



UTC-Semi-Annual Progress Report Portland State University

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A handwritten signature in black ink, appearing to read 'Jennifer Dill'.

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1 ACCOMPLISHMENTS: What was done? What was learned?

1.1 What are the major goals of the program?

The major goals for NITC as described in our application fall into six categories:

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.

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.

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.

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.

Collaboration

- **Collaborate within our consortium.** Our governance structure is cooperative and leadership is distributed. The Executive Committee includes one faculty member from each campus, and it provides overall direction for the Center, makes project funding decisions, and selects NITC 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.

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 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

NITC funds research through General Research, Small Starts and Pooled-Fund grants. The General Research grant supports larger scale projects. The Small Starts grant program funds researchers who have not yet had the opportunity to undertake significant transportation research. Projects must be consistent with NITC's theme, are peer reviewed, and are selected by the NITC Executive Committee via consensus.

Build and extend existing research through Year 1 projects.

The 10 Initial Research Projects funded by NITC (close to \$2 million) engage 22 researchers. Seven projects (64%) involved more than one partner university, demonstrating our commitment to collaboration. The 10 projects are, on average, 85% complete. ([Appendix, Table 1](#)). Four projects are complete and their final reports are posted to the website.

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

General Research: In June 2019, ten proposals were selected out of 37 total proposals for funding through the third General Research RFP ([Appendix, Table 4](#)). The selection process included prioritization for projects relating to multimodal transportation data and transportation-land use-housing. The awards ranged from \$53,702 to \$145,650 for a total of \$1,035,794.24 in grant funding. The funding request of all proposals was \$3,803,378.

In June 2018, eleven proposals were selected for funding through the second General Research RFP ([Appendix, Table 3](#)). These projects ranged from \$38,049 to \$149,973 for a total of \$925,578. Projects are, on average, 68% complete. The first RFP for General Research 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 are, on average, 98% completed. Four of the projects are fully complete.

Small Starts: For the third round, eight proposals were submitted and are being reviewed by Advisory Board members. We will make funding decisions in November 2019.

Three Small Starts projects were awarded \$60,000 in funding in 2018 ([Appendix, Table 3](#)). They are 85% complete. Six Small Starts projects were funded in 2017, for a total of \$119,924 ([Appendix, Table 2](#)). Five projects are complete, and one is 85% complete.

NITC 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. Faculty and students from three of our NITC campuses are actively working on two Pooled Fund Projects that were awarded \$350,000 in funding from NITC and partners in January 2019.

1.2.2 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, staff and students serve on 54 TRB volunteer committees, task forces or panels (43 on committees/sections and 11 on panels/task forces/workgroups). One serves as a committee chair, and four as committee coordinators.
- Lisa Bates (PSU) won the Marilyn J. Gittell Activist Scholar Award from the Urban Affairs Association, which recognizes research that incorporates direct engagement with local community-based organizations and/or local residents around a policy area of high importance.
- At the PSU Research Award Dinner on May 3, transportation researcher Peter Dusicka received "Researcher of the Year" from the Maseeh College of Computer Science and Engineering.
- Dr. Noelle Fields (UTA) received UTA's School of Social Work Professor of the Year in May 2019.
- NITC's Associate Director, Hau Hagedorn, led "How to Market Your UTC" session at the Council of University Transportation Centers Summer Meeting on June 26, 2019.

Solving Regional and National Transportation Problems

During this reporting period, NITC research has been instrumental in informing regional and national issues. Activities and progress in this goal area include:

- The programmatic review of Round 3 research proposals evaluated whether the research is relevant nationally. Of the ten awarded, one involves 10 regions, two include multiple sites, and seven are local projects in Oregon, Arizona, Utah, and Texas that will have lessons for other regions.
- Becky Steckler and Amanda Howell (UO) presented on "How Courier Network Services Impact Cities" at the APA National Planning Conference in April 2019.
- Reid Ewing (UU) presented his research on Intrazonal or Interzonal? Improving Intrazonal Travel Forecast in a Four-Step Travel Demand Model, and Joe Broach (PSU) presented his research on accounting for travel behavior changes and prediction biases given emerging new modes at the TRB AppCon conference in June 2019.
- In a hearing on climate change, Congresswoman Suzanne Bonamici, representing the First Congressional District of Oregon, stated "In my home state of Oregon, TREC at PSU is leading research on integration of transportation and land-use, electric vehicles, resiliency of engineered structures and transit service. (...) How can the regional model of UTC's help define climate resiliency for transportation systems across the country?"
- Jennifer Dill (PSU), Stephen Mattingly (UTA), and Anne Brown (UO) presented "Trips Not Taken" research, TNC work, Bikeshare and Scooter work at ACT Emerging Mobility Summit in Austin, TX in April 2019.

Future Leaders.

