Program Progress Performance Report for University Transportation Center at

Portland State University

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Program Director:	Jennifer Dill, Ph.D. Professor, Portland State University Director, National Institute for Transportation and Communities (NITC) jdill@pdx.edu 503-725-2855
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1 ACCOMPLISHMENTS: What was done? What was learned?

The information provided in this section allows the OST-R grants official to assess whether satisfactory progress has been made during the reporting period.

1.1 What are the major goals of the program?

1.1.1 Research

Build and extend existing research through Year 1 projects. The first year of funding will support projects that extend some of our existing work, supplemented by a competitive peer-review process to select additional projects proposed by researchers of our consortium.

Competitive, peer-review project selection process in Years 2 through 5. Our projects in Years 2 through 5 will be selected through a competitive request for proposal (RFP) process. These funds will be available for projects consistent with our theme.

Pooled-Fund Research. We will continue the Pooled-Fund Research program which offers a process by which cities, counties, MPOs and other regional or local agencies can pool relatively small pots of research dollars to then leverage NITC matched funds for a single, collaborative project.

1.1.2 Leadership

High Standing within National and International Arenas of Transportation. NITC faculty will continue to demonstrate leadership by disseminating their research within and outside of academia. NITC faculty help address national transportation problems through volunteer leadership on TRB committees and in other positions. By serving on these committees, faculty help set national research agendas and connect with agency leaders and practitioners on pressing research issues. To continue and reinforce this practice, NITC will mentor our new, tenure-track faculty to apply for committee and panel membership and recognize the activities of all faculty members.

Solving Regional and National Transportation Problems. NITC's director and staff will serve as points of contact for agency leaders and policymakers regionally, statewide and nationally. When we identify needs that match the expertise of our researchers, we will make a connection. We will work with key staff at the DOT modal administrations, both in Washington, D.C. and within our regions, to determine the most effective way for our researchers to learn from and inform agency activities.

Future Leaders. We recognize the investment we must make in our young faculty and students by prioritizing research projects that include them. We will also support students traveling to conferences to present their work, a key activity in developing the next generation of leaders.

Development and Delivery of Programs. We demonstrate our leadership in innovating transportation education, workforce development, deployment of research results and conducting research.

1.1.3 Education and Workforce Development

Offer Degrees and Courses in Multiple Disciplines. NITC university partners will continue to offer a rich array of degrees that serve the transportation profession.

Provide Experiential Learning. Our campuses will continue to provide experiential learning opportunities, and NITC will seek ways to expand them.

Develop Innovative New Curriculum and Learning Opportunities. We will develop new, innovative curriculum that can be tested and shared among NITC and other universities.
Educate Professionals. NITC will maintain a vibrant program of seminars, workshops, professional courses and other training opportunities that provide practitioners with the latest tools and techniques.

Attract and Support Undergraduate Students. NITC will support projects and initiatives that expose middle and high school students to transportation concepts and careers. The efforts aim to attract and retain new undergraduate students to our degree programs, involve undergraduates in our research, increase the number of women and students of color in these programs, and expand the diversity and capacity of the transportation workforce.

Attract and Support Graduate Students. NITC will support graduate students directly through research assistantships working on projects. We will provide dissertation fellowships for students to research surface transportation topics that fit under the NITC theme. This will be a competitive process open to Ph.D. students at NITC universities multiple times throughout the year.

1.1.4 Technology Transfer

Move Research into Practice. We aim to bridge research and practice with a liaison (our Technology Transfer Manager) who can interpret results, and identify how and by whom they can be best applied in practice. Our Technology Transfer Plan systemizes the integration of research into practice. As part of this plan, projects are given a ranking based on their technology readiness level and an implementation plan is developed for all projects showing implementation potential based on this ranking. This process will ensure research results have a greater chance of being used in practice.

Use Innovative Approaches to Communicate Research Results. NITC will embark on an ambitious program of sharing information through traditional and new media.

1.1.5 Collaboration

Collaborate within our consortium. NITC's governance structure is cooperative and leadership is distributed. The Executive Committee includes one faculty member from each campus. The Executive Committee provides overall direction for the Center, makes project funding decisions, and selects Center award recipients, including student of the year. They will meet in person at least once a year, rotating the location between campuses, and hold regular conference calls. Each Executive Committee member will be responsible for representing and supporting their respective campus.

Collaborate externally. In addition to the partnerships that occur through individual projects and the pooled-fund program, NITC will foster collaboration with a range of "end-users" of our work through an External Advisory Board. As the national UTC for improving the mobility of people and goods, NITC will work with OST-R staff to foster collaboration between all the UTCs focusing on this DOT priority. Primary aims will be to avoid duplication of efforts and identify opportunities for collaboration.

1.1.6 Diversity

Attract underrepresented students to transportation careers. We aim to attract underrepresented students to transportation through programs that target middle, high school, or elementary school students. We do this by providing extra funds to researchers who engage underrepresented students in their projects, collaborating with WTS, STEM and education experts, and expanding our National Summer Transportation Institute (NSTI) Program to our partner campuses.

Priority funding to research with an equity focus. We give priority to funding research projects that have an equity focus by awarding them additional points in the RFP process.

1.2 What was accomplished under these goals?

1.2.1 Research

Build and extend existing research through Year 1 projects.

NITC funded research its **General Research** and **Small Starts grants**. The General Research grant supports larger scale projects and requires that projects provide a 1:1.2 match. The Small Starts grant requires a 1:1 match, and funds researchers who have not yet had the opportunity to undertake significant

transportation research. Projects have to be consistent with NITC's theme, are peer reviewed, and are selected by the NITC Executive Committee via consensus.

- The 11 **Initial Research Projects** funded by NITC (close to $2 million) engages 22 researchers from our consortium. Seven projects (64%) involve more than one partner university, demonstrating our commitment to collaboration. These projects are, on average, **46% completed**. One project has been delayed and is slated to start in late 2018 (Appendix, Table 1).
- The first RFP for the **General Research grant** was issued in spring 2017. **Six projects** were selected, ranging from $39,932 to $99,764, for a total of $437,762 (Appendix, Table 2). These projects started in September 2017 and are, on average, **67% completed**.
- The **Small Starts RFP** (Fall 2017) drew 13 proposals. **Six projects** were funded for approximately $20,000 each, for a total of $119,924 (Appendix, Table 2). One project is completed and is currently under review. The remaining **five projects** are, on average, **60% completed**.

Competitive, peer-review project selection process in Years 2-5.

- In June 2018, **eleven proposals** were selected for funding for the **General Research** grant (below, and Appendix, Table 3). These projects ranged from $38,049 to $149,973 for a total of $925,578 and started between July and August, 2018.
- NITC issued the second RFP for its **Small Starts** grant in August 2018 and received five proposals. The review of the proposals are currently underway.

1.3 General Research Projects funded by NITC during this reporting period

Project Title	Investigators	Univ.
The Connection between Investments in Bus Stops, Ridership, and ADA Accessibility	Keith Bartholomew & Arlie Adkins	UU, UA
Investigating Effects of TNCs on Parking Demand and Revenues	Benjamin Clark & Anne Brown	UO
Matching the Speed of Technology with the Speed of Local Government: Developing Flexible Codes and Policies Related to the Possible Impacts of Autonomous Vehicles on Cities	Marc Schlossberg & Heather Brinton	UO
Reducing VMT, Encouraging Walk Trips, and Facilitating Efficient Trip Chains through Polycentric Development	Reid Ewing & Yehua Dennis Wei (UU); Shima Hamidi (UTA)	UU, UTA
An Electric Bus Deployment Framework for Improved Air Quality and Transit Operational Efficiency	Xiaoyue Liu (UU); Aaron Golub (PSU); Ran Wei (UCR)	UU, PSU, UCR
Connected Vehicle System Design for Signalized Arterials	Xianfeng Yang & Mingyue Ji	UU
Revisiting TODs: How Subsequent Development Affects the Travel Behavior of Residents in Existing Transit-Oriented Developments	Nathan McNeil & Jennifer Dill	PSU
Optimizing Housing and Service Locations to Provide Mobility to Meet the Mandated Obligations for Former Offenders to Improve Community Health and Safety	Anne Nordberg, Jaya Davis, & Stephen Mattingly	UTA
Land Use and Transportation Policies for a Sustainable Future with Autonomous Vehicles: Scenario Analysis with Simulations	Liming Wang (PSU) & Yao-Jan Wu (UA)	PSU, UA
Emerging Technologies and Cities: Assessing the impacts of new mobility on cities	Becky Steckler & Rebecca Lewis	UO
LRT/BRT/SCT/CRT Development Outcomes FINAL PHASE	Arthur C. Nelson, Kristina Currans, & Nicole Iroz Elardo	UA

Transportation for Livable Communities Pooled-Fund Research.

