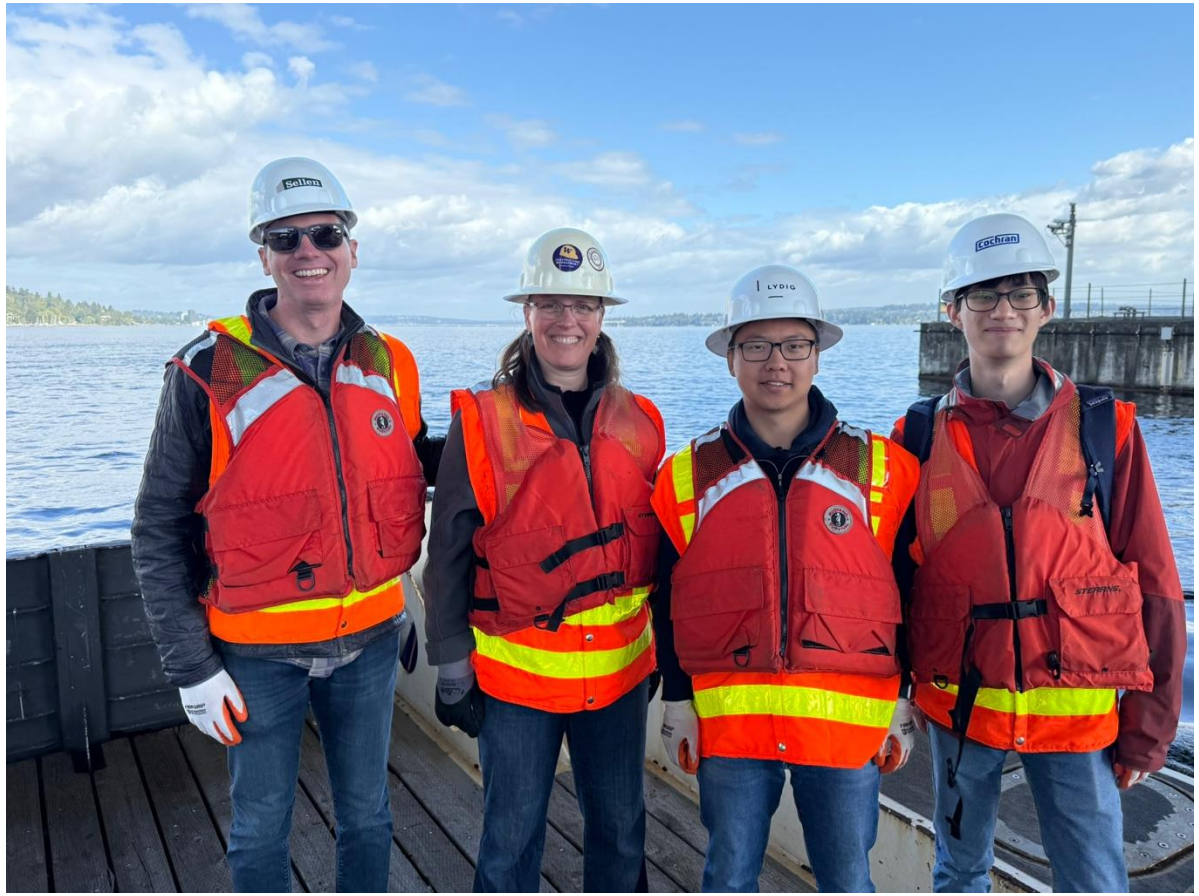
Mobility Innovation Center 2024 Annual Report

MOBILITY INNOVATION CENTER

mobility@uw.edu

UW COMOTION
Your Innovation Partner

Collaboration is the key to innovation



Innovation goes beyond technology or gadgets; it's about the people who discover new ways to solve problems. When it comes to mobility, the challenges are significant and deeply felt by our communities. Our work is about bringing innovative ideas together to address these challenges. And none of this progress would be possible without those who dare to forge this new path forward, knowing it's a challenging but essential journey.

We are proud to share several achievements from 2024. Highlights include:

- The release of "Finding Common Ground: Best Practices for State Policies Supporting Transit-Oriented Development" to guide data-driven discussions on housing and transportation policy
- A conversation about how academia is an essential innovation partner with both the public and private sectors at the Transportation Research Board's Annual Meeting in Washington, D.C.
- Positioning the Digital Twin technology evaluation to deploy on the I-90 Homer Hadley Bridge in 2025
- Releasing a new blueprint to electrify mobility (eMobility) hubs that will improve how people connect with the transportation system

We launched four new projects addressing regional transportation needs: a Unified Control Center to pilot virtual transit operations, the Health Through Housing Pedestrian Mapping project to crowdsource sidewalk gap data, a revamped Seattle Commute Study to understand travel patterns, and a data visualization initiative for future transportation demands for the year 2050.

Looking ahead, we have exciting new projects on deck, including initiatives for zero-emission transportation at ferry terminals, AI-powered safety improvements, and a zero-emission strategy for ride-hailing at key transportation facilities.

These achievements reflect the strength of the cross-sector, interdisciplinary partnerships that propel and sustain our work. I'm grateful to have you on this journey and for your support of the Mobility Innovation Center's work this year. Together, we're changing the way we move people and products throughout the region and beyond.

B. Treece

Barton G. Treece, III, PTP
Director
Mobility Innovation Center at the University of Washington

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Mobility Innovation Center at the University of Washington, since 2016

BY THE NUMBERS

185
Collaborators

20
UW departments

35
Projects launched

The Mobility Innovation Center brings together the knowledge, talents, and expertise of the University of Washington with partners from private and public sectors to solve real-world challenges facing our transportation system.

UW and Challenge Seattle teamed up in 2016 to establish a multidisciplinary research center that is committed to advancing our region's economy and quality of life by helping to build the transportation system of the future. Within this "center for social good" model, UW researchers collaborate directly with industry partners to scope implementation-ready projects.