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

- Roger Lindgren (OIT) began serving as the chair of the civil engineering department in April 2019.
- Gabriella Abou-Zeid (UA undergraduate) won the UA Sustainable Built Environments Capstone Award for her research on "Walkability in Tucson," mentored by NITC researcher Dr. Kristina Currans.
- Dr. Vivian Miller (UTA), NITC Scholar and Dissertation Fellow, and PhD graduate accepted a tenure track position in Social Work/College of Health and Human Services at Bowling Green State University in Ohio.
- ARTBA presents Future Industry Leader Spotlight Awards and NITC scholar Sheida Khademi (UTA PhD student) was one of two award recipients: "This award recognizes students enrolled in undergraduate or graduate studies at a U.S. college or university who have achieved an outstanding academic record and demonstrated extraordinary leadership skills within and outside of the academic environment."
- Katherine Keeling (PSU undergraduate) received an honorable mention for the ITE Bill Kloos Scholarship with her application "If the MUTCD Made a Dating App."
- Congressman Peter DeFazio (OR) visited a transportation class at the University of Oregon to discuss applying transportation research to policy.
- Travis Glick (PSU PhD student) presented his research on Before-and-After Studies: Travel-Speed and Travel-Time Conditions at the TRB AppCon conference Tuesday, June 4th, 2019.

Development and Delivery of Programs.

NITC staff track final reports downloaded as a part of systematically trying to understand the usefulness and usage of research results. A few months after downloading a report, NITC follows up with a survey on the impact of the research report. For example, during this reporting period, 153 surveys were completed by people (58 practitioners, 41 students) who downloaded the final report for "From Knowledge to Practice: Rethinking Streets for People on Bikes." NITC staff provided the PI Marc Schlossberg with the survey results.

At the September Advisory Board meeting, NITC's Executive Committee and Advisory Board members discussed three recent research projects, as a basis for improving our Technology Transfer activities for ensuring that our research is useful to practitioners.

1.2.3 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 sets its own agenda and priorities to cater to its unique student body, goals, and interests. These groups coordinated or participated in 16 webinars, activities and events that attracted 523 participants ([Appendix, Table 5](#)).

In June 2019, three teams of PSU planning masters students completed their MURP Planning Workshop projects focused on transportation. In each of these projects, students work for a client in the community:

- **ReadyStreets: Human Powered Mobility in the Post-earthquake Recovery Period.** The Ready Streets project was prepared by a team of Master of Urban and Regional Planning candidates for the Portland Bureau of Transportation (PBOT) and examines ways to create a strong, connected, and disaster-resilient mobility network in the Parkrose-Argay neighborhood of Portland, as well as replicable criteria for future neighborhoods.
- **Living Streets: A Pathway Toward Inclusive, Equitable, and Accessible Pedestrian Streets.** Since 2009, the Portland Bureau of Transportation (PBOT) has aimed to prioritize pedestrians above all other transportation modes. Pedestrian streets help achieve this goal by reallocating space that was once dedicated to the movement and storage of cars to social spaces for people to interact and recreate. The Living Streets project team compiled key findings from studies of successful and failed pedestrian streets, emerging lessons from recent news reports, and recommendations from those with implementation experience. These findings are tailored to Portland's urban context: a city primarily built for cars, but aspiring and progressing toward a more walkable, bikeable, and transit-friendly future.
- **Cathedral Mobility: A Mobility Strategy for Cathedral Park Neighborhood.** The Cathedral Mobility plan is a toolbox to help the Cathedral Park Neighborhood Association (CPNA) coordinate with PBOT and effectively advocate for walking, biking, rolling, and bus improvements in the area. The team's recommendations are based on extensive public outreach, stakeholder interviews, and professional expertise.

Develop Innovative New Curriculum and Learning Opportunities.

NITC funded S.T.E.A.M. TRAINing: Engaging High School Girls in Transportation Issues through GIS (Randal Morris & Nancee Hunter, PSU), a new curriculum project through its education grant, which developed and delivered a one-week summer class in transportation GIS workshop for 9 middle and high school girls. The project exposed students to real world transportation issues and discussed how mapping and spatial analysis can be applied to solving problems. Students used commonly used spatial analysis software like ArcGIS desktop and ArcGIS online, as well as introducing free and open source mapping software. They were taught foundational concepts like map projections, data collection, map design and production, and data management. The PIs are working on finalizing the curriculum with input from classroom teachers. They have received additional funding from the Institute of Museum and Library Services to help incorporate GIS services in public libraries.

Educate Professionals.

During the reporting period, NITC supported 21 events that were attended by 1,633 professionals. This includes hosting four webinars attended by 318 individuals (primarily practitioners). They are available to view: <https://nitc.trec.pdx.edu/events/webinars>

- Engaging Youth to Choose Car-Free Mobility, Autumn Shafer, UO (104 attendees)
- Aging in Place: Improving Mobility for Older Adults, Alan DeLaTorre, PSU (111 attendees)
- The Effects of Ride-hailing on Parking Demand and Revenues, Anne Brown, UO (66 attendees)
- Social Transportation Analytic Toolbox for Transit Networks, Cathy Liu, UU, (37 attendees)

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 10 seminars that were attended or streamed live by 925 non-students. Viewers streamed seminars from 37 contiguous states in the U.S. and four Canadian provinces.

Partnering with national organization the Association for Pedestrian and Bicycle Professionals (APBP), PSU supported the content development and steered the Local Host Committee for the three-day active transportation conference held in Portland, OR on August 25 - 28, 2019 and attended by over 500 professionals. PSU researchers John MacArthur, Nathan McNeil, and Chris Monsere presented their NITC-funded research on e-bikes, protected bike lane through intersections, and bike share programs. NITC Director Jennifer Dill gave the Opening Welcome.