NITC's Pooled Fund program offers a process by which cities, counties, MPOs and other regional or local agencies can pool relatively small pots of research dollars to then leverage NITC matched funds for a single, collaborative project. In the spring of 2018, NITC issued a national call for Problem Statements to regional and public agencies. Three problem statements were submitted, and the Executive Committee selected two statements for funding. The champions of the selected problem statements each assembled a Technical Advisory committee (TAC) drawn from collaborating stakeholders. NITC and each TAC then developed the RFPs that were issued in September 2018 to NITC's research consortium.

The project, **Exploring Data Fusion Techniques to Derive Bicycle Volumes on a Network**, focuses on developing the data fusion techniques needed to combine bicycle traffic counts from various sources. The project's outcome will allow practitioners to combine a range of bike counts—such as manual counts, crowdsourced data (e.g., Strava, Ride Report), bike share flows, and models—to achieve network coverage for bicycle counts. These data can then be used by cities and municipalities to monitor outcomes of bicycle infrastructure investments. This national study brings together Oregon DOT, Virginia DOT, Colorado DOT, Washington D.C. DOT, Utah DOT, Central Lane MPO, the city of Portland, OR, and the city of Bend, OR, who are funding half of the $200,000 project.

The second project, **Applying an Equity Lens to Automated Payment Solutions for Public Transportation**, evaluates equity implications for people who may be excluded or greatly inconvenienced by paying for transit through non-cash based collection technologies. Specifically, the research will examine existing and emerging automated cashless payment technologies, identify the associated equity impacts for each technology, and determine the most impactful and cost-effective methods for addressing excluded users in modern fare collection. For each mitigation strategy, this study will utilize cost-effectiveness measures to evaluate implementation costs of reaching different excluded user groups. The study will identify technology or solution gaps that need to be implemented to effectively address users excluded by automated cashless payment solutions. This national study brings together moovel NA; cities of Gresham and Eugene, OR; Denver Regional Transit District (RTD); Lane Transit Distrct (LTD); TriMet; and the Washington Metropolitan Area Transit Authority (WMATA) who are funding half of the $150,000 project.

In October, four proposals were submitted to the pooled fund grant, two proposals for each of the RFPs. The selection of the final research team for each project is currently underway and details will be highlighted in the next progress report.

1.3.1 Leadership

High Standing within National and International Arenas of Transportation.

Many of the consortium's faculty members and students serve on national committees and panels and other volunteer positions.

- Faculty members and students serve on 70 TRB volunteer committees, task forces or panels (55 serve on TRB committees/task forces and 15 serve on NCHRP/SHRP2/NCFRP/TRB panels). Three faculty members serve as Chair or Co-Chair on panels or committees.
- Forty-four NITC faculty and staff serve on editorial, policy and other advisory boards.
- NITC staff are active in the AASHTO-RAC liaison group.
- NITC's Director, Jennifer Dill, serves on the Board of Trustees for the TransitCenter and on the Board of Advisors, UC Davis Institute of Transportation Studies.

Jennifer Dill, PSU, is a member of a multi-disciplinary, multi-national research team that is leading the project "**Safer Cycling in the Urban Road Environment**." This June, she traveled to the University of Melbourne to review and discuss project findings. Professor Dill also spoke at a Clark County Commission on Aging Meeting (Aug. 21, 2018 in Vancouver, WA) focusing on how walking and biking can contribute to healthy aging by improving seniors' mobility, access to services, and physical and mental health.

Marc Schlossberg and Nico Larco, UO, are pioneers of the **Education Partnerships for Innovation in Communities (EPIC)**. This program leverages existing university resources to train the next generation of the transportation workforce across multiple disciplines, while helping communities translate existing knowledge into practice. EPIC is currently being adapted by over 25 universities and held its 6th and largest national conference this year in Madison, WI (April 8-11, 2018), attracting over 125 people from both universities and communities to learn how to adopt, adapt, and improve the EPIC model. One consistent experience is that the communities they serve are seeking the time, capacity, and political space EPIC partnerships provide to help transition local transportation practice toward more multi-modal, economically efficient, and equitable systems, and that such expertise can come equally from students in planning, engineering, product design, business, law, economics, geography, public health and more.

NITC researcher **Christopher Monsere, PSU**, was awarded the **NCHRP project "Road User Understanding of Bicycle Signal Faces on Traffic Signals.**" The goal of this research is to summarize and synthesize the U.S. experience with bicycle signal face installations. It will also identify remaining gaps in understanding driver comprehension and compliance and describe how they can be effectively addressed through further research. This project will be conducted in collaboration with a research team at Oregon State University and practitioners at the Toole Design Group.

NITC researchers Keith Bartholomew and Reid Ewing, UU, published the book **Best Practices in Metropolitan Transportation Planning**, which discusses how innovative MPOs are tackling equity and social justice.

Solving Regional and National Transportation Problems.

The city of Phoenix, AZ, took advantage of NITC-funded research on traffic signals by **Sirisha Kothuri, PSU**, and **Edgar Smaglik, Northern Arizona University**, to enhance bicycle safety in the city. The city recognized that the research findings could permanently solve a problem, reducing the risk to cyclist and other traffic, and decided to keep the temporary bike signal installed for the research project. It is now the first permanent bike signal in the city and is, most likely, leading the way for more bike signals in Phoenix.

NITC researchers **Kelly Clifton** and **John MacArthur, PSU**, have been working to help the city of Portland address its need to reduce carbon emissions and do so equitably. In their project, "**Environmental and Equity Scenarios for Alternative Fuel Vehicles Ownership and Use in the Portland Region,**" the team set out to first use an equity lens to establish the current characteristics and usage patterns of personal vehicles in the Portland metro region. They then developed a statistical model of vehicle miles traveled (VMT) as a function of vehicle, household, and land-use characteristics. They then used the model to estimate the societal benefits of fuel savings given different hypothetical policy scenarios where portions of the existing personal vehicle fleet were replaced with either hybrid or electric vehicles. The key takeaways will allow the city to inform its policy decision. The final report for this project is currently under review.

Future Leaders.

NITC support plays a critical role in developing students and faculty as leaders in their discipline.

- During this reporting period, **36 students** from our consortium attended conferences with the support of NITC. **Eleven students** presented in a poster or lectern session.
- To date, one student completed his master's thesis and three students were lead authors on papers, two of which were published in peer-reviewed journals (Appendix, Table 6).
- Five graduate students are members of six TRB committees.
- Several of our graduates joined the academic ranks. During this reporting period, this includes:
    - **Keun Park, UU**, Assistant Professor at Utah State University
    - **Kris Hohn, UTA**, Assistant Professor at University of North Carolina Wilmington
    - **Mary McCoy, UTA**, Assistant Professor at Texas Christian University
    - **Parekh, Rupal, UTA**, Assistant Professor at University of Connecticut

- Several of our junior faculty received tenure during this reporting period. This includes
  - Jenny Liu (PSU)
  - Liming Wang (PSU)
  - Matthew Sleep (Oregon Tech)
  - Ivis Garcia Zambrana (UU)
- **Sirisha Kothuri (PSU)** was promoted to Senior Research Associate.

Development and Delivery of Programs.