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Advancing innovation with the public and private sectors

Open innovation relies on partnerships and collaboration to blend various ideas and approaches to solve problems and stimulate innovation. In January, Mobility Innovation Center Director Bart Treece co-presented at an Open Innovation Workshop during the Transportation Research Board's Annual Meeting in Washington, D.C. Along with representatives from the public and private sectors, he shared how academia plays a role by applying research outside the university through commercialization, evaluation, and de-risking pilot projects and new initiatives.

In addition to the workshop, Treece co-authored *Start-Up Solutions: Advancing Innovation Through Public–Private Partnerships* for the October issue of TR News.

The workshop and TR News issue were developed and led by the TRB Committee on Research Innovation Implementation Management.

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Read TR News October-December 2024: doi.org/10/17226/28568

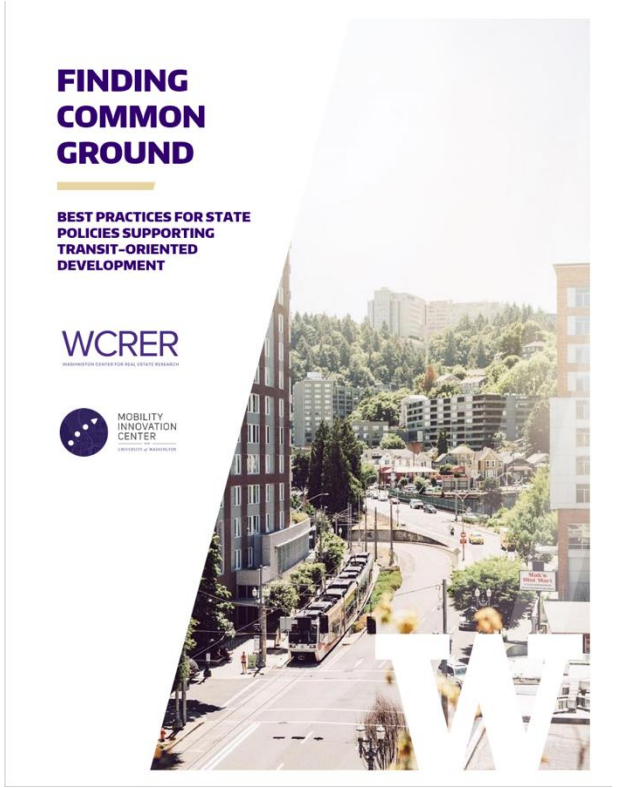
Transit-oriented development – best practices

Transit-oriented development (TOD) can address both housing and transportation needs with dense, mixed-use, vibrant neighborhoods that have travel options to reduce car dependency and related greenhouse gas emissions. While there is general agreement about these benefits, it can be difficult for decision-makers to reach consensus on how to support the development of TOD and what the role of states might be in creating an equitable and sustainable framework.

The authors of “Finding Common Ground: Best Practices for State Policy Supporting Transit-Oriented Development,” released in January, looked at California, Oregon, Massachusetts, and British Columbia and interviewed policy experts, developers, and legislators to identify key themes and elements for transit-oriented development from a state-level perspective to promote private investment.

- **Increase densities**
- **Incorporate TOD policies in zoning reforms**
- **Reduce or remove parking minimums**
- **Reduce development permitting times and uncertainty**
- **Align definitions and requirements**
- **Provide technical assistance and supply relevant data to support local jurisdictions**
- **Provide financial subsides**

This project was led by Mason Virant, Associate Director of the Washington Center for Real Estate Research, Christian Phillips, Urban Design and Planning PhD candidate, Steven Bourassa, Director for the Washington Center for Real Estate Research, and Arthur Acolin, Associate Professor at the Runstad Department of Real Estate.



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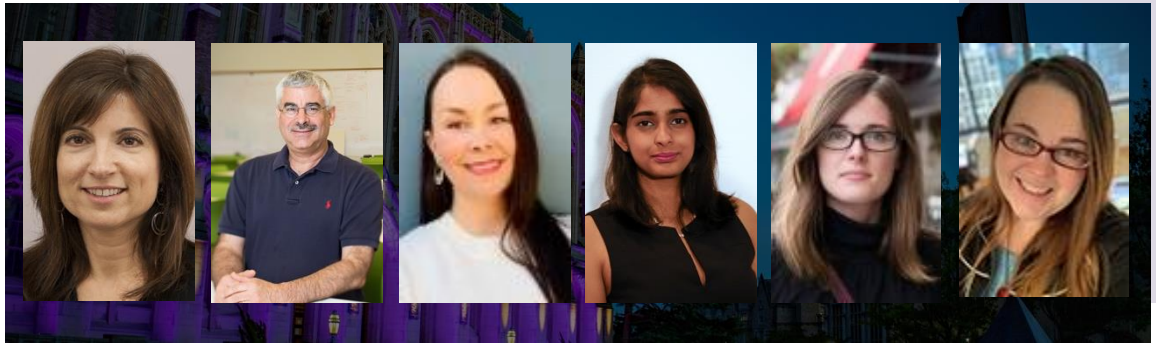
Key highlights and full report: https://mic.comotion.uw.edu/projects/transit-oriented-development-evaluation-of-best-practices-for-state-level-policy/

Unified Control Center (UCC)

How does Sound Transit operate an expanded system without building additional facilities? Research scientist Sonia Savelli, co-director of the Center on Collaborative Systems for Safety, Security, and Resilience (CoSSaR), launched the first phase of the Unified Control Center to evaluate operational workflows to improve system efficiency. Working with Sound Transit, the research team interviewed several staff members to understand their responsibilities and challenges within the existing system and completed the following:

- Conducted on-site observations at multiple Sound Transit facilities across various operational groups.
- Studied control center operations at other transit agencies for comparison and best practices.
- Participated in security training to understand protocols and procedures.
- Shadowed fare ambassadors to observe frontline challenges and interactions.
- Identified key operational challenges to refine and prioritize with Sound Transit stakeholders.
- Developed detailed personas and journey maps to represent different user experiences.
- Mapped challenges to stakeholder groups and specific role types to inform targeted solutions.
- Established and convened a steering committee to guide project direction and implementation.



