

UC Berkeley

Recent Work

Title

Shared Mobility Policy and Modeling Workshop

Permalink

<https://escholarship.org/uc/item/1b51g9p3>

Authors

Shaheen, Susan, PhD

Cohen, Adam

Farrar, Emily

Publication Date

2019-04-01



SHARED MOBILITY POLICY AND MODELING WORKSHOP

Susan Shaheen, Ph.D., Co-Director
Adam Cohen, Researcher
Emily Farrar, Researcher

Transportation Sustainability Research Center
University of California, Berkeley



Workshop Summary

The market for personal mobility is changing rapidly due to shifting social and cultural trends, as well as technological advances, such as smartphones, information processing, widespread data connectivity, sharing, and vehicle automation. Shared, on-demand mobility represents a sustainable vision for future mobility with a reliable network of multimodal options that are available to all travelers.

On March 22, 2019, the Local Government Commission (LGC) and the Transportation Sustainability Research Center (TSRC) at the University of California, Berkeley hosted the Caltrans Shared Mobility and Policy Toolkit Workshop. The workshop facilitated a dialogue of approximately 100 participants representing local, state, and regional governments; private companies; nonprofits and community-based organizations; and educational institutions.

Key goals of the workshop include:

- Enhancing public agency (public transit, local, regional, and state) preparedness for enabling mobility solutions and technologies (both public and private);
- Learning about opportunities for public/private collaboration to deliver shared transportation services;
- Advancing incorporation of shared mobility into transportation planning and modeling approaches; and
- Preparing for the growing role of micromobility and shared automated vehicles (SAVs) in the transportation ecosystem.

Session 1. Workshop Overview & Participant Introductions

The workshop started with an overview by Professor Susan Shaheen and Adam Cohen of TSRC. Shaheen and Cohen set the stage for the day by presenting a review of the agenda, and the state of the shared mobility market, operational models, and future trends. They asked participants to consider how existing and emerging technologies, including autonomous vehicles (AVs) can be incorporated into transportation planning and modeling. Kate Meis, the Executive Director of LGC, welcomed participants and described the challenges the state of California will face regarding meeting climate goals for transportation emissions and reducing vehicle miles traveled (VMT). Meis described opportunities for shared mobility to extend the catchment of public transit and reduce costs for transportation stakeholders, including potential benefits to reduce VMT, infrastructure costs, and congestion across the state. Chris Schmidt, the Chief of the Division of Transportation Planning at Caltrans welcomed participants to the workshop and discussed how shared mobility can integrate into the existing transportation network. Schmidt asked the workshop participants to consider the cases *when* and *where* shared mobility make sense to improve accessibility, and he asked Caltrans employees to consider how to incorporate shared mobility into their projects.

Session 2. Setting the Stage: Shared Mobility Transforming California Communities

The first panel of the morning was moderated by Sally Goodman, the Title VI Program Administrator for the Alameda-Contra Costa Transit District. The panel consisted of four experts from California public agencies: Barbara Laurenson, Senior Program Manager for the Metropolitan Transportation Commission (MTC); Eric Eidlin, Station Planning Manager for the City of San Jose; Raef Porter, former Senior Analyst for the Sacramento Area Council of Governments (SACOG); and Darton Ito, Director of Innovation for the San Francisco Municipal Transportation Agency (SFMTA).

Barbara Laurenson delivered a presentation on the MTC's framework to provide shared and seamless mobility. With public transit established and maintained as the basis of shared transit, governments can work toward Mobility-as-a-Service (MaaS) or Mobility on Demand (MOD) strategies that integrate on-demand services into a considering the customer and their end-to-end journey. Eric Eidlin talked about San Jose's Diridon station as a case study for a multimodal transit-oriented employment center. Eidlin said that San Jose has an opportunity to move towards a space-efficient arrangement that works well to connect people with other assets of their cities. Raef Porter described Civic Lab, a SACOG project that tested new means of funding transportation infrastructure and investments in the context of shared mobility. SACOG revised their procurement practice for shared mobility providers, moving away from traditional requests for proposal (or RFPs) and instead reframing contract conditions as broader policy "challenges" (i.e., first- and last-mile connections, rural microtransit, on-demand paratransit) to be addressed. Darton Ito talked about how the SFMTA integrates shared mobility options into special event planning to improve safe and efficient movement. To improve mobility to and from special events, the SFMTA has worked with transportation network companies (TNCs), local government, and residents to increase modal choices and real-time traveler information services. Following these presentations, Goodman moderated a discussion of how panelists see public agencies working with private partners to promote equity and accessibility as permanent solutions beyond pilots, the challenges and lessons learned from working with mobility providers, and understanding how to coordinate mobility hubs and policy priorities across the Bay Area's 28 different public transit agencies.

Session 3. Public/Private Collaboration to Deliver Shared Mobility Options

The second panel session was moderated by Adam Cohen of TSRC. The panel consisted of four individuals representing different private entities that specialize in a variety of modal options including: Jeff Hoover, Public Partnerships Specialist from Zipcar (carsharing); Emily Strand, Data Sharing Policy Manager from Uber (TNCs or ridesourcing/ridehailing); Megan Richer, Director of Strategic Partnerships from Via (microtransit); and Avi Bar, Head of Public Policy from Waze (app-based services, including routing and carpooling). Emily Strand discussed Uber's efforts to build data products for public consumption including: the Uber Movement a platform designed to provide useful transportation planning insights from aggregated and anonymized Uber data and the SharedStreets activity tool, which provides granular pick-up and drop-off data so cities can effectively plan areas for TNC passenger loading zone pilots. Jeff