TREC offered 32.5 professional development credits for 22 events through the American Planning Association (APA). APA awarded practitioners 1,193.5 AICP credits for these events, who gave the events, on average, a 4.28 star rating (based on a five star rating system). Since 2016, TREC's APA events have achieved a 4.15 star rating, on average.

During this reporting period we hosted two workshops: "Integrating Bike-Ped Topics into University Transportation Courses" (June 20 - 21, 2019) and "Comprehensive Bikeway Design" (July 15 - 19, 2019). Five faculty attended our "Integrating Bike-Ped Topics into University Transportation Courses," a two-day course designed to help transportation planning and engineering faculty integrate bicycle and pedestrian topics into their courses. Eighteen professionals attended "Comprehensive Bikeway Design," a week-long workshop which covers the fundamentals of bikeway design and planning through an intensive week of interactive classroom, field tours, and design exercises. Through this course, transportation engineers, urban planners, advocates, policymakers, municipal staff and other transportation professionals gain valuable guidance and skills to nurture bicycling in their communities.

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 here and in the [Diversity](#) section.

- **GOALS Summit.** On April 24th, the Center for Women's Leadership hosted its 5th annual Girls, Oregon, Action, Leadership, Service Summit for over 400 high school women and female-identifying students from across the state of Oregon. During the Futures Fair, we hosted a table to speak with high school students about transportation career options and advertise our K-12 events.
- **High School Summer STEM Camps.** We planned, hosted, and facilitated four separate [one-week STEM camps](#) primarily for high school girls interested in STEM and transportation. This is further discussed in [Section 1.2.6 Diversity](#). Twenty-three students participated in the co-ed camp hosted at Portland State Universities. Since 2016, over 100 high schoolers have attended the camps.

- **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 hosted seven students from West Chester University of Pennsylvania; California State Polytechnic University, Pomona; SUNY Plattsburgh; University of Missouri, Kansas City; Northern Arizona University; University of California, Santa Cruz; and University of Southern California.

Attract and Support Graduate Students.

Through our funded research projects, NITC supported over 60 graduate students. In addition, NITC offers dissertation fellowships to Ph.D. students who have advanced to candidacy. This reporting period, two dissertations were completed: Vivian J. Miller, UTA, "Transportation, Social Support by Family Visitation, and Depression of Older Adult Nursing Home Residents: A Mixed-Methods Study" and Torrey Lyons, UU, "Social Equity in Transit Service: Toward social and environmental justice in transportation."

1.2.4 Technology Transfer

Move Research into Practice.

The 11th annual Transportation and Communities Summit 2019, held at Portland State University (PSU) on September 19–20, prioritized housing, multimodal data, and access to active mobility. The event drew attendees from 14 states across the U.S.; 197 professionals and 54 students joined us for the Summit Day, and 55 attendees took part in the deep-dive workshops on the second day. The event provided new opportunities for collaboration and synergy between researchers, practitioners, and community members. Congressman Peter DeFazio (OR) kicked off the day with a special video message for the attendees, and the student poster competition featured 20 NITC students' research. ([Photos from the Summit Day.](#))

Use Innovative Approaches to Communicate Research Results.

We continue to incorporate best practices in information design to better communicate research key findings. This past reporting period we have completely revamped the branding and design of our NITC research briefs ([example one](#) and [example two](#)) and [final reports](#). We're currently re-designing the sitemap and menu structure of the NITC website for streamlined navigation.

1.2.5 Collaboration

Collaborating within our consortium.

NITC's governance structure is collaborative. The Executive Committee met with the NITC Advisory Board in September to provide updates on research projects and discuss barriers and strategies for providing useful research findings to practitioners. NITC encourages collaborations within our consortium. Of the 50 research projects funded to date, 50% (25) involve more than one consortium partner.

Collaborating with other UTCs.

NITC's 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.

Susan Handy (NCST director) and Yinhai Wang (PacTrans director) serve on the NITC Advisory Board. We support research dissemination of other UTCs through our social media on a weekly basis. Many of the peer reviewers of NITC final reports are faculty associated with other UTCs.

External collaboration.

John MacArthur and Nathan McNeil received a NITC tech transfer grant to take key findings from a national assessment of equity bike share programs funded by Better Bike Share Partnership and create outreach material to inform bike share system operators of best practices and lessons learned related to integrating equity. Findings from the assessment will be supplemented with examples of programs, measures and planned improvements from members of a technical advisory committee (TAC). Ten 2-page briefs on program elements will be developed and disseminated through project partners. Since data collection and measurement of outcomes is an area that we have observed to be needed (both through survey responses and through interviews with bike share operators and cities), strategies and suggested protocols for measuring each of the program elements will be developed, in consultation with the TAC, and included in the briefs.

1.2.6 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.

