks.

Research by Ibarra and Saphores (UCI) demonstrate the potential positive impact of connected and automated vehicles in port drayage operations, specifically on how they can improve freeway operations by increasing throughput through coordination.

Research by Fresquet and Jin (UCI) investigate the impact of different bounded acceleration (start-up) and aggressiveness (clearance) effects on the network fundamental diagram in signalized networks, which has implications not only for generalized intersection optimization, but also for the design of automated vehicle control systems that will operate in signalized networks.

Impact on transportation workforce development

Training courses and certificate programs have increased the expertise of transportation professionals. PSR carries out an extensive workforce development program as described in sections above.

Pima’s partnership with TuSimple and their work with Autonomous Vehicles has the potential to increase transportation access, fuel efficiency, and road safety. The program will continue to evolve with technology to keep the commercial driver relevant for as long as possible.

Pima’s development of a new and innovative Autonomous Vehicle and Logistics curricula can increase access to training via its online format. The creation of the program was a multi-disciplinary venture within the college.

The Port of Long Beach Academy of Global Logistics (AGL) at Juan Rodriguez Cabrillo High School is a partnership of the Port, Long Beach Unified School District and CITT at LBSU. As an integrated approach

to workforce development, it uses a Small Learning Community approach to combine academic curriculum with industry-relevant training and information, informed by research, to support academic and career development. AGL builds on the Long Beach College Promise by introducing high school students to career opportunities in global trade and logistics and showing them how to prepare for those careers through a wide range of training and education programs including certificates, certifications, and degrees offered by Long Beach City College and California State University, Long Beach. Students in AGL are invited to take part in PSR sponsored events including the International Urban Freight Conference and LBSU CITT State of the Trade and Transportation Industry Town Hall.

CITT's efforts include the development of integrated project learning topics for AGL teachers, and the design, development and implementation of Teacher Externship activities for Cabrillo High School instructors. The program serves an outlet for research done by CITT under other grants such as PSR. Furthermore, an instructional video created by CITT introducing the supply chain with a focus on Southern California is used as part of AGL, available at the following link: <https://youtu.be/7U2fqkCB3pc>

ITS-Davis provides support, via PSR, to the WTS UC Davis Student Chapter, the fourteenth WTS student chapter founded nationwide, to help women network and advance their professional careers.

6. Changes/Problems

ITS-Davis experienced significant delays in receiving its year 3 allocation of funding (FY 2018/2019), which consequently delayed the start of a project that was awarded in 2018. ITS-Davis did not receive an executed subaward amendment until April 2, 2019, and subsequently did not receive the funding allocation until May 2, 2019.

UCLA experienced some contracting delays for matching state funds due to three-party contracting issues. Completed contracts are expected by December 2019.

Caltrans match projects are taking 4 – 6 months to set up after approval, leading to delays in starting these projects.

7. Special Reporting Requirements

Nothing to report.