UO's Sustainable City Year Program (SCYP) has become a replicable model for large scale partnership between universities and communities whereby students through their regular coursework focus on community-identified project areas. This model is expanding transportation education across disciplines while simultaneously putting knowledge into action by working on real projects that are community-driven. And while such university-community partnership is not new, the SCYP model created a structure by which 30+ courses and 500+ students across 10+ disciplines could give 40,000+ hours of focused attention to real-world community issues. The bulk of the activities this year has been in creating a support infrastructure that makes it easier to help more universities adopt and adapt the SCYP model. Specifically, that has occurred in a few ways: developing an evaluation toolkit that programs can implement wholly or draw key questions from in a way that creates network-wide, as well as program-based, metrics; upgrading online resources and custom program animations to help new programs develop and existing programs improve; and organizing a national training conference and workshop (occurring in early April).

Current university transportation curriculum in civil engineering and planning programs lack bicycle and pedestrian design or planning focus. The **Initiative for Bicycle and Pedestrian Innovation (IBPI)** hosts a **faculty workshop** at **PSU** every summer, designed to help transportation planning and engineering faculty from across the U.S. integrate bicycle and pedestrian topics into courses at their home universities. Faculty at PSU have been leaders in active transportation curriculum and have hosted the IBPI faculty workshop for the past seven years.

NITC continually assesses its approach on how we are leading the way in workforce development, and we are ready to make adjustments to meet the needs of our target audience. Last year we responded to the requests of professionals for more in-depth, in-person training by structuring our annual Transportation and Communities event as a professional academy. Specific details of the two-day event are described in section 1.2.4 Technology Transfer.

1.3.2 Education and Workforce Development

Offer Degrees and Courses in Multiple Disciplines.

The six-university consortium offers a total of **1 certificate**, **13 bachelor**, **26 graduate** and **8 PhD programs** in transportation and closely related fields, including several dual degree options. Two of the degree programs offered by the University of Utah and seven of the programs offered by the University of Texas at Arlington also receive support from other U.S. DOT-funded UTC programs.

Provide Experiential Learning.

Our campuses continue to incorporate access to community partners and employment opportunities in a number of ways. This includes the support for **student groups** on each of our partner campuses. Under the guidance of the Executive Committee member, each group is able to set its own agenda and priority to cater to its unique student body, goals, and interests.

- The **Oregon Tech** student group, ITE, focuses on professional development. As a result, many of the activities focus on attending webinars, seminars and conferences, and networking. This year the group also sponsored an outreach event to middle school students where an Oregon Tech faculty and a student introduced 45 middle school students to transportation engineering.
- The **UO** student group, **LiveMove**, organizes a range of events to connect students and the public with professionals who focus on sustainable transportation. One of the recurring events is a

Planner's pub or breakfast, where the group provides an opportunity to meet with a practitioner in an informal forum to learn and network. During this reporting period, LiveMove students also volunteered at the Safe Routes to School on National Walk and Roll Day.
- The **UA** student group, **ITE**, focused during this reporting period on supporting seminars and student group activities on campus.
- **UTA**'s **ITE** student group works to bring together students with an interest in transportation from across different disciplines. During this reporting period, the group provided support for several of its members to attend conferences.
- The **UU** student group, **Point B**, supports events that focused on bike maintenance and bicycle infrastructure.
- **PSU**'s student group, **STEP-ITE**, was supported by MAP-21 funds during this reporting period. The activity of this group are reported on the MAP-21 PPPR.

A detailed list of activities of each student group can be found in Appendix, Table 4.

The **Master's in Urban & Regional Planning (MURP) Program** at PSU offers a **workshop course** that provides students with the opportunity to work on projects for community clients that lead to a professional product. For the 2018 Workshop, three groups of PSU graduate students chose to do projects that tackled specific transportation issues in the Portland area:

- "Elevating People: Planning for Equitable Travel to Marquam Hill": The students developed a plan that aimed at improving travel to Oregon Health and Science University's main campus, particularly for lower-income workers.
- "North PDX Connected: A Community Based Active Transportation Plan for N. Willamette Blvd": This team focused on developing an active transportation plan along a North Portland corridor to improve safety and comfort for people walking, biking, and taking transit – drawing heavily on community input.
- "Cascadia Connect: A Car-Free Access to the Outdoors": The students created a toolkit that demonstrated that car-free access to the outdoors is not just feasible, but can also be economically sustainable, efficient, environmentally responsible, and equitable.

At PSU, the **Master's in Urban & Regional Planning (MURP) Program** continues to offer the **Pedestrian and Bicycle Planning Lab**. The lab provides the opportunity to participate in a workshop-based planning process and is taught by top professionals in the field of bicycle and pedestrian planning and design.

Develop Innovative New Curriculum and Learning Opportunities.

NITC funded a new curriculum project through its education grant that will focus on developing a GIS workshop for high school girls: **S.T.E.A.M. TRAINing: Engaging High School Girls in Transportation Issues through GIS** (Randal Morris & Nancee Hunter, PSU). The goal of the project is to use the artistic and cartographic elements inherent in map-making to excite the interest of girls who might normally steer clear of more exclusively STEM-centric programs (hence the "A for Art" in STEM). The curriculum will cover the theory and general principles of GIS. Projects will allow students to apply what they learned in class to real life scenarios. Students will gather data during field trips and use them in the classroom for analysis.

Educate Professionals.

During the reporting period, NITC supported **23 events** that were attended by **918 professionals**. These events are detailed below.

NITC hosted **four webinars** between April 1, 2018 and September 30, 2018. The webinars, listed below, were attended by **245 individuals**, who were primarily practitioners (Figure 1).

- Tools and Techniques for Teaching Collaborative Regional Planning, Danya Rumore, UU (70 attendees)
- Aiming for Walkable, Inclusive Communities, Arlie Adkins, UA (112 attendees)

- Firsthand Data Collection: Students Get Behind the Wheel of Vehicle Dynamics, Roger Lindgren, Oregon Tech (12 attendees)
- Meeting & Exceeding Mobility User Expectations with Real-Time Transit Information, Sean Barbeau, USF (46 attendees)

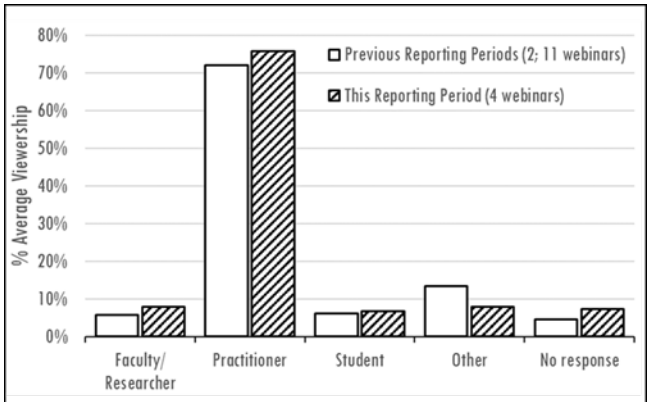


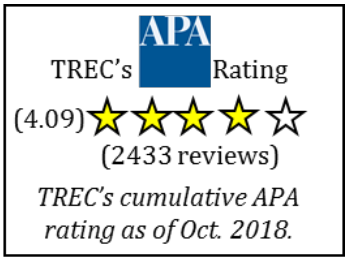
Figure 1. *Practitioners consistently make up the greatest percentage of viewers of NITC webinars. (Data are based on average # of viewers per webinar: Previous reporting periods: 119 average viewers; this period: 64 average viewers).*

During the academic year, PSU holds **Friday Transportation Seminars** that are open to the public and webcasted to enable professionals and individuals across the country to participate. During this reporting period, PSU held **15 seminars** that were attended or streamed live by **606 non-students**. Viewers streamed seminars from 29 contiguous states in the U.S., Puerto Rico, and three Canadian provinces.

PSU's Initiative for Bicycle and Pedestrian Innovation (IBPI) held three workshops this summer. The first was a two-day **Faculty Workshop** that focused on how to integrate bike and pedestrian topics into university transportation courses (7 attendees). The second workshop, **Comprehensive Bikeway Design** was a one-week course geared for practitioners and intended to bridge the gap between topics learned in college and design needs for the practice (23 attendees). This workshop allows practitioners from across the world to learn how to create safe and equitable bike/pedestrian experiences through good design. A new workshop offered this year focused on **Creating Effective Active Transportation Programs** and was designed for practitioners (15 attendees). Throughout the three-day course, transportation and public health practitioners learned about local travel demand management (TDM) strategies and programs and how they could implement similar programs in their communities. PSU partnered with 24 instructors, transportation professionals from across the metropolitan region of Portland, to deliver the three workshops.