- **TURF.** Seven students, six of which are female, were selected from 130 applicants for the Transportation Undergraduate Research Fellowship (TURF) summer program. These students were paired with PSU faculty to experience research firsthand.
- **High School Summer STEM Camps.** We planned, hosted, and facilitated four separate [one-week STEM camps](#) for high school girls interested in STEM and transportation. In 2019, three of the camps were hosted at Portland State University and one was hosted at Oregon Tech. Local transportation professionals worked with the students through classroom instruction, workshops, and field tours. Three of the camps were for female and female-identified students only, one was coed. Twenty-five high school girls attended Oregon Tech's week-long residence camp. The camp's focus was getting girls interested in transportation systems and engineering. Students met with officials from ODOT, the Blue Zones Project, the Basin Transit Service, Klamath County Public Works, the City of Klamath Falls, and various other public and private transportation agencies.
- **DC Youth Summit.** Lisa Patterson and Hau Hagedorn led the challenge project as part of the WTS International Transportation YOU / DC Youth Summit. The challenge project focused on exploring and determining multimodal level of service (LOS) at several intersections in Washington, DC. The girls collected traffic, pedestrian, and bicycle counts at intersections. They then inputted the data into a spreadsheet tool to determine the multimodal LOS. They presented their findings along with suggestions to improve the intersection design so that it is safe for all users. The project was designed to allow students to learn about the barriers, constraints, and opportunities for providing safe access and transportation for everyone. Over 40 mentors, mentees, and volunteers participated in the Summit.
- **Undergrad research assistantships.** During this reporting period, NITC had two active diversity grants supporting two undergraduate students at PSU. The students delivered presentations related to their work. One project is complete, and the other ends this fall.

Priority funding to research with an equity focus.

Many of our research projects address equity (see [Appendix, Tables 1-4](#)) 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 on transit ridership and equity implications for people excluded or greatly inconvenienced by paying for transit through non-cash based collection technologies; and

- optimizing housing and service locations to provide mobility to meet the mandated obligations for former offenders to improve community health and safety.

1.3 How have the results been disseminated?

NITC disseminates our results through our website, e-newsletter, social media, and webinars. Updated daily, the [NITC website](#) saw 9,837 site visitors during this reporting period, a 3.2% increase from the last period which indicates we continue to steadily grow our online audience and reach. The NITC website continues to attract an international audience with 12% non-U.S. visitors, our most notable international reach this past period is with the United Kingdom, Canada, China, and Korea.

We [published twenty-two NITC stories](#) on research results, newly funded projects, the impact of events, and [NITC Student Spotlights](#). The Spotlights showcase the outstanding students supported by NITC funding, including student group leaders, NITC Dissertation Fellows, and research assistants on NITC-funded projects. All of these stories are shared in our [monthly NITC newsletter](#) (6,322 subscribers - 2% increase; with an average 30% open rate; 7.2% click rate) dedicated to communicating NITC research and events.

In addition, NITC researchers present research results at conferences and publish in peer-review journals.. During this reporting period, NITC researchers gave 6 presentations, where they reached an audience of 195 practitioners. So far, 10 papers have been published in peer-reviewed journals ([Appendix, Table 5](#)).

1.4 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 Small Starts research projects
- Support for undergraduate and graduate students - NITC scholars
- Updates on tech transfer and workforce development events

2 PARTICIPANTS & COLLABORATING ORGANIZATIONS: Who has been involved?

2.1 What organizations have been involved as partners?

Each NITC-funded research project is required to have match. For current projects, 56 different partners from outside of the consortium provided match or contributed in other ways ([Appendix, Table 7](#)). This includes partners from local governments, non-profits, regional government agencies, state DOTs, transit agencies, and industry partners.

2.2 Have other collaborators or contacts been involved?

Twenty-five of the funded research projects (50%) involved investigators from more than one university. Thirty of the research projects (60%) included investigators from more than one discipline.

3 OUTPUTS: What new research, technology or process has the program produced?

Technology transfer performance measures are summarized in [Table 8](#).

3.1 Publications, conference papers, presentations, and events

NITC researchers gave 6 presentations of their work that reached an audience of 195 practitioners and academics. So far, 10 papers based on research from this FAST Act grant have been published in peer-reviewed journals, one paper is forthcoming in a peer-reviewed journal, and at least nine additional papers are available in conference proceedings ([Appendix, Table 6](#)). 11 final reports have been published to date. A project brief has accompanied each final report helping us adhere to the key performance indicator.

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

We leverage our strong online and social media presence to promote our research findings, expand the reach of our education, and elevate our faculty and student researchers. We also raise awareness of important transportation issues nationwide and findings that advance our center's theme.

- [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 \(3328 followers, +175\)](#): We promote NITC-sponsored research, publications, and events while also uplifting the activities of fellow UTC's. We share news and achievements from NITC-funded students, faculty, and ongoing projects. Launched in 2019, our new [NITC UTC twitter \(249 followers, +63\)](#) offers more effective framing of the consortium partnership.
- [Facebook \(909 followers, +195\)](#): In addition to sharing research, this platform shares photos of our events and offers connection with other organizations, researchers, and practitioners.
- [YouTube \(655 subscribers, +64\)](#): Where we publish freely accessible video recordings of weekly seminars at PSU, monthly NITC webinars, special lectures, and more.
- [LinkedIn \(249 followers, +66\)](#): 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 \(354 followers, +51\)](#): This platform introduces the people behind the research and puts a face to the center. Instagram has provided a high level of engagement, which we expect to help both our technology transfer and student recruitment efforts.