Hoover discussed the company's public partnerships to identify impacts on carsharing policies and programs. He mentioned how alignment between their business philosophy and government directives to preserve urban space for human use, not car storage, has enabled them to develop pilots that support public goals, such as reducing the space required for private vehicle parking. Megan Richer spoke about the challenges delivering fixed route transit service and opportunities for demand responsive options, such as microtransit, to support car-lite and car-free lifestyles. Richer also discussed how Via supports public transit agencies through a variety of business services, such as transportation-as-a-service, software-as-a-service, MOD, transit simulations, and other direct-to-consumer services. Avi Bar spoke about a use case with the Rio 2016 Summer Olympics, where Waze worked with the city of Rio de Janeiro to provide real-time driver information and assist in identifying traffic patterns and infrastructure investment decisions ahead of the Olympics. He also spoke to the company's "Connected Cities Program," a two-way data exchange partnership with governments to share real-time traffic data, accident information, road closures, and other planned events. Following the panelist presentations, Cohen moderated a discussion of the key challenges and opportunities private companies face in collaborating with the public sector.

Lunch Speaker

During lunch, Bhargava Sana of the San Francisco County Transportation Authority (SFCTA) delivered a presentation on how SFCTA is incorporating TNCs and AVs into San Francisco's chained activity modeling process, SF-CHAMP. The regional travel demand model predicts activity patterns, trips, and modal shares of individuals based on land use, changes in the transportation system, and changes in policies. The model indicated that public transit use would decrease and mileage per person would increase under a future scenario with high penetration of TNCs and AVs.

Session 4. Breakout Sessions

After lunch, the workshop attendees organized into three breakout sessions, two sessions focused on shared mobility policy and one on incorporating shared mobility into modeling. Facilitators at each table followed a standard protocol intended to discuss key questions applicable to shared mobility modelling outcomes and policy discussion. The protocol asked participants to spend 75 min (approximately 25 min per topic area) discussing the following questions/themes:

After the breakout sessions, facilitators of each breakout reported back the key ideas that came out of their respective discussions. Special thanks go to the following individuals for their role as facilitators and note takers during the breakout session:

1. Micromobility policy. Elliot Martin, TSRC (facilitator); Rhett Paranay, TSRC (notetaker); Adam Cohen, TSRC (facilitator); and Richard Davis, TSRC (notetaker)
2. Micromobility modelling. Herbert Higginbotham, Cambridge Systematics (facilitator) and Emily Farrar, TSRC (notetaker)

Shared Mobility Policy

The shared mobility break out groups focused on answering the following questions:

- What are key issues to advancing shared mobility policy from public and private sector perspectives?
- What are possible solutions addressing (what we know, what don't we know, what are key questions) in this area from public and private perspectives?
- What role can policy play in advancing these areas in the context of public-private partnerships?

Key issues related to shared mobility policy making at the urban, suburban, and rural levels included:

- Urban: Intercity and regional transportation agency coordination over jurisdiction in the right of way;
- Suburban: Standardizing the application of lane signage, such as sharrows (indicating car and bike shared lanes); and
- Rural: Difficulty reaching critical mass of participants for carpooling programs; potential opportunities for carsharing.

In general, this breakout group thought it was critical to develop transportation planning standards that scale rationally from urban to rural areas.

Implementation problems identified within the group included:

- Establishing flexible payment options, such as cash payment for low-income communities and communities of color;
- Establishing regulatory mechanisms, such as per-ride surcharges on ridesourcing trips allocated for transit improvements;
- Ensuring that digital applications are accessible for the hearing and sight impaired, as well as making information available to those without smartphones;
- The lack of funding flexibility to address more challenges faced by rural communities or communities with limited public transit accessibility; and
- Inefficient management of curb space at airports that creates unnecessary miles traveled by TNCs.

Strategies identified included:

- Education and outreach to convey the value of active transportation and shared mobility, particularly to youth. Instead of driver's education, high schoolers could receive "mobility education" that frames travel by car as one option among many.
- Creating a centralized, online platform that displays transportation services available in a given area and maintains data about the use of those services. This centralized platform would also facilitate a unified payment platform usable across modes and services.
- Ensuring that shared mobility options continue to work towards human-service aspects of customer services and enable access for people across all lifestyle segments.

- Identifying flexible zones as designated areas for TNC drop-offs, like school parking lots in their after-hours.

Additionally, participants noted the importance of:

- Making it affordable for people to retire to the inner city where active transportation and shared mobility is more feasible than it is in cheaper but more isolated rural areas;
- Aligning the interests of the public and private sectors in partnerships and consulting engagements;
- Identifying good candidates for relinquishment of state routes that are urbanized and allowing them to operate like city streets; and
- Opening data purchased by public sector agencies to all interested parties as a public benefit.

Shared Mobility and Modeling

The shared mobility and modeling groups focused on answering the following questions:

Key issues related to shared mobility modeling included:

- Determining modeling technology that will be best suited to incorporate shared mobility modes; examples of different modeling techniques discussed include activity-based models, four-step travel models, agent-based models, and data-driven models;
- Identification of the underlying theme or issue. Examples of underlying model goals are to minimize system VMT or to increase pedestrian safety; and
- Understanding how shared autonomous vehicles (SAVs) can impact traveler behavior (e.g., reduced commute stress, increased productivity, etc.) and how these quality of life metrics may impact mode choice and how the models are implemented.