This is the second year NITC has offered a Data Science Course designed by a NITC Education project supported by MAP 21funds (**Introduction to Scientific Computing for Planners, Engineers, and Scientists**). The focus of this course is to use R, an open-source platform, and transportation data to teach practitioners from public and private agencies best practices in scientific computing. Based on feedback from the previous year, the course was split into an introductory and advanced section that were attended by 22 professionals. Two students also took advantage of this training opportunity.

During this reporting period, TREC offered **109 professional development** credits for 17 of the events through the **American Planning Association (APA).** APA awarded practitioners **358 AICP credits** for these events, who gave the events, on average, a **4.14 star rating** (based on a five star rating system). Since 2016, TREC's APA events have achieved a **4.09 star rating,** on average.



Attract and Support Undergraduate Students.

NITC recognizes that transportation workforce development does not always take place at the university level. Students' interest in transportation can start much earlier, which is why NITC aims to attract and retain new undergraduate students to transportation-related degree programs and increase the number of underrepresented students in these programs. As a result, we continually work on supporting current undergraduate students while also expanding NITC's reach into the K-12 classroom. These efforts and resulting events are detailed in this and the *Diversity* sections.

- **Two-hour to one-day workshops.** Workshops introduce transportation curriculum to elementary, middle school, and high school students and are usually organized through partner organizations Partners include Adelante Mujeres' Chicas Youth Development, Chick Tech Portland, Girls Inc., Oregon MESA, WTS Transportation You, and many more that we collaborate and partner with to provide programs for their students.
- **Teacher Externships.** In partnership with Portland Metro STEM Partnership (PMSP), we organize teacher externships for high school STEM teachers where teachers visit local transportation firms for a full day to find out how they can prepare students for a career in transportation.
- **Two-week STEM camp.** We plan, host, and facilitate a two-week residential STEM camp at Portland State University for high school girls interested in STEM and transportation. We had 23 high school girls from across the state of Oregon attend. We invite over 30 female transportation professionals to work with the girls through classroom instruction, workshops, and field tours.
- **Transportation Undergraduate Research Fellowships (TURF).** NITC continues to offer undergraduate students the opportunity to learn more about transportation engineering and planning research during the summer months by working alongside faculty and research advisors at PSU. This year, the program expanded to include six student from Cornell University, University of Connecticut, University of Puerto Rico, University of Southern California, and the University of Arizona. Although the program was not exclusively designed for women, all students who participated were female. Two students have already expressed interest in applying to PSU's graduate programs in transportation.

Attract and Support Graduate Students.

For the 2017-2018 academic year, NITC awarded **57 scholarships**, including 18 to students at **UA**, 5 to **Oregon Tech**, 15 to the **UO**, 8 to **UU**, and 11 to **UTA**. The scholarships supported 19 undergraduate, 30 masters, and 8 Ph.D. students. Scholarship support to **PSU** students was provided with MAP-21 funds and is reported in the MAP-21 PPPR. We also connect our students to scholarship opportunities provided through professional organizations such as WTS and ITE.

In addition, **128 students** are currently or will be supported as **student research assistants** on NITC funded-research projects (35 undergraduate, 64 graduate, and 29 Ph.D. students).

NITC offers **dissertation research fellowships** in the spring, summer, and fall of each year to Ph.D. students who have advanced to candidacy. To date, NITC has awarded three dissertation fellowships that are still ongoing. No new dissertation fellowships were awarded during this reporting period.

1.3.3 Technology Transfer

Move Research into Practice.

In response to requests from professionals, NITC changed the format of its annual flagship event, Transportation and Communities, from a summit format to a workshop academy. The event was held September 13-14, 2018 and offered fifteen professional development half- or full-day workshops that focused on skill building and providing the tools to apply the latest research to practice. This format enabled participants to get deeper information and training on specific topics to really be able to impact their work. Topics were varied and ranged from survey design, bike and pedestrian facilities, transit operations, to congestion relief. Of the 25 instructors, 13 were NITC researchers or staff who shared their expertise. A total of **119 individuals** attended the workshops.

TCA Post-Event Survey Results:

- 91% (68) rated workshops as **excellent or good**
- 76% (62) reported that workshops **met expectations**
- 81% (62) expect that they **will use learned content in practice** (e.g., apply at work or communicate to work teams, peers, or stakeholders)

The **IBPI workshops** offered this summer, continue to fill an important gap in the education of transportation professionals. The **Comprehensive Bikeway Design** workshop provided 23 practitioners from across the world to learn how to create safe and equitable bike/pedestrian experiences through

good design. The **Creating Effective Active Transportation Programs** workshop focused on travel demand management. Fifteen practitioners learned about local TDM strategies and programs, and how they could implement or start similar programs in their communities.

NITC was involved in planning the **2018 ITE Quad Conference**. The QUAD Conference is an annual transportation conference held in the Pacific Northwest that is meant to represent transportation professionals from British Columbia, Washington, Oregon and beyond. This year, Oregon hosted in Portland. Several of PSU faculty or alumni presented at this conference.

Oregon ITE hosted a summer workshop inviting transportation professionals from across Oregon. The event was held in Bend to reach professionals, mostly practitioners, outside of Portland. NITC recruited some of its researchers or alumni to present at the workshop and share their expertise, including Roger Lindgren (Oregon Tech, presented "Rethinking Streets"), Joe Broach (PSU, presented "FHWA Connectivity Guide"), Amanda Howell (UO, presented "Urbanism Next"), David Amiton (PSU Alumni, ODOT, presented "Region 4 Integration of Active Modes").

Use Innovative Approaches to Communicate Research Results.

The NITC website (https://nitc.trec.pdx.edu/) continues to be updated daily. In this reporting period, we published twenty-one NITC stories on research results and newly funded projects, the impact of events, and most notably–NITC Student Spotlights (https://nitc.trec.pdx.edu/taxonomy/term/1069). The Spotlights are an opportunity to showcase the outstanding students that the NITC program supports, including student group leaders, NITC Dissertation Fellows, and research assistants on a NITC-funded project. All of these stories are shared in our monthly newsletter (5,696 subscribers; 30% open rate; 6.5% click rate), pictured on the right, dedicated to communicating NITC research and events.

New to the NITC staff, the online project management tool Asana was introduced in February 2018. See Section 5.1 for how this has positively impacted internal communications, and in turn synchronized our external communications with stakeholders.

1.3.4 Collaboration

Collaborating within our consortium.

NITC's governance structure is collaborative. The Executive Committee works together to make funding decisions and resolve administrative issues related to implementing grants. The committee met in person on June 14, 2018 in Tucson, AZ, to make funding decisions and discuss center logistics. Executive Committee members also provide leadership on their respective campuses, performing a variety of tasks that ultimately further NITC's mission. Most outreach by committee members tends to ramp up interest and support for NITC's grant programs and other activities during the first part of the academic year. During this reporting period, the Executive Committee members focused on hosting speakers, promoting NITC through this venue, having discussions with colleagues and other stakeholders about research needs and facilitating potential research collaborations within and across the consortium.

NITC encourages collaborations within our consortium. Of the 34 research projects funded to date, 41% (14) involve more than one consortium partner.

Collaborating with other UTCs.

NITC's director, Jennifer Dill, and associate director, Hau Hagedorn, attended the **National Mobility Summit** in Washington, DC on April 12, 2018. The focus of the presentation was to bring together the five national UTCs funded by U.S. DOT to allow for the exchange of ideas and create opportunities for collaboration between the UTCs as well as industry professionals.

Three of our staff attended this year's **CUTC** summer meeting (June 4–6, 2018) in Minneapolis, MN. NITC director Jennifer Dill shared her expertise on the panel "Community and Publicly Engaged Research." Associate Director, Hau Hagedorn, helped moderate a session on the "Effective Use of Advisory Boards."