3.3 Events to support technology transfer

During the last six months, NITC supported 21 events that were attended by 1,633 professionals. On average, events are attended by 78 people. Many of these events focused on results of NITC research, while others shared complementary research and practice. We are on track to meeting our key performance indicator of 25 events/year on NITC-funded research with an average of 50 attendees/event.

3.4 Technologies or techniques

The "Understanding Factors Affecting Arterial Reliability Performance Metrics" project provided Washington County with an automated process for determining data anomalies, or outliers, in travel time data obtained from Bluetooth sensors. They also developed a modeling framework for determining significant factors on travel time reliability. These tools are being further examined to see if it can be integrated into traffic management software.

3.5 Inventions, patent applications, and/or licenses

Nothing to report.

3.6 Other products

NITC #1087 project: [The Qualitative Pedestrian Environments Data \(QPED\) Toolkit](#) was developed at the University of Arizona in collaboration with Living Streets Alliance and with support from the CDC's Physical Activity Policy Research Network (PAPRN+) and the National Institute for Transportation and Communities (NITC). Arlie Adkins presented it at the NITC Advisory Board meeting in September. It will help communities and decision makers better understand neighborhood walkability from the perspective of a different kind of expert: the people out walking in their communities. The Toolkit includes On-Street Interview Guide (English and Spanish), Data Collection Manual, Training Materials, and Data Entry Template.

NITC #1080 project: a proof-of-concept socio-transportation analytic (STAT) web-based platform that integrates the heterogeneous data sources including social media and open transportation data. The analytic module embedded in the system will enable the platform to demonstrate the transit station performance based on the open data sources. Together with the social media data, the project will demonstrate an integrated methodology to coherently evaluate transit system performance from both the provider and user perspectives.

4 **OUTCOMES: What outcomes has the program produced?**

Research Outcomes

NITC uses two measures to track research outcomes:

1. Number of stakeholders who collaborated on implementing research outcome: 6. During this period, NITC has worked with 5 local government stakeholders, and 1 state-wide nonprofit.
2. Number of projects that reach deployment and adoption (measured by the number of projects that reach TRL scale 4 or 5): 6. Additionally, we have identified eight projects that we believe will reach TRL scale of 4 or 5, including four of the recent research awards.

Attracting and retaining undergraduate and graduate students outcomes

A student from last year's TURF program started PSU's graduate program in civil engineering Fall 2019. Her experience with the TURF and with her faculty advisor was a critical factor in her decision to enter grad school.

5 **IMPACTS: What is the impact of the program? How has it contributed to improve the transportation system: safety, reliability, durability, etc.; transportation education; and the workforce?**

The impacts of the NITC program are achieved through interdisciplinary collaboration, our strong and intentional partner relationships, and the active participation of professionals that informs our educational offerings. Technology transfer performance measures are summarized in [Table 8](#). Thirteen projects have been completed to date and we are working with stakeholders to assess the impact of the work. Impact takes time to track and assess, and many projects have not been completed long enough to measure. This section provides the narrative of impacts that we are now seeing from projects funded through the current and previous NITC grants (MAP-21 funds).

- Number of stakeholders reporting impact from surveys: 16
- Number of stakeholders who have adopted, implemented or deployed research findings or technologies: 4

5.1 What is the impact on the effectiveness of the transportation system?

The Oregon Department of Transportation adopted two new traffic signal head specifications based on a project where Chris Monsere (PSU) served as co-investigator. The specifications provide clarity to the design of protected / permissive right-turn phasing options by including a flashing yellow arrow.

5.2 What is the impact on the adoption of new practices, or instances where research outcomes have led to the initiation of a start-up company?

A new E-bike Share program, Zagster, launched in the LA area was informed by a NITC study on e-bike transportation showing that e-bike riders bike more often, take longer trips & make different types of trips than they do on pedal bikes.

TriMet has increased service on four express lines to OHSU adding earlier and later service as a result of the PSU's MURP Workshop project that led to the OHSU Night Access Plan, which focused on improving evening and early morning access to OHSU.

5.3 What is the impact on the body of scientific knowledge?

The recently completed NITC project "Developing Data, Models, and Tools to Enhance Transportation Equity" by Amy Lubitow (PSU) and Raoul Lievanos (UO) used community input to critique existing travel survey methods that underrepresented Non-white households and overrepresented White households, and they identified alternative approaches. The researchers are continuing outreach to various transportation agencies in order to better understand their ideas around equity. They hope to point out potential challenges and offer suggestions on data collection instruments and procedures.

5.4 What is the impact on transportation workforce development?

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

Bicycle design and planning.

NITC research about negative effect of travel distance on bicycling Jennifer Dill and Joseph Broach is cited in the FHWA Bikeway Selection Guide.

Interdisciplinary collaboration.

NITC research on racial bias in driver yielding behavior at crosswalks was a significant driver for The City of Portland to learn more about Black pedestrian experiences in Portland and is cited in their Walking While Black Focus Group Report.

Next generation of researchers.

Dr. Joanna Ganning's thorough and convincing analysis of the strengths and weaknesses of the Location Affordability Index led HUD to rethink using Census block groups as the geographical unit of analysis. As a result, Version 3 of the Location Affordability Index (published in April 2019) was generated at the Census tract level, addressing multiple data and methodological problems identified by Dr. Ganning in her 2017 article.