Implementation problems identified within the group included:

- The need for sufficient data and resources to run models (e.g., TNC data);
- Difficulty translating proposed policies and mitigation efforts into modeling inputs;
- Incorporating phenomena where no data exists, such as deadheading from TNCs; and
- Better understanding of people's travel patterns. Why do people move the way they do between work and home? A better understanding of motivations may help modelers determine why people choose certain shared modes.

Next, strategies identified included:

- Models should include both motorized and non-motorized transportation modes;
- Planners needing to run models first in order to determine adoption rates (and not letting adoption rates influence models);
- Improving communication between policymakers and modelers; and
- Determining a more human scale reporting of outputs that reflects more local-level transportation experience.

Additionally, participants noted the importance of:

- Shared modes are fairly marginal in modeling projects; most of the resources are going toward fixed-route public transit and personal vehicle travel. If cities scale up demands, i.e., asking for whole streets to be dedicated to bicycles rather than just bicycle lanes, then it will be easier to incorporate shared modes into models.
- Developing an underlying framework or issue for modeling. What key issue do we want a model to address? Does it meet city or agency goals?

Session 5. Preparing for a Shared Automated Vehicle (SAV) Future of 2030

The last panel session was moderated by Ronald West, a Principal with Cambridge Systematics. The panel included speakers representing public and private sectors with experience planning and modeling for SAVs. Panelists included: Chris Ganson, Senior Planner from the California Governor’s Office of Planning & Research; Maren Outwater, Vice President of Resource Systems Group, Inc.; and David Ory, Senior Engineering Manager from WSP. Chris Ganson explained that SAVs can help reduce emissions and traffic congestion, although they must be deployed in a way that supports active transportation. Land development policies that limit sprawl are important factors for equity considerations in the context of where SAVs charge and wait when not in use. Maren Outwater talked about a SANDAG study that shows demographic and trip characteristics of TNCs. This study showed that TNC riders are typically younger, higher income, and use TNC trips to support weekday travel needs. The study also showed that this segment is more likely to be concerned about the policy impacts of SAVs. David Ory discussed the emergence of a dichotomy in framing shared mobility and user preferences that reflect “winners” and “losers” in transportation options. He described that models need to better reflect the technical and operational aspects within shared mobility choices, as well as behavior considerations to understand modern user trends in transportation of goods and services.

Closing Thoughts and Key Takeaways

In the closing session, Shaheen and Cohen delivered a brief summary of the workshop. The panels highlighted opportunities and challenges for public agencies to enable shared mobility solutions. Panels also highlighted opportunities and challenges for public/private partnerships and the incorporation of SAVs into planning and modeling activities. Workshop attendees participated in breakout sessions on the incorporation of shared mobility into planning and modeling approaches. The need for equity and data accessibility were key themes discussed throughout the day.

Key insights from the workshop include:

- There is a lack of connection between policies and communities, and there is a need for defined pathways to implement shared mobility at all levels of governance.

Caltrans Shared Mobility Policy and Modeling Toolkit Workshop Summary

- Objectivity, clarity, and honesty are important for modeling the impact of policies and emerging technologies. Modeling should not be driven by desired outcomes.
- User-centered design should continue to be a shared priority between governments and mobility providers to provide an efficient, seamless transportation experience for all users and communities.
- Workshop participants had many questions regarding how to meet public equity goals when engaging in collaborations with private companies, the improvement of communication between policymakers and modelers, and the role of public agencies in regulating the rights-of-way.

The workshop is part of a larger project that will culminate in a Shared Mobility Toolkit scheduled for release in May 2019.

Agenda

Caltrans Shared Mobility and Modeling Workshop

8:30 am – 4:30 pm, Friday, March 22, 2019

UC Berkeley Alumni House, Berkeley, CA.

8:30 am Registration

9:00 am Welcome and Overview: Introducing the Shared Mobility Policy Toolkit

- Adam Cohen/Susan Shaheen, Transportation Sustainability Research Center
- Kate Meis, Local Government Commission
- Keynote: Chris Schmidt, Chief, Division of Transportation Planning

9:30 am Setting the Stage: Shared Mobility Transforming California Communities

- Moderator: Sally Goodman, Alameda-Contra Costa Transit District
- Barbara Laurensen, Metropolitan Transportation Commission
- Eric Eidlin, City of San Jose
- Raef Porter, Sacramento Area Council of Governments
- Darton Ito, San Francisco Municipal Transportation Agency

10:45 am - *Morning Break* -

11:00 am Public/Private Collaboration to Deliver Shared Mobility Options

Private sector service providers will discuss opportunities for data sharing and public-private collaboration.

- Moderator: Adam Cohen, Transportation Sustainability Research Center
- Jeff Hoover, Zipcar
- Emily Strand, Uber
- Megan Richer, Via
- Avi Bar, Waze at Google

12:00 pm Lunch Discussion and Networking

Lunch Speaker: Bhargava Sana, Senior Transportation Modeler at the San Francisco County Transportation Authority (SFCTA) will share how SFCTA has updated their travel demand model to accommodate shared mobility options.

1:15 pm Micromobility Policy and Modeling Breakouts

Policy and Planning for Local Governments

- Moderator: Adam Cohen, Transportation Sustainability Research Center

Caltrans Shared Mobility Policy and Modeling Toolkit Workshop Summary

- Moderator: Elliot Martin, Transportation Sustainability Research Center
Incorporating Shared Mobility into Local, Regional and State Planning Models
- Moderator: Herbert Higginbotham, Cambridge Systematics

2:30 pm - *Afternoon Break*

2:45 pm Breakout Session Report Back

Rapporteurs from each breakout group summarize key points from their breakout session.