External collaboration.

NITC's External Advisory Board serves a 3-year term, and we are currently in the process of rotating the membership of our board. The Executive Committee also developed a new list of activities for the Board, including engagement in workforce development and curriculum topics. We are in the process of inviting new members for the Board and expect the next meeting December 2018.

Three NITC staff attended the **AASHTO Research Advisory Committee meeting** in Wichita, KS, July 22-25, 2018, and engaged with state DOT research program managers to better understand how to facilitate research between DOTs and universities.

1.3.5 Diversity

Attract underrepresented students to transportation careers.

NITC uses several approaches aimed at attracting women and people of color into the transportation field. This includes offering programs and fostering partnerships with partners that achieve this goal.

PSU continues its partnership with **Adelante Mujeres,** a nonprofit focusing on the needs of marginalized immigrant Latina women, in an effort to reach Latina girls. As part of this partnership, PSU facilitates **Chicas STEM workshops** that are offered during Adelante Mujeres's Discover STEM week at the Chicas Youth Development Program in July. This year three workshops were held on July 26, 2018 that were led by six industry volunteers and reached **40 Latina girls,** grades 3 -12.

PSU also participated in the **Girls: Oregon, Action, Leadership, and Service Summit – Futures Fair** held at PSU on April 25, 2018. This day-long event attracted **high school girls** from all over Oregon. At the fair, we shared information about the transportation industry and career opportunities as well as advertising our summer camp, the Oregon Summer Transportation Institute.

Through the collaborative effort of **PSU** and **Portland Metro STEM Partnership's Teacher Externship Program**, 10 teachers met with practitioners at Kittelson and DKS for a full day, on August 2 or 7, to learn about what skills and education is needed for specific jobs. Teachers can incorporate these examples and background into their lesson plans and activities for students.

The **Oregon Summer Transportation Institute** was held in July 2018 with support from the Oregon Department of Transportation. The two-week program hosted **23 high school girls** from across the state of Oregon at a **PSU** residential camp. Students were introduced to the transportation industry through guest speakers and field tours, and worked in teams on a two-week multimodal project which they presented at the end of the camp. Each day industry professionals discussed either a transportation topic and shared their careers and how they became transportation professionals. They led hands-on activities and field tours of transportation infrastructure and agencies. Photos of the 2018 camp can be found at our Flicker site.

NITC continues to encourage and provide support to faculty to include an underrepresented, undergraduate or graduate student in their research projects. To date, through this mechanism, we have supported one female undergraduate student at **PSU**, one female Hispanic master's student at **UA**, and

one female Ph.D. student at **UTA.** The funding provides support for these students to engage in ongoing research projects.

PSU and **UU** are continuing partnerships with the local chapters of **WTS** which includes a mentoring program for students and young professionals, with a focus on attracting female students to the transportation workforce.

Priority funding to research with an equity focus.

Many of our research projects (38%) address equity (see **Appendix, Table 5**) by:

- examining barriers to access, including the connections between transportation, land use, and housing;
- developing clear sets of strategies or interventions that will generate more inclusive measures of transportation behaviors;
- examining electronic wayfinding technology for visually impaired travelers;
- evaluating the impact of ADA accessibility on transit ridership; and
- optimizing housing and service locations to provide mobility to meet the mandated obligations for former offenders to improve community health and safety.

1.4 How have the results been disseminated?

Research results are disseminated through various venues that include presentations at conferences, TCA, and webinars and through papers and reports. NITC researchers gave **19 presentations** a, where they reached an audience of **1510 practitioners** and **academics**. So far, **10 papers** have been published in peer-reviewed journals (Appendix, Table 6). Three additional papers are currently under review or awaiting publication. One paper was published as a white paper.

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

Expected highlights for the next reporting period include:

- Reporting on progress of funded research
- Selection of Pooled Fund and Small Starts grants
- Release of General Research RFP
- Updates on tech transfer and workforce development events
- Highlights from the TRB 2019 meeting

2 PRODUCTS: *What has the program produced?*

2.1 Publications, conference papers, and presentations

NITC researchers gave **19 presentations** of their work that reached an audience of **1510 practitioners and academics**. So far, **10 papers** of this work have been published in peer-reviewed journals (**Appendix, Table 6**). Three additional papers are currently under review or awaiting publication. One paper was published in a trade journal.

2.2 Website(s) or other Internet site(s)

NITC continues to leverage our strong social media presence to promote the results of our research and tech transfer events as well as raise awareness of important transportation issues and findings nationwide. Our followers on these platforms have increased steadily as outlined below:

- **NITC website:** Updated daily, the website provides comprehensive information about our center and complete research portfolio. This includes stories about our research, press coverage, tech transfer resources, professional development events, and opportunities for students.

- **Twitter (2973 followers, +118):** We promote NITC-sponsored research, publications, reports, and events while also uplifting the activities of fellow UTC's. We also share news from NITC consortium members, including achievements of students, student group activities, and ongoing projects.
- **Facebook (655 followers, +36):** In addition to sharing NITC research, a significant focus of Facebook is to share photos of NITC-sponsored our events and to connect with other organizations, researchers, and practitioners.
- **YouTube (504 subscribers, +61):** To reach a broader audience, we publish freely accessible video recordings of our weekly seminars and monthly webinars, as well as promotional videos.
- **LinkedIn (129 followers, +49):** We target transportation professionals to share tools, practical information, and our latest studies.
- **Flickr:** An archive of photo collections from events we hosted or attended, most notably used to showcase the presence of NITC researchers and students at the annual meeting of TRB.
- **Instagram (217 followers):** We use this newest platform to our strategy to showcase the people behind the research and put a face to our NITC. Instagram has provided a high level of engagement.

2.3 Technologies or techniques

Nothing to Report.

2.4 Inventions, patent applications, and/or licenses

Nothing to Report.

2.5 Other products

Nothing to Report.

3 PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS: *Who has been involved?*

3.1 What organizations have been involved as partners?

Each NITC-funded general research project is required to have 120% match; other projects require a 100% match. For current projects, **34 different partners** from outside of the consortium provided match or contributed in other ways (**Appendix, Table 7**). This includes eight partners from local governments, eight non-profits, ten regional government agencies, two state DOTs, two transit agencies, four industry partners, and the University of North Carolina at Chapel Hill.

3.2 Have other collaborators or contacts been involved?

Fourteen of the funded research projects (41%) involved investigators from more than one university. Eighteen of the research projects (53%) included investigators from more than one discipline.

4 IMPACT: *What is the impact of the program? How has it contributed to transportation education, research, and technology transfer?*

4.1 What is the impact on the development of the principal discipline(s) of the program?

University-level bicycle and pedestrian planning and engineering topics are still not well integrated into transportation engineering and planning curriculum. Our faculty workshop attempts to fill this gap by giving professors the lesson plans, classroom exercises and other tools so that they can easily integrate these topics as a module in an existing course or offer it as a standalone course at their university. To date, we have trained nearly 80 professors teaching courses in civil engineering, planning, geography, epidemiology, and earth resources/sciences.

As transportation evolves to include disruptive technologies and new mobility, so too does the profession in order to understand and sort through big data. One way in which NITC is responding to this need is by developing university curriculum to teach students techniques, software, and tools they can use to understand big data. **Liming Wang (PSU)** curriculum on scientific computing ensures that planners and engineers are introduced to tools for working with big data. His curriculum has already been downloaded 49 times since it was published in January 2018 and the courses continue to get a positive feedback from participants.

4.2 What is the impact on other disciplines?

The collaboration between **Civil Engineering (CE)** and **Social Work (SW)** has become well established at **UTA** thanks to the leadership of **Stephen Mattingly (CE)**, **Noelle Fields (SW)**, and **Courtney Cronley (SW)**. They continue to draw more colleagues and students into their cross-disciplinary circle by using their work and relationship as a model to demonstrate the efficacy and benefits of cross-disciplinary research.

Amy Parker, PSU, the coordinator of PSU's Orientation and Mobility Program under the Graduate School of Education, is leading the way in creating new and innovative ways to address mobility needs of people with disabilities. She has established a partnership with TriMet, the local transit agency, with the ultimate goal of creating urban environments that are designed for all ages and abilities.