Dr. Vivian Miller (UTA), NITC Scholar and Dissertation Fellow, and PhD graduate accepted a tenure track position in Social Work/College of Health and Human Services at Bowling Green State University in Ohio.

Next generation of faculty.

Our IBPI Faculty Workshop helps faculty and instructors integrate bicycle and pedestrian topics into transportation courses. Feedback from Dr. David Hurwitz, faculty at Oregon State University and PacTrans researcher: "This course is exceptional. I've participated as a student and have sent several of my PhD students in the past. I could not recommend it more strongly!"

6 CHANGES/PROBLEMS

6.1 Changes in approach and reasons for change

The NITC advisory board will vote on the NITC Student of the Year. Previously, the NITC Executive Committee made this decision. These external decision-makers will increase objectivity and reduce campus bias.

6.2 Changes that have a significant impact on expenditures

Nothing to report.

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

Nothing to report.

6.4 Change of primary performance site location from that originally proposed

Nothing to report.

7 SPECIAL REPORTING REQUIREMENTS

Not applicable.

Appendix

Table 1: Initial research projects funded (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	Complete
	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	Complete
	Improving Integration of Transit Operations and Bicycle Infrastructure at the Stop Level*	Miguel Figliozzi & Chris Monsere	PSU	Complete
	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	Complete
	Foundational Smart Cities Platform for NITC	Kristin Tufte & John MacArthur (PSU); Larry Head (UA)	PSU, UA	Active

*Research projects that address equity related to mobility

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	Processing final report
	Life-Space Mobility and Aging in Place*	Ivis Garcia Zambrana & Keith Dias Moore (UU); Alan DeLaTorre (PSU)	UU, PSU	Complete
	Understanding Factors Affecting Arterial Reliability Performance Metrics	Avinash Unnikrishnan & Sirisha Kothuri	PSU	Complete
	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	Complete
	Developing Data, Models, and Tools to Enhance Transportation Equity*	Amy Lubitow & Julius McGee (PSU); Raoul Lievanos (UO)	PSU, UO	Complete
	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	Complete
	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	Complete
	Vehicle Sensor Data (VSD) Based Traffic Control in Connected Automated Vehicle (CAV) Environment	Xianfeng Yang	UU	Complete
	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 Hyun, Stephen Mattingly	UTA	Complete
	A Comprehensive Examination of Electronic Wayfinding Technology for Visually Impaired Travelers in an Urban Environment*	Martin Swobodzinski & Amy Parker	PSU	Complete

*Research projects that address equity related to mobility

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 (UU) & Arlie Adkins (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)
	An Electric Bus Deployment Framework for Improved Air Quality and Transit Operational Efficiency	Xiaoyue Liu (UU); Aaron Golub (PSU); Ran Wei (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)
	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)	
Small Starts (Round 2)	Urban Transportation System Flood Vulnerability Assessment with Special Reference to Low Income and Minority Neighborhoods*	Courtney Crosson (UA)
	Promoting Environmental Justice Populations Access to Opportunities within Suburban Boomtowns: An Interdisciplinary, Mixed-Methods Approach to Addressing Infrastructure Needs*	Jandel Crutchfield (UTA)
	Visual Exploration of Utah Trajectory Data and their Applications in Transportation	Nikola Markovich (UU)
Pooled Fund	Applying an Equity Lens to Automated Payment Solutions for Public Transportation*	Aaron Golub, Jenny Liu & John MacArthur (PSU), Anne Brown (UO), Candace Brakewood (UT, Knoxville)
	Exploring Data Fusion Techniques to Derive Bicycle Volumes on a Network	Sirisha Kothuri, Joseph Broach, & Nathan McNeil (PSU), Kate Hyun & Stephen Mattingly (UTA), and Krista Nordback (UNC, Chapel Hill)

*Research projects that address equity related to mobility

Table 4: Research Projects funded by NITC in 2019

Grant	Project Title	Investigators (Univ.)
General Research (Round 3)	Is Transit-Oriented Development Affordable for Low and Moderate Income Households (in terms of H+T)?*	Reid Ewing (UU), Arlie Adkins (UA), and Nicole Iroz-Elardo (UA)
	Seamless Wayfinding by Individuals with Functional Disability in Indoor and Outdoor Spaces: An Investigation into Lived Experiences, Data Needs, and Technology Requirements*	Martin Swobodzinsk) & Amy Parker (PSU)
	New Mobility For All: Can Targeted Information And Incentives Help Underserved Communities Realize The Potential Of Emerging Mobility Options?*	Nathan McNeil, John MacArthur, and Jennifer Dill (PSU)
	Developing Strategies To Enhance Mobility And Accessibility For Community-Dwelling Older Adults*	Kate Hyun, Caroline Krejci, and Kathy Lee (UTA)
	Using Social Network Analysis To Optimize Access To Culturally Responsive And Affordable Transportation For Older (Im)Migrants*	Rebecca Mauldin (UTA), Stephen Mattingly (UTA), and Rupal Parekh (UConn)
	Green Waves, Machine Learning, and Predictive Analytics: Making Streets Better for People on Bike & Scooter	Marc Schlossberg & Stephen Fickas (UO)
	Data-Driven Mobility Strategies for Multi-Modal Transportation	Yao-Jan Wu (UA), Sirisha Kothuri (PSU), & Xianfeng Yang (UU)
	Development Of Low-Cost Radar-Based Sensor For Multi-Modal Traffic Monitoring	Siyang Cao & Yao-Jan Wu (UA)
	Evaluation of Portland Shared E-Scooter Pilot Program Goals and Outcomes	John MacArthur & Jennifer Dill (PSU)
	Scooting to a New Era in Active Transportation: Examining the Use and Safety of E-Scooters	Kristina Currans (UA), Reid Ewing (UU), and Nicole Iroz-Elardo (UU)

