



Mobility on Demand Strategic Plan
Humboldt County
MoD Innovative Practices

TECHNICAL MEMORANDUM

DRAFT – For Discussion



Prepared for HCAOG
by IBI Group

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1 Introduction

1.1 Background

As the mobility landscape continues to evolve, connected travelers, continued advancements in transportation technologies, and private sector involvement present unprecedented opportunities for improving public transportation. In recent years, concepts such as microtransit and mobility-on-demand have helped agencies fill first and last mile gaps by developing and integrating unconventional modes into their services, engaging the private sector in the form of transportation network companies (TNCs), car-share, bike-share and other modes as alternative to private vehicles. However, while transit agencies continue to experiment with new business models, new suppliers, and new technologies, there remain challenges related to providing cost-effective, efficient, and equitable service to all people. This paper discusses some of those challenges in Section 4.

The Humboldt County Association of Governments (HCAOG) is developing a *Mobility on Demand (MoD) Strategic Development Plan* with an overarching goal of providing affordable and accessible mobility solutions for all travelers. As articulated by HCAOG, the agency “seeks to set a plan for optimizing technology-enabled mobility on demand transportation options in Humboldt County.” In short, the MoD Strategic Development Plan’s overall purpose is to assist the HCAOG in determining the best courses of action to increase multimodal mobility and accessibility in Humboldt County, especially for public transportation and transit, bicycling, walking, rideshare, and other modes separate from single-occupancy automobile.



Mobility on Demand is an innovative user-focused approach which leverages mobility services, integrated transit networks, and real-time data, to give users an easier and smoother traveling experience from origin to destination. The Strategic Plan will ultimately improve mobility options for all travelers and users of the transportation system in an efficient and safe manner.

1.2 Document Organization

This report is organized into the following sections:

- **Section 2: Mobility Landscape in North America:** Describes the impacts of transportation on people and cities; overview of current challenges, factors driving change, new mobility solutions and suppliers, and where things look like they are headed.
- **Section 3: Emerging Role of Transit Agencies:** Describes the transit agency as mobility manager; new business models; and challenges and opportunities for transit agencies.
- **Section 4 Challenges and Opportunities:** Describes some of the challenges and considerations of deploying new service models, engaging private sector, and using other strategies for first- and last-mile connectivity.

- **Section 5: State of Industry Overview:** Describes the general state of mobility in the United States, including services, contexts, partners, and examples of initiatives; and specific case studies. We have summarized the case studies under the following categories of mobility services:
 - **Local mobility:** mobility options customized to local conditions targeted to increase ridership (e.g., local shuttles)
 - **Commuter services:** mobility options designed to enhance connectivity to existing transit services and facilities (e.g., transit centers, park and ride locations)
 - **Destination-based service:** shuttles or other services designed to take riders to and from a specific type of destination (e.g., commercial, retail, education, and recreation).

Appendix A provides some additional examples of such implementations.

- **Section 6: Emerging Mobility Technologies:** Profiles *mainstream* and *limited commercial* deployments as well as *advanced research but no deployments*.
- **Section 7: MoD Examples – Humboldt County Environment:** Presents findings from research and survey endeavors specific to MoD examples applicable to the Humboldt County operating environment.
- **Section 8: Analysis:** Describes key themes related to transit agency initiatives; key considerations and questions; and assesses MoD Sandbox grant recipients.
- **Section 9: Conclusions:** Provides a synopsis of innovative practices in next-generation operational, service delivery and technological deployments.
- **Section 10: Opportunities - A Way Forward:** Provides a framework for discussion of opportunities for advancing MoD/next-generation operational, service delivery and technological solutions to address identified transit/mobility needs in Humboldt County.

1.3 Sources

In addition to ancillary web research, the following key research papers were consulted:

- American Public Transportation Association, March 2016: *Shared Mobility and the Transformation of Public Transit*.
- Brandon Hemily, Ph.D, July 2016: *Transit and New Shared-Use Modes; Key questions from the transit agency perspective; a Discussion Paper*.
- Eno Center for Transportation, January 2018: *UpRouted; Exploring microtransit in the United States*.
- TransitCenter, September 2016: *Private Mobility, Public Interest; How public agencies can work with emerging mobility providers*.
- Transportation Research Board, December 2015: *Between Public and Private Mobility; Examining the rise of technology-enabled transportation services*.

- Feigon, S., C. Murphy, and T. McAdam. 2018. *Private Transit: Existing Services and Emerging Directions*. Pre-publication draft of TCRP Research Report 196. Transportation Research Board, Washington, D.C.
- Feigon, S. and C. Murphy. 2018. *Broadening Understanding of the Interplay Between Public Transit, Shared Mobility, and Personal Automobiles*. Pre-publication draft of TCRP Research Report 195. Transportation Research Board, Washington, D.C.
- Foxx, Anthony. December 5, 2016. FTA Dear Colleague Letter on Shared Mobility
- Federal Transit Administration. *Shared Mobility Frequently Asked Questions*. FTA website. <https://www.transit.dot.gov/regulations-and-guidance/shared-mobility-frequently-asked-questions>. Checked February 16, 2018.
- Pew Research Center. *Mobile Fact Sheet*. February 5, 2018. Pew Research Center website, <http://www.pewinternet.org/fact-sheet/mobile/>.
- Federal Motor Carrier Safety Administration. *Interstate Passenger Carrying Driver's Guide to Hours of Service*. (no date, but ca 2014). FMCSA website, checked February 19, 2018. <https://www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/docs/Interstate-Passenger-Carrying-Driver-Guide-To-HOS.pdf>
- US Department of Labor. *Mass Transit Employee Protections 49 U.S.C. § 5333(b)*. US DOL website, checked February 19, 2018. <https://www.dol.gov/olms/regs/compliance/compltransit.htm>
- Federal Transit Administration. *Charter Bus Service Regulations*. FTA website. Checked February 19, 2018. <https://www.transit.dot.gov/regulations-and-guidance/access/charter-bus-service/charter-bus-service-regulations-0>

2 Mobility Landscape in North America

Mobility refers to the movement of people from one place to another. Doing so, in an efficient and cost-effective way in order to access to health, education, employment, and entertainment directly impacts people's lives. Choices in travel have large-scale society-shaping impacts related to human rights, the economy, the environment, and the development of cities.

Over the past 60 years, mobility in the United States has been dominated by the private vehicle. Over this period, challenges for people and cities have included:

- Large scale society-shaping trends including:
 - Congestion and accidents;
 - Personal health impacts and associated rising health costs;
 - Reduced accessibility to important services and opportunities; and
 - Greenhouse gas emissions.
- Urban environment outcomes such as:
 - Sprawl; and
 - Reduced neighborhood character.
- Impacts to individuals such as:
 - Reduced accessibility (e.g., the high costs to own and operate a private vehicle, physical distance from transit and alternative modes of transportation, physical and perceptual barriers); and
 - Fewer social interactions.

At the same time, more and more people had shifted to depend on public transportation, relying on buses, trains, and other publicly-owned modes of transit to move about their cities. As such, transit agencies are under increasing demand to provide equitable, cost-effective service for all residents, including those with all income levels, needs and preferences, and regions within the service area. Overall, there has been a need to shift from a car-dependent transportation system that promotes urban sprawl, to a multi-modal system that promotes transit friendly, higher density urban development. Such multi-modal systems can help redefine the hierarchy of the road and assist in creating pleasant, efficient, and prosperous cities.

2.1 Factors Driving Change

Fortunately, the landscape of mobility is changing, aspiring to significantly curtail single-occupancy vehicle trips in internal-combustion vehicles. New choices, advancing technologies, and emerging trends are driving change.

- **New mobility solutions and suppliers** (described in Section 2.2) have entered the market, beginning with Zipcar car-sharing service in 2000, followed by car2go in 2008, and bike-sharing in 2011. In 2009, ride-sourcing company Uber was founded, followed by Lyft in 2012, with both companies emerging with a ridesplitting option in 2014 and 2017, respectively. In 2014, private microtransit providers Bridj and Chariot were founded (both have since ceased operation in the United States). New mobility

solutions and suppliers has increased mode choices for people, though not all residents can afford to use some of these services.

- **The sharing economy** has transformed how some travel. Is a car public or private—and is it delivering goods or services?
- **Smartphone penetration is increasing.** More than 75% of Americans own a smartphone. According to the Pew Research Center, 96% of the population owns some type of cellphone. This enables people to be connected at all times and use their phones to receive information in real-time.
- **Advancing technology** has improved access to real-time travel information, allowed for inter-modal payment, and enabled real-time routing and dispatching. Of special importance is the following:
 - **Connected and automated vehicles (CAV):** CAVs have the potential to improve traffic safety, transportation efficiency, land-use efficiency, infrastructure, and transit spending if used in the correct context. Major car companies are moving towards CAVs. There is movement towards using the vehicles in a shared-use, on-demand context.
 - **Beacon technologies and crowdsourcing travel patterns:** Beacons can assist riders with wayfinding. At the same time, transit agencies can receive data on travel habits from riders who are willing to share data. Transit agencies can obtain data on which bus stops riders get on, where the rider disembark, and can track if riders get on another bus within the system. Opportunities may exist to partner with local businesses to send riders exclusive deals based on their geo-location and nearby retail locations.
 - **Artificial intelligence/machine learning:** E-hailing is now very common and also popular with travelers. However, as e-hailing service providers start to offer shared ride services (Lyft LINE, Uber Pool/Express Pool), it is important for them to improve their ridematching and routing algorithms. Data from multiple sources on traffic patterns and variability, and crowdsourced data from riders can enable self-learning algorithms and can help deliver efficient and cost-effective transportation services. Most shared ride services offered by agencies through conventional demand response software today lack such level of sophistication in their algorithms, particularly when delivering same-day trips that require continuous optimization.
- **New business initiatives and partnerships** are a result of the changing mobility ecosystem and are moving the market forward. For example, Ford Smart Mobility has acquired a number of mobility, technology and microtransit companies including Autonomic, Inc., and TransLoc Inc.
- **Urbanization and the movement of people back into the city** has created the need to ensure that people can move around the city at any income, age, and ability. This trend has highlighted the need to create cities that are dense and walkable, stimulating a transit renaissance and a reclaiming of streets for pedestrians.
- **An increasing population** highlights a greater need for multi-modal options and shared mobility solutions as cities and their surrounding areas become increasingly

crowded. **An increasing and ageing population** means that no transportation system is sustainable unless it is accessible.

- **Environmental awareness and active lifestyles** have contributed to a reduced dependence on private vehicles and an increased trend toward active transportation such as cycling.
- **New funding opportunities** are available to transit agencies to experiment with leveraging existing mobility solution providers. For example, the US DOT *Integrated Mobility Innovation* (IMI) Program, part of a larger research effort at DOT, supports transit agencies and communities as they integrate new mobility tools like smart phone apps, bike and car-sharing, and demand-responsive bus and van services.

2.2 Mobility Solutions and Suppliers

New and existing challenges related to mobility beg the question of how transit agencies can help to provide solutions in a cost-effective manner. Rather than expending effort providing new technologies and mobility solutions for transit riders, transit agencies are generally better off focusing on what they do best: moving people from point A to point B. It is by partnering or integrating with mobility solution suppliers that transit agencies can help to shape the future of urban mobility without incurring a large cost. Such mobility solutions include:



- **Vehicle Sharing (Cars, Bicycles, and Scooters):** Vehicle sharing services involve multiple customers operating the same vehicle at different times. While operating the vehicle, the customer has exclusive access. This is distinguished from more conventional car rental by generally shorter-term rentals and a distributed network of automated access vehicle storage “docking station” locations. Usage requires a means of identifying the user and securing collateral for the vehicle, such as a credit card. Vehicle sharing works best in areas with a sufficient user base within walking distance of the network of docking stations. Vehicle sharing may also enable first- and last-mile solutions if the density at the outer end of the trip is still sufficient to support a docking station.
- **Microtransit:** Microtransit consists of public transit medium-capacity vehicles (8 to 15 passengers) operating with on-demand, flexible routing to provide service to areas that are inefficient to serve with a fixed route. The driver operates as an employee of the transit agency or a corporation. The distinguishing feature of microtransit, compared to earlier generation demand-response transit, is that the passenger does not need to schedule a trip far in advance. Instead, passengers can order trips on-demand, and the centralized dispatching algorithm automatically adjusts service in response. Eligibility for microtransit service, as with conventional fixed route service, is open to the public, and fares may be integrated with the rest of the public transit network. Past attempts have been made by transit agencies to achieve this with previous generations of demand-responsive scheduling and dispatch technology with only limited success.

Much of the current interest in microtransit stems from mobile-apps-based technology being used in recent years by various third-party ridesharing, ridesourcing and ridesplitting service providers (see below) to provide this type of service more effectively.

- **Ridesharing:** Ridesharing is a software-assisted modernization of conventional carpooling, in which drivers with their own personal vehicles are matched with passengers using the same subscription service. The driver and passenger(s) split the cost of commuting together. For security and payment management, eligibility as both a driver and a passenger are limited to members who maintain an account with the central service.
- **Ridesourcing:** Ridesourcing consists of drivers utilizing their personal vehicles to provide a private trip to a paying passenger. Unlike carpooling and ridesharing, the driver of a ridesourcing service is driving professionally, and not making their own commute in the process of transporting passengers. Ridesourcing closely mirrors the service model of traditional medallion taxis and is most familiarly employed by Transportation Network Companies (TNCs) such as Uber and Lyft.
- **Ridesplitting:** Ridesplitting is a close counterpart of both the ridesourcing and the microtransit models. The drivers utilize their personal vehicles, drives professionally rather than as part of their own commute, and can simultaneously accommodate multiple independent passengers (as distinct from ridesourcing that is oriented to individual paying passengers), on a route that dynamically responds to new trip requests. Ridesplitting is another service offered by TNCs (such as Uber and Lyft) in major cities, where it is highly likely that customers will independently book trips simultaneously and have start and end points that can be conveniently served using the same overall trip. Ridesplitting commonly uses vehicles able to accommodate less than 6 passengers.