Marc Schlossberg and **Heather Brinton (UO)** are combining their expertise in planning and law to address the need for developing codes and policies that address the possible impacts of autonomous vehicles on cities.

4.3 What is the impact on the transportation workforce development?

The skills and knowledge of the current transportation workforce needs to keep pace with the changing times. NITC has made significant impacts training the current transportation workforce in several areas:

- **Bicycle design and planning.** Few professionals responsible for designing bikeways were taught bicycle design or planning in their undergraduate or graduate education. PSU's bicycle-focused workshops provide hands-on training for professionals to directly apply to their community. A participant that attended the summer course noted, "*I have already applied what I have learned to a new bikeway that is in the early phase of design and I expect to apply more of what I have learned to other upcoming projects.*"
- **Transportation data.** The transportation system is generating more data than ever, and professionals need to understand how to sort, digest, synthesize and visualize these data to make sense of their meaning. NITC attempts to address this with skills-based workshops that help professionals learn techniques such as R and data analysis techniques to make more meaningful use of their data. One participant in the R workshop stated that they would use their training to "*build interactive dashboards using dynamic data to pull and clean data from database servers.*" In our data analysis workshop, another mentioned that, "*I hope to more competently and confidently discuss the use and analysis of statistics in the reports I prepare at work.*"
- **Emerging technologies and new mobility.** NITC plays a significant role in helping to convene and lead conversations on the impact of emerging technologies and new mobility on the workforce. We continue to work with our partners across our communities such as through Urbanism Next.

4.4 What is the impact on physical, institutional, and information resources at the university or other partner institutions?

PSU launched two new university research centers focused on solving some of Portland's biggest challenges. TREC and NITC were models for these new centers and we will be collaborating with them on projects The **PSU Homelessness Research & Action Collaborative** will focus on combating homelessness by understanding its root causes and using evidence-based science. The **PSU Digital City Testbed Center** will examine the benefits technology brings to the city, while also addressing concerns about privacy, security, and equity. This center will also function as a test bed where cities, companies, university

researchers and the public will be able to evaluate new technologies before installing them in neighboring communities.

The **UO** established the new **Urbanism Next Center**, which explores the secondary effects of autonomous vehicles, e-commerce, and the sharing economy on the form and function of cities. This new center is part of the UO's Sustainable Cities Initiative, which was previously established with the help of NITC seed funds. The Urbanism Next Center held its first national conference in May 2018, drawing over **500 people** from the private, public, educational, and non-governmental sectors. Center staff are already busy working with cities across the U.S. to help them proactively understand the secondary impacts of these transformative technological changes on local government finance, land use and transportation systems, street design and curb management, greenhouse gas impacts, equity and health.

Oregon Tech now serves as the host for the new **Oregon Manufacturing Innovation Center Research and Development** (OMIC R&D). The center brings together manufacturing companies and higher education in an innovation environment where applied research with faculty and university students solves real problems for advanced manufacturers while training the next generation of engineers and technologists.

UO, Oregon Tech, and UA added new faculty to their teams. **UO** hired **Anne Brown** as a new tenure-track transportation faculty member, who joined the School of Planning, Public Policy and Management. Professor Brown brings expertise in equity, shared and innovative mobility, travel behavior, and transportation finance. **Oregon Tech** welcomed **Erin Cox**, an Environmental Engineer, as a new tenure-track assistant professor to its engineering department. At **UA**, **Nicole Iroz-Elardo** joined the College of Landscape Architecture & Planning as a research assistant professor. Professor Iroz-Elardo is cross-trained in planning and public health, and her research focuses on how to plan healthier and more equitable communities. She is also a former OTREC scholar.

4.5 What is the impact on technology transfer?

The **Transportation & Communities Academy (TCA)** has great impact on transferring knowledge to professionals in a way that they can implement directly to policies, practices, designs or their work. Post-TCA survey shows that 81% (62) expect that they will use learned content in practice (e.g., apply at work or communicate to work teams, peers, or stakeholders.

Building on previous research, **Chris Monsere (PSU)** and **David Hurwitz (OSU)** worked on understanding the potential for using a flashing yellow arrow (FYA) for right turn movements. The research offers specific updates to the **Oregon Department of Transportation** documents, policies and manuals to put into practice the use of the FYA.

The **2018 AASHTO Bike Guide** includes significant updates from the previous guide and is informed by research on protected bike lanes from NITC researchers **Christopher Monsere, Jennifer Dill, and Nathan McNeil** (**PSU**).

Our work has been instrumental in helping to **infuse equity into civil engineering and planning** that will ultimately help equalize the pedestrian experience for everyone. For example, one of the workshops offered at TCA focused on how to use the **dual lenses of equity and universal accessibility when designing pedestrian infrastructure.** Through exercises and storytelling, participants learned how to integrate pedestrian safety, equity, and accessibility at each of the phases of project development, from planning through design to construction. **PSU** will continue that conversation at Mobility Matters 2019, a summit that will focus designing systems that support access for all people.

4.6 What is the impact on society beyond science and technology?

Mobility improvements have positive impacts on people of all races, ages, abilities, incomes, and backgrounds. They directly impact the health and safety of communities, while also providing economic value. The mobility projects NITC supports provide tangible contributions and impacts on society, including projects such as:

- Autonomous vehicles will become reality but how they will shape our future is still uncertain. Two of recently funded NITC projects will help cities and local agencies get ready to tackle this uncertainty and help moderate the impact AV's will have on society.
- Transit developments can have wide ranging impacts on society, both positive (e.g. increased access to jobs) and negative (e.g. gentrification along new rail lines). Several NITC projects have been instrumental in assessing the impact of transit on jobs, people, housing, and economic outcomes.
- Reintegrating former offenders promotes community safety. While many factors are important to reduce recidivism, transportation has been identified as a major barrier to successful re-entry. A new NITC study is taking the first steps to break this barrier and, as such, will make a significant societal contribution.

5 CHANGES/PROBLEMS

5.1 Changes in approach and reasons for change

Staff strive to **work as cross-functional teams** to better support the mission and goals of NITC. To facilitate this process, we have been working on integrating technology in different ways to help team members stay abreast of activities across functional areas, such as communication, research administration, and events planning. For example, we are now using **Asana**, a project management software designed for teams, and a **Google team drive** to share activities and critical documents. This helps balance the number of meetings needed to communicate essential information while also keeping everyone abreast of important information. We expect that the use of these and other software platforms will evolve as we continually explore new and better ways to focus our efforts on *improving the mobility of people and goods to build strong communities — through research, education and technology transfer*.

5.2 Actual or anticipated problems or delays and actions or plans to resolve them

Nothing to Report.

5.3 Changes that have a significant impact on expenditures

Nothing to Report.

5.4 Significant changes in use or care of human subjects, vertebrate animals, and/or biohazards

Nothing to Report.

5.5 Change of primary performance site location from that originally proposed

Nothing to Report.

6 Additional information regarding Products and Impacts

Nothing to Report.