3:00 pm Preparing for a Shared Autonomous Vehicle (SAV) Future of 2030

Planning and Modeling for SAVs

- Moderator: Ronald West, Cambridge Systematics
- Chris Ganson, Governor's Office of Planning & Research
- Maren Outwater, Resource Systems Group, Inc.
- David Ory, WSP

4:15 Closing Reflections and Wrap Up

- Adam Cohen/Susan Shaheen, Transportation Sustainability Research Center

SHARED MOBILITY POLICY TOOLKIT AND MODELING WORKSHOP PARTICIPANT HANDOUT

March 22, 2019

Transportation Sustainability Research Center, UC Berkeley
Susan Shaheen, Ph.D., Adam Cohen, Rhett Parany, Michael Randolph, Emily Farrar

SETTING THE STAGE

Technology is transforming mobility by offering new ways to access transportation services and enhancing traveler engagement. Technology is spawning new businesses, services, and mobility models. The market for personal mobility is changing rapidly due to shifting social and cultural trends, as well as technological advances, such as smartphones, information processing, widespread data connectivity, sharing, and vehicle automation. In recent years, shared mobility has grown rapidly due to advancements in technology; changing consumer patterns (both mobility and retail consumption); and a combination of economic, environmental, and social forces.

What is Shared Mobility?

Shared mobility—the shared use of a vehicle, bicycle, or other travel mode—is an innovative transportation strategy that enables users to have short-term access to a mode of transportation on an as-needed basis. Shared mobility includes various service models and transportation modes that meet the diverse needs of travelers. Shared mobility can include roundtrip services (vehicle, bicycle, or other mode is returned to its origin); one-way station-based services (vehicle, bicycle, or low-speed mode is returned to a different designated station location); and one-way free-floating services (vehicle, bicycle, or mode can be returned anywhere within a geographic area).

Given the complexity of these modes and interactions with users, a new language of relevant terminology and definitions has emerged to reflect these nuances.

TRAVEL MODES

BIKESHARING provides users with on-demand access to bicycles at a variety of pick-up and drop-off locations for one-way (point-to-point) or round-trip travel. Bikesharing fleets are commonly deployed in a network within a metropolitan region, city, neighborhood, employment center, and/or university campus (SAE International, 2018) (Shaheen et. al., 2016) (Cohen & Shaheen, 2016). Bikesharing systems can be further categorized by their operational models: station-based, dockless, and hybrid. In a station-based bikesharing system, users access bicycles via unattended stations offering one-way service (i.e., bicycles can be returned to any station). In a dockless bikesharing system, users may access (unlock) a bicycle and park it at any location within a predefined geographic region. In a hybrid bikesharing system, users can check out a bicycle from a station and end their trip by either returning it to a station or a non-station location or users can pick up any dockless bicycle and either return it to a station or a non-station location within a designated geographic (or geofenced) area.



CARSHARING offers members access to vehicles by joining an organization that provides and maintains a fleet of cars and/or light trucks. These vehicles may be located within neighborhoods, public transit stations, employment centers, universities, etc. The carsharing organization typically provides insurance, gasoline, parking, and maintenance. Members who join a carsharing organization typically pay a fee each time they use a vehicle (SAE International, 2018) (Shaheen et. al., 2016a) (Cohen & Shaheen, 2016).



Courier Network Services (CNS) (also referred to as flexible goods delivery) CNS provides for-hire delivery services for monetary compensation via an online application or platform (such as a website or smartphone app) to connect couriers using their personal vehicles, bicycles, or scooters with freight (e.g., packages, food) (SAE International, 2018) (Shaheen et. al., 2016a) (Cohen & Shaheen, 2016).



MICROTRANSIT is defined as a privately or publicly operated, technology-enabled transit service that typically uses multipassenger/pooled shuttles or vans to provide on-demand or fixed-schedule services with either dynamic or fixed routing (SAE International, 2018) (Shaheen et. al., 2016a) (Cohen & Shaheen, 2016).



PERSONAL VEHICLE SHARING is defined as the sharing of privately-owned vehicles, where companies broker transactions between vehicle hosts and guests by providing the organizational resources needed to make the exchange possible (e.g., technology, customer support, driver and motor vehicle safety certification, auto insurance, etc.). This model also includes peer-to-peer (P2P) carsharing, P2P marketplace, hybrid B2C and P2P models, and fractional ownership (SAE International, 2018) (Shaheen et. al., 2016a) (Cohen & Shaheen, 2016).



TRANSPORTATION NETWORK COMPANIES (TNCs) (Also known as ridesourcing and ridehailing)



TNCs provide prearranged and on-demand transportation services for compensation in which drivers and passengers connect via digital applications. Digital applications are typically used for booking, electronic payment, and ratings (SAE International, 2018) (Shaheen et. al., 2016a) (Cohen & Shaheen, 2016).

RIDESHARING (also known as carpooling and vanpooling) is defined as the formal or informal sharing of rides between drivers and passengers with similar origin-destination pairings.



Ridesharing includes vanpooling, which consists of 7 to 15 passengers who share the cost of a van and operating expenses, and may share driving responsibility (SAE International, 2018) (Shaheen et. al., 2016a) (Cohen & Shaheen, 2016).

SCOOTER SHARING allows individuals access to scooters by joining an organization that maintains a fleet of scooters at various locations.



Scooter sharing models can include a variety of motorized and non-motorized scooter types. The scooter service provider typically provides gasoline or charge (in the case of motorized scooters), maintenance, and may include parking as part of the service. Users typically pay a fee each time they use a scooter. Trips can be roundtrip or one way (SAE International, 2018) (Shaheen et. al., 2016a) (Cohen & Shaheen, 2016).

