



Program Progress Performance Report for University Transportation Center at Portland State University

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Signature:

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

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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.

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 our current research through Year 1 Projects.** During the first year, we will undertake research projects that build upon and extend our current work, and reflect priorities identified by our external advisory board. All Year 1 project work plans will be peer-reviewed.
- **Competitive, peer-review project selection process in Years 2 and 3.** Our projects in Years 2 and 3 will be selected through an open RFP process to consortium faculty. These funds will be available for projects consistent with our theme.
- **Transportation for Livable Communities Pooled-Fund Research.** We will continue the Transportation for Livable Communities Pooled-Fund Research program. This program provides regional and local agencies, such as metropolitan planning organizations and municipalities, more opportunity to be invested in research.

Leadership

- **High Standing within National and International Arenas of Transportation.** NITC faculty are well regarded nationally and internationally as leaders in their fields. They will continue to demonstrate this leadership through publishing in the top journals and presenting their work at conferences. NITC takes the concept of leadership far beyond academic circles, as evidenced by the wide dissemination of research results in professional, technical and general publications and other media.

NITC faculty help address national transportation problems through volunteer leadership on TRB committees and in other positions. By serving on these committees, faculty will 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, junior faculty to apply for committee and panel membership and recognize the activities of all faculty members.

- **Solving Regional and National Transportation Problems.** NITC researchers have a long history of conducting research that is useful in solving the problems practitioners and decision-makers face every day. 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 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 will continue to offer a rich array of degrees that serve the transportation profession.

- **Provide Experiential Learning.** A key component of our education strategy is experiential learning, which will help attract and retain students. Our campuses will continue to provide these opportunities, and NITC will seek ways to expand them.
- **Develop Innovative New Curriculum.** We will develop new, innovative curriculum consistent with transportation and livable communities 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 transportation practitioners with the latest tools and techniques.
- **Attract and Support Undergraduate Students.** NITC will build upon existing and effective mechanisms to expose K-12 students to transportation, attract and retain new undergraduate students to our degree programs, and involve undergraduates in our research.
- **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.
- **Sponsor a Transportation and Livable Communities Student Competition.** To further attract students to transportation-related professions and to promote integrated education into transportation and livability issues, NITC will sponsor an annual competition on transportation and livable communities.

Technology Transfer

- **Move Research into Practice.** Each research project will include a well-defined scope of work that identifies the problem the research will solve, how the research will address the problem and how the results will be implemented. We will continue our practice of having every final report peer reviewed by at least one academic and one practitioner with relevant knowledge. We will also identify "implementation champions" the influential decision makers, executives and other top officials who can cut through organizational obstacles to deploy research results. We will provide these champions yearly summaries of our deployment successes as a reminder of the value of our research. Researchers working closely with practitioners and champions throughout the project ensures that our research stays current with the changing needs of practice and delivers research results in the optimal format.
- **Use Innovative Approaches to Communicate Research Results.** NITC will embark on an ambitious program of sharing information through traditional and new media.

Collaboration

- **Collaborating 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
- **External collaboration.** 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.

Diversity

- **Attract underrepresented students to transportation careers.** We aim to attract underrepresented middle through high school students to transportation as a career through our partnerships with STEM and WTS.

- **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. In addition, three of our projects selected for the first year directly address equity issues.

What was accomplished under these goals?

The following progress was made under each of the above state goals.

Research

- **Build and extend our current research through Year 1 Projects.**

Thirteen projects were selected for **NITC National Year 1** funding. Of these projects, eleven projects have been completed and published on NITC's website (10 projects) or are in the final stages of the publishing process (1 project). The project still in progress is 40% completed. One project was cancelled, because the PI passed away and the necessary expertise was not anymore available at the university to complete the project ([Appendix, Table 1](#)).

- **Competitive, peer-review project selection process in Year 2**

Sixteen projects were selected for **NITC National Year 2** funding. Of the funded projects, 14 projects are completed, and have been published on NITC's website (11 projects) or are currently in different stages of the publishing process (3 projects). The two projects still active are, on average, 83% complete ([Appendix, Table 2](#)).

NITC also issued a call for **Small Starts** research proposals. The purpose of the Small Starts grant is to assist researchers who are interested in transportation but have not yet had an opportunity to undertake a small project that supports safe, healthy, and sustainable transportation choices to foster livable communities. Four Small Starts projects were funded, and all projects are completed and have been published on NITC's website ([Appendix, Table 2](#)).

- **Competitive, peer-review project selection process in Year 3**

Of the 11 projects selected for **NITC National Year 3** funding, six are completed and have been published on NITC's website. The remaining 10 projects are, on average, 76% completed ([Appendix, Table 3](#)).

Two Small Starts projects were selected in Year 3. **Matthew Sleep, Oregon Tech**, project is completed and in peer-review. **Autumn Shafer, UO**, project is 50% completed ([Appendix, Table 3](#)).

