The Future of Transit

Fall 2019
LTD

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MGMT 641 Industrial Ecology

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

Fall 2019 LTD

The Future of Transit

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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 that result in on-the-ground impact and expanded conversations for a community ready to transition to a more sustainable and livable future.

About Lane Transit District

LTD provides more than 10 million trips per year on its buses and EmX Bus Rapid Transit line in Lane County, Oregon. Encompassing the Eugene-Springfield metro area, LTD is a special district of the state of Oregon and led by a seven-member board of directors appointed by Oregon's Governor.

LTD also operates RideSource, a paratransit service for people with disabilities, and numerous transportation options programs to promote sustainable travel county wide, and Point2Point, an initiative that provides community members with the necessary information and resources to assist them in identifying opportunities to drive less by discovering transportation choices that meet their individual lifestyles.

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Executive Summary

Lane Transit District (LTD) asked graduate students in Joshua Skov's Industrial Ecology course to help envision how it might provide safe, affordable, and low-carbon mobility options to the community in the face of a changing urban mobility ecosystem. Students applied corporate sustainability strategy principles to assess potential opportunities and threats created by global trends in transportation.

Students analyzed potential impacts of new modes, technologies, and business models, as well as the resulting shifts in consumer behavior in six areas:

1. Micromobility as a first-last mile solution
2. Cases of smartphone apps for transit
3. Partnerships and policies for ride-hailing
4. Travel behavior, mode choice, and perceptions of transit
5. Privacy and security in the age of big data
6. Collection of consumer insights through survey instruments

Ultimately, students recommend that LTD leverage pilot projects and partnerships to explore new opportunities while adapting emerging trends to community needs in order to foster positive outcomes.

Introduction

Graduate students at the University of Oregon's Center for Sustainable Business Practices analyzed potential opportunities and threats created by global trends and regional factors that affect Lane Transit District. Students applied business and sustainability strategies to provide LTD with recommendations and adaptive strategies. Students sought to answer the following question: How can a regional transit agency adapt to the modern realities of cities and a shifting urban mobility ecosystem?

Industrial Ecology is a graduate-level management course taught in the Lundquist College of Business that analyzes business ecosystems through the lens of sustainability, and climate adaptation and mitigation strategies through the lens of business.

Though the majority of students in the course are part of the University of Oregon's Center for Sustainable Business Practices, students in Industrial Ecology represented disciplines across campus including accounting, finance, landscape architecture, and law.

Students were divided into the following teams by topic area:

- First-last Mile Analysis: This team analyzed four Eugene neighborhoods – South Hills, Harlow, River Road, and Friendly – to understand whether launching micromobility solutions might increase transit access and ridership.

- App Ecosystem Opportunities: This team explored smartphone apps aimed at simplifying urban mobility. They examined what opportunities might exist for LTD to improve service through wayfinding, digital payments, and multimodal connections.

- Partnerships and Policies for Ride-hailing: This team explored whether ride-hailing services might serve as a complement to transit through partnerships and policies, rather than an existential threat. Students conducted a case study of existing partnerships and developed recommendations for contract terms to ensure success in potential partnerships.

- Travel Behavior, Mode Choice, and Perception: This team conducted a literature review exploring the mobility choices individuals make and the tradeoffs they face, including travel time, convenience affordability, and accessibility. Students made connections to how LTD might plan future service around these factors.

- Data Disclosure, Privacy, and Security Issues: This team examined currently deployed and emerging data collection and analytics technologies. While these technologies could provide insight on travel behavior and level of service, they may pose risks to user and agency privacy.

- Design of Survey Instruments for Youth Pass and Micromobility: This team developed survey instruments to launch and measure success for the agency's forthcoming Youth Pass program.

Adapting to the Future of Transit

Students sought to answer how changes in technology, business models, consumer behavior, and urban form will affect LTD. Students explored emerging technologies and business models that are shaping the future of mobility and transit in order to provide insight, recommendations, and adaptive strategies for LTD.