Scooter sharing includes two types of services:

- Standing electric scooter sharing using shared scooters with a standing design with a handlebar, deck and wheels that is propelled by an electric motor. The most common scooters today are made of aluminum, titanium and steel; and
- Moped-style scooter sharing using shared scooters with a seated-design, electric or gas powered, generally having a less stringent licensing requirement than motorcycles designed to travel on public roads.

SHUTTLES are shared vehicles (typically vans or buses) that connect passengers from a common origin or destination to public transit, retail, hospitality, or employment centers.



Shuttles are typically operated by professional drivers, and many provide complimentary services to the passengers (SAE International, 2018) (Shaheen et. al., 2016a) (Cohen & Shaheen, 2016).

TAXI SERVICES provide prearranged and on-demand transportation services for compensation through a negotiated price, zone pricing, or taximeter (either traditional or GPS-based).



Passengers can schedule trips in advance (booked through a phone dispatch, website, or smartphone app), street hail (by raising a hand on the street, standing at a taxi stand, or specified loading zone), or e-Hail (by dispatching a driver on-demand using a smartphone app) (SAE International 2018).

Common Partnerships Between Shared Mobility Service Providers and Public Agencies

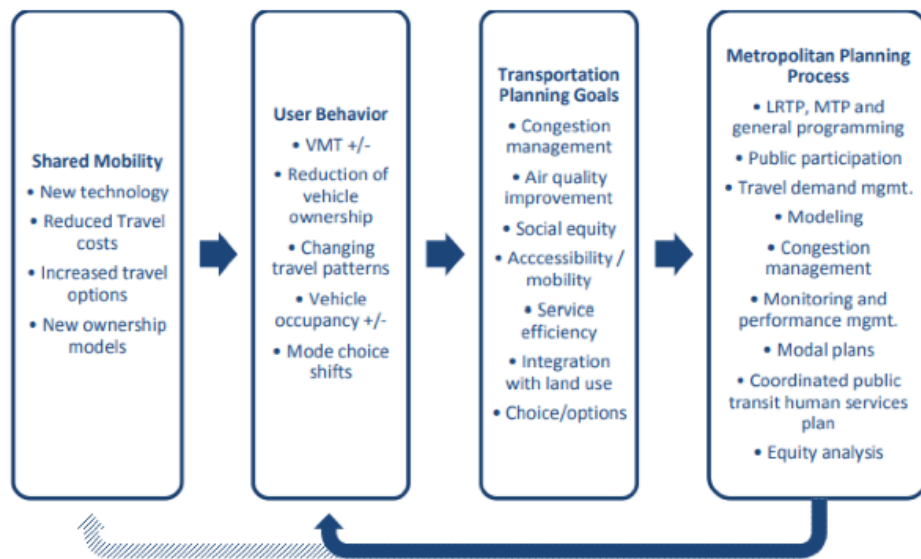
- *Trip Planning and Fare Integration* partnerships involve presenting public transit and private partner travel options on the same interface, potentially offering trips as a first- and last-mile option to or from public transportation. This allows riders to easily plan multimodal trips. Increased convenience and public transit ridership are common goals of trip planning and fare integration partnerships.
- *First- and Last- Mile Connections to Public Transportation* partnerships involve a public partner subsidizing MOD company trips to or from public transit stops or stations. A service provider may use technology to geographically (or “geofence”) the designated transit stop or station to ensure the discount only applies to eligible trips. Common goals of these partnerships including bridging gaps in the transportation network and increasing both the catchment area and ridership of fixed-route public transportation.
- *Low-Density Service* partnerships offer discounts on shared mobility trips anywhere within a designated area. These partnerships target low-density areas that cannot support high-frequency fixed-route transit service. Common goals of these partnerships are to improve mobility options in low-density built environments and reducing costs for providing public transportation.
- *Late-Night Transportation Service* provide discounts specifically during off-peak hours. Potential benefits include offering direct, on-demand trips at a lower cost than infrequent and low-ridership late-night transit service. They can also discourage driving under the influence and may provide additional mobility options to night-shift workers with limited transportation options.
- *Paratransit* partnerships use shared mobility service to supplement or replace a public transit agency's existing paratransit service. Common goals of these partnerships are to improve service delivery to paratransit customers and reduce paratransit costs for public agencies.

The Role of Shared Mobility in Regional Multimodal Transportation Planning

Metropolitan Planning Organization (MPOs) hold an integral role in coordinating transportation planning across regional and local levels of government, and must develop multimodal systems that have impacts across a range of factors spanning infrastructure, safety, congestion and access.

The recent rise of shared mobility operators and modes may have a significant impact on these factors, as they are increasingly associated with shifts in travel and user behavior. Given their rapid growth and diverse impacts across environmental, efficiency and equity factors, shared mobility has become an important consideration for regional planning processes. The emergence of new technologies and business models occurs in tandem with established planning processes that draw from user input and MPO coordination (see Figure 1).