- **Transportation for Livable Communities Pooled-Fund Research.**

This program provides regional and local agencies more opportunity to be invested in research that has a national impact. Specifically, it offers a process by which cities, counties, MPOs and other regional or local agencies can pool relatively small pots of research dollars to leverage NITC funds for a single project. The project **Contextual Guidance at Intersections for Protected Bicycle Lanes**, PI **Chris Monsere**, was selected and funded through this process. Municipalities and partners provided \$125,000 cash match for this project and include the cities of Los Angeles, Chicago, Seattle, Washington, D.C., Portland, Oakland and Cambridge; TriMet; Metro; Washington County; and SRAM Foundation to support the project

The goal of this research is to provide cities around the country with better, evidence-based, information with which to design intersection treatments for protected bike lanes, allowing for safer and more comfortable bicycling conditions. The project is currently 71% percent completed and has made significant progress towards its goal. For example, the team completed a comprehensive inventory of protected bike lanes and bus stops in Salt Lake City, Denver, Portland, Seattle and Chicago. These data provide an inventory of design options the team used to identify design variations and generate a data collection and analysis tool plan.

The team has also started data collection and analysis for the project. Earlier this year, the team launched a survey to gather data from cyclists for further input. To support the surveys, videos were collected from Salt Lake City, Denver, Portland and Seattle.

Leadership

- **Shape national & international conversations on transportation research and education.**

Highlighted examples of how NITC researchers are leading the way:

- "Road Diets," in which one or more travel lanes are removed to make space for wider and safer bicycle and pedestrian space, is a common type of roadway reallocation. Traditionally, before-and-after studies have assessed the effects of roadway changes using auto travel speeds. **Miguel Figliozi, PSU,** and his student Travis Glick, PSU, (**Evaluation of Roadway Reallocation Projects**) research lead to the development of a new methodology for performing before-and-after studies of these projects. This method uses high-resolution transit data from transit providers to measure transit as well as general traffic speed, so these data serve both purposes. To validate their method, Figliozi conducted before-and-after studies of two road diets in Portland using data from TriMet (the Portland region transit agency), which has been collecting high-resolution data since around 2010. This robust dataset allowed Figliozi to quantify changes in transit speeds and travel times on both study corridors, which confirmed that the new methodology is a viable alternative to the traditional approach of evaluating the performance of this type of road improvement. This work is in particular relevant to transit agencies, in particular those that already have high-resolution data available, because it offers an alternative approach to assess the effects of roadway changes. Furthermore, this method allows practitioners to gain a more holistic understanding of how roadway changes affect all road users considering the added dimension of a transit perspective.
- Electric bicycles (e-bikes) are a relatively new mode of transportation that could substantially improve efficiency in the transportation system while creating a more inclusive biking culture for people of all ages and abilities. **John MacArthur, PSU,** and his collaborator, Christopher Cherry, University of Tennessee, Knoxville, provide insight into the emerging realm of e-bike transportation (**A North American Survey of Electric Bicycle Owners**). Their extensive survey of almost 1,800 e-bike users in the United States and Canada, revealed how e-bikes can overcome many barriers to biking. Their results, for example, suggest that e-bikes can counter the three most common barriers to biking: hills, lengthy distances to desired destinations, and not liking to arrive at destinations sweaty. In addition, e-bikes support longer trips for both recreational and utilitarian pursuit. Riders also reported feeling safer on their e-bikes than on a traditional bike. Yet, the survey also revealed that barriers to biking remain, such as a lack of comfortable bicycle infrastructure. Overall, the findings of this study provide evidence that e-bikes can indeed be a viable mode of transportation but also points to the need for policies and regulations that support and protect the use of e-bikes. Insights that are key for practitioners and policy makers.
- **Serve on national committees and panels.**
 - Faculty members and students at the five NITC member campuses currently hold 70 TRB volunteer memberships and serve on 44 different committees/task forces and 12 different NCHRP/SHRP2/NCFRP/TRB panels. Four 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 faculty were part of the team (led by ICF International) that developed FHWA's Strategic Agenda for Pedestrian and Bicycle Transportation.
 - NITC's Director, Jennifer Dill, serves on the Board of Trustees for the Transit Center and on the Board of Advisors, UC Davis Institute of Transportation Studies.

- NITC researchers provided also a significant presence at the **2018 TRB meeting** in Washington, DC. NITC members disseminated their research findings in 25 lectern sessions, 55 posters, and 3 workshops. The diversity of contributors also highlighted NITC's commitment to support current and future leaders in transportation research. Eighteen students presented research projects; students were lead authors on all of the projects they presented. A total of 36 students (6 undergraduate, 11 Masters, and 19 Ph.D. students) attended TRB. The Transportation and Land Development Committee awarded the best paper to Keunhyn Park, a Ph.D. student from UU, for his research stemming out of the NITC project, Does Compact Development Increase or Reduce Traffic Congestion?. Keunhyn will be moving on to a tenure-track position at Utah State University in the Fall of 2018.
- **NITC Director, Jennifer Dill**, continues to provide leadership through a variety of activities. During this reporting period, she shared her expertise on the panels "Beyond Bike Lanes on the Ground," at the National Association of City Transportation Officials conference (Chicago, IL, Oct 31-Nov 2), and "Achieving Equity Goals," at the North American Bikeshare Association Conference (Chicago, IL, Aug 30-Sept 1). She was also the Co-Chair of the Active Living Research Conference (Banff, Alberta, CA, Feb 2018), and a member of the Planning Committee for Advancing Obesity Solutions through Investments in the Built Environment and Transportation workshop organized by the National Academies of Sciences (Sept 12, 2017).