3 Emerging Role of Transit Agencies

As new services and suppliers are seen as important parts of the transportation network, many transit agencies are taking on the role of “mobility manager” to ensure that service is equitable in terms of cost, service area, and vehicles, and to coordinate services to prevent further congestion. An example of an agency moving towards this role is the San Francisco Municipal Transportation Agency (SFMTA) whose mission is to “*work together to plan, build, operate, regulate and maintain the transportation network, with our partners, to connect communities.*”

According to Brandon Hemily, Ph.D; in *Transit and New Shared-Use Modes; Key questions from the transit agency perspective; a Discussion Paper*, in this new role, transit agencies are being asked to:

- *“Open real-time transit data to an ever-growing range of new stakeholders;*
- *Participate and/or build technological interfaces with the new suppliers;*
- *Participate in external shared-data platforms;*
- *Develop integrated trip planning tools or real-time information platforms;*
- *Participate in, or develop, integrated payment back-offices, with a variety of public and private organizations, many of which may be in competition with each other.”*

As part of this emerging role, transit agencies may partner with other for-profit and non-profit partners in order to fulfil their mission which generally has included:

- Connect people to transit;
- Provide service to underserved areas;
- Fill gaps in hours of operation; and
- Reduce costs of providing accessible transportation and find alternatives to low-ridership fixed route service.

Beyond partnering with new providers, from a service delivery and/or technology standpoint, transit agencies are also experimenting with new business models. Two new business models are in-house on-demand service (microtransit) for both paratransit and regions with low ridership, and Family of Services, which encourages eligible paratransit riders to take conventional transit for all or part of their trips.

3.1 Business Models

New business models with potential, for HCAOG’s consideration are described in this section.

3.1.1 Mobility on Demand

Mobility on Demand (MoD) may expand customer travel opportunities and offer customers spontaneity of travel. The service model may be enabled by private companies (such as Uber, Lyft, taxis, private microtransit), or the agency, and used to facilitate first-mile/last-mile solutions, paratransit, and travel within low-density zones where it is not economically feasible to provide conventional transit service. Further, MoD may be used as an offering for same-day specialized/paratransit and rural transit services.



4 Challenges and Opportunities

A public agency considering contracting or otherwise coordinating with a private entity for the provision of transportation service must navigate a number of potentially tricky regulatory standards and public perception issues. With the advent of Uber service in 2009 and Lyft service in 2012, the world of transportation has changed, but the associated regulatory framework has not kept pace. Several recent studies have been published by the Transit Cooperative Research Program (TCRP) and the Federal Transit Administration (FTA) that have provided some guidance on how new service types will be addressed within the regulatory framework. These new services and contractual arrangements have not been tested in the legal system.

Further changes are likely to result, but the sections below provide guidance on what issues may arise and how best to deal with concerns in the current environment. Most of the discussion applies to TNCs, but similar issues should be considered for any private transportation company.

While the challenges below are serious and complex, they should not be viewed as “fatal flaws” that would kill the ability to take advantage of the emerging approaches to providing mobility services. They are cautionary concerns that need to be taken into account when structuring any service changes, especially if these changes affect existing services or operator jobs.

4.1 Equity/Title VI

Of principal concern is to ensure that any new service arrangement with a private company meets equity requirements. Equity in this sense encompasses

- Service availability – where and when service is provided
- Fare – how much is charged to use the service
- Technology access – ensuring that riders have access to the service without requiring a smart device
- Rider access – non-discrimination based upon rider characteristics, including Americans with Disability Act (ADA) and Title VI of the Civil Rights Act.

Equity in this sense does not mean “equal” or “the same.” For example, a transit agency may establish geographic zones where a private operator provides the service, and the service in that zone may be different from service that is offered elsewhere. In an area of service or time of day where there is low demand, where traditional fixed route service is unproductive, a transit agency could contract with a TNC to provide demand-response service.

The transit agency would need to ensure that such an arrangement was not done in a discriminatory fashion, such as only offering demand-response service in low-income or minority communities.

The fare charged for the service would have to be equitable when viewed against the fares charged for traditional fixed-route service, adjusted for differences in the type of service provided. For example, federal law states that fares for ADA riders shall not exceed twice the fare that would be charged to an individual paying full fare for a trip of similar length at a similar time of day. (49 CFR §37.131). These laws, however, were established when ADA service was generally demand-response and was being compared with fixed-route general public service. It is unclear whether a larger difference could be charged for a demand-response, e-hailing type service that was offered to the general public.

Further, fare policy must also address the unbanked (those who may not have a credit/debit card account) by providing a cash-payment option. A ticket vending machine (TVM) overcomes some of this limitation if they can be placed near where riders board. Such an arrangement works well for a service like a park & ride, where there are few boarding locations. However, for a demand-response service with widely dispersed origins and destinations, it would be impractical to provide full coverage with TVMs. At any rate, neither Uber nor Lyft accept cash or ticket fares. Account-based fare collection has the potential to account for the lack of TVMs and help integrate with TNCs' mobile payment. The account-based fare collection allows riders to maintain an account that they can fund with a bank card or other methods (e.g., mailing check or by paying cash in person). Account-based payment also allows agencies to partner with local retailers to sell passes and other fare media (prepaid cards, reloadable cards).

Technology Access is another equity concern. The Pew Research Center has tracked the prevalence of cell phones and smart devices among different population groups. Overall, they found that in the US, 95% of individuals own a cell phone of some type, with 77% owning a smart phone. This widespread adoption indicates that, over time, technology access may decline as an equity concern. The report did identify some current areas of concerns. Notably, older individuals (65+) were less likely to have a cell phone (85%) or a smart phone (46%). People with less than a high school education were less likely to have a smart phone (57%) as were people with an income less than \$30,000 (67%). Rural residents were also less likely to have a smart phone (65%). These results are at a national level; further differences may exist at an individual location.

Equity is also an issue when it comes to the treatment of individual riders. This issue is primarily a concern when it comes to how an individual driver may treat an individual rider, such as an Uber driver refusing to carry someone from a protected group. Both Uber and Lyft have guidelines for their contractor drivers that prohibit such discrimination, and even go beyond federal laws by prohibiting discrimination based upon "sexual orientation, marital status, and gender identity", which are not covered by federal statutes. If a driver is shown to have engaged in such discrimination, he/she will be barred from driving for the company.

4.2 Driver Training/Security and Drug Screening/Hours of Service

The safety of the service provided is a paramount concern to a transit agency. Safety relates to both the safety of the driver (discussed here) and safety of the vehicle (discussed in the next section).

The Federal Motor Carrier Safety Administration (FMCSA) has established several regulations to ensure that drivers are able to safely operate their vehicle. One area of regulation is the "hours of service," that is, how many hours can a driver safely drive before taking a rest break. For interstate commerce (where federal regulations apply), related to a vehicle that carries nine or more passengers including the driver, there are three limitations for a driver's hours of service. First, a driver cannot be on-duty for more than 15 hours without taking eight hours off. Second, a driver cannot drive for more than 10 hours without taking an eight-hour break. Third, a driver cannot be on-duty for more than 60 hours during any consecutive seven-day period or 70 hours during any consecutive eight-day period. While these regulations apply only to interstate commerce, California has similar legislation.

What's notable about the above regulations is that they apply to drivers who operate a vehicle that carries nine or more passengers. Most TNC vehicles are private cars that carry 5 to 7 people, so these regulations do not apply. Uber and Lyft have recently imposed their own hours of service limits. Lyft requires drivers to take a six-hour break for every 14 hours the driver has the app in

service; Uber requires a driver to take a six-hour break after 12 hours of “driving time.” Driving time equals the time the driver has the app in service, less time spent stopped between trips. While these regulations are an attempt to mimic the federal hours-of-service rules, nothing prevents an individual driver from exceeding the service hour limits by switching back and forth between the apps.

In order to drive for either Uber or Lyft, drivers must pass a background check. Neither company reveals precisely what the checks encompass, but they cover a motor vehicle record review and a criminal background check. Uber notes that it periodically re-runs background checks. For both Lyft and Uber, a driver is declared ineligible if they exceed a certain number of traffic violations or have a “felony, violent crime, or sexual offense”. Lyft makes further reference to ineligibility including a “drug-related offense, or certain theft or property damage offense”. These requirements may not be as strict as a public transit agency may perform on its operators. For example, neither company does a fingerprint check as do some taxi licensing boards.

Note that neither Uber nor Lyft does any drug screening, whether pre-employment, periodic, or for-cause. Instead, both companies rely on their rating system to identify problem drivers. A rider is encouraged to report any driver suspected of driving under the influence and the company will follow up.

Neither Uber nor Lyft does any training for their drivers, although Uber does note that some drivers that have been removed from driving can have their privileges reinstated if they complete some training. There is no general operation, safety, or customer interaction training. Instead, these companies rely on the “community guidelines” and rating system to identify where a driver may have a problem. Taxi license boards have different requirements depending upon the city or jurisdiction.

4.3 Vehicle Standards

Vehicle standards are important from a safety and accessibility perspective. From a safety perspective, all vehicles must pass the annual state inspection standards, whether owned by a private individual (for Uber and Lyft), a taxi company, or a transit provider. Uber and Lyft further place age limits on their drivers’ vehicles; generally, a vehicle can be no older than 10-15 years, depending upon the company and location. Neither company conducts in-person vehicle tests, and instead relies on the annual state inspections to ensure the vehicle is safe to operate. For non-safety issues, such as automotive body or interior damage, the companies rely on riders to report issues.

Neither Uber nor Lyft have a requirement to operate (or provide) an accessible vehicle. Both companies’ guidelines require a driver to accept wheelchair passengers if the passenger is able to transfer to a seat and the wheelchair can be safely stored in the drivers’ vehicle. The FTA requires that some mechanism exists to provide an equivalent level of service to the rider. As a practical matter, this burden would fall on the public transit operator to be able to dispatch an accessible vehicle when needed. A potential issue is that the accessible service must be “equivalent” to the service provided to those without disabilities, including response time. It is unclear if an accessible vehicle were dispatched from a remote facility while non-accessible vehicles were prevalent throughout a community, is deemed “equivalent”.

4.4 Prevailing & Minimum Wage

Special requirements relate to the wages and benefits of mass transit employees. According to the US Department of Labor,

When federal funds are used to acquire, improve, or operate a mass transit system (public transportation), federal law requires arrangements to protect the interests of mass transit employees. 49 U.S.C. § 5333(b) (formerly Section 13(c) of the Urban Mass Transportation Act). Section 5333(b) specifies that these protective arrangements must provide for the preservation of rights and benefits of employees under existing collective bargaining agreements, the continuation of collective bargaining rights, the protection of individual employees against a worsening of their positions in relation to their employment, assurances of employment to employees of acquired transit systems, priority of reemployment, and paid training or retraining programs. 49 U.S.C. § 5333(b)(2).

This could potentially be an issue if any current operator jobs were replaced by lower-wage jobs, especially if the replaced jobs were covered by a collective bargaining agreement.

In the case of using Uber/Lyft, the hourly wage earned, is typically lower than the wages paid to unionized operators. While little data exists on the earnings of Uber and Lyft drivers, the drivers must pay all expenses (gas, maintenance, insurance) out of their earnings, so their effective hourly rate may be even less than the federal minimum wage. According to a recent study conducted by MIT's Center for Energy and Environmental Policy Research (CEEPR), nationally, Uber and Lyft drivers earn a median wage of \$3.37 per hour. Uber has contested this finding and claims that the average gross earning is closer to \$20 per hour. MIT is revisiting the research methodology. Twenty dollars per hour is considerably lower than what transit drivers typically earn, particularly if one accounts for their other employee benefits (such as sick time, holidays, health benefits, etc.)

4.5 Private Sector Competition/Charter Regulations

Public bus companies are prohibited from providing charter service that competes with private charter bus companies. In general, these regulations prevent FTA subsidized grant recipients from unfairly competing with private companies.

The FTA website specifically notes that these regulations do not apply to demand-response service to individuals, so they would not apply to any Uber-type services. The regulations could potentially come into play if a transit agency looked at establishing its own service in competition with a private microtransit service operator that provides a customized route for select companies or groups of individuals.

4.6 Private Partner Durability

A hard-to-quantify challenge/consideration is the concern over the long-term viability of any private sector partner. This concern has always been present with the contracting with any private bus company or taxi company, but is, perhaps, more acute with the newer technology-based companies.

In the past, a transit operator faced the downside risk that its private partner could go out of business. This risk may be mitigated by partnering with more than one taxi company, for example, or by owning its own vehicles which would be operated by a private bus company. If the private bus company went out of business, the public transit operator would be able to reclaim its equipment and quickly have a new contractor use it.

For partnerships with the newest mobility companies, whether bus-based, such as Bridj, or private-car based, such as Uber and Lyft, the risk is greater. Bridj has already ceased operation, and Uber/Lyft face challenges to their business model that could jeopardize their existence. Already in

Europe, Uber has been classified as a “taxi” company, which subjects it to additional regulation, including having to classify its drivers as “employees” rather than “independent contractors.” Should that occur in the US, Uber/Lyft’s cost of operation will significantly increase from paying benefits and minimum wages to their employees.

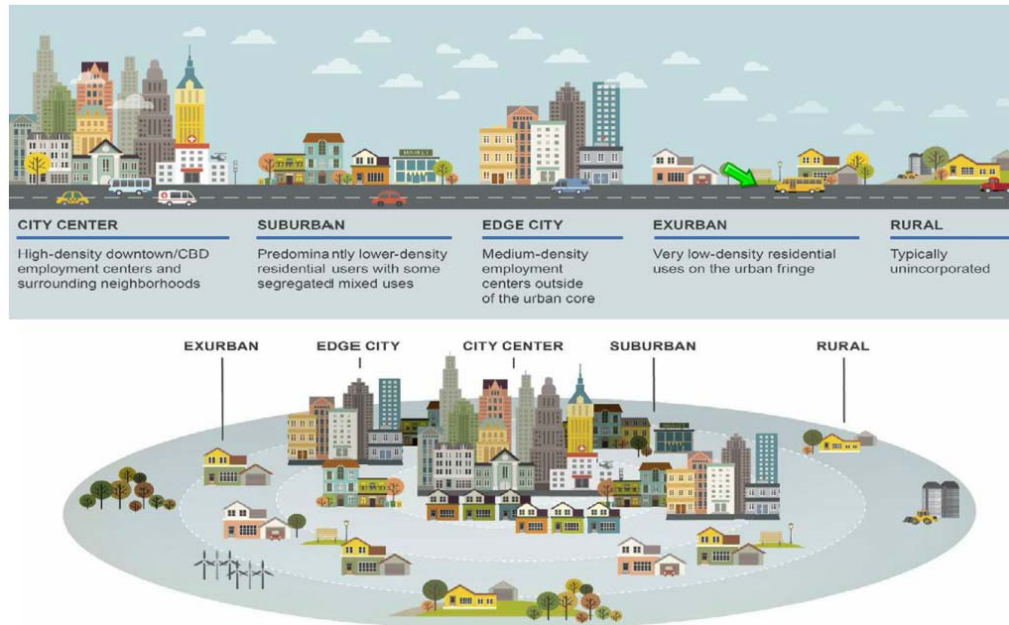
4.7 Political Considerations

The above challenges have been presented primarily as legal issues for consideration to avoid any potential regulatory pitfalls. Aside from legal considerations, any of these challenges could enter the political realm, either positively or negatively. The political issues could be more acute when changes to existing services are proposed, as opposed to implementing new service. HCAOG may be sensitive to how any changes will be perceived by the community at large and by its elected representatives.