Figure 1. Illustration of the Effects of Shared Mobility on User Behavior and the Transportation Planning Process



Source: Reprinted from McCoy et al., (2018)

The Impacts of Shared Mobility on Travel Behavior

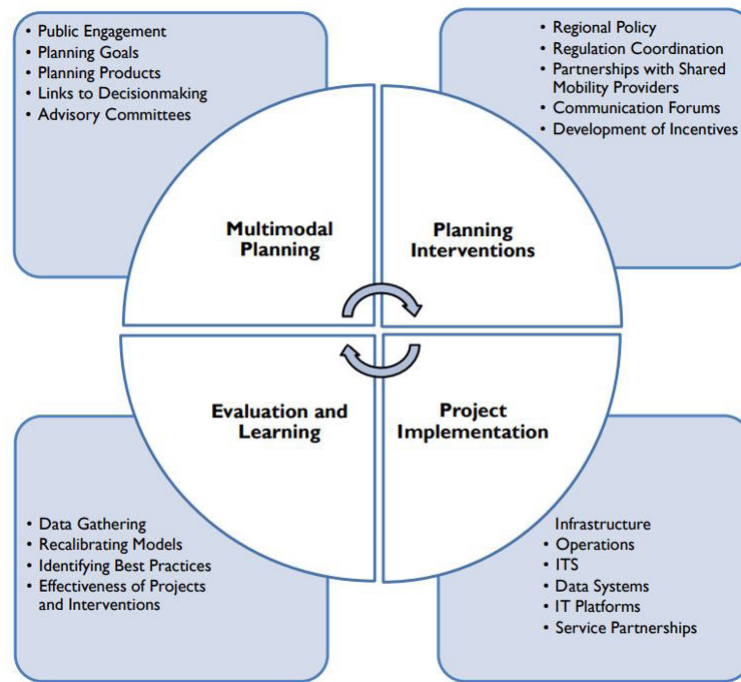
Preliminary research has shown that shared mobility options may have impacts on user preferences on modal choice, individual vehicle miles traveled (VMT) and greenhouse gas emissions, though these findings are still emerging as the mobility landscape evolves. Impacts on VMT and emissions may be positively or negatively influenced based on which type of shared mobility option an individual uses, with research findings able to support either conclusion depending on the mode and context of shared mobility deployments (e.g., the built environment, public transit accessibility, and other factors). Research has supported shared mobility as both a means of reducing or replacing private automobile trips as well as for becoming a substitute to fixed-route bus and light-rail service based on mode and local context, as noted previously.

Framework for Integrating Shared Mobility in Regional Transportation Planning

Previous MPO transportation planning efforts were based on determining how and where major sources of investment, including fleet management and infrastructure development, was going to be most effective for the region’s public goals and its representative communities. Shared mobility presents a major contrast to this established planning process; given the pace of technological innovation and business model development, along with rapidly shifting user behaviors and preferences to arising modes, regional public goals may not be fully represented in modern regional transportation planning efforts.

Despite new technology and market segments, MPOs will continue to rely on established techniques to collect information about user preferences and behaviors of shared mobility as they pertain to regional planning and investment. Additionally, MPOs can address data collection efforts through forging partnerships with shared mobility operators towards fulfilling regional goals. These partnerships can be operationalized as pilots for determining how shared mobility can support public efforts, and can produce data and opportunities for learning, evaluation and future planning efforts (see Figure 2).

Figure 2. Conceptual Framework for Visualizing Shared Mobility Integration with Regional Multimodal Transportation Planning Process



Source: Reprinted from McCoy et al., (2018)

Emerging Practices and Strategies for Incorporating Shared Mobility into Modeling

Data collection and standardization practices challenged by shared mobility

Traditionally, public agencies have relied upon transit data or self-reported survey data for planning and impact evaluation. The growth of shared mobility services offers a new opportunity to understand mobility as these services often collect detailed information about trips, fleet operations, customer demographics, and travel behavior. However, public entities face challenges to obtaining shared mobility data, including but not limited to: collecting data that might be viewed as proprietary by private operators, privacy concerns over user data, and inconsistency across data sharing.

Shared mobility operators may be reluctant to disclose data on their operations for fear of revealing proprietary information. Concerns over risks to user privacy can also make operators reluctant to share data; for example, information such as trip data may reveal the daily routines or residence of a user. This reluctance may leave government planning and modeling efforts unable to keep pace with an evolving marketplace. In addition, the extent to which shared mobility services impact the overall transportation system -- including congestion, shifts in modal share, and vehicle shedding -- is difficult to evaluate without data.

Data collection on shared mobility services also faces barriers to completeness and standardization. Not all operators provide the same level of detail in their data sets. Data delivery can vary in type (i.e., fleet data, spatial data, or trip data) and in frequency (via an application programming interface (API) in real-time or via periodic reports). The operators themselves might vary across time, providing data in different formats and levels of completeness from month to month. There is little existing incentive for operators to provide data consistently, unless specified as a condition of their operating permit.

Lacking sophistication of available detection technology

Bike counters are typically not sophisticated enough to capture emerging trends in the bike transportation. Many counters are unable distinguish among these personal and shared bikes, and the rise of electric bikes and scooters has further complicated the efficacy of the counters in measuring bike networks. As a result, these current sensors are unable to keep pace with the growth of shared mobility and do not generate data that accurately reflects trends.

Current shared mobility implementation may not align with previous models

In addition to evading current sensing technology, several modes of shared mobility are also not fully represented in many active transportation models across levels of government (see Table 1). For example, the growth of standing electric scooters and e-bikes is recent enough to not have been fully vetted in long-range strategic or scenario planning from MPOs; as a result, these impact of these modes on infrastructure development or regional coordination is unknown. Many current demand and traffic models may not be compatible with advents in how shared mobility services impact the transportation network.