Solving Regional and National Transportation Problems.

The majority of NITC research focuses on solving transportation problems that can have a direct impact at the regional and national level.

- Small towns and cities outside of national parks and other major natural amenities throughout the western United States are becoming increasingly popular places to visit and live. As a result, many of these gateway and natural amenity region (GNAR) communities—including places such as Jackson, Wyoming, and Moab, Utah—are facing a variety of "big city" issues, such as severe congestion, lack of affordable workforce housing, and concerns about sprawl and density. **Danya Rumore, UU**, and students, leveraged funding from the project (**Collaborative Regional Planning: Tools and Techniques for Teaching Collaborative Regional Planning to Enhance Livability and Sustainable Transportation**) to develop tools and resources needed to train planners to work in these unique communities and to help these communities enhance livability and provide sustainable transportation options. This project not only fills an essential gap, it also provided a stepping stone to more extensive research aimed at better understanding and addressing the planning and transportation issues in GNAR communities.
- "Livability" is a broadly used term and a key goal in land use and transportation plans at the state level, but it is unclear whether people think their neighborhoods are livable, or what contributes to that perception of livability. **Rebecca Lewis** and **Robert Parker, UU**, set out to understand how residents define and perceive livability (**The Contribution of Transportation and Land Use to Citizen Perceptions of Livability in Oregon MPOs**). They did so by surveying over three thousand registered voters in Oregon asking them to answer questions about the characteristics of their neighborhoods and to identify the features they preferred or ideal neighborhood would have.

The survey results showed interesting insights into the determinants of livability, including a common "tradeoff" between affordability and livability. For example, when people said that housing affordability was more important in decisions about housing and neighborhood choice, their perception of livability in their neighborhood was more negative. Meanwhile, people who prioritized accessibility had a more positive perception of livability. Furthermore, the study revealed that access to transportation options is important to perceptions of livability. Individuals who reported better access to transportation options across a broad range of measures reported higher ratings of livability. Pedestrian improvements and natural amenities were also important to survey respondents. These results provide a broader perspective to practitioners and policy makers and offer them

insights into which characteristics of the built environment add to or detract from livability, and how local and state governments can achieve the objective of creating livable communities.

Education and Workforce Development

- **Offer Degrees and Courses in Multiple Disciplines.**

NITC universities offer 11 bachelor, 15 graduate and 6 PhD degrees in transportation, closely related fields as well as seven dual degree options. Two of the degree programs offered by the University of Utah receive support from another U.S.DOT funded UTC program.

- **Provide Experiential Learning.**

Our campuses continue to incorporate access to community partners and employment opportunities in a number of ways. The support for the student groups and student scholars are our priority method for accomplishing this goal. During this reporting period, this grant supported PSU's student group. The other NITC student group activities are included in the NITC FAST Act PPPR.

The **PSU** student group, **STEP**, hosted numerous events and supported student attendance at conferences:
Events:

- Transportation Networking Event: Small event to introduce transportation interested students and researchers (25 students)
- Meet and Greet with Young Professionals in Transportation (YPT): This event allowed students to network with other young transportation-minded persons and build a network outside of PSU in Portland (35 attendees).
- Movie Screening and Discussion: "Isla Chatarra". The discussion following the documentary focused on the impacts of transportation and car culture in Puerto Rico (10 students).
- Movie Screening and Discussion: "Bogota Change." The discussion following the documentary focused on transit planning, the effect of psychology on transportation, and how Colombia's national unity was challenged throughout these events and helped contribute to the city's successes (25 students)
- Bicycling tour of Portland's cycling infrastructure: Students learned about the infrastructure that makes Portland rank consistently as one of the best bike cities in America (4 students).
- Walking tour: Students took a walking tour along one of Portland's deadliest streets located in a low-income community. Students observed and experienced improved crossings, lighting conditions at dusk, and transit improvements through the corridor. They ended the tour at an open house run by the City of Portland, where students provided input and met with city officials and staff (2 students).
- Streetcar Seminar & Field Tour: Students heard from Dan Bower, CEO of Portland Streetcar, about the streetcar's beginnings, growth, present and future. After the seminar, students rode the streetcar to the maintenance facility and took a tour focusing on the tools and methods of maintaining the fleet of streetcars (15 students)
- Oregon ITE-Bill Kloos Memorial Traffic Bowl: Four students competed and won the Traffic Bowl competition.
- 7th TRB Aftershock, co-hosted with YPT Portland. This event provided an additional event for TRB presenters to share their research local transportation professionals. (25 attendees)
- Prospective Graduate Student Meet and Greet: Prospective students of the Maseeh College of Science and Engineering met with current students for a Q&A session in an informal setting. (5 students)
- Supported conference attendance:
 - ITE Student Leadership Summit: The summit trains student group officers in being role models and prepares them to balance coursework and extracurricular activities (2 students)
 - 2018 TRB Annual Meeting: 17 students attended the meeting. Four were Eisenhower recipients. Disciplines included 12 planning, four civil engineering, and one dual degree.