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5 State of the Transit/Mobility Landscape

Transit agencies are trying new business models, creating new partnerships, and offering new and upgraded services to customers in different contexts, including the city center, suburbs, and rural areas as illustrated below:



There are a number of different contexts for implementing new service delivery models and transit agencies have responded with the following types of service delivery:

- Contracting with full-service suppliers who provide a customer app, a software platform for scheduling, dispatching and payment, and operate vehicles.
- Agency-operated vehicles under distinct branding, fulfilling customer trip requests from vendor-provided apps while being managed by a vendor-provided dispatch solution.
- Trips fulfilled by TNCs, either subsidized or paid in full by agencies, or paid by customers as part of first/last mile connectivity.

5.1 Case Studies

The following table presents a summary of innovative transit/mobility services from other agencies that could be feasible in Humboldt County. Further discussion of these service examples is presented following the summary table.

SERVICE TYPE	DESCRIPTION	POSSIBLE APPLICATIONS
Local Mobility	Includes mobility options customized to local conditions to increase ridership (e.g., local shuttles)	Provides local travel in suburban and urban neighborhoods where it may not be cost-effective to operate conventional transit services. Examples included in this paper are: <ul style="list-style-type: none"> • OCTA Project V program in San Clemente, CA • AC Flex Operated by AC Transit • Direct Connect Service operated by PSTA • HyperLINK program by HART- Tampa • NeighborLink Service- LYNX-Orlando • Uber Pool, Express Pool and WAV
Commuter Services	Includes connectivity to express services and/or park & ride facilities	Connects riders to services provided by the agency. This could be connectivity options to agency routes or connectivity to and from transit centers, park and ride facility and any other facilities. Example included in this paper is from suburban Orlando.
Destination-based	Includes services designed to serve specific types of destinations, such as commercial/ retail, medical, education and recreation	Case studies included in this paper are from: <ul style="list-style-type: none"> • Rosemont entertainment circulator from suburban Chicago • USC Safe Ride program • Bishop Ranch in San Ramon, CA

Additional examples of such innovate service delivery models in the area of MoD, microtransit, FoS, and MaaS are provided in Appendix A.

Details of services implemented by agencies as listed above are provided in the following subsections.

5.1.1 Local Mobility

5.1.1.1 San Clemente, CA (OCTA Project V Program)

Project V, establishes a process for local communities to develop their own transit services that complement the regional transit services. When Orange County Transportation Authority (OCTA) decided to eliminate two of its unproductive routes (191 and 193) due to low ridership in the City of San Clemente, the City and OCTA decided to partner with Lyft to provide on-demand services to riders dependent on those routes.

In October 2016, the City Council approved a \$900,000 contract with Lyft to provide on-demand service to riders within the City limits. The contract is funded by an OCTA grant. Overall, OCTA pays 90% of operating deficit and the City pays a local match of 10%. This contract allows riders affected by discontinued routes to travel locally, travel to another OCTA route or to regional Metrolink (rail) service. The contract establishes the following guidelines for trip payments

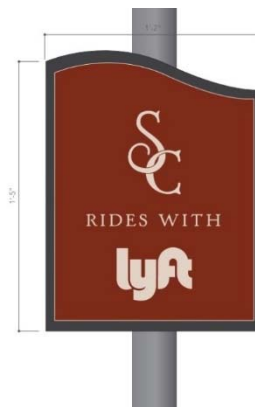
- Passenger pays the first \$2.00 of the regular Lyft fare
- City pays remainder up to a maximum of \$11.00 (up to \$9.00 subsidy)
- Customer is responsible for any amount above \$11.00

Riders can use a discount code when booking rides.

Given potential difficulties of seniors and disabled riders to take services offered by Lyft vehicles and drivers, riders eligible for OCTA Access service can request services from San Clemente’s Senior Mobility Program for local trips. The program offers free, on-demand service for trips to shopping and the senior center.

5.1.1.2 AC Flex – Operated by AC Transit

In early 2017, AC Transit, the transit service operator in Alameda and Contra Costa counties, launched a flexible service in the neighborhoods of Newark and Castro Valley (also available in Union City and Fremont), areas that had low transit demand. The service is designed as an alternative to fixed route service. As part of the service, AC



Add payment method

Add credit card

SCRIDES APPLY

Download the Lyft app and enter the code SCRIDES in the 'Payment' section

\$5	\$2
\$10	\$2
\$12	\$3
\$14	\$5

Sample fare breakdown for eligible rides



Transit operates 12-passenger buses equipped with wheelchair access, fareboxes and Clipper Card¹ readers.

All trips must begin and end within a predefined flex service area. The service area also includes two BART rail stations. Implemented as a one-call-one-click concept, the service allows trip booking using a web application (smartphone, tablet, computer) anytime or through the call center during restricted hours. AC Transit recommends trips be booked 30 minutes in advance. Recurring trips may get booked up to 3 months in advance.

The trip booking platform uses MobilityDR, developed by Demand Trans. Riders may subscribe to receive text or email alerts when their vehicles are 10 minutes away.

5.1.1.3 Direct Connect Service by Pinellas Suncoast Transit Authority (PSTA)

In 2016, PSTA launched a unique public-private partnership program to enhance local mobility. They partnered with Uber and United Taxi. This service is designed to address the county's sprawling population and service gaps that require riders to walk long distances to get to a bus stop. The service is designed such that:

- Riders can travel within a defined geographic service zone
- To or from designated stops within a zone

The service was designed to serve areas of PSTA where low ridership bus service was eliminated. Initially, the service was launched such that riders could use low-cost Uber (Pinellas Park neighborhood) or United Taxi (Pinellas Park and East Lake neighborhoods). Based on the success of the program, PSTA has expanded the service to the entire Pinellas County.

PSTA service partners (now include Uber, United Taxi, Care Ride, and Wheelchair Transport) use app-based e-hailing platform. PSTA provides a discount of \$5.00 per trip. Passengers pay an average of \$1.00. Riders can pay by bankcards or Paypal. On taxis, riders can also pay by cash.



P3 for Paratransit MOD Demonstration

MOD Sandbox Demonstration Federal amount \$500k + Local Match \$125k.

- Demonstrate a model to provide cost-effective, on-demand door-to-door paratransit service
- Leverage existing partnerships with United Taxi and CareRide with new partnership with Lyft
- Supplement PSTA's DART (ADA paratransit) program

¹ The Clipper card is a reloadable contactless smart card used for electronic transit fare payment in the San Francisco Bay Area.

5.1.1.4 HyperLINK Program- Hillsborough Area Regional Transit (HART)

HART offers HyperLINK service to provide direct connections to bus stops in Brandon, Temple, Terrace and University Area neighborhoods. Designed as a shared ride service, this first and last mile solution was launched in the University of South Florida area with \$1.2 million capital from Florida Department of Transportation (FDOT). The service is operated by Transdev who is paid \$10 per trip. Riders pay \$1 to connect to a designated HART stop or \$3 to connect to anywhere else in the service zone. Riders can pay by cash or credit cards.



Private business donors (led by TECO) are funding the \$170,000 two-year leases for four Tesla Model X SUV vehicles. The program aims to expand using Tesla vehicles equipped with autonomous vehicle technology (initially will have "drivers" to ensure safety). Also, in addition to regular shuttle buses, one accessible van from MV-1 is used to meet the needs of customers who may need accessible vehicles.

5.1.1.5 NeighborLink –LYNX

LYNX offers a flex service, called NeighborLink (NL), for its riders living in low density areas that are underserved by its local bus system. LYNX has currently defined 13 NL routes and zones. Riders can use an app to book trips to travel anywhere within the zone or to and from a stop on a NL route. Similar to AC Flex, LYNX operates small vehicles branded for NL service.



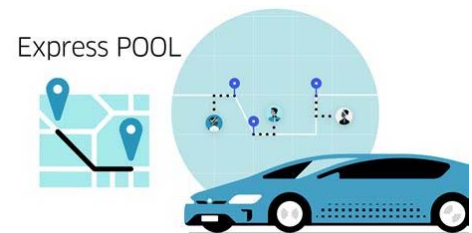
Riders pay fare similar to a regular fixed route service- \$2 for full fare and \$1 for reduced fare.

LYNX has been offering NeighborLink for several years but it required booking riders two hours in advance until recently when an app was launched. LYNX has partnered with DoubleMap to provide the trip booking, dispatching platform. Also, DoubleMap provides real-time information and alerts to riders,

The service is operated by LYNX's paratransit service (ACCESS) contractor, MV Transportation.

5.1.1.6 New Local Mobility Initiatives

Uber Express Pool: Uber is currently piloting share ride service called Express Pool. Unlike Uber Pool that provides door to door service, Express Pool offers services to/from designated stops. Express Pool is currently being piloted in Boston, San Francisco, D.C., L.A., Philadelphia, Denver, and San Diego.



UberWAV and Uber Assist – Uber provides rides for persons with disabilities through branded service called Uber WAV and Uber Assist. WAV is offered for riders who may need wheelchair access accommodation and Assist is offered for seniors and disabled riders who may require additional assistance. Riders can bring Personal Care Attendants (PCA)/ companions with them. Also, they are allowed to bring service animals. Driver-partners providing the service are certified by a third party in driving safety and assisting people with disabilities.



5.1.2 Commuter Services

5.1.2.1 Altamonte Springs – (suburban Orlando, FL)

While LYNX provides NeighborLink service as a flex service in its service area, cities in the northern suburbs have teamed up to provide innovative service through public private partnership to compensate for any service gaps. The implementation was led by the City of Altamonte Springs and now is joined by the communities in Maitland, Longwood, Sanford and Lake Mary.



This is a classic example where cities leap-frogged a conventional transit option in favor of an innovative service delivery in partnership with the private sector. For several years since the early 2000s, Altamonte Springs partnered with LYNX and other local communities to develop a flexible service concept, called FlexBus. FlexBus includes 25+ fixed stations, where riders walk up to and book a ride using kiosks or use their smartphones to book rides and board at fixed stations. After going through preliminary design and engineering process for over 10 years, a pilot was launched in 2014. However, the pilot was not successful due to lack of definitive agreements among partners on operations and maintenance and concerns about profitability of the service. Hence, FlexBus plans were cancelled and, given Uber's interest in the transit industry around the same time, Altamonte Springs decided to partner with them.

While creating a public private partnership with Uber, cities have created an organization called Municipal Mobility Working Group (MMWG) through an interlocal agreement. The main purpose of the service and agreement is to provide feeder service to Sun Rail stations, but riders can travel anywhere within city limits and areas that are part of the MMWG agreement. Cities currently contract with Uber, where cities pay 20% of the cost of travel within their city limits or for travel to a location within a city that is part of MMWG. Also, cities pay 25% of the cost of riders that begin or end at the SunRail commuter rail station.

5.1.3 Destination-based Services

5.1.3.1 Rosemont Entertainment Circulator (PACE - suburban Chicago)

Pace, the agency responsible for providing services in suburban Chicago, has launched a shuttle service between the CTA Blue Line subway station and nearby destinations in the Rosemont Entertainment District, Outlet Mall & Convention Center. The service is provided through partnership between Pace and the Village of Rosemont. Key landmarks



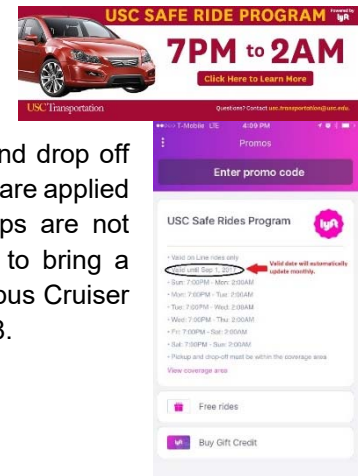
serviced by the stop are Donald E. Stephens Convention Center, Fashion Outlets of Chicago, MP Financial Entertainment District and Rosemont CTA Station. The service is free and offered as Pace route 811. The route has designated pickup and dropoff locations and the service is offered every 10-15 minutes per the following schedule:

- Mon-Thurs: 7:30 am – midnight
- Fri and Sat: 8:30 am - 3 am
- Sun: 11:30am - 9:30 pm

The service is operated by MV Transportation.

5.1.3.2 USC Safe Ride Program – Lyft Partnership (University of Southern California)

University of Southern California provides free safe rides program through a partnership with Lyft in the University Park neighborhood, nightly from 7:00pm-2:00am.



Students can board Lyft LINE vehicles from designated pickup and drop off locations within the University Park. Ride credits for unlimited rides are applied to student accounts; however, excessive PrimeTime fares or tips are not covered by the ride credits. The service allows student riders to bring a companion for free. This service is designed to supplement Campus Cruiser service and operated as a pilot program from January to May 2018.

5.1.3.3 Bishop Ranch (San Ramon, CA) - 585-acre office park

Contra Costa Transportation Authority (CCTA), backed by combination of private companies and public transit and air quality authorities, has launched a driverless shuttle service. Two 12 seat shuttles are provided by Easy Mile. CCTA plans to operate nearly a 100 such shuttles by 2020.

The majority of funding is provided by owners of Bishop Ranch property, a Sunset Development Company. The ranch is a 585-acre office park that includes 550 tenants and where 30,000 people go to work. Shuttles provide services in the office park area and also provide first and last mile connectivity to a nearby BART station.

The shuttle was implemented following the passage of California Assembly Bill 1592. This Bill allowed for the testing of electric, low-speed, multi-passenger autonomous vehicles that are not equipped with a steering wheel, brake pedal, accelerator or operator.



