New Mobility Case Study

Fall 2018
Eugene

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UNIVERSITY OF OREGON
Eugene
SCI Sustainable Cities Institute
SCYP Sustainable City Year Program

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Contents

About SCI

The Sustainable Cities Institute (SCI) is an applied think tank focusing on sustainability and cities through applied research, teaching, and community partnerships. We work across disciplines that match the complexity of cities to address sustainability challenges, from regional planning to building design and from enhancing engagement of diverse communities to understanding the impacts on municipal budgets from disruptive technologies and many issues in between.

SCI focuses on sustainability-based research and teaching opportunities through two primary efforts:

1. Our Sustainable City Year Program (SCYP), a massively scaled university-community partnership program that matches the resources of the University with one Oregon community each year to help advance that community's sustainability goals; and

2. Our Urbanism Next Center, which focuses on how autonomous vehicles, e-commerce, and the sharing economy will impact the form and function of cities.

In all cases, we share our expertise and experiences with scholars, policymakers, community leaders, and project partners. We further extend our impact via an annual Expert-in-Residence Program, SCI-China visiting scholars program, study abroad course on redesigning cities for people on bicycle, and through our co-leadership of the Educational Partnerships for Innovation in Communities Network (EPIC-N), which is transferring SCYP to universities and communities across the globe. Our work connects student passion, faculty experience, and community needs to produce innovative, tangible solutions for the creation of a sustainable society.

About SCYP

The Sustainable City Year Program (SCYP) is a year-long partnership between SCI and a partner in Oregon, in which students and faculty in courses from across the university collaborate with a public entity on sustainability and livability projects. SCYP faculty and students work in collaboration with staff from the partner agency through a variety of studio projects and service-learning courses to provide students with real-world projects to investigate. Students bring energy, enthusiasm, and innovative approaches to difficult, persistent problems. SCYP's primary value derives from collaborations resulting in on-the-ground impact and expanded conversations for a community ready to transition to a more sustainable and livable future.

About Urbanism Next

The Urbanism Next Center at the University of Oregon focuses on understanding the impacts new mobility, autonomous vehicles, e-commerce and the sharing economy are having and will continue to have on city form, design, and development. The Center does not focus on the emerging technologies themselves, but instead on the multi-level impacts — how these innovations are affecting things like land use, urban design, building design, transportation, and real estate and the implications these impacts have on equity, health and safety, the economy, and the environment. Urbanism Next brings together experts from a wide range of disciplines including planning, design, development, business, and law and works with the public, private, and academic sectors to help create positive outcomes from the impending changes and challenges confronting our cities.

About Eugene, Oregon

The city of Eugene is a central hub of commercial, educational, and recreational activity in the southern Willamette Valley. Incorporated in 1862 as “Eugene City,” residents sought to turn Eugene into a center of learning. To that end, they raised the initial funding to start the University of Oregon, now the city’s flagship university and public research facility.

With a population of just over 160,000 people, Eugene is Oregon’s second largest city and the county seat of Lane County. Located in the heart of the county along the Willamette and McKenzie Rivers, Eugene is recognized for its green landscape, recreational opportunities, and sustainability efforts. The city’s slogan, “A Great City for the Arts and Outdoors,” reflects its commitment to the arts and culture as well as nature preservation efforts. Eugene is also popular for many nearby recreational opportunities, including Willamette Pass Ski Area, Fern Ridge Reservoir, and hiking and rafting along the McKenzie River.

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Executive Summary

The city of Eugene is interested in learning how its residents might benefit from technology-enabled 'new mobility' solutions to differently meet their transportation needs.

Student teams analyzed how members of a fictional or real household in Eugene could reduce their reliance on single-occupancy vehicles in daily commutes, local and regional trips, and infrequent travel destinations. For this project, new mobility is defined as a transportation mode that is:

- enabled by new technologies, including electric and autonomous vehicles, or;
- enabled by new business models or social trends, sometimes referred to as shared-use mobility (a categorization that typically includes bikesharing, carsharing, e-scooters, ridehailing, and even transit at various scales).