At **PSU**, the College of Urban and Public Affairs 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.**

NITC funded 13 education projects. All projects have been completed. Twelve of the projects have either already been published or are currently prepared for publication ([Appendix, Table 4](#)).

- **Educate Professionals.**

As NITC is starting to close out this grant, activities and events that focus on educating professionals are detailed in NITC's FAST Act PPPR.

- **Attract and Support Undergraduate Students.**

NITC recognizes that exposing students to transportation concepts at a young age will eventually expand the workforce pool and diversity of new professionals. NITC offers a variety of K-12 programs and outreach activities with the goal of attracting to transportation-related degree programs, including women and students of colors. These activities were funded through NITC's FAST Act funds and detailed in NITC's FAST Act PPPR.

- **Attract and Support Graduate Students.**

NITC awards scholarships to fund student-led research projects and professional development activities. To date, NITC has awarded 101 scholarships, including 50 awarded to students at PSU, 19 to the UO, 13 to UU, 14 to Oregon Tech, and five to USF.

NITC funded **four Ph.D. fellowships**. Three dissertation fellows have successfully defended their dissertation in the spring or summer of 2017 and have moved on to tenured track positions at the University of Arizona in Tucson, AZ (Kristina Currans), Texas A & M University in College Park, TX (Tara Goddard), and Utah State University in Logan, UT (Patrick Singleton). The fourth fellow, Steven Howland, is expected to defend his dissertation in the Fall of 2018.

Technology Transfer

- **Move Research into Practice.**

Researchers gave **75 presentations** on their NITC funded research at professional and trade conferences **reaching 9,732 people**. This research was also published in **21 peer-reviewed journal articles** and **five publications** in trade journals or on professional or agency websites.

- **Use Innovative Approaches to Communicate Research Results.**

NITC uses its website, Twitter (2,855 followers), Facebook (619 followers), LinkedIn (80 followers), and YouTube (443 subscribers) to communicate and promote center specific events, research results and to raise awareness of important transportation issues and findings. For example, publications of NITC reports are promoted using Twitter and LinkedIn, and these platforms as well as Facebook are used to promote events and other activities. YouTube is used to host videos from recorded seminars and webinars as well as promotional videos.

During this reporting period, the NITC website was visited 10,447 times. Users initiated sessions primarily by navigating directly to the NITC website (35%) or by entering relevant search terms into their browser (29%). The site-wide average session lasted 2 minutes, 47 seconds. Social media generated 4.3% of visits to the NITC website, with nearly all social referrals coming from Facebook (50%) or Twitter (43.5%). Twitter users visited slightly more pages than Facebook users (2.40 versus 1.76 pages), and stayed on the site longer than Facebook users (2:40 versus 1:28 min.). However, Facebook generated more new users than twitter (141 versus 106 new users).

Collaboration

- **Collaborating within our consortium.**

As NITC is starting to close out this grant, the focus has been towards guiding PIs to successfully complete their projects. As a result, most communication between the Executive Committee regarding this grant has

occurred via email, because more extensive discussions of programmatic or administrative issues were not necessary.

- **External collaboration.**

The following people and organizations were members of the NITC Advisory Board:

Alan Lehto, Director of Planning & Policy, TriMet
Michael Baltes, ITS Program Manager, Office of Mobility Innovation, Federal Transit Administration
Michael Bufalino, Research Section Manager, Oregon Department of Transportation
Wendy Cawley, Traffic Safety Engineer, Portland Bureau of Transportation
Tyler Deke, Executive Director, Bend MPO
Susan Handy, Director, National Center for Sustainable Transportation
Matthew Hardy, Program Director, Policy and Planning, AASHTO
Susan Herbel, Principal, Cambridge Systematics
Craig Honeyman, Legislative Director, League of Oregon Cities
Cameron Kergaye, Director of Research, Utah DOT
Wayne Kittelson, Founding Principal, Kittelson & Associates, Inc.
Ted Knowlton, Sustainability Director, Wasatch Front MPO
Brian Lagerberg, Director, Public Transportation Division, WSDOT
Ivan Marrero, Division Administrator, Utah Division, Federal Highway Administration
Gabe Rousseau, Safety Operations Team Leader, FHWA
Brian Saelens, Professor of Pediatrics and Psychiatry & Behavioral Sciences, Seattle Children's Hospital
Tom Schwetz, Planning & Development Manager, Lane Transit District
Ted Trepanier, Director of Product Management, Traffic, Inrix
Yinhai Wang, Director, PacTrans

Diversity

- **Attract underrepresented students to transportation careers.**

NITC is committed to recruiting underrepresented students into transportation careers. In pursuit of this goal, NITC continued to offer activities and programs during this reporting period. These activities are detailed in NITC's FAST Act PPR.

- **Priority funding to research with an equity focus.**

Eight NITC projects directly address equity issues, and all but one of these projects have been completed.

- Encouraging Low-Income Households to Make Location-Efficient Housing Choices Developing a model for Transit Oriented Development in Latino Immigrant Communities (*published*)
- Planning ahead for livable communities along the Powell-Division BRT: neighborhood conditions and change (*published*)
- What do we know about Location Affordability in U.S. Shrinking Cities? (*published*)
- Integrating Title VI and Equitable Investment in Transportation Alternatives into the MPO Transportation Planning Process (*published*)
- Racial Bias in Drivers' Yielding Behavior at Crosswalks: Understanding the Effect (*published*)
- Evaluating Efforts to Improve the Equity of Bike Share Systems (*3 reports published*)
- Evaluating and Enhancing Public Transit Systems for Operational Efficiency, Service Quality and Access Equity (*active*)

How have the results been disseminated?