A final report will include recommendations and alternative solutions to the traditional control center functionality and physical space and will be delivered in spring 2025. A phase 1+ will commence to carry this work forward into the summer, with a potential second phase to develop and build on the recommendations and concepts. Supporting Dr. Savelli on this project is professor Mark Haselkorn, researchers Susanna Lammervo, Bhoomika Bangalore Rajeeva, Ridley Jones LeDoux, and project manager Brie Yost.

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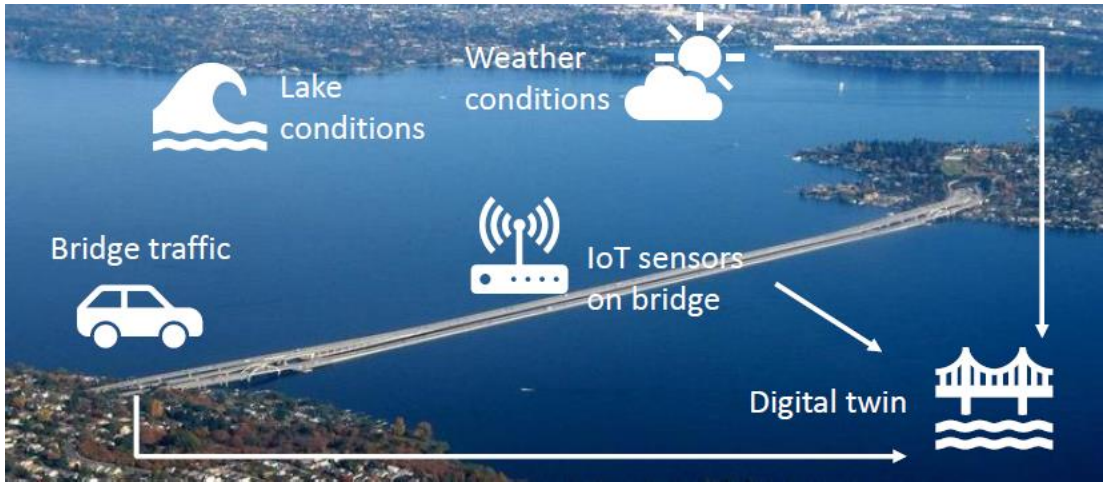
Project information:
mic.comotion.uw.edu/projects/unified-control-center-innovation-project/

I-90 Digital Twin – progress



In 2024 we made significant progress on the I-90 Digital Twin project. Digital twin technology, which uses real-time sensors placed on a physical structure to feed a computer model, has the potential to provide better infrastructure insights.

With the help of our partners, we developed a data management and cybersecurity plan, built our IoT hub to house the data, and lab-tested equipment. The research team conducted a field visit to the bridge with WSDOT to verify equipment placement and logistical needs.

Now that the sensors are all acquired, we will deploy on the bridge in early 2025 for a year of data collection and analysis. This proof-of-technology project will evaluate the benefits, limitations, and tradeoffs that an agency or agencies could expect using IoT digital twin technologies for asset management, maintenance, and operations.

The final report will be delivered at the end of 2025.

U.S. Department of Transportation Federal Highway Administration · WSDOT · STIC State Transportation Innovation Council · ABC UTC

CIVIL & ENVIRONMENTAL ENGINEERING UNIVERSITY of WASHINGTON College of Engineering · Bentley · T-Mobile

COLLEGE OF BUILT ENVIRONMENTS UNIVERSITY of WASHINGTON · Microsoft Azure · WSP · CHALLENGE SEATTLE

SEMTECH

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Project information: mic.comotion.uw.edu/announcement/what-it-takes-to-build-a-digital-twin-of-one-of-the-longest-floating-bridges-in-the-world-that-will-soon-also-run-trains/

Early interest in Digital Twin progress

As the project progressed toward a 2025 equipment deployment, the research team and their work gained interest for their early efforts. Carrie Sturts Dossick, professor of construction management and an expert in digital twin and cybersecurity research, presented the latest project developments at the National Institute of Building Sciences, the Institute of Electrical and Electronics Engineers (IEEE) symposium on Digital Twins and the Metaverse, and the Cyber-Care Symposium on Safeguarding Transportation Cybersecurity in the Digital Age.

The World Bridge Engineering Conference featured a session on the digital twin project with Professor Travis Thonstad from Civil and Environmental Engineering, PhD candidate Ori Borjigin, and graduate student Timothy Bernard.

The project team also presented to traveling legislators from across the country when the National Conference of State Legislators visited UW CoMotion and the Mobility Innovation Center.

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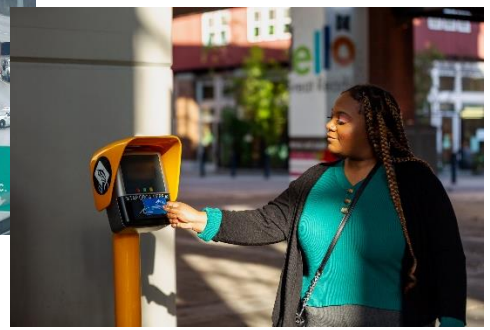
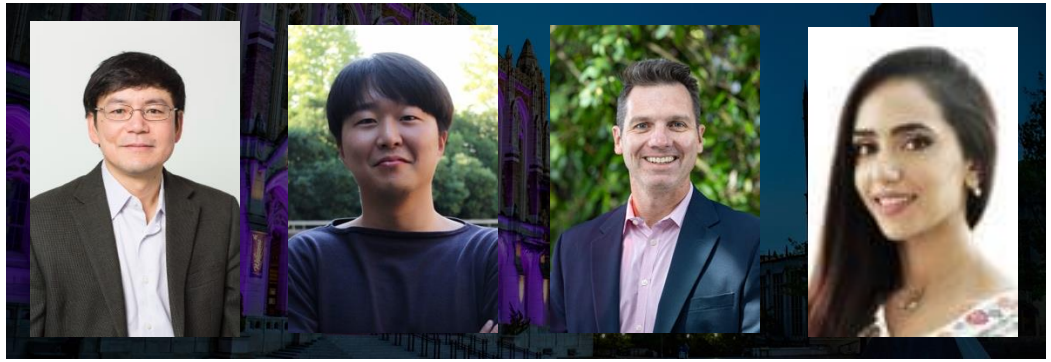
Project information: mic.comotion.uw.edu/announcement/what-it-takes-to-build-a-digital-twin-of-one-of-the-longest-floating-bridges-in-the-world-that-will-soon-also-run-trains/

Seattle Commute Study 2024 update

Building off the groundbreaking 2022 report, the Mobility Innovation Center is teaming up again with Commute Seattle to improve the biannual survey that captures how people travel to the office and elsewhere.