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6 Emerging Mobility Technologies

This section explores some of the emerging mobility technologies and concepts that are either still in their infancy or yet to be tried in the specialized transit environment. Opportunities have been identified in the following areas:

- Trip Discovery;
- Trip Booking;
- Payments;
- Service Delivery; and
- Customer Information and Wayfinding.

Further, available technologies have been summarized under the following categories:

- **Mainstream technologies:** Refers to technologies that are widely deployed in the industry for solutions relevant to customers and agencies. There are very low risks in deploying such technologies.
- **Limited commercial deployment:** While there have been some experimental deployments, either technologies/solutions have not matured or there is not enough acceptance for mainstream use by customers and/or agencies.
- **Pilot deployments:** There have been some deployments, typically funded by USDOT grants or under public/private partnerships. Concepts or technologies are still in their infancy.
- **Advanced research but no deployments:** These technologies or solutions should be considered high-risk to deploy since no field testing has yet been performed.

6.1 Mainstream Deployment

Personal Mobility Enhancements: There are several mainstream technologies available through many vendors that can help enhance the mobility experience of transit customers. Mainstream technological deployments include:

- Real-time information on vehicle arrivals and service alerts. Transit customers often have access to real-time information on iPhone and Android devices as well as real-time information on a transit agency's website. Also, trip planner capabilities should incorporate the real-time status of vehicles when displaying travel options to customers.
- Seamless travel across Humboldt County modes using a single fare medium by capitalizing on account-based payment systems.
- Self-service portal for demand response/specialized transit trips where customers can register, apply for and track their eligibility and book and manage trips.
- Trip notification via interactive voice response (IVR) system the night before the trip and a configurable number of minutes prior to the vehicle arriving at the pickup location.
- Better adoption of continuous optimization of commercially available scheduling software to support same day trips and vehicle assignments.

No risks are anticipated in deploying suggested enhancements.

Benefits of Suggested Enhancements: Riders will presumably perceive the following benefits:

- Improved customer experience
- Improved service reliability
- Seamless mobility

6.2 Limited Commercial Deployment

6.2.1 Enhanced e-Hailing/Booking

E-hailing or ridesharing apps have been prevalent in recent years and have provided travelers additional travel alternatives. However, these services are not an alternative to agency provided specialized transit. They are most suitable solutions for supplemental service. Most of the e-hailing companies now provide their public API (application programming interface) to be used by third party developers. This could potentially allow paratransit registrants to book their Dial-a-Ride trips, or any resident to book an e-hailing/demand response service with one click. However, the experience is not as seamless as might be expected, as is the case with most such mobility aggregator apps. They typically provide a trip discovery platform and booking is done by individually going to e-hailing company websites or apps. Often, transit agencies may also partner with a suitable mobility aggregator, such as Moovel, who provides an integrated trip brokerage platform for booking and payment for multiple services (e.g., TNC, carshare, bikeshare and transit) through a single trip planning app. TriMet is currently implementing such a solution as part of their Mobility-on-Demand grant.



E-hailing solutions by now have been integrated with transit agencies under various models (e.g., fully or partially subsidized by agency or paid by customer) and pose limited risks.

Benefits of Suggested Enhancements: Riders will presumably perceive the following benefits:

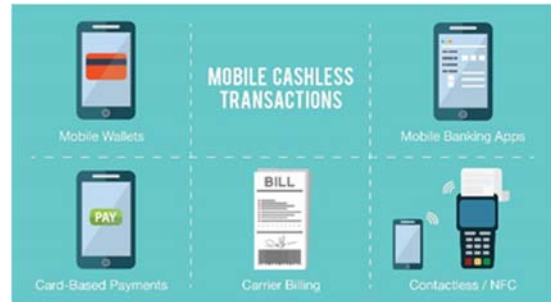
- Enhanced trip booking and payments experience;
- Seamless door-to-door mobility;
- Increased personal mobility alternatives and first/last mile connectivity; and
- Cost-savings to agency by reducing the number of expensive demand response / paratransit transit trips or replace poorly performing fixed route segments.

6.2.2 Cashless Payments

Cashless payment enables customers to pay for trips electronically, which in turn requires customers to have access to banking. Historically, unbanked and underbanked populations have not allowed agencies to adopt 100% cashless payment strategies exclusively or only cashless payment. Cash-based fare collection continues to be around 10-30% at most agencies. For example, even after many years of their rollout of the Ventra open payment system, Chicago

Transit Authority's cash payment ratio exists at 8%. Cash payments at suburban agency Pace are even higher at 20%. Need for cash payments require agencies to install fareboxes, which are expensive to maintain, factoring the daily cash collection, accounting and reconciliation processes.

Considering a best-case scenario for banked customers, a cashless plan requires a series of strategies to reduce the amount of cash usage by targeting specific rider market segments. Infrequent transit riders and those without a credit/debit card, resort to cash-based payments. Targeted strategies could and should be developed for these market segments to steer them towards adopting cashless payments.



With the advent of account-based payment, agencies now have more flexibility in steering customers towards electronic media by establishing an extensive retail network so customers have access to locations where they can buy or reload smartcards. For example, MBTA (Boston) is planning to achieve fully cashless payment by 2020. Part of their strategy involves developing a retail reload network such that 98% of MBTA bus stops have a retail location within walking distance (typically ¼ mile).

Transit systems have greater opportunities in adopting cashless payments since those customers have registered accounts and could potentially be provided electronic fare media which is tied to their accounts. Also, customers could pre-pay for some of the trips online when booking via the internet.

To conclude, opportunities and technologies now exist more than ever to adopt cashless payment to a certain degree. There will always remain a segment of the population that will not be able to use electronic media due to lack of a bank account to replenish - unless they use cash to replenish at a retail location. The private sector is also advancing technologies such as PayNearMe where customers can pay using cash at a participating retail location such as CVS or 7/11 for online transactions. PayNearMe has now also partnered with Blackhawk Networks where customers could go to retail locations that are interfaced with Blackhawk Network for prepaid card sale and distribution.

As stated earlier, adopting 100% cashless payment may leave out a significant section of ridership that is unbanked or underbanked and might also raise Title VI compliance concerns.

6.2.3 Enhanced Wayfinding

Wayfinding is one of the key issues in specialized transit, particularly with the senior and disabled population who may not be familiar with the transit service area. There are various reasons, including but not limited to unfamiliarity with routes and stops, poor signage, temporary relocation of stops, stops located within a large transfer center, shared stops with another agency, among many others. In some cases, particularly with riders with a disability, their inability to locate a stop often



prompts them to use the more expensive paratransit service option.

Agencies have conventionally relied on map and text-based signage and tactile guideways to help riders locate stops and its facilities, but modern technologies based on RFID or Bluetooth Low Energy (BLE) beacons open up greater possibility in helping riders orient towards a bus stop and navigate. Typically, there are the following components involved in beacon-based wayfinding:

- BLE tags that transmit Bluetooth signal and can be installed anywhere, indoors or outdoors. These signals can be preprogrammed to transmit specific information (e.g., stop ID); and
- Riders' smartphones that have an app to detect BLE signal and help navigate the riders through built-in accessibility features of the phone. This could be visual, audio or haptic (e.g., vibration) feedback.



Some agencies and vendors use additional features that improve the navigation aid. These include defining a geo-fence around a stop so the app on a rider's device knows when to start the navigation. Also, BlindWays, the app developed and deployed by Perkins Institute for the Blind and Raizlabs in partnership with MBTA, has a crowdsourcing feature that allows regular riders to volunteer in the program. Participants are then able to mark obstructions or physical objects (e.g., tree, fire hydrants, potholes, broken sidewalks) on the map, and hence help the app to use that information and provide proper guidance to visually impaired riders. PathVu is also a crowdsourcing-based application that allows riders who use a mobility device (scooters or wheelchairs) to navigate safely to their location.

There are apps that are meant to address specific types of disabilities as well. For example, WayFinder 3 by AbleLink, also featured by USDOT's Accessible Transportation Technology Research Initiative (ATTRI) program, allows riders with cognitive disabilities to orient and navigate themselves while traveling.

For general public riders, vendors are starting to launch apps that use augmented reality for better wayfinding. These apps use the smartphone camera to display real-time information to the stop location at which the camera is pointing. Such tools can be very useful to infrequent users of transit.

While there have been several deployments of BLE-based beacons, they are still not mainstream yet, particularly in a transit environment. Key issues with this approach are that of training customers with a disability and that most solutions require a smartphone. Also, it is important to make sure the navigation map being used for directions has an updated database of locations as well as any physical obstructions.

Maintenance of beacons is also a concern. Beacons operate on battery power and there will need to be a way for an agency to know the battery level to ensure beacons can be serviced when running out of power.

Benefits: Arguably, the greatest beneficiaries of wayfinding solution will be riders with disabilities. However better wayfinding solutions will also assist general public riders and could prompt more riders to take fixed route transit service.

6.3 Pilot Deployments

6.3.1 Connected and Autonomous Vehicles

While most agencies are still running pilot programs for field testing in a controlled environment, some municipalities, such as Las Vegas, have already started running Connected and Autonomous Vehicles (CAV) shuttles in mixed traffic.

A key component of a CAV shuttle solution should be to link these vehicles with an overall control center so riders can hail these shuttles like any other ridesplitting service and board them at designated stops. The size of these CAV shuttle vehicles (16 seats or less) enable for the ease of operation on most streets in any neighborhood given their lower turn-radius.



Further, the “connected” aspect of these shuttles can be utilized to ensure pedestrian and passenger safety (discussed in the next section). V2X sensors installed on the vehicles can interact with other vehicles and roadside equipment (RSE) for collision avoidance. Advanced vision sensors, such as those offered by MobileEye, can be used to detect objects and avoid collisions as well.

While agencies are running pilot programs with key CAV providers (such as Navya, EasyMile, Local Motors and operators such as Transdev and Keolis), safety and reliability continue to be an issue. The shuttle that Keolis ran in Las Vegas was involved in an accident on Day 1 of testing. Even though the vehicle was not at fault, it stopped to avoid a collision with the vehicle in front instead of backing up a little as human drivers would do.

These shuttles could still be operated in dedicated guideways, similar to Jacksonville Transit Authority’s experimental Urban Circulator project. Manufacturers continue to test and perfect the technology behind autonomous driving.

Benefits: CAV shuttles offer a promising future for providing additional mobility options including first/last mile connectivity as a result of the small size of the vehicles, the “connected” nature, and the limited cost due to being driverless.

6.3.2 Enhanced Safety Solutions

Pedestrian safety is an important factor in planning mobility solutions for older adults and people with a disability. Connected vehicle technology can assist with ensuring safety to a great extent through collision avoidance and warning systems. There are the following types of technologies in testing/pilot stages:

- V2X Safety Solution: Vehicle to vehicle (V2V), vehicle to infrastructure (V2I), vehicle to pedestrian (V2P) and similar technologies where vehicles and road-side equipment communicate over secure, dedicated, short range communication (DSRC) to alert pedestrians or bikers at intersections and other vehicles equipped with V2V sensors; and
- Vision-sensor and Range Sensor based Collision Avoidance: Technology used in autonomous vehicles could also be installed in regular (transit) vehicles for object detection and collision warning/avoidance. This technology includes vision and/or range sensors on vehicles that interact with an on-board vehicle computer to process data and

detect objects. Drivers or pedestrians are warned about potential collisions. In some cases, breaks could be applied automatically to avoid an accident.

V2X technology is still being developed and not available in commercial space. USDOT pilot demonstrations have used after-market kits from Savari Networks and others for providing V2X functionality. However, given DSRC has been widely adopted as the standard in the industry, several car manufacturers are starting to include DSRC connectivity functionality in their vehicles. There is no expected timeline on any transit vehicles or transit system vendors incorporating such connectivity in their solutions.

Vision and range sensor-based technology is more widely available from Mobile Eye (now part of Intel). These units are expensive, costing \$5,000-\$7,500 per vehicle and hence restricting agencies from widely deploying these units.

Benefits: Safety is critical to the transit industry. Safety technologies mentioned in this section are not mainstream, they are expected to be widely deployed in coming years. Presence of such technologies, particularly on autonomous vehicles, will presumably give riders extra confidence when the ride in these vehicles.

Similar to any technology deployment, equipment installed on vehicles or at roadside infrastructure will require maintenance to ensure failsafe operation. This may have staffing impacts on the organization.

6.4 Advanced Research but No Deployments

6.4.1 Better Service Interoperability with Transactional Data Standards

Demand Trans, under contract with the Transportation Research Board (TRB), is conducting research to address the development of standards for data exchange between demand response service providers. The key focus of the research involves (per research statement from the TRB):

- Develop specifications that may evolve, at some future time, to standards for transactional data;
- Consider privacy and security in the transmission and storage of transactional data;
- Identify key strategies to encourage adoption of the proposed specifications;
- Propose and carry out an approach for testing the specifications;
- Create an open source tool for data producers to validate their data against the specifications; and
- Create and convene a forum for consensus-based refinement of the technical specifications.

Demand Trans is still conducting the study and has not released any information in the public domain yet.

Benefits: Key benefit of transactional data standards are as follows:

- Better coordination among demand-response/paratransit service providers at regional scale;

- Increased integration among demand-response systems from different vendors; and
- Efficient deployment of platforms such as MoD.

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7 Mobility-on-Demand Examples

Mobility-on-Demand (MoD) options in rural and small urban areas, while not growing as rapidly as MoD options in urban centers, are improving through changes to existing options that may make both existing and newer options more approachable for travelers (e.g. changing the way demand-responsive transportation is provided), the introduction of new options (such as shared micro-mobility services), and shifting cultural factors (individuals more willing to share a ride in a vehicle with strangers).

In a scan of dozens of small urban and rural mobility-on-demand examples, the options that emerged as the most promising or as having the most useful lessons for Humboldt County's operating environment include:

- volunteer driver programs,
- modern hitch-hiking,
- on-demand transit,
- shared micro-mobility,
- shared cars,
- community ridesharing, and
- the use of TNCs to fill gaps in or replace service.

Within these options, several strategies stand out as good practice for Humboldt County:

- Integrating planning, booking, and payment for travelers,
- Providing travelers with online, app-based, and phone-based information,
- Servicing a mixture of private pay and subsidized rides,
- Focusing resources on the most critical needs first, and
- Starting small and growing the program over time to ensure sustainability.