NITC has published **39 final reports** on its website. NITC also created **27 Executive Summaries or Project Briefs** that distill a project's premise, key findings and recommendations into a brief document (Figure 1).

Executive Summaries provide a brief snapshot of the project and its findings while Project Briefs offer a more in-depth summary that includes research process and methods as well as infographics. Both allow readers to quickly access the essential insights of a report. They are also useful tools to promote the research at events and via social media.

Thirty research-related news stories were published on NITC's website. It was further promoted via a monthly newsletter and social media. NITC research also captured the attention of local and national **news outlets (19 stories)**.

In addition to the final reports, this research led to **26 publications** in peer-reviewed academic journals and **8 trade publications** or on professional/agency websites. NITC researchers gave **124 presentations** at conferences that reached nearly **18,922 practitioners, fellow academics, and policy makers**.

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

Expected highlights for the next reporting period include:

- Complete all remaining active projects
- Publication of remaining research reports
- Promote NITC final reports through social media and webinars
- Identify and implement specific research results with partner agencies

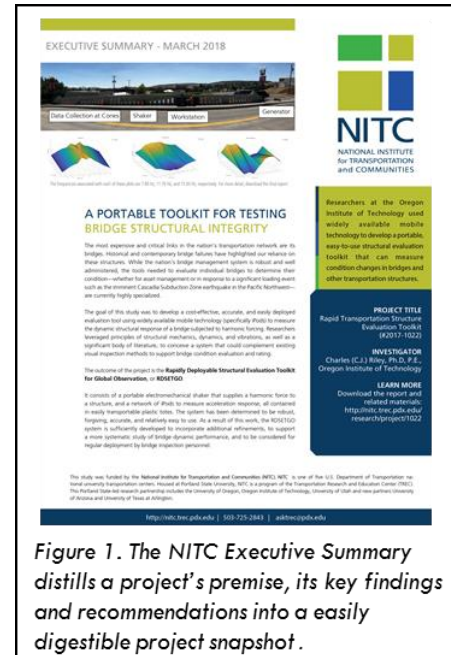


Figure 1. The NITC Executive Summary distills a project's premise, its key findings and recommendations into a easily digestible project snapshot.

2. PRODUCTS: What has the program produced?

Publications, conference papers, and presentations

A total of **39 final reports** have been published to NITC's website and PDX Scholar, PSU's online archive for scholarly publications. The research was also published as **26 peer-reviewed articles** in academic journals and **8 white papers** in trade publications or on professional or agency websites. In addition, **124 presentations** on NITC National research reached an **audience of 18,922** people at professional and academic conferences.

Website(s) or other Internet site(s)

- **NITC website** (<http://www.nitc-utc.net/> or <http://nitc.trec.pdx.edu/>): Updated daily, the website provides comprehensive information about NITC and complete research portfolio (<http://nitc.trec.pdx.edu/research/>). This includes stories about NITC research, press coverage, tech transfer resources, professional development events, and opportunities for students.
- **Twitter** (<https://twitter.com/TRECpdx/>): Through Twitter we promote NITC sponsored research, publications, reports, and events and engage our audience in discussions of topics that are trending. We also share news from consortium members, including achievements of students, student group activities, and ongoing projects.
- **Facebook** (<https://www.facebook.com/TRECpdx/>): In addition to sharing NITC research, a significant focus of Facebook is to share photos of NITC sponsored events and to connect with other organizations, researchers, and practitioners.
- **YouTube** (<https://www.youtube.com/user/askotrec/>): To reach a broader audience, we publish freely accessible video recordings of our weekly seminars and monthly webinars, as well as promotional videos.
- **LinkedIn** (<https://www.linkedin.com/company/trec-the-oregon-transportation-research-and-education-center-/>): We target transportation professionals and share tools, practical information, and our latest studies.

- **Flickr** (<https://www.flickr.com/photos/otrec/>): An archive of photo collections from NITC-related events and activities, most notably used to showcase the presence researchers and students at the annual meeting of TRB.
- **Instagram** (<https://www.instagram.com/trecpdx>): The newest platform to our strategy, we use it to showcase the people behind the research and put a face to our center. This platform has experienced the fastest growth and highest percentage of engagement.