Partnerships in mobility: The survey design was led by Professor Qing Shen from the Department of Urban Design and Planning, PhD candidate Hoseok Sa, Mobility Innovation Center Director Bart Treece, and senior research assistant Lamis Ashour, who worked collaboratively with Commute Seattle and the city of Seattle to ensure questions and data gathered provide the most value for transportation providers and employers.

The 2022 report made front-page headlines in the Seattle Times, which declared “Your old workweek is extinct!” Improved data gathering shows the effects of telecommuting and hybrid work.

New for the 2024: In addition to capturing a large sample of the 600,000 people who work in the city, the survey will increase responses from small businesses with fewer than 100 employees and from people in post-secondary educational institutions, such as two-year colleges and trade schools. The results will be released publicly in late March 2025.

DEPARTMENT OF URBAN DESIGN & PLANNING
UNIVERSITY of WASHINGTON
College of Built Environments

Commute Seattle

Seattle Department of Transportation

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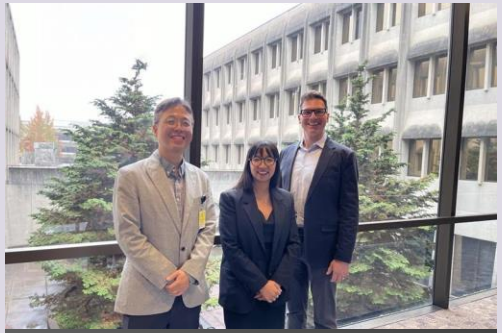
Project information: mic.comotion.uw.edu/projects/seattle-commute-study-2024-2025/

Still Charging Forward: P3 for bus base electrification gains recognition



Prof. H.W. "Chris" Lee, Huoi Trieu, Bart Treece

Professor Lee, and Bart at ITS Washington

The results of a successful project don't end when the report or the research is complete. Following the release of "Charging Forward: Evaluating Public-Private Partnerships for Electric Bus Base Conversion to Support a Zero-Emission Fleet," the Mobility Innovation Center shared the findings with the transportation and engineering industries and policy leaders.

In addition to a featured article by the UW College of Built Environments, the work of construction management professor Hyun Woo "Chris" Lee, senior research scientist Laura Osburn, and Mobility Innovation Center Director Bart Treece was highlighted by the American Society of Civil Engineers online publication in March.

Along with King County Metro's Zero Emissions Director Huoi Trieu, Lee and Bart briefed the Washington State Transportation Commission at the October meeting in Olympia on the report findings and opportunities to apply the research into practice. The research was also highlighted at the ITS Washington conference in November.

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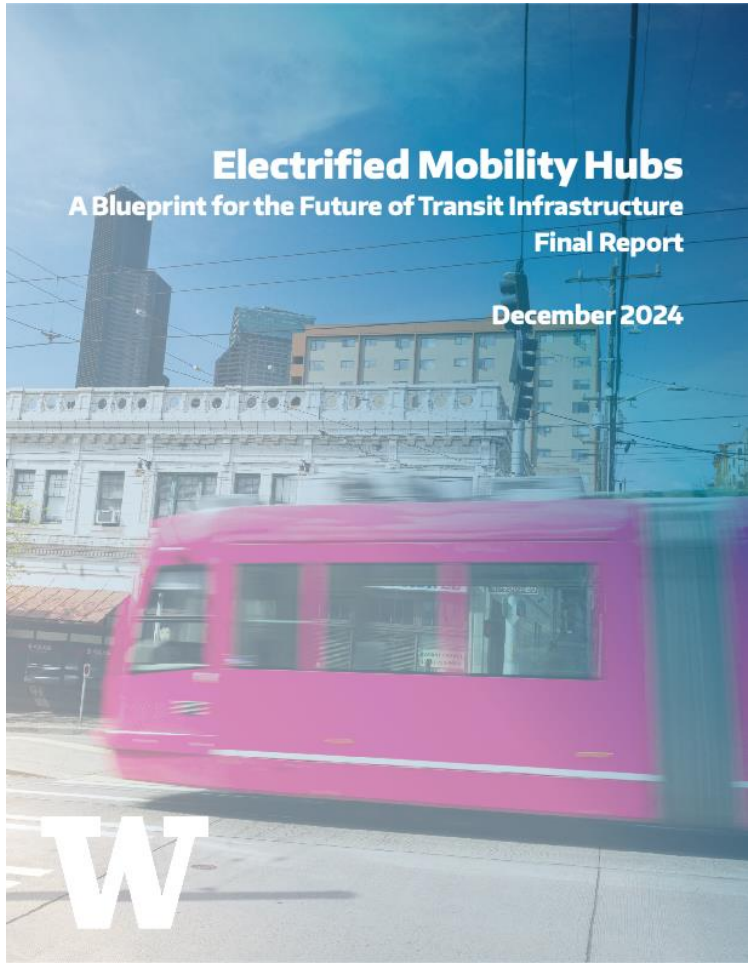
Key highlights and full report: mic.comotion.uw.edu/announcement/charging-toward-a-zero-emission-transit-fleet/