Table 1. Potential Roles for Public Agencies in Shared Mobility Planning

	MPO	Local Government	Transit Agency	State DOT
Regulating shared mobility operations		☑		☑
Regulating the use of public right-of-way and curb space		☑	☑	☑
Data collection, analysis and dissemination	☑	☑	☑	☑
Partnerships with shared mobility providers to complement transit or transportation demand management (TDM)	☑			
Training and technical assistance for regional partners	☑			
Thought leadership and research	☑			☑
Regional coordination and consensus building	☑			
Integration into transportation plans and programs of projects	☑	☑	☑	☑

Source: Reprinted from McCoy et al., (2018)

As is the case with modeling and reporting standards, lacking availability of shared mobility data has complicated these new modes' impact on transit (see Table 2). Specifically, determinations of how shared mobility either complements or competes with various forms of transit cannot readily be made. Shared mobility may be able to improve access in areas that had been historically underserved with transit options, but cannot be confirmed without sufficient evaluative data. Innovative modes such as autonomous vehicles (AVs) present novel opportunities for modeling, though unknown factors and assumptions about their system-wide implementation may complicate initial attempts at incorporating them into current transportation models.

Taken together, shared mobility has expanded such that impacts on mode shift, data management and availability, and regulatory responses have created challenging conditions to incorporate emerging modes into transportation modeling.

Table 2. Emerging Practices and Strategies for Incorporating Shared Mobility into Modeling

Category	Emerging Practices and Strategies
Data Standards, Access and Sharing	<ul style="list-style-type: none"> ● Negotiating access to shared mobility usage data ● Involving third-parties to coordinate data sharing ● Including data sharing provisions in partnerships and regulatory agreements
Strategic Planning	<ul style="list-style-type: none"> ● Scenario planning and visioning to grapple with uncertainty ● Shared mobility planning programs
Integrating Shared Mobility into Modeling and Forecasting	<ul style="list-style-type: none"> ● Incorporating shared mobility in travel surveys ● Collecting data continuously ● Using off-model approaches to estimating shared mobility impacts

Source: Reprinted from McCoy et al., (2018)

Integrating Shared Mobility into Modeling and Forecasting

MPOs develop travel demand models to anticipate how trends in regional population, employment, and land use can impact the transportation network and associated areas of infrastructure investment and programming. Shared mobility services create challenges to these models, as there is little recorded precedent for how these new modes have significantly altered expectations and behaviors of travel in urban areas. Travel demand models draw from user surveys on previous travel decisions to inform future activity; with shared mobility, these models do not have access to that same fund of user knowledge and may not be reliable for forecasting purposes. To account for this, multiple MPOs across the country are rapidly shifting strategies to better incorporate shared mobility into their modeling efforts.

Portland Metro has redeveloped their household travel survey to better reflect the modern transportation environment, including changes to more frequent survey administration and new questions about shared mobility modal preferences. These amendments can enable scenario planning around pricing and service areas. In addition, Portland Metro has identified partnerships with other local government agencies, the Portland Bureau of Transportation and the Port of Portland, to gather TNC data for regulatory and planning purposes. Some cities have identified that security and confidentiality issues may be systemically tied to researching proprietary data from shared mobility providers. In Seattle, the Seattle DOT has worked with the University of Washington to develop a data collaborative that will allow planners to work with Census block data as proxies for identifying local level issues.

Given the rapid pace of development in shared mobility, local governments and cities may lack the data expertise to conduct thorough research. To supplement this gap, operational partnerships between mobility providers and governments can aid development of transportation modeling.

BART owns and operates more than 47,000 parking spaces across the entire system. BART’s former carpooling program was subject to carpool violations (single-occupant vehicles parking in carpool spaces). As part of the Federal Transit Administration’s Mobility on Demand Sandbox,

BART launched a program with Scoop to leverage the company's real-time ridematching platform to improve carpooling matching and parking enforcement. Specifically, the partnership aims to increase BART ridership by allowing carpoolers to connect to regional transit.

The partnership relies on incentives such as guaranteed parking and seamless app integration to find matching riders and make payments, as well as on regulatory efforts to verify the carpooling status of cars in carpooling parking spots. Partnership goals include reducing single occupant vehicle travel, increasing ridership, and reducing the vehicle miles traveled (VMT) associated with first and last mile connections to the BART network.

In 2016, Kansas City Area Transit Authority (KCATA) created a one-year pilot with Bridj to offer flexible transit services and to determine how on-demand microtransit could be incorporated into the region's existing mobility options. The Bridj and KCATA partnership highlighted opportunities for public and private transit operators to partner and implement technological innovations, such as on-demand scheduling and flexible routing. Historically, bus public transit services have had operational inefficiencies, such as lower ridership (compared to vehicle size), long headways (time between buses), low fare-box recovery, and higher operating costs per hour. Bridj believed that microtransit may be able to help public transit agencies save money by providing lower-cost options in lower density areas or with new routes that may not have an established ridership. In many sections of the Bridj Kansas City service area, there was no pre-existing public transportation service. Bridj viewed its service as an opportunity for public transportation agencies to partner on an innovative mobility strategy. To begin, KCATA operated the program with KCATA drivers and 10 KCATA 14-passenger vans.

Transit agencies are increasingly at opportunity to form pilots with providers to gain a better sense of how new services fit with existing resources, which can generate comparative data on shared mobility to improve modeling efforts. Over time, the cumulative outcome of these efforts can be used to inform regional coordination models, including use for performance monitoring and strategic plan development. Waze Carpool, a navigation software for helping share real-time traffic information, partnered with MTC and the University of California-San Francisco to provide free promotional rides as a part of the Bay Bridge Forward initiative to reduce congestion.

Without partnerships between providers and governments, modeling to determine impacts of new shared mobility options on the transportation network may remain challenged. However, MPOs and local governments have continued to develop new means of determining shared mobility models and impacts. A study from the Southern California Association of Governments (SCAG) used a series of off-model analyses to corroborate and inform other current shared mobility demand models. This study, which constructed an altered model of current carsharing methodology through land use consideration and TNC data, was able to inform new emission target recommendations through travel behavior.