Each of the examples below offers lessons for Humboldt County's consideration of mobility-on-demand services. Programs that are no longer operating or have been scaled back are included, because these also provide helpful lessons for program development.

7.1 Volunteer Driver Programs

Within Humboldt County, the Area One Agency on Aging Volunteer Driver program (VCOR/RSVP) provides seniors 50+ with non-emergency medical rides. Though the program limits participation and ride type, it is still not able to meet the current level of requests. The examples below include two programs that operate across different areas - each provides access to technological and programmatic frameworks that can be tailored to community needs.

7.1.1 Independent Transportation Network of America (ITNAmerica)

[ITNAmerica](http://www.itn-america.org/) is a national non-profit organization that supports ITN (Independent Transportation Network) affiliate programs across the county.² ITNAmerica was established in 1995 and, as of July 2018, had 13 affiliates in 12 states. (Affiliates used to number as many as 25).³ ITNAmerica aims to “replicate the comfort and convenience of private automobile ownership” for adults 60 and older (age limits vary by affiliate) and people with visual impairments. Program participants can be riders, drivers, or both. “The program uses volunteer drivers who use their own vehicles

² http://promising-approaches.umtri.umich.edu/page_summaries.php?p=8

³ <https://en.wikipedia.org/wiki/ITNAmerica>

to transport riders (and receive mileage reimbursement) as well as paid drivers, who use one of the program's vehicles."⁴ Rides can be scheduled in advance for a discounted rate or can be scheduled on-demand. Trip purposes are not limited, though there are special programs and discounts through the Ride & Shop and the HealthyMiles programs. These special programs are developed in each community in partnership with local healthcare providers, grocery stores, and other local businesses.

The following information is specific to ITN affiliate ITNPortland (in Portland, ME), many of the characteristics of other ITN affiliates are similar.

Operating Environment

ITNPortland provides rides in the Portland, ME area - including in the small urban and rural areas such as North Yarmouth (population 3,766) and Buxton (population 8,253). In Portland, program partners include AARP, Liberty Mutual, Portland Stage Company, the Portland Symphony Orchestra, and businesses and health care services that participate in Ride & Shop and HealthyMiles programs. In each area, ITNAmerica provides tools and resources, but a local group is responsible for the day-to-day operation and oversight of the program. The organization has paid staff and a volunteer board.

Institutional Management & Operations

ITNAmerica provides ITNPortland and other affiliates with driver training materials, program templates, and marketing and web tools, including a tool for storing cash or credit value for riders to use to pay for rides.

Technology - Payment

ITNAmerica's Personal Transportation Account stores value that riders can use to pay for services. The account can store cash value, credit received for driving as a volunteer, credit received for a car trade in, credit received as gifts, and more. The Personal Transportation Account can work seamlessly with programs that are developed community-by-community; for example, ITN has developed a framework for two programs - HealthyMiles and Ride & Shop - that affiliates can create in their own communities. The Personal Transportation Account also works with the Ride Services that an ITN affiliate may develop with a community-based partner. Riders do not exchange cash with drivers; rides can only be paid for through the Personal Transportation Account. ITNAmerica provides affiliates with "GIS software, ITNRides™ that also includes payment and billing functions, as well as member, volunteer and community outreach management."⁵

ITNPortland does not appear to have an online or app-based booking option; members can call a local number to book their ride.

Funding

ITNAmerica is sponsored by Regeneron Pharmaceuticals, and ITNAmerica and affiliates raise funds through business partnerships, grants, and other pathways. "ITN affiliate communities may use up to 50 percent public funds in the first 7 years of service. Because ITN does not want to compete with public transportation for scarce tax payer dollars, [they] seek to supplement

⁴ http://promising-approaches.umtri.umich.edu/page_summaries.php?p=8

⁵ http://promising-approaches.umtri.umich.edu/page_summaries.php?p=8

public transportation by working directly with seniors, their families, and their communities to access private resources.”⁶ About half of the cost of each ride is paid by the rider.

7.1.2 Feonix Mobility Rising

[Feonix Mobility Rising](#) is a non-profit organization, started in 2018, that is working with several communities to support rural mobility. Feonix provides “mobility management, accessibility and equal access assurance, training, and technology support in each community partnership and deployment.”⁷ Program services associated with Feonix vary by community; here we are focusing on two deployments: Catch-A-Ride (CAR) in Winnebago County, Wisconsin, and Ride@50+ in the Columbia area in South Carolina.

[Catch-A-Ride](#) “provides 24/7, on-demand employment transportation services for workers throughout the greater Oshkosh area.”⁸ Rides are provided by volunteer drivers, and rides are booked and paid for through QRyde’s online platform or app.

[Ride@50+](#) is a one-call/one-click program where travelers can discover private ride options, via phone, or using the Feonix app; travelers who have created a profile can book the trip from these options as well. Feonix provides one of the volunteer driver options available in the area. Users can search for options that accommodate their mobility device and that provide different levels of service (e.g. door-to-door or traveling with a companion).

⁶ <https://www.itnportland.org/faq>

⁷ <https://feonixmobilityrising.org/our-mission>

⁸ <https://greateroshkosh.com/wp-content/uploads/Catch-a-Ride-General-Info.pdf>

One Way Round Trip

 Depart At ▾ 11:00 AM

Travel times and rates are approximate and may be affected by load times, traffic conditions, fixed route, shared ride services, and other factors. The transportation providers may not accommodate all of your advanced options. Please see provider details for more information.
 Note: If you update the address, date, time, or advanced options, you must click "Search" or "First Leg" to update your available transportation options.

Show 10 entries

Pick Up	Drop Off	Service Type	Transportation Service	Fare	#
11:00 AM Click for details	11:34 AM	Private	Lyft Ride	\$37.34	Select
11:00 AM Click for details	11:38 AM	Private	Feonix Volunteer	\$17.17	Select
11:00 AM Click for details	11:38 AM	Private	Fox Coach	\$38.10	Select
11:00 AM Click for details	11:38 AM	Private	Fox Coach - Kid Services	\$38.10	Select
11:00 AM Click for details	11:38 AM	Private	Senior Express of the Midlands	\$49.61	Select
11:00 AM Click for details	11:38 AM	Private	Metro Home Care	\$52.95	Select
11:00 AM Click for details	11:38 AM	Private	Metro Home Care -Long Distance	\$52.95	Select
11:00 AM Click for details	11:38 AM	Private	Fox Coach - Charleston Airport	\$63.10	Select
11:00 AM Click for details	11:38 AM	Private	Fox Coach - Charlotte Airport	\$63.10	Select
11:00 AM Click for details	11:38 AM	Private	Fox Coach - Myrtle Bch Airport	\$73.10	Select

Operating Environment

Winnebago County, Wisconsin, is a rural county. The largest city in the county is Oshkosh (population 66,665); small towns in the county include Wolf River (population 720) and Clayton (population 550). The county is home to University Wisconsin-Oshkosh (UW-O) (enrollment ~14,000). Oshkosh's fixed-route transit runs Monday-Saturday, starting service around 6:15 a.m. and ending around 6:45 p.m., leaving many workers without a public transit option for their commute. It appears that UW-O used to provide evening transit service to supplement the fixed route, but it may be on hold for now. Lamers, a private bus company, provides regional service that connects UW-O to UW campuses in Green Bay and Madison. UW-O at one point had, but has now discontinued, a ZimRide program (Enterprise's ride-sharing platform).

The Ride@50+ service area includes Lexington and Richland counties in South Carolina. Columbia (population 133,114), the capital city of South Carolina, is located in Richland County. Both Lexington and Richland counties include a large rural and small urban population, including small towns served by the program (e.g. Pelion (population 699) in Lexington County and Gadsden (population 1,632) in Richland County). The Central Midlands Regional Transit Authority (recently rebranded as the COMET) has been providing fixed route service. While a couple of routes extend into more rural areas of the counties, the frequency of most lines is 60 or 120 minutes, and these lines have limited or no service on the weekends.

Institutional Management & Operations

In Winnebago, WI, Feonix partners with Making the Ride Happen (a program of Lutheran Social Services) to provide Catch-A-Ride (CAR). Making the Ride Happen has been providing mobility management services for over 15 years.

Ride@50+ in South Carolina is provided by a partnership between Feonix and AARP.

Technology - Trip Planning & Booking

Both programs appear to use Feonix Mobility/QRyde's platform for planning and booking rides.

Funding

Catch-A-Ride is funded by the Wisconsin Departments of Workforce Development and Transportation. The cost of a ride includes a \$1.00 booking fee and \$.54/mile in reimbursement for the driver. The funding from the Departments of Workforce Development and Transportation covers the \$1.00 booking fee and \$.29/mile of the mileage reimbursement; the rider covers the other \$.25/mile of the mileage reimbursement for the driver.

Ride@50+ appears to have been funded initially by AARP. The cost to riders depends on the program; Ride@50+ allows travelers to discover and book eligibility-restricted options, but Ride@50+ does not itself seem to provide services or subsidies.

In Feonix's other programs, they work to combine trip purposes and pay types. There are nearly 100 federal programs that support transportation for transportation-disadvantaged populations, and these programs often have eligibility criteria and program and funding rules that can make it challenging to efficiently combine different types of passengers or passengers who are taking trips for different reasons. Feonix's ability to combine private pay trips with eligibility-restricted trips may allow partner communities to diversify funding sources and efficiently use transportation resources.

7.2 Modern Hitchhiking

While hitch-hiking is not as prevalent as it has been in the past (in part due to laws prohibiting it and concerns about driver and passenger safety), technology solutions and the general public's increasing comfort with sharing a ride with a stranger (such as in shared TNC rides), have inspired a new generation of app-supported hitchhiking options. This shifting dynamic means that while there are few U.S.-based examples from recent years, we anticipate seeing more in the future.^{9 10} Here we'll explore an example from France.

⁹ In 2014, the [Lawrence OnBoard](#) project brought organized hitchhiking to Lawrence, KS. The project first used [Carma Carpooling](#) technology and then the [Klokan GogoRideshare](#) app. The project itself is no longer active (other than to provide resources to others), and it's unclear if there is still a robust hitchhiking practice in Lawrence.

¹⁰ [Hitch](#), a start-up in Texas, will soon expand its app-based hitch-hiking services from just one route (between Houston and Austin) to two (adding between Austin and Dallas). Passengers typically pay about \$25 through the app, can book a ride in advance or up to 1-2 hours before their ride, and must verify their identification through the app. Drivers are added to the system subject to a background check.

7.2.1 Rezo Pouce

[Rezo Pouce](#) started in 2010 as a collaboration between eight communities. As of 2017, there were 1,305 member municipalities.¹¹ Once a municipality is a member, riders and drivers in the area can sign up for the service using the app. Drivers and riders are sent physical materials that help identify them (membership cards, a sticker for drivers, and a destination card for riders). Their website indicates that riders generally wait 5-10 minutes to be picked up.

Operating Environment

Rezo Pouce operates throughout France in communities large and small -- from Oise (population 825,207) to Bessan (population 338). Some of the communities have fixed-route public transit options, while others do not. The program markets itself toward youth, older adults, and individuals without a car, but the only limitation to membership is that you must be 16 years old or older (16 to 18 year old's need parental authorization).



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Institutional Management & Operations

The service is not available in the community until the community has become a member and worked with Rezo Pouce staff to identify the “stop and go” areas where riders are picked up. As of 2015, these agreements were made for 3 years at the cost of 7500 € for the first year and 3000

¹¹ <https://ruralsharedmobility.eu/wp-content/uploads/2019/08/SMARTA-GP-Rezopouce.pdf>

¹² <https://www.instagram.com/p/BIsGXYGn3fO/>

€ for the last two years for municipalities with a population of 10,000-25,000.¹³ The municipalities that join form a cooperative society and provide governance for the organization.

Technology - Mobile App

Rezo Pouce has a mobile app that riders and drivers can use to coordinate rides. Riders can also wait at designated stops to ask for a ride without using the app.

Funding

Municipalities pay a membership fee to be part of the Rezo Pouce service area. Early in the program, riders paid a fee, but that appears to no longer be the case.

7.3 On-Demand Transit

7.3.1 Transitioning Fixed Route to Demand-Responsive Transit (DRT) - Shotl

The towns of Can Barata and Valliran, Spain each transitioned from a local fixed route service to a mini-van DRT service. In these mountainous areas with irregular street patterns, riders often had a lengthy walk to a stop and a lengthy wait for a bus. Both areas piloted the new DRT service for two months (Can Barata in 2017 and Valliran in 2018) before deciding to commit to the transition. To operate the new service, both towns use [Shotl](#), which is a trip pooling platform that includes a driver app, a rider app, and a management module. Shotl touts the ability to pilot the DRT service with current physical infrastructure as one benefit of their approach. Under the new service, average waiting time from the trip request is 9 minutes in Can Barata and under 15 in Valliran. The service started out using the original fixed route stops, but Valliran added 35 stops (increasing from 50 to 85), so many passengers now have a stop closer to their home.

Operating Environment

Both areas are rural, mountainous, and have irregular streets. Each area had a fixed-route transit operator with infrequent service. Each area has a few thousand residents. In Can Barata, 90% of the trips are between the residential area and the train station; the nearby care center is another popular destination. In Vallirana, the service connects the outlying residential areas to the town center.

One clear use case of the service is when passengers are able to walk downhill to town but take the service back uphill.

Institutional Management & Operations

The local municipalities assign licenses to operate transit; the number available is limited at the regional level. The DRT services operate under the concession that the fixed route service had.