The implications of shifting a household's transportation habits created tradeoffs between competing priorities of cost, time, flexibility, and sustainability. In order to understand the financial implications, students were asked to analyze the full—and often overlooked—costs of vehicle ownership. Upon completing this analysis, many teams found significant savings opportunities in adopting active transportation and shared-use mobility. Beyond financial cost, teams discovered opportunities, trade-offs, and barriers to adoption.

Teams found that households best served by existing new mobility solutions lived closest to the city center. Feasibility was often complicated by demographic factors including income, age, and occupation. Cultural norms and attitudes toward car ownership played a role in whether households shifted their behavior, both for fictional household members and for the authors.

Where currently available options were not feasible, students identified modes in other markets that might benefit Eugene residents. Students also examined emerging and future technologies not currently in existence. While feasibility varied widely based on currently available modes, the city of Eugene can foster a transition to new mobility through partnerships that support multimodal first- and last-mile solutions. The City can also work to educate residents by using tools and messaging to improving awareness, perception, and trust in new mobility options.

Introduction

How could we meet our transportation needs differently? What new lifestyles and opportunities open up for individuals and households if and when a community begins to realize the emerging vision of new mobility? How are these solutions complicated by class, lifestyle, cultural norms, and living situations?

Industrial Ecology students analyzed the transportation needs of a diverse sample of Eugene residents from a range of hypothetical and real households, demographic circumstances, and living situations. The goal was to assess how these residents could reduce their reliance on cars, especially single-occupancy vehicles. Students and faculty worked to identify ways that the city of Eugene could foster a change toward a more sustainable, technology-enabled future using new mobility modes and services.

For this small-team assignment, 23 student pairs assessed the possibilities for a given household by building a few new mobility scenarios and analyzing them. Teams then wrote a short report to describe their analysis and explain their findings. Students could draw on existing modes (e.g., bikeshare and transit) and plausible future modes that are not yet present in the metropolitan area (e.g., scooters and carsharing).

To explore these possibilities, students were asked to consider competing priorities when choosing between transportation modes including cost, time, flexibility, and environmental impacts. A focus on one of these factors creates tradeoffs and hidden costs.

The assignment required that teams consider three types of trips:

- High frequency or daily activities, including trips to work, school, or wherever household members traveled on a daily basis.
- Lower frequency but still regular intra-urban trips, including grocery shopping and trips to a doctor or dentist.
- Long distance, extra-urban trips like vacations or business travel which happen on a low frequency basis.

When students recommended modes not currently available in Eugene, they were required to speculate about the details of availability, based on those modes' presence in other markets.

Findings

Findings from the 23 different scenarios illustrated a wide array of solutions as well as obstacles to adopting new mobility. Recommendations and their feasibility varied widely based on lifestyle, location, and demographic factors.

LIFECYCLE COSTS

The Cost of Vehicle Ownership

A central task of this exercise was to analyze the full cost of car ownership beyond the purchase price of the vehicle—costs that are often overlooked. Full cost accounting for ownership includes monthly car payments, gasoline, insurance, registration, parking, repairs, and occasional speeding tickets or citations. When we account for all associated costs, we find that the cost of a bikeshare rental or Lyft ride is comparable if not less expensive than vehicle ownership.

Disparities Across Income

Mobility as service solutions like carshare and ride-hail work well for higher income families, but become cost-prohibitive as families move below the area median income (AMI). Transit and bikeshare were much more affordable at the expense of flexibility. Commute origin or destinations often fell outside the PeaceHealth Rides service area and were thus not practical for daily activities. Additionally, employees in the service industry are poorly served by transit due to irregular work hours and unpredictable schedules. Contractors and self-employed workers often require personal vehicles due to variability of work sites and the need for tools and equipment.

NON-FINANCIAL IMPLICATIONS

Looking beyond financial cost, the implications of making the shift in lifestyle towards new mobility became difficult to quantify. Students discovered many intangible benefits of switching to new mobility options, including time savings, health benefits, and a reduction in household greenhouse gas (GHG) emissions. They also found barriers to adoption and feasibility including cultural norms and a lack of accessibility for some new mobility services.