Technologies or techniques

- NITC researcher **C.J. Riley, Oregon Tech, (Rapid Transportation Structure Evaluation Toolkit)** developed a cost-effective, accurate, and easily deployed evaluation tool using widely available mobile technology (specifically iPods) to measure the dynamic structural response of a bridge subjected to harmonic forcing. Riley's research team leveraged principles of structural mechanics, dynamics, and vibrations, as well as a significant body of literature, to conceive a system that could complement existing visual inspection methods to support bridge condition evaluation and rating. The outcome of the project is the **Rapidly Deployable Structural Evaluation Toolkit for Global Observation, or RASETGO**. The toolkit consists of a portable electromechanical shaker that supplies a harmonic force to a structure, and a network of iPods to measure acceleration response, all contained in easily transportable plastic totes. The system has been determined to be robust, forgiving, accurate, and relatively easy to use. As a result of this work, the RASETGO system is sufficiently developed to incorporate additional refinements, to support a more systematic study of bridge dynamic performance, and to be considered for regular deployment by bridge inspection personnel. Riley will demonstrate the system and share the results of the work with ODOT employees at an Oregon Department of Transportation (ODOT) Bridge Design Training session (May 16, 2018). The goal is to deploy these toolkits nationwide, starting with Oregon.
- Real-time transit information is critical for transit providers and ridership as it improves the reliability and efficiency of passenger travel. Despite its importance, barriers have prevented some transit agencies from adopting the General Transit Feed Specification (GTFS)-realtime v1.0 technology, which includes a lack of clear documentation and openly available validation tools, which significantly increases the time and effort necessary to create and maintain GTFS-realtime feeds. **Sean Barbeau, USF**, focused in his project, **Overcoming Barriers for the Wide-scale Adoption of Standardized Real-time Transit Information**, on removing some of these barriers to make real-time transit info a universal amenity. Barbeau's project involved the community-driven creation of the GTFS-realtime v2.0 format. This new version addresses the shortcomings of the earlier version by offering better guidance for transit agencies, application developers, and automatic vehicle location system vendors. The research team also collaborated with the GTFS community to create **GTFS Best Practices**. In parallel to their efforts to standardize practice, Barbeau's team developed two additional tools. This includes the **GTFS-realtime validation tool** that allows agencies, app developers and vendors to quickly identify and resolve problems. The **Transit Feed Quality Calculator tool** can be used by agencies to validate a large number of agency feeds. Both are open-source and available on GitHub for download. The next step is focusing on encouraging agencies to use GTFS-realtime v2.0 and the GTFS-realtime Validator, and developing more tools such as a data dashboard that could help agencies and vendors measure the performance of their transit systems. Barbeau also believes that GTFS could benefit from a more formal governance structure going forward, while being careful not to abandon key qualities of the grassroots approach to governance that has served the format well to date.

Inventions, patent applications, and/or licenses

Nothing to report for this period.

Other products

Nothing to report for this period.

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

What organizations have been involved as partners?

The members of the consortium include PSU, UO, Oregon Tech, UU, and the USF. Each NITC-funded research project is required to have 120% match; other projects require a 100% match. Match partners for projects funded to date include the following:

American Automobile Association	OPAL Environmental Justice Oregon
Caltrans	Oregon Department of Transportation
City of Cambridge	Oregon METRO
City of Chicago	People for Bikes
City of Eugene	Portland Bureau of Planning and Sustainability
City of Flagstaff	Portland Bureau of Transportation
City of Los Angeles	SRAM
City of Oakland	Summit Foundation
City of Seattle	Tampa Bay Network to End Hunger
City of Tigard	Transportation for America
Cleveland State University	TriMet
District of Columbia Department of Transportation	University of Arizona
Florida Department of Transportation	University of Colorado, Denver
Hillsborough County MPO	Utah Department of Transportation
Institute of Sustainable Solutions (PSU)	Utah Transit Authority
Intel	Vancouver Housing Authority
Lane Transit District	Wasatch Front Regional Council
NACCO Industries	Washington County
Natural Resources Defense Council	

Have other collaborators or contacts been involved?

Many NITC researchers also working closely or are supported in their research efforts by a variety of stakeholders above and beyond match partners. This includes non-profit organizations, private industry, public agencies, research centers or other university partners. Below is a list of these partners.

Bedford Stuyvesant Restoration Corporation in Brooklyn, New York	Philadelphia IndeGO Bike Share
Bicycle Product Suppliers Association (BPSA)	Portland Business Alliance
Bicycle Transportation Alliance	Portland Development Commission
Chicago Department of Transportation	Robert F. Bennett Institute for Transportation and Development
City of Arlington, VA	Sacramento Area Council of Governments (SACOG)
City of Gresham, OR	San Francisco Public Health Department
Cleveland Regional Transit Authority	Sustainable Cities Initiative
Community Cycling Center	Toole Design Group
Department of Land Conservation and Development (DLCD)	Town of Rockville
GTFS-realtime communities (online community)	Town of Springdale
Land Conservation Development Commission (LCDC)	Twin Cities Metropolitan Council
Mark O. Hatfield School of Government Center for Public Service (PSU)	University of Idaho
National Park Service, Zion National Park	University of Wisconsin at Milwaukee
	Venture Portland

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

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

Nothing new to report for this period.

What is the impact on the transportation workforce development?

NITC continues to expand its repertoire for professional development and continues to lead the education of the current and next generation of bicycle and pedestrian professionals. These efforts are detailed on the FAST ACT PPPR.

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

Nothing new to report for this period.

What is the impact on technology transfer?

NITC provided a variety of technology transfer activities during this reporting period. These activities are reported on NITC's FAST Act PPPR.

What is the impact on society beyond science and technology?