¹³ <http://www.mobilicites.com/011-4248-Rezo-pouce-l-autostop-organise-en-complement-des-transport-en-commun.html>

Technology - Routing & Scheduling Algorithm, Trip Planning

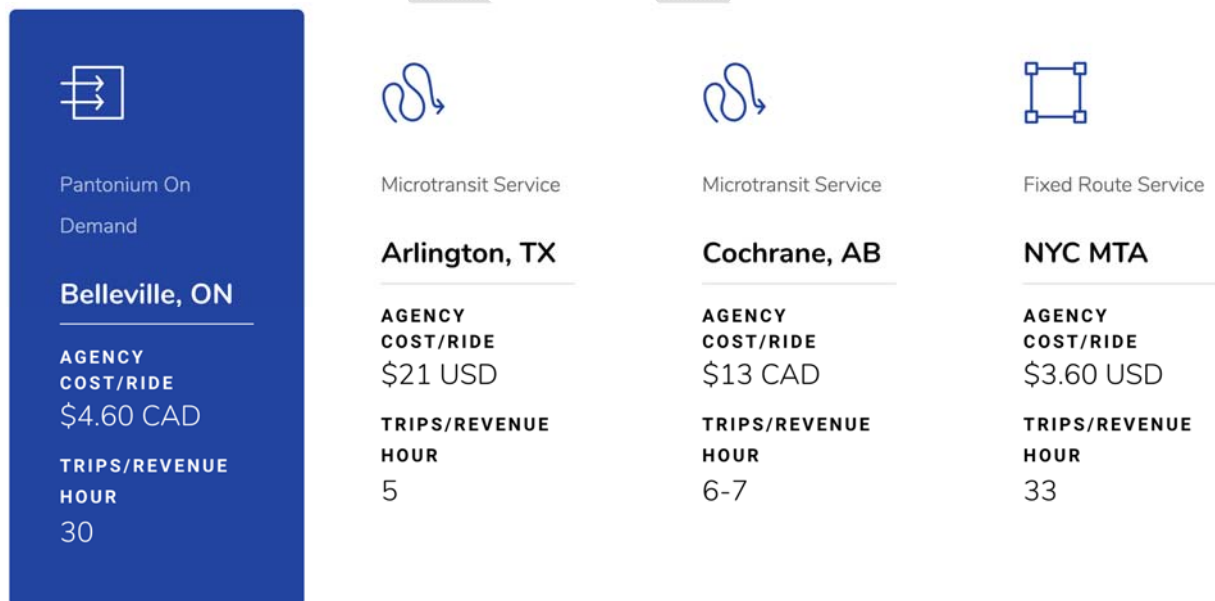
The Shotl scheduling algorithm has improved the effectiveness of the service and rider satisfaction. In Can Barata, 70% of trips are booked through the app; the remaining 30% are booked via phone. In Villarina, all trips must be booked with the app.

Funding

The service is funded by the municipality.

7.3.2 Transitioning Fixed Route to DRT- Pantonium

Belleville, Ontario and Kings County, California worked with [Pantonium](#) to transition portions of their fixed route services into DRT services. Pantonium analyzes rider and transit system factors and uses a proprietary algorithm to develop new DRT services. This case study will focus on the Belleville experience. Belleville moved their evening and weekend fixed route service into DRT services. Riders can order a trip via phone Mon-Fri 8:30 a.m.- 4:00 p.m. or from the app at any time, and trips can be scheduled in advance or ordered on demand. In addition, drivers can pick up passengers along the route who have not booked a trip, and the route will update dynamically. Belleville is piloting the service for a year, and, if it is successful, Belleville will consider transitioning weekday service as well.



Operating Environment

The population of Belleville is 50,000. The area of the city is 95 square miles, but the fixed transit (and DRT service) only covers a portion of this area. The more rural areas of the city are not covered by transit service.

Technology - Scheduling & Routing Algorithm, Trip Planning & Payment

Pantonium's app, "On Demand Transit," is used by riders to book trips and by drivers to see the routes being created by Pantonium's Everrun algorithm. As of September 2018, payment was not integrated into the app.

Funding

The municipality pays for the transit service and Pantonium's services.

7.4 Shared Micro-Mobility

So far, small urban and rural areas have not proven to be highly attractive markets for most shared micro-mobility operators, though areas with colleges or universities appear to be more attractive. As small urban and rural areas look to provide shared micro-mobility options, lessons from earlier deployments may be valuable.

The electric scooter service [Bird](#) launched in Montpelier, Vermont in late 2018, but when the pilot ended prematurely due to snow, Bird decided that the company would not return to Montpelier.¹⁴ It appears that Montpelier will attempt a second pilot with [Gotcha](#). Gotcha is able to provide several different shared mobility options - bikes, electric trikes, electric scooters, and electric cars - with an integrated trip-planning, booking, and payment app. Currently, Gotcha appears to operate primarily in urban areas and on university campuses.

7.4.1 Koloni

[Koloni](#) is a bikeshare and scooter-share company that is focused on the small urban market. They charge cities a monthly fee per bike/scooter and let the cities set the pricing for users. Koloni's bike fleet (at least in part) was purchased from Spin when Spin moved from providing bikes to providing scooters. Koloni leases micro-mobility vehicles to municipalities or universities, and the level of involvement of Koloni beyond that varies by partner. This example is focused on Pocahontas, Iowa -- Koloni's first partner. Pocahontas' bikeshare program was piloted with 15 Koloni bikes in 2016 and was formally launched again in 2018. The program has 25 bikes now.

Operating Environment

Pocahontas is a small town of 1,700. Koloni's other partners include Willmar, Minnesota (population 19,628), and Brusly, Louisiana (population 2,751). Koloni also partners with colleges and universities.

Institutional Management & Operations

In Pocahontas, the city is responsible for the maintenance, repair, and rebalancing of the system; these tasks are undertaken by city staff and community volunteers.

Technology

Users unlock the bike/scooter with an app.

¹⁴ <https://vtdigger.org/2019/06/10/e-scooters-burlington-sidelined-future-uncertain/>

Funding

Pocahontas was able to start the system with a \$4,000 grant. Currently each bike costs \$40/month to lease from Koloni, and advertising fees (from ads on the bikes) cover those costs. Koloni keeps fees collected through their app.

In Brusly, a \$30,000 sponsorship from Dow Chemical supports the bikeshare system.

7.5 Shared Cars

Shared cars, vans, and trucks are rented on a short-term basis (usually by the minute or hourly) from a location readily accessible from the street (i.e. not a large rental car facility). They can provide an affordable option for making occasional local and regional trips.

Shared cars can provide important mobility for households who cannot afford a reliable vehicle. Shared cars might also make it possible for households that would otherwise purchase one or more vehicles to occasionally use a shared car and other modes, in lieu of spending a large portion of their mobility budget on owning their own private vehicle.

There are many examples of commercial and cooperative or non-profit carshare operators. Commercial examples include [Enterprise CarShare](#) and [Zipcar](#). Humboldt State University already has a partnership with Zipcar through which five shared cars are made available on campus.¹⁵ The University reports that the vehicles are well utilized. The SF-focused non-profit City CarShare joined the GetAround network in 2016.¹⁶ Below is an inventory of a carshare program in rural Needles, California.

7.5.1 Needles CarShare

[Needles CarShare](#)¹⁷ launched in August 2016. Two cars are provided by a private rental car company, with subsidy from the regional transit agency. The program has 50 members and higher-than-average utilization.¹⁸

Operating Environment

Needles is a small town in San Bernardino County. More than a quarter of its residents live below the poverty line. Many do not own a car. “The nearest grocery stores, medical offices and other amenities are just over the [state] border in cities like Laughlin, NV or Bullhead, AZ—not far, but not reachable via public transit.”¹⁹

Institutional Management & Operations

The program offers two cars (a sedan and a minivan) parked outside a downtown credit union. Enterprise CarShare provides insurance, maintains the vehicles, and provides customer service.

¹⁵ <https://parking.humboldt.edu/zipcar>

¹⁶ <https://blog.getaround.com/getaround-and-city-carshare-join-forces/>

¹⁷ <https://vvta.org/flex/needles-car-share/>

¹⁸ <https://sharedusemobilitycenter.org/how-a-tiny-california-town-launched-a-successful-carshare-program/>

¹⁹ Ibid.

Technology

Enterprise CarShare manages information functions including membership, reservation, and payment. An online interface or mobile app²⁰ is used for reservations. A membership card provides access to the vehicle.

Funding

Members pay \$5/hour to use a car. There is no membership cost or sign-up fee. Use revenue covers about 70% of the program's cost. Victor Valley Transit Authority (VVTA) provides a revenue guarantee to Enterprise CarShare; the revenue guarantee has amounted to about 30% of the program's cost.

7.6 Community Ridesharing

Informal rideshare and carpool programs already provide important transportation options in many rural areas.^{21 22} There are currently a few posts per day on Craigslist rideshare for Humboldt.²³

7.6.1 Green Raiteros and Van y Vienen

Two long-term informal community arrangements in rural Fresno County, California, were formalized with investments in electric vehicles, charging stations, and dispatch staff or technology. Both programs are now managed by local non-profit organizations.

Green Raiteros began as an informal program in which rural farm workers provided rides to one another in the Huron, California area. The program now has paid and volunteer drivers and two program-owned electric vehicles that provide rides to riders who book 24 hours in advance. For now, the program limits trip purposes to medical and social services appointments. Costs to the rider are charged on a sliding scale.

Van y Vienen, in the towns of Cantua Creek and El Porvenir, runs a seven-seat Tesla Model X van as a ride-hailing service during the week and as a rental vehicle on the weekends. The cost of a trip between the towns and Fresno is \$10.

Operating Environment

Green Raiteros' community of Huron (population 7,311) is served by the intercity Fresno County Rural Transit Agency (one stop) Monday through Saturday. Cantua Creek & El Porvenir (populations <1,000) do not appear to have any transit service.

Institutional Management & Operations

Green Raiteros is managed by the Valley Latino Environmental and Advancement Policy (LEAP). Part of the program included creating a community center where riders and drivers can wait; the center has wifi as well.

Van y Vienen is managed by the Leadership Council for Justice and Accountability.

²⁰ <https://www.enterprisecarshare.com/us/en/mobile-app.html>

²¹ Go! Vermont is a statewide service that matches carpools. The software is a service of AgileMile (agilemile.com).

²² Oregon's statewide ride matching site, Get There, uses software from RideAmigos (rideamigos.com)

²³ <https://humboldt.craigslist.org/d/rideshare/search/rid>

Technology

Green Raiteros does not appear to be using any online or app-based technologies for scheduling rides. Riders can call or physically go to community resource center to book a ride. The community resource center is also the location where riders can start their ride. Van y Vienen uses Green Commuter software to manage ride booking.

Funding

Both projects are supported by grants and by California Utility settlement charges. The programs began in 2018, and current writing about the programs does not indicate what the plans are for future funding.

7.7 Transportation Network Companies

Transportation Network Companies (TNCs) such as Uber and Lyft started many of their partnerships with cities and transit agencies as a first-mile/last-mile solution. Some small towns are now looking to TNCs to replace transit trips; in some cases, TNCs may replace transit altogether, while in other cases TNCs are used to connect to transit or to provide service for specific types of trips (such as to healthcare). The popularity of these subsidized private rides has made it difficult (at least for these two case examples) to plan for the cost of the service. In both case studies, the cities have had to change the program along the way to try to contain costs. The subsidized TNC programs generally appear to be serving more trips than the fixed route or dial-a-ride services that they are replacing.

7.7.1 GoMonrovia

California's GoMonrovia started out in 2018 as a subsidized on-demand ride hailing and bike sharing program. The city worked with Lyft to establish service areas within which the city subsidized Lyft trips for travelers. The bike sharing portion of the program is no longer running, because the operator, Lime, is no longer operating bikeshare.

The city spent, in the first three months of the pilot, as much as they used to spend for a year of DRT service (~\$1 million) and provided as many rides (30,000). The city has since reduced the service area of the program and changed the amount of subsidies for different types of rides. The city has limited their dial-a-ride service to only those with ADA requirements (as of February 2019); Lyft does not provide accessible vehicles. In addition, after discovering abuses of the Lyft Concierge services, the city created more requirements for use of that system. In 2019 it was reported that the annual program expense is \$3.3 million, while revenues are \$1.2 million.²⁴

²⁴ <https://www.sgvtribune.com/2019/04/22/bradbury-is-piggybacking-on-monrovia-lyft-program-and-monrovia-wants-it-to-pay-up/>



The graphic features a background image of a mountain range with the 'go monrovia' logo overlaid. Below the image is a purple and green banner with the text 'NEW Lyft PRICING EFFECTIVE JUNE 1'. Three white boxes contain pricing details for different ride types.

Ride Type	Price	Details
Classic Ride	\$5.00	Travel anywhere within the service area! Private ride or for groups up to 4 passengers No stops before reaching final destination
Shared Ride	\$2.50	Select a shared ride and receive 50% off regular price when traveling in the service area! Up to two (2) passengers Possible stops before reaching final destination
Shared Ride	\$0.50	Those traveling to and from Old Town Monrovia, the Metro Gold Line Station, or any hospitals within the service area will pay just \$0.50!

Operating Environment

Monrovia (population 37,061) is served by several different transit options: Foothill Transit busses, the Gold Line light rail, and ADA paratransit services. It is located 20 miles from the City of Los Angeles.

Institutional Management & Operations

The City of Monrovia and nearby municipalities negotiate the service area and subsidies with Lyft. The service boundaries have been expanded and reduced over time as neighboring jurisdictions join and leave the program.

Technology - Trip Planning & Payment

Trips are planned, booked, and paid for through the Lyft app or through the Lyft Concierge service.

Funding

The City of Monrovia subsidizes the trips, and the city may soon reduce the amount of the subsidy again. There are likely other funding sources as well; the city is applying for funding from L.A. Metro.

7.7.2 Innisfil Uber

The City of Innisfil, Ontario, replaced their fixed-route transit system with subsidized Uber rides.²⁵ Fares are a fixed cost for residents within the service area to/from specific destinations, and other trips within the service area are discounted. The city initially started the program to save money over the cost of the fixed route system. The city now spends more than the cost of the fixed route and has started to cap rides to 30 a month (residents can apply for an exemption) and increase the cost of each ride by \$1. Long-term, the program may be too popular (and thus expensive) to continue as-is. The program relies on a local taxi service to provide accessible trips and subsidizes them to the same amount.

Operating Environment

Innisfil (population 36,566) is an historically rural area experiencing residential growth. It is connected to Toronto via intercity transit.

Institutional Management & Operations

Innisfil contracts with Uber and updates the contract and program terms on a regular basis.

Technology

Riders use the Uber app to order rides.

Funding

The City of Innisfil subsidizes the Uber rides.

7.8 Supportive Technologies

Most examples included in this chapter rely on or are supported by software or mobile applications, which are noted in the “Technology” portion of each example. In this section, we provide an easy overview of potential technology supports: we present one technology-focused example and then present the technologies from all examples grouped together by function.