Health Benefits

Scenarios that adopted active modes of transportation such as walking and cycling noted potential health benefits for household members. These modes are easily paired with transit or shared mobility as a first- and last-mile solution, such as cycling to and from transit stations or walking to rent an e-scooter. However, these modes became less feasible for older residents and those with health concerns, as well as homes located up steep hills or far from the city center.

Environmental Benefits

Active transportation modes represented the largest opportunity for household carbon footprint reduction, followed by transit and shared mobility. In one scenario, when a family of four sold one of its two vehicles and purchased bicycles for daily use, its

annual transportation emissions were reduced by 63% (Naganuma-Kahler). In the case of ride-hailing, potential GHG savings were limited by driver idle time and the lack of shared ride-hail service (i.e. Uber Pool and Lyft Line) in Eugene.

Time Gains and Losses

In alternative infrequent or long-distance travel scenarios, such as business travel to Portland via Amtrak instead of driving, household members gained leisure and personal time. Local travel with new mobility options nearly always added time to trips. Some teams found that in daily travel, currently available alternatives to driving alone added an infeasible amount of time to their commutes.

Location

Location played a key role in feasibility. New mobility services are more accessible as population density increases and, as in the case of bikeshare, can be limited within a geographic radius. The closer a household to the city center—or the higher its walk, bike, or transit score—the more feasible adopting new mobility options became. The further one lives outside the city center, the less feasible new mobility becomes.

Families

Families with children were much less successful at adopting new mobility, somewhat regardless of income. Children themselves have much more limited options due to age restrictions for services like PeaceHealth Rides, as well as liability and safety concerns. Parents responsible for drop offs, pickups, and escorting children to extracurriculars saw diminished flexibility for their own commutes. Additionally, students noted a skepticism among parents to eschew personal vehicles in case of emergency situations.

Norms and Expectations

In many scenarios, students cited cultural norms and expectations as a barrier to adopting new mobility. American families are expected to own multiple vehicles, which act not only a means of travel from point A to point B. Rather, cars act as a status symbol, an expression of identity, or a representation of cultural milestones like teaching adolescents to drive. Additionally, certain occupations such as real estate come with the expectation of vehicle ownership. One such household traded in their two vehicles for a Tesla in order to meet societal expectations while achieving sustainable mobility new goals.

Other Barriers

Other barriers to adoption included safety and perceptions of safety when using transit or walking at night. Interest in and demand for different new mobility options may be seasonal, especially in Eugene's rainy climate. Flexible and multimodal mobility scenarios helped to mitigate these challenges. Finally, most new mobility services are not currently Americans with Disabilities Aact (ADA) accessible. Uber's accessible ride-hail service is currently being tested in select cities. Transit remains the best option for ADA services.

MOBILITY GAPS

Mobility needs are distinct across income levels, but flexibility remains an issue for all. The availability (or lack thereof) of new mobility modes and services apply to all, regardless of cost, as do increased time considerations. The most feasible scenarios were multi-modal and/or had alternate options in case of unexpected events or changes in plans.

Partial Adoption

For many households, reducing to one car was an effective solution where gaps in new mobility options existed. This shift required some lifestyle changes without forfeiting too much flexibility. The family car could be used for shopping and occasional long-distance trips while household members adopted new mobility modes for daily activities.

Missing Links

The return of ride-hail companies to Eugene in 2018 created new opportunities for mobility and was particularly useful for occasional trips when households eliminated personal vehicles. Ride-hail was viewed as an effective backup mode in case of inclement weather or emergencies. However, the lack of shared ride services like UberPool and Lyft Line created cost barriers for households below the median area income and all but eliminated GHG emissions savings for those trips.

Students found limitations in fully implementing existing new mobility services. Bikeshare was only an effective solution for daily activities if the household and its frequent destinations were located within the PeaceHealth Rides service area. Students also found services available in other regions that might benefit the citizens of Eugene. App-enabled carpool matching services, such as Waze Carpool and Scoop, allow residents to connect with others to share rides. However, they are currently unavailable in the Eugene-Springfield area.