Appendix

6.1 Table 1: Initial research projects funded during the first year of the grant (2016-2017).

Grant	Project Title	Investigators	Univ.	Status
Initial Projects	Access to Opportunities: Redefining Planning Methods and Measures for Disadvantaged Populations	Arlie Adkins (UA); Stephen Mattingly (UTA)	UA, UTA	Active
	Bringing Bikes into the V2X Smart City Conversation	Stephen Fickas & Marc Schlossberg	UO	Active
	Economic and Business Impacts of Non-Motorized Bike/Pedestrian Infrastructure	Jenny Liu & Jennifer Dill	PSU	Active
	Evaluating Improved Transit Connections for Ladders of Opportunity	Stephen Mattingly (UTA); Yi-Chang Chiu (UA)	UTA, UA	Active
	From Knowledge to Practice: Rethinking Streets for People on Bikes	Marc Schlossberg (UO); Roger Lindgren (Oregon Tech)	UO, Oregon Tech	Active
	Improving Integration of Transit Operations and Bicycle Infrastructure at the Stop Level,	Miguel Figliozzi & Chris Monsere*	PSU	Active
	Key Enhancements to Four-Step Travel Demand Models	Reid Ewing	UU	Active
	Network Effects of Disruptive Traffic Events	Juan Medina & Cathy Liu	UU	Active
	Social-Transportation Analytic Toolbox (STAT) for Transit Networks	Cathy Liu & Ran Wei (UU); Aaron Golub & Liming Wang (PSU)	UU, PSU	Active
	Foundational Smart Cities Platform for NITC	Kristin Tufte & John MacArthur (PSU); Larry Head (UA)	PSU, UA	Active
	Non-Motorized Data Archive and Tools	Jennifer Dill (PSU); Stephen Mattingly (UTA)	PSU, UTA	Has not yet started

6.2 Table 2: Research Projects funded by NITC in 2017.

Grant	Project Title	Investigators	Univ.	Status
General Research (Round 1)	Updating and Expanding LRT/BRT/SCT/CRT Data and Analysis	Arthur Chris Nelson	UA	Active
	Life-Space Mobility and Aging in Place	Ivis Garcia Zambrana & Keith Dias Moore (UU); Alan DeLaTorre (PSU)	UU, PSU	Active
	Understanding Factors Affecting Arterial Reliability Performance Metrics	Avinash Unnikrishnan & Sirisha Kothuri	PSU	Active
	Planning in Gateway and Amenity Communities: Understanding Unique Challenges Associated with Transportation, Mobility, and Access to Opportunity	Danya Rumore (UU) & Philip Stoker (UA)	UU, UA	Active
	Developing Data, Models, and Tools to Enhance Transportation Equity	Amy Lubitow & Julius McGee (PSU); Raoul Lievanos (UO)	PSU, UO	Active
	Universally Accessible Trail Improvement with Naturally Occurring, Sustainable Materials	Matthew Sleep	Oregon Tech	Active
Small Starts (Round 1)	A Decentralized Network Consensus Control Approach for Urban Traffic Signal Optimization	Gerardo Lafferriere	PSU	Active
	Is There a "Buy Local" Case for Lower Travel Speeds? Testing Differences in Driver Recognition of Local versus National Retail at Different Travel Speeds	Jonathan Bean & Arlie Adkins	UA	Active
	How Will Autonomous Vehicles Change Local Government Budgeting and Finance? A Case Study of Solid Waste, Drop-off/Pick-up Zones, and Parking.	Benjamin Clark	UO	Active
	Vehicle Sensor Data (VSD) Based Traffic Control in Connected Automated Vehicle (CAV) Environment	Xianfeng Yang	UU	Active
	How Can Interdisciplinary Teams Leverage Emerging Technologies to Respond to Transportation Infrastructure Needs? A Mixed-Methods Evaluation of Civil Engineers, Urban Planning, and Social Workers' Perspectives.	Noelle Fields & Courtney Cronley, Kate Hyn, Stephen Mattingly	UTA	Active
	A Comprehensive Examination of Electronic Wayfinding Technology for Visually Impaired Travelers in an Urban Environment	Martin Swobodzinski & Amy Parker	PSU	Active

6.3 Table 3: Research Projects funded by NITC in 2018.

Grant	Project Title	Investigators	Univ.
General Research (Round 2)	The Connection between Investments in Bus Stops, Ridership, and ADA Accessibility	Keith Bartholomew & Arlie Adkins	UU, UA
	Investigating Effects of TNCs on Parking Demand and Revenues	Benjamin Clark & Anne Brown	UO
	Matching the Speed of Technology with the Speed of Local Government: Developing Flexible Codes and Policies Related to the Possible Impacts of Autonomous Vehicles on Cities	Marc Schlossberg & Heather Brinton	UO
	Reducing VMT, Encouraging Walk Trips, and Facilitating Efficient Trip Chains through Polycentric Development	Reid Ewing & Yehua Dennis Wei (UU); Shima Hamidi (UTA)	UU, UTA
	An Electric Bus Deployment Framework for Improved Air Quality and Transit Operational Efficiency	Xiaoyue Liu (UU); Aaron Golub (PSU); Ran Wei (UCR)	UU, PSU, UCR
	Connected Vehicle System Design for Signalized Arterials	Xianfeng Yang & Mingyue Ji	UU
	Revisiting TODs: How Subsequent Development Affects the Travel Behavior of Residents in Existing Transit-Oriented Developments	Nathan McNeil & Jennifer Dill	PSU
	Optimizing Housing and Service Locations to Provide Mobility to Meet the Mandated Obligations for Former Offenders to Improve Community Health and Safety	Anne Nordberg, Jaya Davis, & Stephen Mattingly	UTA
	Land Use and Transportation Policies for a Sustainable Future with Autonomous Vehicles: Scenario Analysis with Simulations	Liming Wang (PSU) & Yao-Jan Wu (UA)	PSU, UA
	Emerging Technologies and Cities: Assessing the impacts of new mobility on cities	Becky Steckler & Rebecca Lewis	UO
	LRT/BRT/SCT/CRT Development Outcomes FINAL PHASE	Arthur C. Nelson, Kristina Currans, & Nicole Iroz Elardo	UA

6.4 Table 4: Student group activities during this reporting period (April 1 – September 30, 2018).

Student group	Activity	Date	# of participants
STEP (PSU)	Reported on MAP-21 PPPR		
ITE (Oregon Tech)	Visiting Professional Presentation: "The effects of liquefaction on transportation networks", Mike Greenfield, PhD, PE, Principal with Greenfield Geotechnical	5/21/2018	51
	Visiting Scholar Presentation: "Changing the Future of Transportation: Connected and Autonomous Vehicles", Robert Bertini, PhD, PE Center for Urban Transportation Research (CUTR)	5/31/2018	39
	Visiting Scholar Social: What's Brewing in Autonomous Vehicle Implementation - Dinner with a Scholar, Robert Bertini, Phd, PE Center for Urban Transportation Research (CUTR)	5/30/2018	16
	Webinar: Developing Practical Dynamic Evaluation Methods for Transportation Structures	5/25/2018	8
	ITE Student Chapter Outreach to Middle School Students	6/11/2018	47
	ITE Western District Annual Meeting, Keystone CO	6/24/2018	3
ITE (UA)	Co-sponsored public event: Gil Penalosa in Tucson	4/5/2018	100
	Visiting Scholar event: Kelly Clifton, PhD, PSU	4/30/2018	70
	Transportation Research Institute 2018-2019 Kick Off	8/22/2018	50
	ITE Student Chapter meeting	9/12/2018	25
	ITE Student Chapter meeting	9/26/2018	25
LiveMove (UO)	Volunteer event: Safe Routes to School on National Walk and Roll Day	5/9/2018	7
	Community event: Bicycle/Race with Adonia Lugo, PhD	5/9/2018	25
	Speaker's Series: Equiticity with Oboi Reed	5/24/2018	25
	Planner's Pub with City of Eugene Urban Design: Chad Cramer	5/3/2018	20
	Planner's Lunch: Emma Newman and Laughton Elliott-DeAngelis	5/20/2018	20
	Planner's Pub: Advisory Bike Lanes with Michael Williams	5/30/2018	25
	National APA Conference	4/21/18 - 4/24/18	12
ITE (UTA)	TexITE and Western ITE meeting, Keystone, CO	6/24/2018	11
	Traffic Flow Theory and Characteristics Committee 2018 Mid-Year Meeting	8/7/2018	1
	5th Summer Conference on Livable Communities	6/21/2018	7
Point B (UU)	Bike Rack Design Session with the U Shop Manager	8/22/2018	26
	Jane's Walk of downtown Salt Lake City pedestrian facilities	9/7/2018	25