Several overarching and overlapping themes emerged from the six topics of analysis, including emerging technologies, new mobility modes and business models, and how these realities fit in with a changing Lane County's institutions, governing bodies, and residents.

EMERGING TECHNOLOGIES

Platform Possibilities

Mobile applications and online platforms create an opportunity for LTD to connect residents of Lane County with its services. Wayfinding & trip-planning applications could help to increase LTD ridership by presenting information about transit service to potential customers in a convenient and user-friendly manner.

Students noted that in-house app development is one way to leverage the benefits mobile platforms present while maintaining a high level of control over data and functionality. General Transit Feed Specification (GTFS) and Open Application Program Interfaces (APIs) are examples of open-source tools that agencies may use to safely and efficiently publish information and data while connecting with third-party services that users are familiar with, such as Google Maps. However, the level of technological sophistication necessary for in-house app development and maintenance might present cost, skill, and time barriers for LTD.

Integrating with existing wayfinding apps, open-source platforms, or competing new mobility services (i.e. Uber and Lyft) could capture existing user markets and engage new customers that are not currently using LTD services. While opportunities for data collection through mobile applications might provide valuable insights, protecting the privacy and security of this data is paramount.

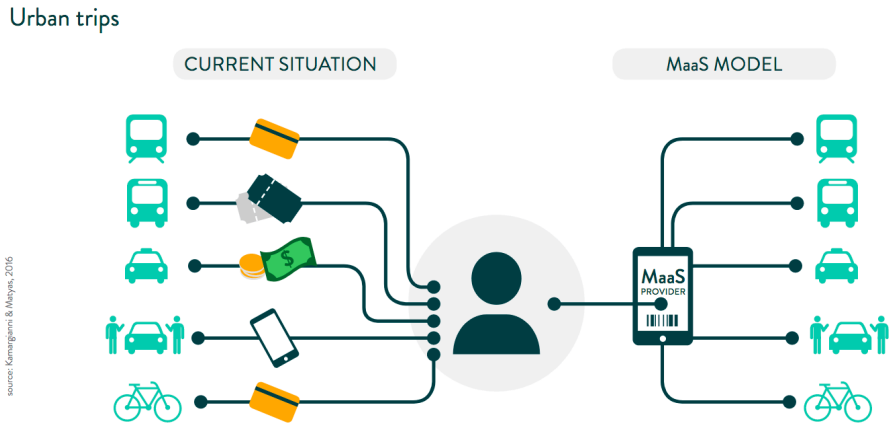
Looking to experienced peer institutions can be helpful in understanding available options for third-party app development. For example, in the San Francisco Bay Area, BART provides two options to third-party developers. Its "no strings attached" option provides limited access, while a "strings with benefits" option requires registration with the agency and a licensing agreement in exchange for more detailed data.

Finally, the emerging concept of "Mobility as a Service" (MaaS) integrates wayfinding and payment processing for many public and private modes (including transit, car-sharing, micromobility, and ride-hailing) on a

single app. Though MaaS, which began in Scandinavia, has been implemented in relatively few markets at this point, it presents significant potential benefits for transit agencies. In presenting many mobility options in a single, easy-to-use app, residents may find that it is affordable and convenient to combine transit with other modes.

The tradeoffs presented by mobile applications require future analysis of strategy and priorities. The App Ecosystem team presents a helpful list of questions for LTD to consider (Appendix A).

FIG. 1
Mobility as a service



Big Data

The revolution of so-called "big data" presents the opportunity for transportation service providers of all types to analyze rider behavior and travel patterns. Big data refers to software and tools that enable the collection, storage, and processing of large amounts of information.

LTD's newly launched TouchPass program presents a major opportunity to collect meaningful insights from the program's operations. However, data could also be shared between partners or collected and analyzed indirectly through public databases. Analytics and insights can help LTD inform long term strategy and better serve the region's needs.