CHALLENGES BEYOND THE BOUNDARY OF THE ASSIGNMENT

The student work delivered a variety of consistent insights, but it also revealed some challenges associated with this sort of rethinking of transportation habits. While most of the students performed the mechanics of the assignment fairly well, they grappled with the assignment in a variety of ways that are telling for future efforts to transform transportation behavior.

First, many student teams failed to perform legitimate full-cost accounting for all transportation modes. Concepts such as opportunity cost and time value of money did not enter fully and consistently into many of the teams' calculations. The students can serve a potential warning for policy makers and planners: we may not always be able to rely on citizens to immediately perceive the economic trade-offs among modes. Considering that transit and other active transportation modes typically cost much less cars, poor cost-benefit intuition may prevent many individuals and households from considering cost-saving shifts to other transportation options.

Second, some student teams did not fully acknowledge the potential health benefits associated with active transportation. Given that the assignment explicitly involved a move toward more active modes, this may be a notable shortcoming.

Third, student teams did not necessarily have a coherent view of safety. While safety considerations can be valid for many transportation modes, many students simply assumed that unfamiliar modes were systematically unsafe. Several student teams also felt comfortable using their impressions and prior assumptions about alternate modes (especially transit), rather than vetting those assumptions with readily available data.

Fourth, some student teams failed to set up apples-to-apples comparisons involving time. Notably, students often used Google Maps travel times for transit, biking, and driving itineraries, but then failed to accommodate search time and walking time for parking at peak times in congested locations.

Finally, visualization of options other than the car was challenging. Many of the analyses used cars as frames of reference and often struggled to think creatively about multi-modal possibilities. For example, the inherent flexibility of the personally-owned car loomed large for many groups. It was difficult for some groups even to imagine the regular use of non-car modes with back-up use of Lyft and Uber in emergency situations.

In sum, the assignment produced many insightful analyses, but students also struggled to step outside of their personal experiences and think analytically and quantitatively about such a personal set of choices. These challenges parallel the human cognitive barriers to the widespread deployment of new mobility technologies and habits more generally.

Conclusion

New mobility solutions were most feasible for households that were younger, higher income, without children, and in areas with higher walk, bike, or transit scores. It is unclear how many different circumstances one must model to draw any broader insights. Put another way, it is unclear if there are meaningfully "representative" household circumstances from which one can extrapolate.

Often, mode replacement was not feasible as a 1:1 swap. Instead, the solution to the problem of internal combustion engine (ICE), single-occupancy vehicle (SOV) use is multimodal. Furthermore, the difficulty of this paradigm shift will require tools which might not yet exist.

Students were not tasked with assessing and refining the existing transportation system in the community, but nonetheless identified a number of implications for local policy and investments.

- Higher frequency service: Low frequency of transit service was widely viewed as a barrier to transit ridership. Fortunately, LTD's recent planning effort (Transit Tomorrow) will move the agency toward ridership over coverage and increase frequency on a variety of high volume corridors.

- Transit improvements and partnerships: Support for multimodal solutions and transit-oriented development can help bridge transit gaps and last-mile coverage problems. The City can leverage partnerships with new mobility companies to create seamless transitions between modes and improve access for more citizens. Even partnerships between ride-hail firms and transit could play a role here.

- Contingency options: Many groups indicated that the car remained appealing due to its flexibility in case of emergencies or other unexpected events. It is possible to view this as a system-level concern if individuals are collectively shying away from biking, walking, and transit to guard against infrequent situations when cars are genuinely needed. This barrier suggests the need for new programs (such as guaranteed ride home programs), as well as education and awareness-raising.

- New Mobility Education and Tools: As we saw in this exercise, not only was it difficult for our fictional households to move away from personal vehicles, but also for students to think outside social conventions and biases. Educational programs should improve awareness, perception, and trust in transit, active transportation modes, and new mobility. Online tools and platforms can help to bridge this gap.

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