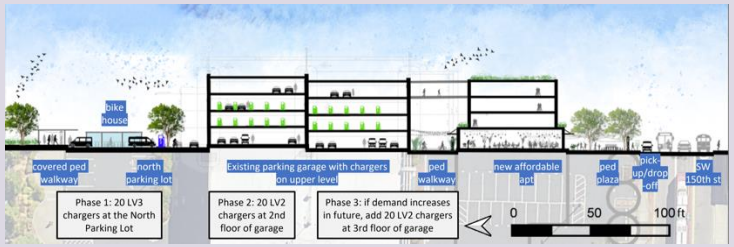
Mobility hubs – electrification



We are in the midst of a transportation evolution driven in part by two things that have been around for some time: electricity and micro-mobility, like bikes and scooters. Electrified or “eMobility” simply puts a charge into many of the modes that we already have, but in doing so, can provide better access for people of all abilities, make taking a bike more appealing (especially where we have hills), and also promote a cleaner fuel source. But how do you create a space where anyone can catch an electric bus, charge an electric car, or park an e-bike to connect all these ways we now travel?

In December, the Mobility Innovation Center released a blueprint for electrified mobility hubs. The project, funded by King County Metro, Sound Transit, Seattle City Light, and Challenge Seattle, with support from the Seattle Department of Transportation, represents a new approach for the joint conceptual development of the features, functions, and operations of electrified mobility centers.

Led by Professor Jan Whittington from the Department of Urban Design and Planning, along with professors Rachel Berney and Hyun Woo “Chris” Lee, researchers combined a series of workshops over the course of a year, informed by principles of urban design, urban mobility data, field research, industry contacts, and literature reviews, in a graduated process of urban design. The results provide several recommendations for public agencies and partners. In addition, this work provided a foundation for a new project with Washington State Ferries for eMobility hubs at ferry docks using Bremerton as focus area. The two-year project will begin in July.



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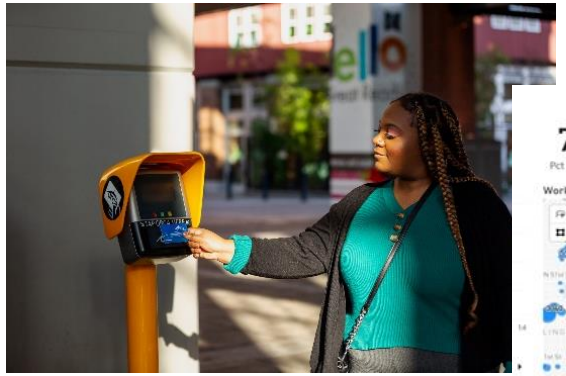
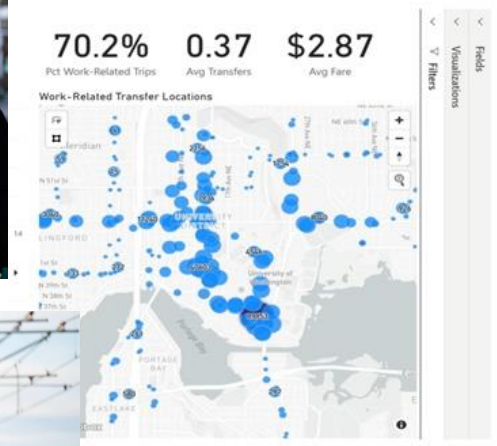
Key highlights and full report:
mic.comotion.uw.edu/announcement/how-electrified-mobility-hubs-can-supercharge-the-future/

ORCA business intelligence

A Mobility Innovation Center project continues to provide valuable insights on transit use





Regional transit agencies and employers are continuing to see improved insights into user origins and destinations, and also the busiest transit lines for commuters, through this project that is now in operation. This year, Dr. Ryan Avery from the Washington State Transportation Research Center (TRAC) led additional work to enhance and manage the dashboard application that visualizes usage and high-boarding locations for the ORCA (One Region Card for All) network in Central Puget Sound.

Partnering with transit agencies and employers: Transit passes, such as ORCA, generate a significant amount of data, but it's not easy for a transit agency to process what's available to see where people are coming from and going. By collecting all the taps into a dashboard, transit agencies and employers who provide passes can see the busiest routes. This data is potentially helpful for private employer shuttle planning to complement public transit service. TRAC will operate and maintain the system for another year. This was funded by partners in the public and private sectors.

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Project information:
mic.comotion.uw.edu/projects/orca-data-business-intelligence/

Working across campus – Evans School of Public Policy & Governance

King County Metro sought to gain improved insights into who pays for trips. In a pilot project, KCM worked with the Mobility Innovation Center and the Evans School for Public Policy to hire a graduate student and consult with professor Steven Page to conduct data and analyze the results to help improve fare outreach programs and farebox collection.

As a graduate research assistant for the University of Washington Evans School, Cassandra Paschall worked with King County Metro's research team to assist in the design, collection, and analysis of a research study on rider experiences. This included both a survey and an observational component. In the fall 2024 quarter, she worked with Metro staff and their consultant team to complete in-person survey recruitment and observational study on bus routes throughout the county. Following data collection in the winter 2025 quarter, she assisted with cleaning, analyzing, and presenting the initial results from the onboard survey and boarding behavior data collection effort. We found that most riders engaged in some sort of fare payment when boarding, and that Metro's ridership is younger and more likely to be renters compared to the county's overall demographics.