7.8.1 Technology Profile - Go! Vermont

The Vermont Agency of Transportation (VTrans) provides a statewide trip planner branded as the Go! Vermont Trip Planner²⁶, launched in 2017. This intermodal trip planner returns fixed-route transit options in combination with general service demand-responsive transit (DRT) such as deviated fixed-route, zone-based dial-a-ride, and hail-and-ride (flag stop service). The same trip planner is used by the state’s call center staff to respond to direction requests by phone. Previously, the state’s transit trip planning was available through Google Maps but included only fixed-route transit, making DRT harder for travelers to discover and use.

²⁵ Arlington, TX (population 400,000) has a [similar program](#) with Via (some accessible vehicles provided by Via and door-to-door accessible service provided by Handitran).

²⁶ <https://www.connectingcommuters.org/>

Operating Environment

Vermont is a state with an area of 9,616 square miles and a population of 626,299 residents. Its largest city is Burlington, with 42,899 residents. There are ten transit operators in Vermont²⁷, with operations including local and intercity fixed-route and demand-responsive transportation.

Institutional Management & Operations

Vermont Agency of Transportation (VTrans) manages software and data hosting and maintenance. VTrans staff oversee Trillium Transit, the firm contracted to perform these functions.

Technology

The Go! Vermont trip planner uses the open-source OpenTripPlanner multimodal journey planning software. First developed and deployed by TriMet in Portland, Oregon, this software is now used in many regions in the U.S. and internationally. VTrans added functionality to support demand-responsive transportation to the software. Originally, OpenTripPlanner software planned bike, transit, and bike+transit trips.

Standardized data formats enable modal options to be included in the trip planner. General Transit Feed Specifications (GTFS) describes fixed-route public transportation and its new extension GTFS-Flex²⁸ describes demand-responsive transportation. OpenStreetMap²⁹ data is used for streets, including pedestrian and bicycle infrastructure.

VTrans also uses AgileMile software for carpool matching. The software refers transit directions requests to OpenTripPlanner.

Funding

VTrans received a \$480,000 grant from the FTA's MOD Sandbox program in 2016.³⁰ This grant funded software design and development, data specification development, data creation, software testing, and pilot implementation. VTrans contributed about \$100,000 in-kind during the implementation phase. The ongoing cost for trip planner hosting is about \$20,000 per year, paid from general VTrans program funds.

7.8.2 Information Tools

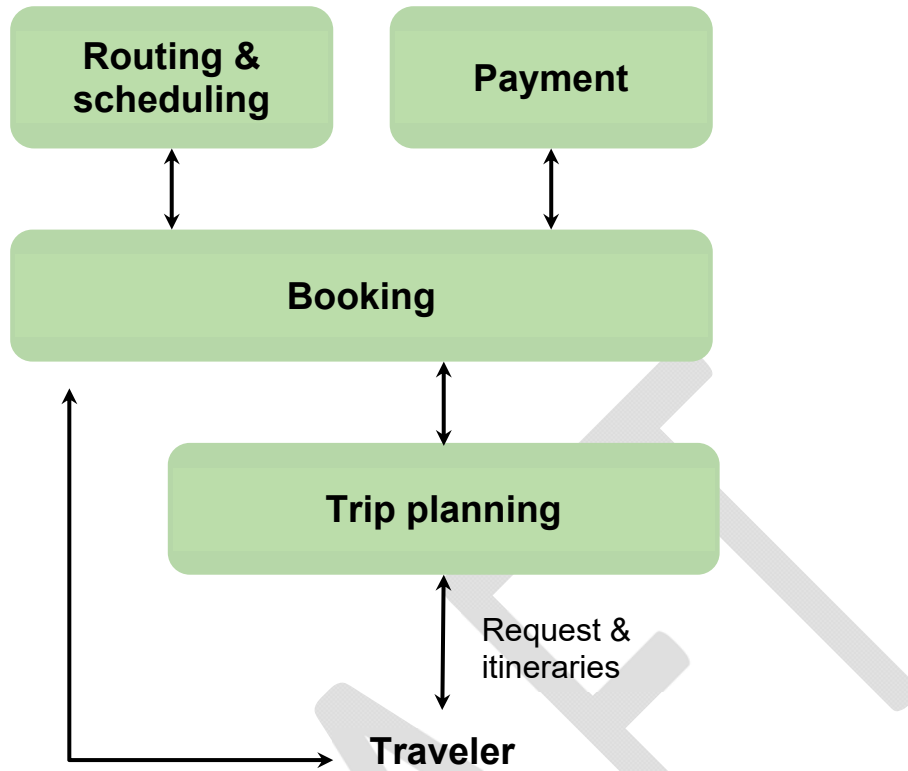
Trip planning, booking, payment, and routing & scheduling are all functions that are sometimes consolidated in a technology platform or product, or which might be part of a system with various software and vendors. Below is an illustration of how the functions relate.

²⁷ vermont-gtfs.org

²⁸ gtfsflex.com

²⁹ openstreetmap.org

³⁰ <https://www.transit.dot.gov/research-innovation/fiscal-year-2016-mobility-demand-mod-sandbox-program-projects>



Below is a matrix of some products and platforms, and the functions they include.

Product / Vendor	Trip Planning	Trip Booking	Payment	Routing & Scheduling
QRyde	X	X		
Shotl		X	X	X
Pantonium		X	X	X
Kyyti	X	X	X	X
Koloni mobile app ³¹		?	?	
OpenTripPlanner	X			
RideAmigos	X	?	?	
AgileMile	X	?	?	

³¹ For bikeshare and scooter-share

Product / Vendor	Trip Planning	Trip Booking	Payment	Routing & Scheduling
RezoPouce mobile app		X		
Hitch		X	X	
Green Commuter software		X		
Lyft		X	X	X
Uber		X	X	X
ITNAmerica Personal Transportation Account			X	

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8 Analysis

The initiatives of other agencies which are presented in this section, help highlight important themes for HCAOG to consider going forward.

In addition to these themes, we have consolidated questions for HCAOG from a separate report and presented an assessment of the MOD Sandbox grant recipients to help HCAOG determine how to best align itself if there is another opportunity for such funding (now called *The Integrated Mobility Innovation (IMI) demonstration research Program*).

8.1 Important Themes

8.1.1 Agility of Transit Agencies

Flexibility is advantageous when conducting a pilot. The agility of private transportation providers, when compared to transit agencies, is higher due to transit agencies rules and regulations.

- **Existing procurement structure:** The traditional procurement structure requires flexibility when emerging services are sending unsolicited proposals, and agencies are interested in a specific service provider available in their cities.
- **Existing governance structure:** The existing structure of transit agencies in terms of planning, construction, operations and maintenance may need to be adapted as new services and roles for transit agencies emerge.
- **Federal funding:** Federal policy regarding equity and accessibility may limit what transit agencies can implement.
- **Labor management:** Pilots with emerging services can require flexibility to allow for service areas to change. If additional (or fewer) drivers are needed to operate the service, transit agencies can be limited to adjusting driver staffing as a result of internal bidding/sign-up processes. Further, collective bargaining rules may preclude the contracting out of (supplemental) services such as the use of TNCs.

8.1.2 Public Microtransit vs. Private TNC

Public microtransit/demand-response services and TNCs may provide similar services but result in different ridership potential. Factors that influence the attractiveness of the respective services include:

- **Shared ride vs single ride:** TNCs, except for their ridesplitting service, do not involve picking up multiple people.
- **Response time:** The agility of TNCs may result in their ability to provide a quicker response time.
- **Hours of service and cost model:** TNCs are available 24 hours per day, every day. Trip densities may preclude the use of traditional transit agency services which are typically costed on a per revenue hour basis (vs. the TNC model where payment is for services consumed).
- **Rider/driver interaction:** Transit operators, typically assigned to a specific route or service, often establish rapport with regular riders.

8.1.3 Upgrading Existing Service to Microtransit

Daniel Sperling, author of “Three Revolutions,” believes microtransit can transform transit agencies into “demand-responsive” companies. Select examples of this transformation include:

- **Dial-a-Ride:** Upgrading existing Dial-a-Ride service to microtransit, such as in the case of CARTA, can improve service to customers. There are potential challenges related to maintaining aspects of the previous business model, including pre-determined stops at set times, and customers boarding without first booking a trip, causing either the operator or dispatcher to input the destination for consideration in the algorithm, which the technology may need to enable.
- **Paratransit:** Creating an on-demand model for paratransit can improve people’s spontaneity of travel and increase independence. In the new model, it is important to maintain existing access methods, and offer training related to new access methods.
- **Fixed-route:** Replacing low-ridership fixed route with microtransit was accomplished with PSTA and YRT. In such instances, the Orange County Transportation Authority (OCTA) emphasizes the importance of a thorough cost assessment to decide whether fixed-route should be replaced with on-demand service in particular areas.

8.1.4 Prioritizing Customers

- **Putting the customer first in planning:** When designing the pilot, agencies must first consider the customer. Within the zone, how many customers have smartphones? What initiatives will provide the most benefit to the customer, based on what customers in this context require?

In determining how best to provide paratransit, King County Metro has developed a multi-phase stakeholder engagement process to identify gaps and determine effective solutions as a team with their customers, customer caretakers, and community stakeholders. And AC Transit found success with first identifying specific use cases to test and designing its pilot based on specific challenges related to providing service to customers in the zones identified for the pilots.

- **Marketing:** To acquire ridership, marketing is required. Many agencies, such as PSTA, found in-person interaction to be most effective. As a result of aggressive marketing, AC Transit also saw its ridership increase by 30%.

To provide a FoS model and move people from paratransit to conventional transit, in-person interaction is imperative. Directly engaging customers and recognizing individual needs are essential to facilitating people transitioning to conventional fixed-route services.

- **Education and training:** Training customers on how to use new technology may be beneficial for people unfamiliar with booking trips via a mobile application or web portal. When launching their same-day taxi application, OCTA found it necessary to engage users who were uncomfortable using a smartphone. Increased staffing for the purposes of training customers was important for successful program outcomes. It may be important to consider designing technology training and developing mechanisms to follow-up with trainees.

For FoS initiatives, in-person education and travel training is vital. YRT offers location-specific travel training to educate Family of Services customers on

procedures at specific Mobility Hub (accessible transfer point) locations. This training is required for customers to use a given Mobility Hub. King County Metro offers an extensive travel training program through a contractor. This includes a permanent bus at their Harbor View Medical Centre where customers can be travel trained and tested.

- **New metrics for measuring success:** Customer engagement and feedback is important for measuring success and identifying areas for improvement. Since pilots are designed based on the customers' needs, measuring success based on whether such needs are being met is important. Valley Metro and RouteMatch are redefining how service success is measured, using measures such as spontaneity, loyalty, and dignity. It also becomes important to assess: What percentage of customers are using the call center to book trips? What are the demographic characteristics of these customers?

8.2 Key Questions

The following key questions are from Brandon Hemily's *Transit and New Shared-Use Modes; Key questions from the transit agency perspective; a Discussion Paper* and have been included for HCAOG and the IBI Group team's consideration throughout the MoD strategies development.

Policy Goals and Objectives

- Does the transit agency's overall corporate mission (and accompanying goals and objectives) need to be reviewed in light of the new mobility ecosystem? Is the mission to deliver transit service or to manage mobility? Should the mission focus on ensuring mobility options for the disadvantaged, or for all in an effort to improve quality of life?
- Are there different goals and objectives being served by different components of the transit agency's family of services (e.g. rapid transit, regular bus, express bus, DRT, etc.)? Have they been made explicit?

Transportation Planning

- What is usage of shared-use modes? Who? When? Where?
- To what extent should privately-operated mobility options be explicitly integrated into the MPO planning and implementation frameworks?

Data (for planning & deployment)

- What data is absolutely essential for the following purposes?
 - Monitoring of goals
 - Coordinated operations with shared-use modes
 - Financial accountability
- What are the key private provider concerns that transit agencies must be sensitive to?
- What data should be shared with MPOs?
- What are the privacy concerns and how to address them?

8.3 Funding Opportunities

As described in Section 2: Landscape of Mobility, in October 2016, FTA announced project selections for \$8 million in funding for MOD public transportation projects, under the US DOT MOD Sandbox program. Here we assess the key factors for success, which we believe were continuity, consistency, and readiness.

- **Continuity:** Many recipients that applied for funding did so to improve existing technologies, including the Chicago Transit Authority, Dallas Area Rapid Transit, and Tri-Met, which focused on improvements to existing mobile applications. Other recipients, such as the City of Palo Alto and San Francisco Bay Area Rapid Transit, applied for funding to improve existing programs, such as car-pooling and commuter programs. Recipients also ensured continuity through initiatives that were part of a broader plan.
- **Consistency:** Recipients such as Dallas Area Rapid Transit showed consistency through a track record of previous completed pilots and programs, all geared toward the same initiative.
- **Readiness:** Many recipients had identified partners. However, also contributing to the readiness of the agencies' applications were defined project approaches, and description of project phases.

Recipients, such as the San Francisco Bay Area Rapid Transit, that did not apply for funding to improve existing technologies proposed innovative, interesting projects. Most specifically, the projects focused on the unique challenges faced by the agency; and less so on general challenges faced in many cities in the United States. Focusing the project on these unique challenges allowed agencies to propose solutions that were strategic and relatively small in scope. There were few recipients with large project scopes.

Many recipients also included small but innovative ideas as part of their project (e.g. community incentives, tokenized payment transferrable to other users) which may have given them an edge in the funding application.

Other comparative advantages:

- 6/11 had identified partners;
- 3/11 pilots were extensions of existing programs;
- 3/11 pilots were part of a broader plan;
- 2/11 pilots were modeled on a prior program;
- 2/11 were USDOT Smart City finalists;
- 1/11 pilots had implementations in multiple cities; and
- 1/11 pilots had a wide implementation, covering an entire state including rural areas.

In addition to being funded through MoD Sandbox funding, projects that offer innovative service delivery models may be funded through streams such as the Congestion Management and Air Quality (CMAQ) grants and other existing funding sources, as well as advertising, public-private partnerships, and reallocating monies saved by the elimination of poorly performing conventional transit routes.

9 Conclusion

Transit agencies in the United States have been partnering with private sector entities including TNCs and private microtransit companies, and real-time routing and dispatching software providers for several years, particularly since the launching of USDOT's MoD Sandbox initiative. However, transit agencies are still assessing how best to position themselves in the shifting paradigm of mobility. Throughout this time agencies have experimented with replacing existing services, complementing current services, and adding new services. Given that most of the operating cost in the transit industry is attributed to direct driver employment and vehicle ownership, agencies have experimented with a variety of models, where they: 1) operate a service on their own; 2) use a contractor to run their services; or 3) partner with TNC or taxis and subsidize the trip cost as well as fares.