*Research projects that address equity related to mobility

Table 5. Student group activities during this reporting period

Student group	Activity	Date	# of participants
STEP (PSU)	Spring Movie Social - PBS "Supertunnel"	5/22/19	25
	Association of Pedestrian and Bicycle Professionals Conference	8/25 - 8/28/19	11
	Transportation and Communities Summit - student sponsorship	9/19/19	4
	Transportation and Communities Summit - Bike tour	9/20/19	9
	STEP New Student Welcome	9/25/19	6
ITE (Oregon Tech)	Henley Schools Student Outreach	5/15/19	65
	Klamath Falls Bike/Walk to work day co-sponsored by ITE, Blue Zones Project and Sky Lakes Medical Center	5/17/19	125
	ITE Western District Meeting, Monterey, CA	6/26/19	3
	ITE International Meeting, Austin, TX	7/15/19	3
	Oregon Summer Transportation Institute	7/23 - 7/29/19	8
ITE (UTA)	"Economic Development Finance Professional" presentation	4/8/19	35
	Toyota Foundation outreach	Ongoing	6
	Uber outreach	Ongoing	3
Point B (UU)	Making Strides: Creating Walkable Communities	8/28/19	175
UA	NITC/TRI Lecture Series: Alia Anderson (Toole Design Group)	4/5/19	20
	UA ITE joint meeting with ITS AZ	4/10/19	25

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

Publication type	Citation	Status
Peer-reviewed Journals (scientific, technical, or professional)	Nelson, Arthur C. et al. 2017. <i>Transit-Oriented Developments Make a Difference in Job Location</i> , Fordham Urban Law Journal, Vol 44 (4), 1079-1102	Published
	Nelson, Arthur C. 2017. <i>Transit and Real Estate Rents</i> , Transportation Research Record: Journal of the Transportation Research Board, Vol 2651(5), 22-30	Published
	Hinners, S. J., Nelson, A. C., & Buchert, M. (2018). Streetcars and Economic Development: Do Streetcars Stimulate Employment Growth?. Transportation Research Record.	Published
	Nelson, A. C., Stoker, P., & Hibberd, R. (2018). Light rail transit and economic recovery: A case of resilience or transformation?. Research in Transportation Economics.	Published
	Haghighi, Nima, 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	Published
	Chen, Z., Liu, X. C., & Wei, R. (2019). Agent-based approach to analyzing the effects of dynamic ridesharing in a multimodal network. Computers Environment and Urban Systems, 74, 126-135	Published
	(NEW) Yang, X. F., Chang, G. L., Zhang, Z., & Li, P. F. (2019). Smart Signal Control System for Accident Prevention and Arterial Speed Harmonization under Connected Vehicle Environment. Transportation Research Record, 2673(5), 61-71.	Published
	(NEW)Keeling, K. L., Glick, T. B., Crumley, M., & Figliozzi, M. A. (2019). Evaluation of Bus-Bicycle and Bus/Right-Turn Traffic Delays and Conflicts. Transportation Research Record, 2673(7), 443-453.	Published
	(NEW)Dai, Z., Liu, X. C., Chen, Z., Guo, R. Y., & Ma, X. L. (2019). A predictive headway-based bus-holding strategy with dynamic control point selection: A cooperative game theory approach. Transportation Research Part B-Methodological, 125, 29-51.	Published
	(NEW)Lievanos, R. S., Lubitow, A., & McGee, J. A. (2019). Misrecognition in a Sustainability Capital: Race, Representation, and Transportation Survey Response Rates in the Portland Metropolitan Area. Sustainability, 11(16).	Published
Peer-reviewed Published proceedings of conferences & meetings	Sleep, MD and Masley, M, (2019) Innovative and Sustainable Uses of Volcanic Ash as a Natural Pozzolan for Dust Abatement and Unpaved Roadway Improvement, Eighth International Conference on Case Histories in Geotechnical Engineering, March 24–27, 2019, Philadelphia, Pennsylvania	Published
	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.	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.	Published
	Nelson Arthur C. et al. 2018. <i>Commuter Rail Transit and Economic Development</i> . Meeting Compendium of Papers. Transportation Research Board.	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.	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.	Published

	Hibberd, Robert and A.C. Nelson. 2018. <i>Longitudinal Cluster Analysis of Jobs-Housing Balance in Transit Neighborhoods</i> . Meeting Compendium of Papers. Transportation Research Board.	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.	Published
	Nelson, Arthur C. 2018. Bus Rapid Transit and Office Rents. Annual Meeting Compendium of Papers. Transportation Research Board.	Published

Table 7: Organizations partnering with NITC projects.