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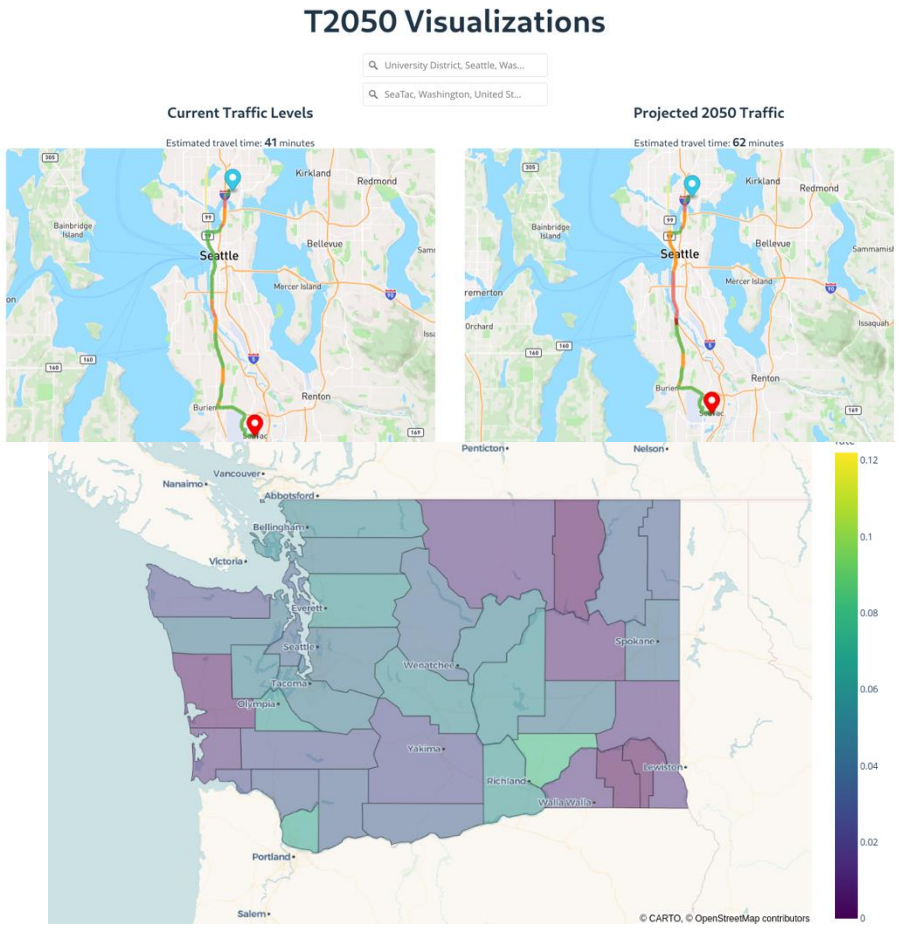
Transportation visualization 2050



Regional transportation planning uses models based on existing data with forecasted trends that provide some guidance for potential future system needs. Although useful for developing long-range strategies, it can be difficult to visualize the potential effects to the transportation system with, or without large infrastructure enhancements. Using population forecasts for the year 2050, this project, led by professor Cecilia Aragon from the Department of Human Centered Design & Engineering, will incorporate regional planning data into a visualization platform, evaluate travel times and costs for individual households and freight, and evaluate passenger air travel demand, cost, and availability.

The first phase will be complete in spring 2025 and is sponsored by the Washington State Department of Transportation, King County, and Challenge Seattle, with contributions from Alaska Airlines, Boeing, and Microsoft. Additional team members include Ryan Avery from the Washington State Transportation Research Center, Bart Treece from the Mobility Innovation Center, and Andrea Figueroa and Vishnupriya Napa Ravikumar from Human Centered Design & Engineering.

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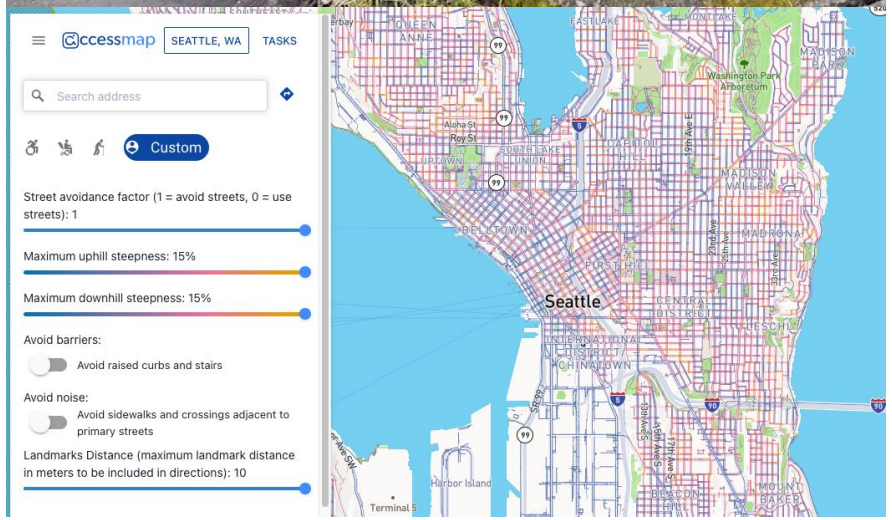
Project information: mic.comotion.uw.edu/projects/transportation-2050-visualization-scenarios/

Health Through Housing accessible mapping



Accessible pedestrian infrastructure, such as connected sidewalks and safe crossings of busy streets, are necessary for people to walk or roll to transit or nearby destinations. However, the absence of accurate mapping depicting preferred walking and rolling routes, along with the associated accessibility conditions, pose a barrier for individuals with mobility challenges. This lack of information leaves them hesitant to walk or roll to access transit or essential services, uncertain of potential obstacles that may hinder their trip.

Residents at Health Through Housing (HTH) facilities have diverse mobility needs, some have a difficult time accessing transit and reaching places for their essential daily needs. Many HTH sites were former hotels or motels and do not have adequate pedestrian access. By leveraging accessible technology and data-collection methods, King County Metro's collaboration with the Taskar Center for Accessible Technology at the University of Washington will inform HTH residents of the accessibility of nearby pedestrian infrastructure. In addition, a dataset of accessibility information will jumpstart future walkway accessibility enhancement projects.

This project is funded by King County Metro and led by Dr. Anat Caspi, director of the Taskar Center for Accessible Technology and principal scientist at the Paul G. Allen School of Computer Science & Engineering.