There is no clear conclusion on the best model, and it varies largely on the type of service being provided and the ridership demography. The experiments continue.

Information gleaned from nation-wide examples of next-generation mobility (operations, service delivery and technology) informs on potential applications in Humboldt County. Section 10 presents a framework for discussion of opportunities for advancing MoD/next-generation solutions to address identified transit/mobility needs in multiple locations in the county.

10 Opportunities - *A Way Forward*

Table 10.1 (Unmet Needs and Potential *MoD* Solutions) provides a framework for discussion of opportunities for advancing *MoD*/next-generation operational and service delivery solutions to address identified transit/mobility needs.

The previously provided *Existing Conditions and Unmet Needs* and this *MOD Innovative Practices* Tech Memos serve to inform on identified unmet needs and potential operational and/or service delivery solutions.

Table 10.1 remains work-in-progress and will be expanded upon to generate discussion with key stakeholder constituencies including SSTAC, TAC and the public.

Table 10.1: Unmet Needs and Potential *MoD* Solutions

Unmet Need / Latent Demand	Locations or Services Identified (comment received)	<i>MoD</i> Application(s) – PROMISING CONCEPTS (“N/A” = not currently a priority)	Co-Benefit (of any <i>MoD</i> applications)	Contra Benefit (of any <i>MoD</i> applications)
Address Unserved or Underserved Areas	Service to/from Southern Humboldt to Eureka/Arcata	N/A -- HTA’s updated Southern Humboldt Intercity is serving this need.	Reduced social isolation; improved health outcomes – community health needs assessment.	
	Service to Samoa	N/A – Low-priority need due to low density (insufficient to support service).		
	East/northeast: Blue Lake, Hoopa Valley			
	North: Orick	N/A – RCTS is serving this need: stops in Orick, as well as State/National Parks.		
	South/southeast: Bridgeville	N/A – Low-priority need due to low density, remoteness (insufficient to support service)		
	Old Arcata Road between Eureka-Arcata: Freshwater, Bayside, Jacoby Creek	<i>Pilot project continues.</i>		
Lifeline to remote rural areas	Hoopa Valley, Orick, Weitchpec	N/A– Low-priority due to current low demand. KTNeT, RCTS, WCTS serve this need.		

Unmet Need / Latent Demand	Locations or Services Identified (comment received)	<i>MoD</i> Application(s) – PROMISING CONCEPTS (“N/A” = not currently a priority)	Co-Benefit (of any <i>MoD</i> applications)	Contra Benefit (of any <i>MoD</i> applications)
Address Service When It’s Needed				
Later evening	Fixed route and dial-a-ride services in Eureka and Arcata			
Sunday				
Address Service for Most Vulnerable Customers with Fewest Mobility Options			Reduced social isolation; improved health outcomes – community health needs assessment.	
Enhancing trips for elderly/ disabled for health/medical appointments	Add more dial-a-ride service vehicles to reduce long wait times			
Get people (SSTAC target population) onto mainline transit. *				
Reduce fares				
Attract the Most Riders for the Most Trips, Most of the Time			<ul style="list-style-type: none"> • Reduce VMT per person per vehicle. • Increase farebox revenue. • Supports RTP. Likely to support future 	

Unmet Need / Latent Demand	Locations or Services Identified (comment received)	<i>MoD</i> Application(s) – PROMISING CONCEPTS (“N/A” = not currently a priority)	Co-Benefit (of any <i>MoD</i> applications)	Contra Benefit (of any <i>MoD</i> applications)
			Climate Action Plan goals.	
Maximize service in urban areas for work, service, shopping, and top recreational destinations				
Decrease SVO trips (SSTAC, HCAOG goal)				
Increase Ridership on Good-Performing Routes			<ul style="list-style-type: none"> • Dependable/strong farebox ratio. • Reduce VMT per person per vehicle. • Supports RTP. Likely to support future Climate Action Plan goals. 	
Streamline RTS (shorter travel times)	Replace RTS’s McKinleyville airport stop	Demand-responsive taxi	MoD serves (limited) McK suburbs. Add an RTS run.	
	Decrease RTS’s Fortuna stops, Rio Dell stops	Coordinate with Fortuna Transit	Opportunity to open service to gen. public. Add an RTS run.	
	De-couple stops in Manila	Demand-responsive taxi, 3 rd -party vendor	Manila MoD service more frequent. Vehicles more “right-sized” for Peninsula Drive.	

Unmet Need / Latent Demand	Locations or Services Identified (comment received)	<i>MoD</i> Application(s) – PROMISING CONCEPTS (“N/A” = not currently a priority)	Co-Benefit (of any <i>MoD</i> applications)	Contra Benefit (of any <i>MoD</i> applications)
	Provide express intercity route (north-south)		Decrease riders' travel time.	
More frequency on RTS		Streamline RTS/shorten trunk (strategies above).	Capture more ridership.	
More connections to RTS from communities along SR 101	Diverted/deviated fixed-route (premium service) that is app-based. *			
Introduce new technology	“Arcata program to try out software—integrates user app side with transit operators' side.” *			
*Comments from one of the <i>MoD</i> stakeholder meetings.				

Appendix A

This Appendix provides additional examples of where agencies have implemented first and last mile solutions, alongside the key examples discussed in Section 5. The following paragraphs provide additional information on examples of first and last mile solutions.

Chattanooga Area Regional Transportation Authority (CARTA)

CARTA is the key implementer of a microtransit pilot set to replace two existing Dial-a-Ride routes. The microtransit service will be operated by CARTA using the agency's vehicles and employees, augmented by on-demand technologies supplied by an undisclosed private partner, with whom CARTA is engaged in contract negotiations.

The target audience of the pilot is the customers living within the current Dial-a-Ride service areas, where over 75% have indicated that they cannot drive or have no access to another transportation mode. These users have also been identified as the most likely to need to transfer between 2-3 buses to complete their trips. Fixed route service is not provided in these areas of the city due to inefficient street connectivity, as well as low development densities and poor walking infrastructure that would hinder access to fixed stops. One of the zones is primarily residential, while the other serves a mix of land uses including commercial, residential, and the service centers of a number of public agencies.

During the pilot, each Dial-a-Ride route will be replaced with a zone, within which customers will be able to book on-demand trips. The microtransit service will connect to CARTA's conventional bus network at two suburban shopping centers that serve as existing transfer nodes for Dial-a-Ride. The microtransit pilot will provide continuity from the Dial-a-Ride service model by allowing call-in bookings for customers without smartphones, and by automatically scheduling the microtransit vehicles to check-in at the transfer nodes to facilitate transfers with fixed routes, allowing customers to board the vehicle without booking a trip.

Detailed evaluation metrics for the pilot are in development. Key aspects identified for evaluation are mobility (which may focus on accessibility, ridership, and/or system utilization), and CARTA operations (which may focus on revenue, staffing needs, and/or costs). Once key performance indicators have been established, they will be tracked using data available from the microtransit dispatching technology and CARTA operations.

The service model employed by the CARTA microtransit pilot, combining features of FM/LM and zone circulators, has potential applications for on-demand community routes in suburban and mid-city contexts. Such services could be deployed in districts that require strong connections to the broader transport network, but whose destinations are not concentrated in clustered nodes or along linear corridors. This could complement HTA's Redwood Transit Service, for example, by feeding direct, trunk service, and serving local destinations with on-demand trips instead of circuitous fixed routes.

Greater Dayton Regional Transit Authority (RTA)

Greater Dayton RTA currently provides RTA Connect service, in partnership with Lyft, that serves its customers previously served by stops that have since been eliminated. Riders can request rides that go from transit centers located at the route end-points to a location within the GDRTA service area. As GDRTA plans to expand its service area from Montgomery County to an 11-county region, is developing a MaaS platform for the Greater Dayton region as part of its efforts to upgrade its existing fare collection system and offer an integrated payment system. At the same

time, the agency is implementing a one-year microtransit pilot with TransLoc, aimed at providing on-demand service to residents. The pilot is currently in the testing phase. To share insights and lessons learned regarding microtransit pilots and potential MaaS visions, CARTA and RTA are meeting on a regular basis.

Electronically, different transportation modes and mobility solutions may be integrated through a mobile device application, generally complemented with a web portal and/or call center in recognition that not all riders will be able and/or willing to use a mobile devices application. Such an integrator is equipped with functions including inter-modal real-time information, inter-modal trip planning, inter-modal trip booking, and inter-modal payment. There are potential benefits related to an integrated platform for mobility. For instance, in San Francisco when a new transit agency is added to the integrated fare management system, all transit agencies in the management system see an increase in ridership.

Kansas City Area Transportation Authority (KCATA)

KCATA is in the process of implementing its second on-demand pilot as part of its Kansas City RideKC Freedom On-Demand project. The project originally leveraged a public-private partnership with the microtransit company Bridj (which has since discontinued operations). The one-year pilot program was launched in March, 2016, and included a mobile application offering same-day service. The target audience of the first pilot was commuters, as Bridj offered a solution designed for commute patterns, where service was only provided in the direction of demand. This was the first time an agency worked with Bridj, using public funding. The pilot also included 10 Ford Transit shuttle buses, representing one of the first partnerships in the industry between a major automobile provider, transit agency, and private microtransit company.

KCATA and Bridj worked together to define the zones for the service, which offered trips to customers for \$1.50 during weekday rush hours. Ridership for the first 6 months of the pilot was low. Overall, 1200 trips were not accepted as they were outside the zones and/or hours of service. In the last 6 months, ridership increased slightly as a result of a partnership with the hospital, KUMed, where parking was limited and for this reason commuters were incentivized to use the service. Looking back, KCATA noted that the pilot did not meet the needs of the KCATA customers within the geographies selected.

Following the one-year pilot, on May 1, 2017, KCATA launched a second on-demand project with TransDev, once again with the RideKC Freedom mobile application, enabling KCATA customers to book accessible, on-demand trips. The mobile application offers a user-friendly, map based trip-booking interface. In the future, KCATA plans to expand their technical developments to integrate mobile fare payment with the RideKC Freedom On-Demand application. The KCATA pilots represent commuter and urban circulator delivery models.

Livermore Amador Valley Transit Authority (LAVTA)

LAVTA is providing residents traveling within the city limits of Dublin with options for first- and last mile trips with partnerships with Uber, Lyft, and Desoto Cab Company. The GODUBLIN pilot promotes ridesplitting, leveraging UberPOOL, LyftLine and Desoto Share. Residents use a promo code to access the service, where half of customers' fare, up to \$5, is paid for by the agency. The service represents a low-density zone-based model, with 10-15 minute wait times.

Regarding labor, partners must provide background checks, DMV checks, vehicle inspections and \$1 million in liability insurance. To measure success, LAVTA will assess data such as anonymous users' frequent destinations, peak travel times, and other non-address specific information.

Not all services are accessible for people without smartphones. The DeSoto Cab Company provides the only call-in option, wheelchair accessible vehicles, and a cash payment option.



Research Triangle Regional Public Transportation Authority (GoTriangle)

GoTriangle's pilot with Uber and TransLoc was one of the first public private partnerships. TransLoc provided consolidated information and trip planning, where residents could enter a destination and receive a trip itinerary including public transit and Uber, if necessary to reach the transit station. People could also see real-time travel times within the application. During times when transit wasn't available, customers could still plan trips with Uber as an option. GoTriangle saw a 26% increase in ridership as a result of consolidated information, according to TransLoc.

Separate from this is the current partnership with TransLoc in the Research Triangle Park, where RTP shuttle operated by GoTriangle are being dispatched on demand

Sacramento Regional Transit District (RT)

Sacramento RT is an example of a public microtransit pilot, titled SmART Ride, through a partnership with TransLoc, who is providing the on-demand software. SmART Ride is an on-demand, rideshare service. Using a smartphone app, riders can request a ride to travel within one of three service areas.

Designed to pare down some of its low-productivity bus routes, West Sacramento has also launched a similar microtransit service using technology from Via.

York Region Transit (YRT)

YRT is a leader in the FoS initiative, moving eligible customers to in-house on-demand microtransit provided by RouteMatch. To find success with this new business model, YRT upgraded their specialized transit scheduling, dispatch, and customer access systems (including a web portal and mobile application). Prior to the upgrade, in 2014 YRT manually planned trips for travel-trained specialized transit customers to use conventional services.

Encouraging specialized transit riders to use accessible conventional transit has increased the number of trips taken, but also reduced the length of specialized transit trips. The average distance has decreased from 11km to 7.4km. The change in business model has allowed YRT to absorb a 7%-10% growth in ridership from 1,200 trips per day to 1,500 trips per day with almost zero additional cost (i.e. operation costs rose due to inflation). In addition to these impacts to YRT, customers have stated that seeing customers of all needs using conventional service has become the norm.

The RouteMatch upgrade is also intended to be used for other on-demand services. Both the specialized transit, Mobility Plus, and rural, low-density Dial-a-Ride service will be integrated as part of a united On-Demand Strategy. This is in line with consolidating all YRT services into one FoS, where users may be assigned to either type of vehicle, if eligible.

The following table provides some additional examples.

AGENCY	PARTNER	INITIATIVE
Austin Metro	Via	Offering free on-demand service within two zones, asking simply that customers provide feedback so Austin Metro can use it to measure the effectiveness of the pilot.
King County Metro	Non-profit transportation providers	Providing funding in exchange for partners providing a certain number of accessible rides. Examples of partners include supportive living facilities and community centres.
Lone Tree, Colorado	Uber (software)	Using Uber's software on existing shuttles to provide the town of 2 square miles with free, on-demand shuttle service.
Massachusetts Bay Transportation Authority (MBTA)	Uber and Lyft	Offering subsidized paratransit rides in an effort to reduce MBTA's cost per paratransit trip. Over 5 months, there have been 10,000 Uber trips.

AGENCY	PARTNER	INITIATIVE
Montreal System de Transport Metropolitain (STM)	Bike-share	Offering the ability to pay for bike-share with STM transit passes.
Orange County Transportation Authority (OCTA)	Taxi	Providing a same-day taxi mobile application for on-demand taxi service.
Sacramento, California	Car-share	Providing residents of three public housing complexes with access to free car-share available at the complexes and nearby transit stop.
Summit, New Jersey	Uber	Offering free rides to and from the train station in an effort to alleviate demand for parking.