While data analytics may not currently be one of LTD's core competencies, the agency can improve through partnerships. For example, partnerships with ride-hailing firms and/or micromobility companies should and must include data-sharing agreements, which could create real value for LTD's future. Additionally, increased visibility of non-transit travel behavior might help LTD understand how to create incentives for mode-switching and multimodal connections, thereby potentially increasing transit ridership.

The threat of data privacy and security looms large over the collection and storage of personally-identifiable data of any kind. However, this does not mean LTD should not pursue data collection and analysis. The agency can take a number of steps to avoid negative consequences, including creating contracts with trusted third-party services for data collection, storage, and analysis; ensuring data is anonymized and encrypted; and establishing transparency and open communication with the community

about its data collection policies and practices.

NEW MODES AND MODELS

The last decade has introduced new ways to move through urban environments, including ride-hailing, e-bikes, e-scooters, shared mobility, and MaaS. While new mobility has often been contingent upon emerging or improved technologies like lithium-ion batteries, internet-connected devices (IoT), smartphones, and big data, the business models of new mobility mark an innovation all their own.

Ride-hailing

While research shows that ride-hailing alone has a negative impact on transit ridership, several municipalities and transit agencies have engaged in partnerships with ride-hailing firms in order to leverage the unique benefits of both modes.

Partnerships with ride-hailing firms present transit agencies with the opportunity to engage with riders that it may be at risk of losing to these services. Additionally, agencies can leverage gaps in transit service and coverage. Ride-hailing can extend mobility access on late nights and weekends. Additionally, ride-hailing services can extend to more sparsely populated geographical areas where frequent transit service is costlier to provide.

Partnerships can also provide transit agencies the opportunity to negotiate with ride-hailing firms and implement contract terms that mitigate negative impacts on ridership. If programs can promote the combined use of transit and ride-hailing, agencies might increase or retain ridership while maximizing benefits to the community and its residents.

Referencing the DePaul University "Partners in Transit" case study and exploring partnership models described in context of the particular realities of Lane County, its residents, and their mobility needs, the team recommends several potential partnership models from which LTD might benefit:

1. A short-term partnership creating financial incentives for ride-hailing and EmX trips, especially for neighborhoods affected by planned route changes via Transit Tomorrow.

2. Outsource Point2Point's emergency ride home program to ride-hailing firms. This comes at both low cost and lower risk to LTD relative to other partnership opportunities as the agency already outsources this program to taxi companies.

3. A partnership with Lyft, which has partnered with a number of transit agencies around the country to include transit options within the app's trip-planning tool.

LTD can explore the feasibility of such partnerships through pilot programs, which would allow the agency a chance to measure outcomes over a limited period. A request for proposal (RFP) process is preferable to engaging firms directly, as this allows LTD to compare bids and willingness to comply with desired contract terms such as cost-sharing and liability. Contracts must also address the vulnerabilities of shared data.

Shared and Micromobility

The term "micromobility" describes any small fully or partially human-powered vehicles such as bikes, e-bikes, e-scooters, and mopeds. In recent years, fleets of shared docked and dock-less micromobility vehicles have been deployed in over 100 U.S. cities, amounting to over 84 million trips in 2018 (NACTO).

Eugene has had a bike-share program, PeaceHealth Rides, in operation for nearly two years, and the city of Eugene is exploring the possibility of an e-scooter pilot in the near future. Students analyzed how micromobility might be strategically deployed to address gaps in LTD's system and connect more people with its current and future high-frequency network.

Specifically, shared micromobility solutions might be strategically deployed, connecting residents of the Friendly, Harlow, South Hills, and River Road neighborhoods in Eugene to higher-frequency LTD transit hubs. While these neighborhoods are distinct in their demographic and topographic characteristics, each contains proposed cuts to transit service – such as lines 33, 12, 55, and 28 – as LTD transitions to a high-frequency ridership model.