NITC's research has a broad reach and ultimately impacts the livelihood and daily lives of individuals. For example, Kimberly Kahn's research, **Walking While Black: Racial Bias at the Crosswalk**, continues to spark conversations and already produced tangible impacts. Her work led the Portland Bureau of Transportation (PBOT) to conduct two focus groups named for the work that inspired them "Walking While Black Focus Groups." The conversations in these groups revealed racial tensions at the Portland Bureau of Transportation and will help shape Portland's PedPDX Pedestrian Masterplan that is expected to be adopted in the winter of 2018.

Findings from Kahn's research has also been a discussion point during **meetings of the City of Portland's Vision Zero Task Force**. The PBOT team leading the Walking While Black Focus groups and participants of the focus group are members of this task force and have been shaping the discussion of how Portland can reach its Vision Zero goals. For example, as part of one of the task force meeting's residents were invited to share their experiences as pedestrians, some of which turned out to echo findings of Kahn's study. Task force discussion also focused on identifying potential solutions to addressing safety issues encountered pedestrians. While the task force is still tackling how best to approach the interaction between implicit and racial bias on pedestrian safety, it is clear that Kahn's study helped move this issue to the forefront of their priorities.

5. CHANGES/PROBLEMS

Changes in approach and reasons for change

Nothing to Report for this period.

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

Nothing to Report for this period.

Changes that have a significant impact on expenditures

Nothing to Report for this period.

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

Nothing to Report for this period.

Change of primary performance site location from that originally proposed

Nothing to Report for this period.

6. Additional information regarding Products and Impacts

Nothing to Report for this period.

APPENDIX

Table 1. List and Status of Year 1 Research Projects.

NITC Grant	Project	Status
General Research	Changing attitudes toward sustainable transportation: The impact of meta-arguments, David Sanbonmatsu and David Strayer, UU	Published
	Developing a model for Transit Oriented Development in Latino Immigrant Communities: A National Study of Equity and TOD, Gerardo Sandoval, UO	Published
	Do TODs make a Difference? Phase 2, Arthur Nelson and Reid Ewing, UU, and Jenny Liu, PSU	Published
	Encouraging Low-Income Households to Make Location-Efficient Housing Choices, Andree Tremoulet, PSU	Published
	Improving Trip Generation Methods for Livable Communities, Kelly Clifton, PSU and Nico Larco, UO	Published
	Integrating Freight into Livable Communities, Kristine Williams, USF	Published
	Metropolitan Centers: Evaluating local implementation of regional plans and policies, Richard Margerum and Rebecca Lewis, UO, and Keith Bartholomew, UU	Published
	Modeling and Analyzing the Impact of Advanced Technologies on Livability and Multimodal Transportation Performance Measures in Arterial Corridors, Miguel Figliozzi, PSU	Published
	Rapidly Expanding Mobile Apps for Crowd-sourcing Bike Data to New Cities. Sean Barbeau, University of South Florida	Published
	Transportation Cost Index: A Comprehensive Performance Measure for Transportation and Land Use Systems and its Application in OR, FL, and UT, Liming Wang and Jenny Liu, Portland State University	Published
	Improving Bicycle Crash Predictions, Sirisha Kothuri, Portland State University	Completed, in review
	Creating Livable Communities through Connecting Vehicles to Pedestrians and Cyclists, John MacArthur, Portland State University	Active
	Generalized Adaptation of an Electric-Hydraulic hybrid drive system, James Long and David Culler, Oregon Institute of Technology	Cancelled

Table 2. List and Status of Year 2 Research Projects.

NITC Grant	Projects	Status
General Research	Integrating Title VI and Equitable Investment in Transportation Alternatives into the MPO Transportation Planning Process, Kristine Williams, USF, and Aaron Golub, Lisa Bates and Liming Wang, PSU	Published
	Planning Ahead for Livable Communities Along the Powell-Division BRT: neighborhood conditions and change, Lisa Bates and Aaron Golub, PSU	Published
	How Does Transportation Affordability Vary Between TODs, TADs, and Other Areas, Brenda Scheer and Reid Ewing, UU	Published
	Impacts of Bus Rapid Transit (BRT) on Surrounding Residential Property Values, Victoria Perk and Martin Catala, USF	Published
	What Do We Know About Location Affordability in U.S. Shrinking Cities? Joanna Ganning, UU	Published
	The Economic and Environmental Impacts of Smart-Parking Programs, Nicole Ngo, UO	Published
	Racial Bias in Drivers' Yielding Behavior at Crosswalks: Understanding the Effect, Kimberly Barsamian Kahn, PSU	Published
	Building Planner Commitment: Are Oregon's SB 1059 & California's SB 375 Models for Climate-Change Mitigation? Keith Bartholomew, David Proffitt and Reid Ewing, UU	Published
	Evaluation of roadway reallocation projects, Miguel Figliozzi, PSU	Published
	Evaluating Efforts to Improve the Equity of Bike Share Systems, Nathan McNeil, John MacArthur and Jennifer Dill, PSU	Published
	Effectiveness of Transportation Funding Mechanisms for Achieving National, State, and Metropolitan Economic, Health, and Other Livability Goals, Rob Zako and Rebecca Lewis, UO	Published
	Addressing Bicycle-Vehicle Conflicts with Alternate Signal Control Strategies, Sirisha Kothuri, Christopher Monsere, PSU, Krista Nordback, UNC, and Ed Smaglik, NAU	Completed, publication ready
	Framing Livability: A Strategic Communications Approach to Improving Public Transportation in Oregon, Deb Morrison, Kelli Matthews and Nico Larco, UO	Completed, in review
	Understanding the Economic Impacts of Urban Greenway Infrastructure, Jenny Liu, PSU	Completed, in review
	Small Starts	Multimodal Trip Generation, Vehicle Ownership and Use: Characterizing The Travel Patterns of Residents of Multifamily Housing, Kelly Clifton, PSU
Incorporate Emerging Travel Modes in the Regional Strategic Planning Model (RSPM) Tool, Liming Wang, Kelly Clifton and Jennifer Dill, PSU		Active
Narratives of Marginalized Cyclists: Understanding Obstacles to Utilitarian Cycling Among Women and Minorities in Portland, Oregon, Amy Lubitow, PSU		Published
Travel to Food: Transportation Barriers for the Food Insecure in Tampa Bay, Kevin Salzer, USF		Published
Active and Public Transportation Connectivity between North Temple TOD and Jordan Park River Trail, Ivis Garcia Zambrana, UU	Published	
How Do Stressed Workers Make Travel Mode Choices That Are Good For Their Health, Safety, and Productivity? Liu-Qin Yang, PSU	Published	