Organization		Contribution Type			
Name	Location	Financial support	In-kind	Data	Other
Alliance for Walking and Biking	Washington, DC				x ¹
American Printing House for the Blind	Louisville, KY		x		
Arlington Adult Day Health Care	Arlington, TX		x		
Assoc. of Pedestrian Bicycle Prof.	Lexington, KY	x			x ¹
Catholic Charities of Fort Worth	Fort Worth, TX		x		
Central Lane MPO	Eugene, OR	x			
City of Eugene	Oregon	x			x ¹
City of Gresham	Oregon	x			
City of Orem	Orem, Utah	x			
City of Portland	Oregon		x		x ¹
City of Seattle	Washington		x		
City of Springfield	Oregon				x ¹
City of Tucson	Arizona	x			
Clevor Consulting Group	Portland, OR	x			
Colorado DOT	Denver, CO	x			
Concord Engineering	Utah	x			
District of Columbia DOT	Washington, DC	x			
ECONorthwest	Portland, OR	x			
Gayle Wells Foundation	Houston, TX		x		
Institute for Sustainable Solutions	Portland, OR	x			
Lane Transit District	Eugene, OR	x			
League of American Cyclists	Washington, DC				x ¹
Metro	Portland, OR	x	x		
Metropia	Tucson, AZ		x	x	
Mid-American Regional Council	Kansas City, MI	x			
Mountainland Assoc. of Gov't	Orem, UT			x	
moovel NA	Portland, OR	x			x ¹
Oregon DOT	Salem, OR	x	x		x ¹
OPAL Environmental Justice	Portland, OR				x ¹
PeopleforBikes	Boulder, CO	x			
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			
Regional Transportation District	Denver, CO	x			x ¹
Rowell Brokaw Architects	Eugene, OR	x	x		
Resource Systems Group (RSG)	Salt Lake City, UT			x	

Rowell Brokaw Architects	Eugene, OR	x	x		x ²
Salt Lake City Corporation	Salt Lake City, UT	x	x		
Salt Lake County Planning & Transp.	Salt Lake City, UT	x			
Sixty and Better	Fort Worth, TX		x		
Smart Growth America	Washington, DC				x ¹
St. George Area Convention and Tourism	Washington County, UT	x	x	x	
The Senior Source	Dallas, TX		x		
Town of Springdale	Utah	x	x	x	
TriMet	Portland, OR			x	x ^{1,2}
Tucson Water	Tucson, AZ		x		
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	
Virginia DOT	Richmond, VA	x			
Wasatch Front Regional Council	Salt Lake City, UT	x		x	x ¹
Washington County Engineering & Construction Services	Hillsboro, OR			x	

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

Table 8. Technology Transfer Performance Metrics

Tracking Parameter	Performance Metric	Performance Goals & Key Performance Indicators (KPI)
Outputs	Number of final reports 11 total	Produce final report that clearly articulate research results and meet NITC standards (KPI: 1 final report/project) On track
	Number of publications in trade/professional publications 10	Meet or exceed the number of publications (KPI: 1 publication/project) In progress
	Number of presentations at national/international and professional/trade conferences 6 presentations (covering 6 projects) of their work that reached an audience of 195 practitioners and academics. This represents 1.2 presentation/project.	Meet or exceed the number of presentations (KPI: 1 presentation/project) On track
	Number of events and event participants for technology transfer 20 events/last six months 82 attendees/event	Meet or exceed number of events, professional development hours and number of attendees (KPI: 25 number of events/year with average of 50 attendees/event) On track

	Number of dissemination tools and products for each completed research project 11 briefs 6 webinars	Meet or exceed the number of dissemination tools or products per project (KPI: 1 brief/project) On track
	Number of downloads for electronic tools (databases, scripts, algorithms, etc.) TBD	Meet or exceed the downloads per electronic tool (KPI: 20 downloads/tool) In progress
	Number of media stories covering NITC faculty, researchers and projects 31 in the last six months	Meet or exceed the number of media stories (KPI: 30/year) On track
	Percentage increase of online engagement with stakeholders NITC Newsletter (subscribers) - 2% NITC Newsletter (open rate) - 30% NITC Newsletter (click rate) - 7.2 % NITC Website (visitors, compared to previous 6-month period)) - 3.2% Twitter - 5% Facebook - 27% YouTube - 11% LinkedIn - 36% Instagram - 17%	Meet or exceed our currently high averages for online engagement metrics (KPI: NITC Newsletter (subscribers) - 9% NITC Newsletter (open rate) - 31% NITC Newsletter (click rate) - 8.5 %) On track
Outcomes	Number of stakeholders who collaborated on implementing research outcomes 6 stakeholders	Meet or exceed the number of stakeholders involved (KPI: TBD) In progress. Two is the baseline.
	Number of projects that reach deployment and adoption. 6 projects	Meet or exceed number of projects that reach TRL scale 4-5 (KPI: TBD) In progress. Six is the baseline.
Impacts	Number of stakeholders reporting impact from surveys 16 Practitioners 7 Faculty/Researchers	Meet or exceed response rate of stakeholders. (KPI: TBD) In progress
	Number of stakeholders who have adopted, implemented or deployed research findings or technologies: 4	Meet or exceed number of adoptions, implementations and deployments (KPI: TBD) In progress