Students analyzed the demographic characteristics of these neighborhoods, displayed below:

	Friendly	South Hills	Harlow	River Road	Eugene - Springfield
Residents (2018 est.)	7,000	9,400	12,900	35,000	234,224
Land Area (sq. mi)	1.8	4.3	3.1	9.1	60.0
Density (per sq mi)	3,944	2,175	4,115	3,859	3,904
Median Income	$57,240	$66,000	$48,909	$50,058	$43,450
Median Age	41.5	44.0	35.5	30.1	34.7
% College Educated*	78%	85%	75%	64%	74%

FIG. 2

Demographic characteristics of Eugene neighborhoods

* "Some College" or more

The team's findings indicate that the younger median age and larger population of the Harlow and River Road neighborhoods align well with the target market for micromobility options. This is especially poignant considering that many residents of the Harlow neighborhood attend the nearby University of Oregon. These areas are also relatively flat compared to the Friendly and South Hills neighborhoods, making them more favorable for active and light-duty motorized transportation modes like bicycles, e-bikes, and e-scooters.

From a geographic perspective, micromobility options give residents of Harlow and Friendly the greatest increase in access to points of interest in the community and to LTD's updated frequent service network. Friendly and Harlow residents are also directly adjacent to the current PeaceHealth Rides network, which has already seen multiple system expansions in its two-year history. Partnering with the bike-share program to expand LTD's borders into these neighborhoods can help to expand residents' access to mobility options.