Table 3. List and Status of Year 3 Research Projects.

NITC Grant	Projects	Status
General Research	Does Compact Development Increase or Reduce Traffic Congestion? Reid Ewing, UU and Shima Hamidi, UTA	Published
	Electric Bicycle Nationwide Survey, John MacArthur, PSU, and Christopher Cherry, UT	Published
	Rapid Transportation Structure Evaluation Toolkit, Charles Riley, Oregon Tech	Published
	Overcoming Barriers for the Wide-Scale Adoption of Standardized Real-time Transit Info, Sean Barbeau, USF	Published
	The Contribution of Transportation and Land Use to Citizen Perceptions of Livability in Oregon MPOs, Rebecca Lewis and Robert Parker, UO	Published
	Transferability & Forecasting of the Pedestrian Index Environment (PIE) for Modeling Applications, Kelly Clifton, PSU	Active
	Biking and Walking Counts: Data Quality, Nathan McNeil and Kristin Tufte, PSU	Active
	Understanding Economic and Business Impacts of Street Improvements for Bicycle and Pedestrian Mobility, Jenny Liu and Jennifer Dill, PSU	Active
	Evaluating and Enhancing Public Transit Systems for Operational Efficiency, Service Quality and Access Equity, Ran Wei, UU, and Liming Wang and Aaron Golub, PSU	Active
	SEGMENT: Applicability of an Existing Segmentation Technique to TDM Social Marketing Campaigns in the United States, Philip Winters and Amy Lester, USF	Active
	V2X: Bringing Bikes into the Mix, Stephen Fickas, UO	Active
	Does Compact Development Increase or Reduce Traffic Congestion? Reid Ewing, UU, and Shima Hamidi, UTA	Active
Small Starts	The Use of Mt. Mazama Volcanic Ash as Natural Pozzolans for Sustainable Soil and Unpaved Road Improvement, Matthew Sleep, Oregon Tech	Completed, in review
	Engaging Youth to increase their Transportation System Support, Understanding, and Use, Autumn Shafer, UO	Active

Table 4. Education Projects Funded by Grant.

Projects	Link to Deliverable(s)
Multimodal Transportation Planning, Kristine Williams, USF	NITC-ED-851 Final Report.pdf
Phase 2: Multimodal Transportation Planning Curriculum for Urban Planning Programs, Kristine Williams, USF	NITC-ED-998 Phase 2 Final Report , see also Project Brief
Graduate-level Civil Engineering Transportation Course, Roger Lindgren, Oregon Tech	NITC-ED-853 Final Report
Dynamic Evaluation of Transportation Structures with iPod-Based Data Acquisition Charles Riley, Oregon Tech	NITC 985 Final Report , see project page for additional resources
Advanced GIS: Smart Transportation, Christopher Bone, UO	NITC-ED-850 Final Report.pdf
Design of an Aging Population, Trygve Faste and Kirsten Muenchinger, UO	NITC 784 Final Report
Pedestrian and Transit Oriented Design, Keith Bartholomew, UU	NITC-ED-852 Final Report
Introduction to Scientific Computing for Planners, Engineers, and Scientists Liming Wang, PSU	NITC 854 Final Report , see also Executive Summary.pdf
Instructional Modules for Obtaining Vehicle Dynamics Data with Smart Phone Sensors, Roger Lindgren, Oregon Tech	NITC 1073 Final Report , see also Project Brief
Collaborative Regional Planning: Tools and techniques for teaching collaborative regional planning to enhance livability and sustainable transportation, Danya Rumore, UU	NITC 1074 Final Report , see also Project Brief
Graduate Certificate in Sustainable Transportation, Keith Bartholomew, UU	Final report completed but not published
A Smart Bike Project for Grades 6-12, Stephen Fickas, UO	Final report completed & to be published; see also You Tube tutorial
Pedestrian Observation and Data Collection Curriculum, Jennifer Dill, PSU	Final report completed & to be published