6.5 Table 5: Funded research projects that address equity related to mobility.

Grant Program	Project Title	Investigators	Univ.
Initial Projects	Access to Opportunities: Redefining Planning Methods and Measures for Disadvantaged Populations	Arlie Adkins (UA); Stephen Mattingly (UTA)	UA, UTA
	Evaluating Improved Transit Connections for Ladders of Opportunity	Stephen Mattingly (UTA); Yi-Chang Chiu (UA)	UTA, UA
	Social-Transportation Analytic Toolbox (STAT) for Transit Networks	Cathy Liu & Ran Wei (UU); Aaron Golub & Liming Wang (PSU)	UU, PSU
General Research (Round 1)	Updating and Expanding LRT/BRT/SCT/CRT Data and Analysis	Arthur Chris Nelson	UA
	Life-Space Mobility and Aging in Place	Ivis Garcia Zambrana & Keith Dias Moore, Alan DeLaTorre	UU, PSU
	Planning in Gateway and Amenity Communities: Understanding Unique Challenges Associated with Transportation, Mobility, and Access to Opportunity	Danya Rumore & Philip Stoker	UU, UA
	Universally Accessible Trail Improvement with Naturally Occurring, Sustainable Materials	Matthew Sleep	Oregon Tech
	Is There A "Buy Local" Case For Lower Travel Speeds? Testing Differences In Driver Recognition of Local Versus National Retail at Different Travel Speeds	Jonathan Bean & Arlie Adkins, Tara Goddard	UA, TAMU
General Research (Round 2)	The Connection Between Investments in Bus Stops, Ridership, and ADA Accessibility	Keith Bartholomew (UU) & Arlie Adkins (UA)	UU, UA
	Optimizing Housing and Service Locations to Provide Mobility to Meet the Mandated Obligations for Former Offenders to Improve Community Health and Safety	Anne Nordberg, Jaya Davis, & Stephen Mattingly	UTA
	LRT/BRT/SCT/CRT Development Outcomes FINAL PHASE	Arthur C. Nelson, Kristina Currans, & Nicole Iroz Elardo	UA
Small Starts (Round 1)	Optimizing Housing and Service Locations to Provide Mobility to Meet the Mandated Obligations for Former Offenders to Improve Community Health and Safety	Anne Nordberg, Jay Davis, & Stephen Mattingly	UTA
	LRT/BRT/SCT/CRT Development Outcomes FINAL PHASE	Arthur C. Nelson, Kristina Currans, & Nicole Iroz Elardo	UA
	A Comprehensive Examination of Electronic Wayfinding Technology for Visually Impaired Travelers in an Urban Environment	Martin Swobodzinski & Amy Parker	PSU

6.6 Table 6. List of publications resulting from work funded by NITC.

Publication type	Citation	Funding Ackn.?	Status
Peer-reviewed Journals (scientific, technical, or professional)	Nelson, Arthur C. et al. 2017. *Transit-Oriented Developments Make a Difference in Job Location*, Fordham Urban Law Journal, Vol 44 (4), 1079-1102	Yes	Published
	Nelson, Arthur C. 2017. *Transit and Real Estate Rents*, Transportation Research Record: Journal of the Transportation Research Board, Vol 2651(5), 22-30	Yes	Published
	Nelson, Arthur C. and Robert Hibberd#. 2018. Streetcars and Economic Development: Do Streetcars Stimulate Employment Growth? Transportation Research Forum, TBD	Yes	Publication, forthcoming
	Nelson, Arthur C., Philip Stoker and Robert Hibberd#. 2018. Light Rail Transit and Economic Recovery - Economic Resilience or Transformation? International Journal of Sustainable Transportation	Yes	Publication, forthcoming
	Nelson, Arthur C. and Keuntae Kim. 2018. Commuter Rail Transit and Economic Development, Journal of Public Transportation	Yes	Publication, forthcoming
	Nima Haghighi#, Xiaoyue Liu, Ran Wei, Wenwen Li, Hu Shao. Using Twitter Data for Transit Performance Assessment: A Framework for Evaluating Transit Riders' Opinions about Quality of Service. Public Transport. Vol 10, Issue 2, pp 363-377. 2018	No[1]	Published
Published proceedings of conferences & meetings (Peer-reviewed)	Nelson, Arthur C. and Keuntae Kim. 2018. Bus Rapid Transit and Economic Development: A Quasi-Experimental Treatment and Control Analysis. Meeting Compendium of Papers. Transportation Research Board.	Yes	Published
	Nelson, Arthur C. and Robert Hibberd#. 2018. Analysis of the Variation in Apartment and Office Market Rents with Respect to Commuter Rail Transit Station Distance in Metropolitan San Diego and Salt Lake City. Meeting Compendium of Papers. Transportation Research Board.	Yes	Published
	Nelson Arthur C. et al. 2018. *Commuter Rail Transit and Economic Development*. Meeting Compendium of Papers. Transportation Research Board.	Yes	Published
	Nelson, Arthur C. 2018. Express Busways and Economic Development: Case Study of the Miami-Dade South Express Busway. Meeting Compendium of Papers. Transportation Research Board.	Yes	Published
	Hinners, Sarah Jack, Arthur C. Nelson, Martin Buchert. 2018. Streetcars and Equity: Case Studies of Four Streetcar Systems Assessing Change in Jobs, People and Gentrification. Annual Meeting Compendium of Papers. Transportation Research Board.	Yes	Published
	Hibberd, Robert# and A.C. Nelson. 2018. *Longitudinal Cluster Analysis of Jobs-Housing Balance in Transit Neighborhoods*. Meeting Compendium of Papers. Transportation Research Board.	Yes	Published
	Nelson, Arthur C. and Robert Hibberd#. 2018. Using the Real Estate Market to Establish Streetcar Catchment Areas: Case Study of Multifamily Residential Rental Property in Tucson, Arizona. Meeting Compendium of Papers. Transportation Research Board.	Yes	Published
	Nelson, Arthur C. 2018. Bus Rapid Transit and Office Rents. Annual Meeting Compendium of Papers. Transportation Research Board.	Yes	Published

#designates student

[1]PI already contacted publisher and request acknowledgment to be added retrospectively

6.7 Table 7: Organizations partnering with NITC projects.

Organization		Contributions[#]			
Name	Location	Financial support	In-kind	Collab. research	Other
Alliance for Walking and Biking	Washington, DC				x[1]
Assoc. of Pedestrian Bicycle Prof.	Lexington, KY	x			x[1]
City of Eugene	Oregon	x			x[1]
City of Gresham	Oregon	x			
City of Portland	Oregon		x		x[1]
City of Seattle	Washington		x		
City of Springfield	Oregon				x[1]
City of Tucson	Arizona	x			
Concord Engineering	Utah	x			
League of American Cyclists	Washington, DC				x[1]
Metropia	Tucson, AZ		x	x	
Mid-American Regional Council	Kansas City, MI	x			
Mountainland Assoc. of Gov't	Orem, UT			x	
Oregon DOT	Salem, OR	x	x		x[1]
OPAL Environmental Justice	Portland, OR				x[1]
Pima County DOT	Arizona	x			
Portland Metro	Portland, OR	x	x		x[1,4]
Project 7B	Utah	x	x	x	
Puget Sound Regional Council	Washington				x[1]
Regional Transportation Commission of Southern NV	Nevada	x			
Resource Systems Group (RSG)	Salt Lake City, UT			x	
Rowell Brokaw Architects	Eugene, OR	x	x		x[2]
Smart Growth America	Washington, DC				x[1]
St. George Area Convention and Tourism	Washington County, UT	x	x	x	
Town of Springdale	Utah	x	x	x	
TriMet	Portland, OR			x	x[1,2]
Unlimited Choices	Portland, OR				x[3]
Unlocking Doors	Dallas, TX		x		
USTAR - Utah Office of Economic Development	Salt Lake City, UT	x			
Utah Office of Tourism	Utah	x	x	x	
Utah DOT	Salt Lake City, UT	x		x	x[1]
Utah Transit Authority	Salt Lake City, UT	x		x	
Wasatch Front Regional Council	Salt Lake City, UT	x		x	x[1]
Washington County Engineering & Construction Services	Hillsboro, OR			x	

[#]Facilities or personnel exchanges are not included, because none of our partners provide these contributions at this point.

[1]Resource partner (provides input into research at various stages of project), [2]Assistance with data collection and/or processing, [3]Recruitment of survey participants, [4]Facilitates communication with stakeholders.