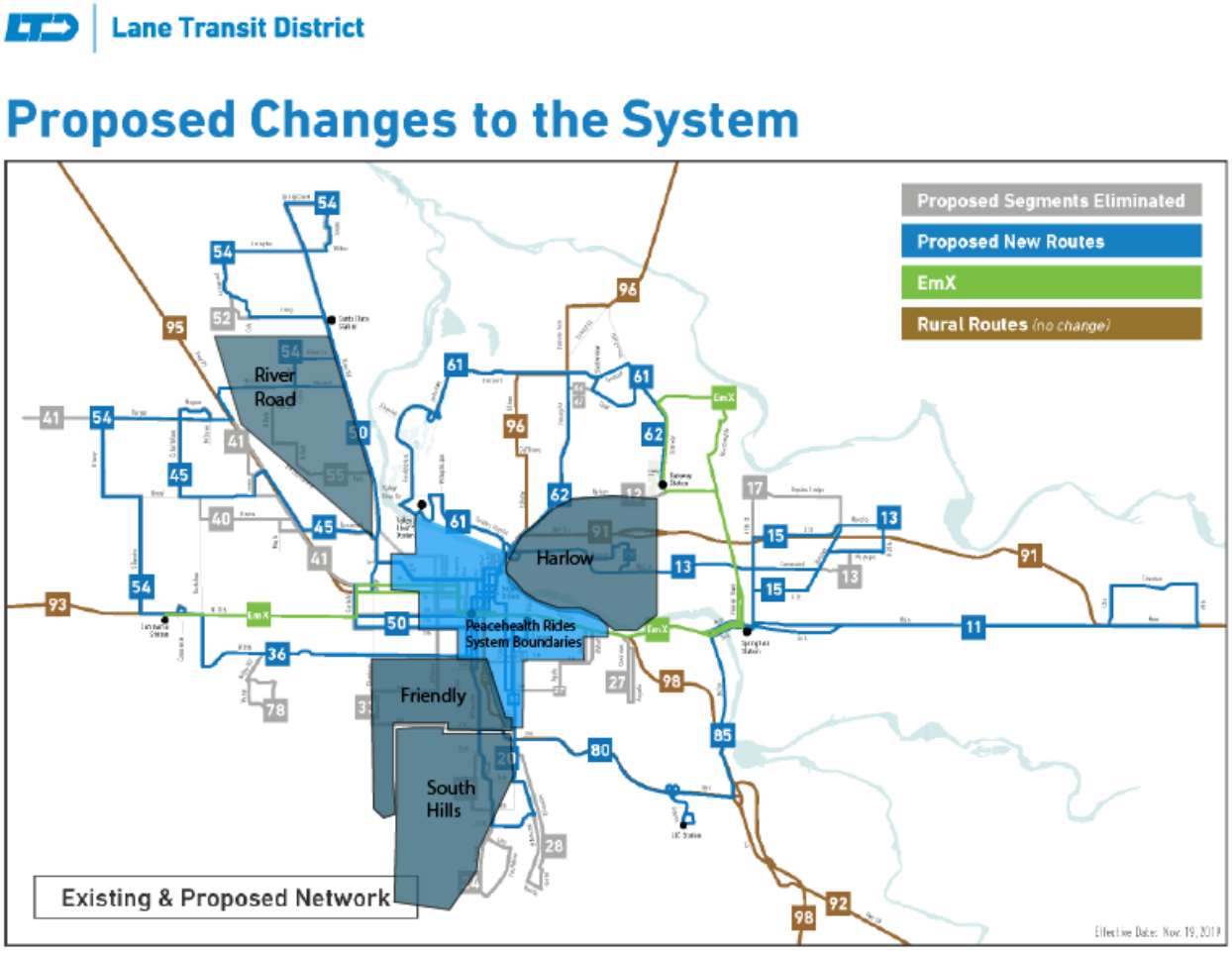


FIG. 3
First/last mile (FLM) map

It is important to remember that while micromobility may expand the travel options available to many, it cannot be a solution for all residents or for all types of trips. Factors and tradeoffs to consider when implementing micromobility programs include affordability, accessibility, and seasonality. These barriers are not without solutions, however. LTD, PeaceHealth Rides, and other local partners are already providing solutions like adaptive bike-share and reduced fare programs, which support Lane County residents by increasing their travel options.

A CHANGING LANE COUNTY

Students considered the implications of local context and current realities in the region in their analyses.

Changing Policy Landscape and Regional Strategy

The Eugene-Springfield metropolitan area is undergoing many changes to its community and regional planning efforts including Envision Eugene, MovingAhead, and changes to residential zoning, among others. LTD's transition to a high ridership model through Transit Tomorrow creates the difficult reality that some areas will lose the type of coverage to which they are accustomed. Students analyzed ways that LTD can support these communities through partnerships with new mobility services, multimodal incentives, and wayfinding applications.

Students analyzed public policy levers at the municipal level that support mode-switching and transit ridership. Restricting private car use through traffic calming or car-free zones can change the incentive structure for different modes. Economic policy mechanisms such as congestion pricing, fuel taxes, or reduced transit fares make driving more expensive relative to public transportation. However, students found that changes to parking policy through increased pricing and/or parking availability were perhaps the strongest predictor of mode choice and mode switching.

While LTD does not have control over municipal parking policy, the agency can partner with the cities of Springfield and Eugene as well as institutions and major employers such as the University of Oregon and PeaceHealth in order to alleviate parking strain and encourage transit ridership. The agency's EmGo pilot in Downtown Eugene exemplifies one such creative solution.

Changes in demographics, public perceptions, and travel behavior

Population growth, demographic change, and an aging population affect how, where, and why people travel. LTD can respond to these factors by providing inclusive and accessible options for all. Students also analyzed the perceptions of and attitudes towards different transportation modes and how these could affect transit. Negative perceptions of transit involved inconvenience, longer travel times, and safety concerns. However, changing perceptions of transit among younger generations as well as attitudes toward environmental issues and climate action might serve as an opportunity to gain public support for transit in the near future.

The team analyzed several studies that explored ways to alter perceptions of transit. These studies indicate that the most effective interventions build awareness and change misconceptions through personalized campaigns that incentivize system trials.