RECOMMENDED READING

- Cohen, Adam and Shaheen, Susan. 2016. "Planning for Shared Mobility." PAS Report 583. *The American Planning Association*. Available at <https://www.planning.org/publications/report/9107556/>
- Klim, Terry, Anna Giragosian, Diane Newton, and Elisabeth Bedsole. 2016. *Integrated Corridor Management and Transit and Mobility on Demand*. Report Number FHWA-HOP-16-036, Federal Highway Administration. Available at <https://ops.fhwa.dot.gov/publications/fhwahop16036/fhwahop16036.pdf>
- McCoy, Kevin, James Andrews, Russell Glynn, William Lyons. 2018. *Integrating Shared Mobility into Multimodal Transportation Planning: Improving Regional Performance to Meet Public Goals*. Report Number FHWA-HEP-18-033, Federal Highway Administration. Available at https://www.planning.dot.gov/documents/SharedMobility_Whitepaper_02-2018.pdf.
- National Association of City Transportation Officials. 2018. *NACTO Guidelines for the Regulation and Management of Shared Active Transportation*. Available at: <https://nacto.org/wp-content/uploads/2018/07/NACTO-Shared-Active-Transportation-Guidelines.pdf>
- SAE International. 2018. *Taxonomy and Definitions for Terms Related to Shared Mobility and Enabling Technologies*. Available at https://www.sae.org/standards/content/j3163_201809/.
- Seattle Department of Transportation. 2017. *New Mobility Playbook*. City of Seattle. Available at: http://www.seattle.gov/Documents/Departments/SDOT/New-MobilityProgram/NewMobility_Playbook_9.2017.pdf
- Shaheen, Susan, Corwin Bell, Adam Cohen, Balaji Yelchuru. 2017. *Travel Behavior: Shared Mobility and Transportation Equity*. Report Number PL-18-007, Federal Highway Administration. Available at https://www.fhwa.dot.gov/policy/otps/shared_use_mobility_equity_final.pdf.
- Shaheen, Susan and Adam Cohen (2019). *Micromobility Policy Toolkit: Docked and Dockless Bike and Scooter Sharing*. doi:10.7922/G2TH8JW7
- Shaheen, Susan, Adam Cohen, Balaji Yelchuru, Sara Sarkhil. 2017. *Mobility on Demand Operational Concept Report*. Report Number FHWA-JPO-18-611, Federal Highway Administration. Available at <https://rosap.ntl.bts.gov/view/dot/34258>.

Shaheen, Susan, Adam Cohen, Ismail Zohdy. 2016. *Shared Mobility: Current Practices and Guiding Principles*. Report Number FHWA-HOP-16-022, Federal Highway Administration. Available at <https://ops.fhwa.dot.gov/publications/fhwahop16022/fhwahop16022.pdf>.

Shaheen, Susan, Adam Cohen, Ismail Zohdy, Beaudry Kock. 2016. *Smartphone Applications to Influence Travel Choices: Practices and Policies*. Report Number FHWA-HOP-16-023, Federal Highway Administration. Available at <https://ops.fhwa.dot.gov/publications/fhwahop16023/fhwahop16023.pdf>.

Transit Cooperative Research Program 2013. *Millennials and Mobility: Understanding the Millennial Mindset and New Opportunities for Transit Providers*. Prepared by Neela Sakaria and Natalie Stehfest, Latitude° Research. Available at <http://www.trb.org/Publications/Blurbs/169527.aspx>

Transportation Research Board. 2016. *Between Public and Private Mobility: Examining the Rise of Technology-Enabled Transportation Services*. Available at <http://onlinepubs.trb.org/onlinepubs/sr/sr319.pdf>

REFERENCES

- Cohen, Adam and Shaheen, Susan. 2016. "Planning for Shared Mobility." PAS Report 583. The American Planning Association. Available at <https://www.planning.org/publications/report/9107556/>
- McCoy, Kevin, James Andrew, Russell Glynn, William Lyons. 2018. *Integrating Shared Mobility into Multimodal Transportation Planning: Improving Regional Performance to Meet Public Goals*. Report Number FHWA-HEP-18-033, Federal Highway Administration. Available at https://www.planning.dot.gov/documents/SharedMobility_Whitepaper_02-2018.pdf.
- Mobility on Demand (MOD) Sandbox Summary. 2017. *Integrated Carpool to Transit Access Program*. Available at <https://www.transit.dot.gov/sites/fta.dot.gov/files/FTA%20MOD%20Project%20Description%20-%20BART.pdf>.
- SAE International. 2018. Taxonomy and Definitions for Terms Related to Shared Mobility and Enabling Technologies. Available at https://www.sae.org/standards/content/j3163_201809/
- Shaheen, Susan and Adam Cohen. 2019. Micromobility Policy Toolkit: Docked and Dockless Bike and Scooter Sharing. doi:10.7922/G2TH8JW7
- Shaheen, Susan, Adam Cohen, Balaji Yelchuru, Sara Sarkhil. 2017. Mobility on Demand Operational Concept Report. Report Number FHWA-JPO-18-611, Federal Highway Administration. Available at <https://rosap.ntl.bts.gov/view/dot/34258>
- Shaheen, Susan, Adam Cohen, Ismail Zohdy. 2016. Shared Mobility: Current Practices and Guiding Principles. Report Number FHWA-HOP-16-022, Federal Highway Administration. Available at <https://ops.fhwa.dot.gov/publications/fhwahop16022/fhwahop16022.pdf>