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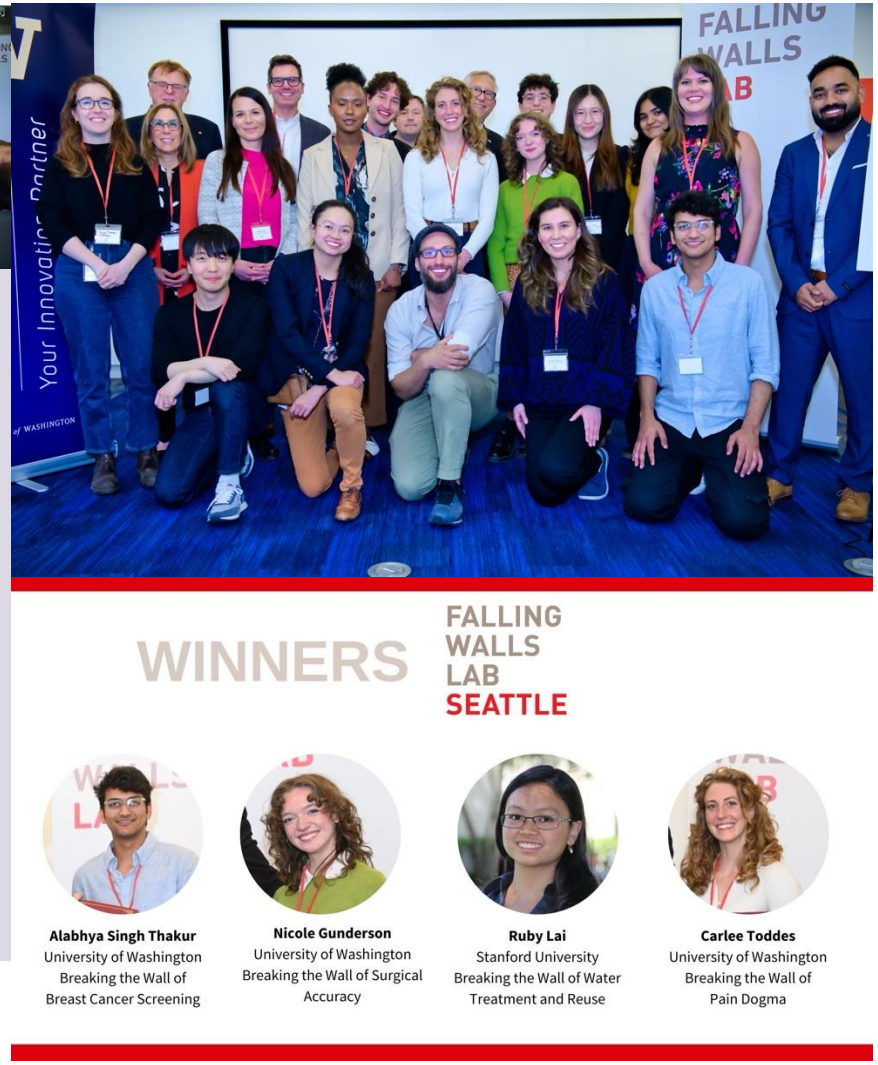
Project information: mic.comotion.uw.edu/projects/health-through-housing-pedestrian-accessibility-mapping-project/

Falling Walls – International pitch competition hosted at UW CoMotion

As part of UW Innovation Month in May, the Mobility Innovation Center and UW CoMotion hosted an international pitch competition held by the German Center for Research and Innovation to solicit breakthrough ideas to make a positive impact on science and society. Falling Walls Lab is a world-class pitch competition and networking forum that brings together a diverse and interdisciplinary pool of students and early-career professionals by providing a stage for breakthrough ideas both locally and globally. Participants had three minutes to share their ideas to the jury, which included Sarah Furman from the CoMotion patents team and Mobility Innovation Center Director Bart Treece.

The winner, Alabhya Singh Thakur, won a trip to Berlin to compete in the finals.



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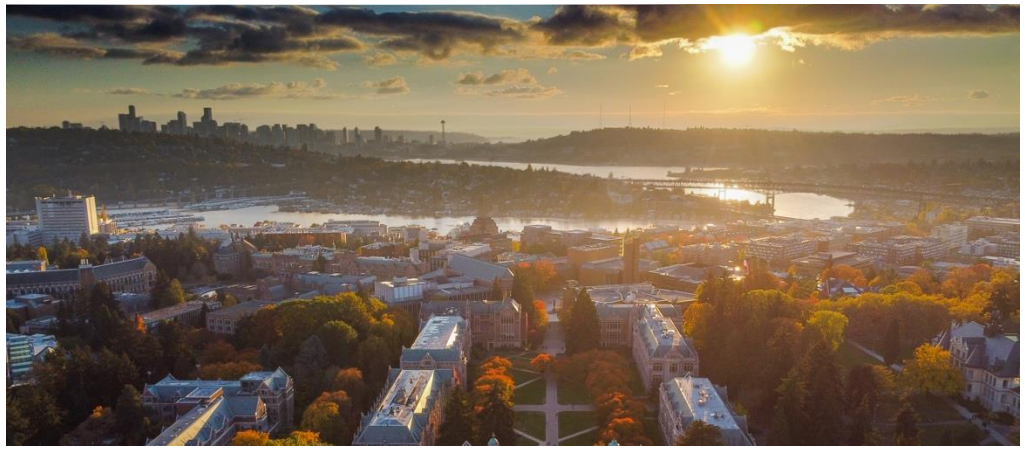
MAY 2024 INNOVATION MONTH IMAGINE NEW HEIGHTS

FALLING WALLS LAB

German Centres for Research and Innovation
Land der Ideen

UW transportation visioning



What does the future of transportation research and workforce development look like at the University of Washington? How do we partner with the public and private sectors to drive innovation? Those were some of the questions on the table when the College of Engineering convened a Visioning Committee for Transportation that brought together various colleges and departments who are contributing to the wide breadth of research needed in this field to accomplish the following:

- Identify emerging trends, technologies, and best practices in transportation research and education.
- Discuss the needs and expectations of our faculty, students, and industry stakeholders.
- Develop a strategic vision for pursuing upcoming grant opportunities.
- Recommend specific actions and milestones to achieve our vision.