Changes to the built environment and urban form

Students found that changes in transportation infrastructure have a strong influence on whether transit is a more or less attractive mobility option. Dedicated bus lanes (like the EmX) as well as so-called "smart cities" technology like intelligent traffic systems, real-time location services, and signal priority, make transit much more efficient. In turn, the bus can become a much more appealing travel option.

Zoning and land use planning decisions also have a strong effect on mode choice. For example, increased housing density, walkable neighborhoods, and transit-oriented development reduce reliance on single-occupancy vehicles and increase the likelihood that transit is a viable daily travel option.

While these factors lie outside of LTD's direct control, the agency can leverage its partnerships with local governments and with ODOT to advocate for an urban form, both transportation-related and otherwise, that is conducive to multimodal travel and transit ridership.

Conclusion

Amidst a changing mobility landscape, LTD can stay current on emerging technologies and mobility trends while prioritizing community needs. Industrial Ecology students recommend the following steps for LTD to determine which mobility trends to embrace and how to modify them for a local audience:

1. Experiment and pilot
   Pilot projects give LTD the ability to experiment with new ideas and technologies for a limited period of time while minimizing risk to core services. Pilots should collect program data and feedback from community members. These data points can subsequently be analyzed to measure success and decide whether to renew, adjust, or discontinue pilots.

2. Leverage partnerships
   LTD should partner with local and regional government agencies and public institutions in order to share ideas and maximize benefits for the community. Additionally, partnerships with third-party mobility services like app developers, micromobility operators, and ride-hailing firms allow LTD to outsource technological capabilities outside its core competency while sharing the benefits to LTD riders.

3. Adapt global trends to address local needs
   While keeping watch of broader trends in mobility technology, business models, and best practices in transit, LTD should adapt these trends to the particular needs of the community. In turn, as the community grows and changes, these new technologies can help the agency update its service to changing preferences and habits.

References

International Association of Public Transport (UITP). (2019). Mobility as a Service. Brussels.

National Association of City Transportation Officials (NACTO). (2018). Shared Micromobility in the U.S.

Schwieterman, J. P., Livingston, M., & Van Der Slot, S. (2018). Partners in Transit: A Review of Partnerships between Transportation Network Companies and Public Agenices in the United States. Chaddick Insitute for Metropolitan Development at DePaul University.

Appendix A

Appendix A: Key Questions for Transit Agencies to Consider During the App Development Process

CONVENIENCE

1. What are the value propositions for public transit agencies to integrate other modes of transportation?
2. What partnerships are required to implement a MaaS solution? How would partnerships benefit consumers?
3. What rules should be required to govern mobility integration? How should transit data be treated to ensure both public usability and trust?
4. How do we look at the regulatory environment more comprehensively with convenience in mind while simultaneously setting effective policies and avoiding analysis paralysis?
5. Which data points link to specific benefits?

DATA SECURITY

1. How much control would third-party developers have over riders' data? What are the strategic plans LTD could implement to address data security concerns in partnerships with app developers or TNCs?
2. Would sharing more data points allow for innovation among private companies? Which data points would present potential security concerns?
3. What is the modern role of transit authorities? Has data become a new piece of infrastructure?

EFFICIENCY

1. What specific goals would an in-house app meet? If there are private-sector solutions, why aren't they a good fit?
2. Is it feasible for an in-house app to integrate other modes of transportation? Should LTD limit transportation modes on the platform?
3. Would an LTD app development team be funded, in part, by charging for the in-house app? What are the alternatives with limited fundings?
4. How can LTD ensure the new apps, whether third-party or in-house, create business values? What are the standards and measurements that could evaluate that?
5. What are the larger policy goals for the city and how does LTD currently meet these goals?
6. Who should be taking the lead, transit agencies or commercial integrators?
7. How strong is current transit ridership? Could partnerships with app developers or TNCs threaten ridership?
8. How do we ensure equitable access to integrated mobility solutions, especially for those without bank accounts and easy access to technology?
9. How can MaaS bring in new revenue potential for transportation providers?

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