The work of the committee spanned the summer and fall months and culminated in a report with a series of recommendations to the College of Engineering to be finalized and submitted by spring 2025.

Committee members include, from left to right:
Top row: Yinhai Wang, Jon Froehlich, Ashis Banerjee, Anne Goodchild, Anat Caspi, Qing Shen, Ryan Avery
Bottom row: Mark Haselkorn, Ryan Calo, Bart Treece, Bill Howe, Sonia Savelli.
Staffed by Muhammad Karim, and Lucia Ersfeld

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New initiatives in 2025

Rainier Valley SMART – Can artificial intelligence-powered video detection systems improve safety for all users at light rail crossings in Seattle's Rainier Valley? That's what this pilot project, led by Sound Transit and the City of Seattle, intends to find out. The Mobility Innovation Center and UW professor Xuegang (Jeff) Ban from the Department of Civil & Environmental Engineering will lead the data collection and analysis to determine if the technology achieves the project goals for a potential second phase.

Port of Seattle Sustainability Evaluation – Taxis and rideshare vehicles like Uber and Lyft (known as transportation network companies, or TNCs), make several trips to SeaTac Airport and Seattle cruise ship terminals. The Port of Seattle strives to achieve sustainability goals by evaluating ways to encourage ride hailing vehicles to shift to zero-emissions models. In a two-phase project, the Mobility Innovation Center will evaluate what drivers need to make the shift and cost-modeling for potential infrastructure investments to support charging equipment. Professors Don MacKenzie from Civil & Environmental Engineering and Hyun Woo "Chris" Lee from Construction Management will each lead portions of this work, which is expected to begin in mid-2025.

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New initiatives in 2025




Shore Power: eMobility Options at the Bremerton Ferry Terminal

Ferry terminals may be the new eMobility hub to connect people to boats and potentially increase walk-on passenger travel for the fleet. To do this, professor Hyun Woo “Chris” Lee from the Department of Construction Management and professor Rachel Berney from Urban Design & Planning will collaborate with transit agencies, utility partners, cities, and other stakeholders to create a shared vision for electrified mobility (eMobility) using the Bremerton terminal as a blueprint for the state ferry system. This two-year project builds on previous eMobility hub work and begins this summer.

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Evaluating Autonomous Vehicle Technology

With the emergence of connected and autonomous vehicles, cities are trying to find the best ways to work with the industry with goals of safety and efficiency for all users of the road. In partnership with the Washington D.C. Department of Transportation (DDOT) and the Southwest Business Improvement District (SWBID), the Mobility Innovation Center will help test the feasibility of autonomous vehicle monitoring technologies and approaches at select locations and develop a deployment plan for the full testbed. The research and evaluation team includes professor Samer Hamdar from George Washington University, Xuegang (Jeff) Ban from the University of Washington Department of Civil & Environmental Engineering, and MIC Director Bart Treece. This initial phase will begin by the summer and last approximately 18 months.

New initiatives in 2025: Seattle Climate Innovation Hub

Launched in January

Seattle Climate Innovation Hub

Powered by 9 ZERO

COMOTION LABS Climate Tech Incubator

VertueLab

Seattle Office of Economic Development

The Seattle Climate Innovation Hub launched in January 2025! Developed through a partnership between the City of Seattle's Office of Economic Development , the University of Washington's CoMotion Labs startup incubator, global climate community 9Zero, and VertueLab—a nonprofit funder and accelerator—this collaborative hub will serve as a nexus for innovators and early-stage entrepreneurs focused on tackling the climate crisis and expanding the region's green technology sector while supporting downtown Seattle's revitalization. The Mobility Innovation Center played a central role in convening the various partners and aligning the vision that will help address one of our most pressing needs through collaboration and innovation. MIC Director Bart Treece will be involved in selecting the initial cohort of five startups working to bring their ideas to impact.

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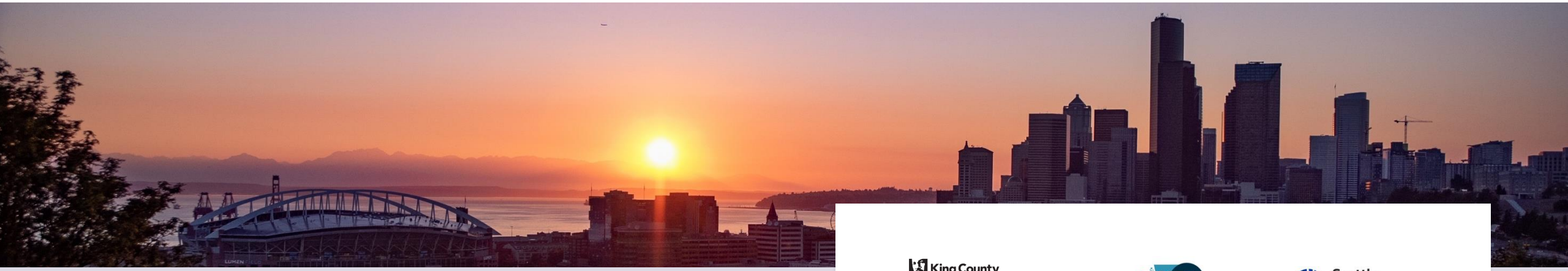
Announcement and overview: comotion.uw.edu/startups-incubation/comotion-labs/seattle-climate-innovation-hub/

A shared vision



To ensure a robust economy and quality of life for the region, Seattle needs an integrated transportation system that is reliable, safe, environmentally sustainable, forward-facing, equitable, and accessible.

The Mobility Innovation Center brings together the knowledge, talents, and expertise of the University of Washington and private and public sector partners to solve real-world challenges facing our transportation system.

To accomplish our vision, everyone must be part of the solution.

The Center is truly grateful for the support of our partners. We look forward to continuing our progress into the new year and beyond!

King County METRO
Moving forward together

Washington Roundtable

Seattle Department of Transportation

WSDOT

HNTB

UW CoMotion
Your Innovation Partner

Microsoft

Seattle Office of Economic Development

Sound Transit

WSP

Challenge Seattle

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