SHARED MOBILITY PROGRAMS

GUIDEBOOK FOR AGENCIES

Texas Department of Transportation

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TABLE OF CONTENTS

List of Figures

List of Tables



Chapter 1. Introduction

Why Use This Guidebook

This guidebook provides a thorough understanding of three shared mobility programs to the Texas Department of Transportation (TxDOT) and its stakeholders for planning and mobility efforts: dynamic ride-share, car-share, and bike-share. New technology and changing travel trends have spurred the development and uptake of these new models of transportation, which expand the set of available travel options and have the potential to provide social, economic, and environmental benefits.

Texas is one of the fastest-growing states in the nation, and many Texas cities and regions are actively seeking solutions to improve air quality, expand mobility and accessibility, and mitigate growing congestion. Proactive approaches that manage travel demand help use limited resources efficiently.

Shared mobility programs offer flexible transportation options that vary based on cost, travel time, travel distance, and other trip needs of travelers. However, there is not a one-size-fits-all approach to implementing shared mobility programs at the state level or within a given region. Shared mobility programs offer a set of adaptable, scalable transportation options that have the potential to serve a range of needs in various contexts. Existing programs range in scale and scope, often operating in multiple regions, to provide creative solutions to increase travel options.

This guidebook aids planning and mobility practitioners in how to best identify, assess, attract, and manage shared mobility programs. Finally, the guidebook looks at emerging trends in this rapidly changing field.

This guidebook highlights key factors that contribute to the development and success of a shared mobility program. These factors include the role of agencies involved, regulations in force, regional travel behavior characteristics, and vendor criteria for program implementation.

Development of the Guidebook

For information about the research behind this guidebook, see *Dynamic Ride-share, Car-share, and Bike-share – Research Supporting the Guide to Assessing Your Community, Attracting and Managing Programs* - Final Report, available at http://tti.tamu.edu/documents/0-6818-1.pdf.

Organization of the Guidebook

This guidebook is organized into the following chapters:

1. Introduction: a discussion of how and why to use this guidebook.
2. Shared Mobility Programs: a short introduction to each program type—ride-share, car-share, and bike-share—and an overview of the three programs at the national and state level.
3. Assessment: steps for assessing a region to identify which program(s) best match regional characteristics and goals.
4. Attraction: key components to attracting shared mobility programs, including the political and regulatory environment, policy considerations, funding and revenue streams, outreach and marketing, and business model factors.
5. Management and Operations: critical factors in successfully managing a shared mobility program, such as the business model type, agencies involved, regulations in force, program costs and program expansion and evaluation.
6. Emerging Trends: new trends and innovations in shared mobility management and programs that an agency can investigate after this guidebook is published.

Chapter 2. Shared Mobility Programs

This chapter provides brief introductions to the three shared mobility programs and the current state of each program in the United States and in Texas. This includes a brief summary of each program type including the definitions, operations, and purposes for ride-share, car-share, and bike-share programs in the United States. These two-page summaries offer a quick introduction to these programs. Major features and considerations are expanded on in the rest of this guide. This chapter then provides an up-to-date account of current shared mobility programs operating in the United States as of this guide's publication.

What Is Ride-Share?

Dynamic or real-time ride-share programs offer a service in which drivers and passengers arrange recurring or occasional shared rides in real time. There are several variations of these types of programs. For the purposes of this guidebook, the term "ride-share" is used in the broadest sense, recognizing that different programs are continually evolving.

Dynamic shared rides can be arranged informally between individual drivers or contracted through a transportation network company (TNC). TNCs typically offer a service more akin to taxi service than carpooling. Existing programs exhibit a range of program types and business models. This mobility program has also been referred to as ride sourcing or ride-hailing to account for the role of a paid driver.

Dynamic ride-share is distinct from carpools or vanpools that are static and scheduled in advance. These traditional programs coordinate long-term, prescheduled, and pre-organized carpools focused on the daily commute.

New technology has enabled ride-share models to focus on travelers who want to arrange short-notice, one-time, shared trips with one another regardless of the trip purpose.

U.S. Ride-Share

Pros:

- **Increases vehicle occupancy.**
- **Uses prescheduled or short-notice arrangements.**

Cons:

- **Resistance from taxi unions.**
- **Potential for increased congestion/VMT.**

Trends:

- **Less formal.**
- **Trip purpose less important.**
- **Programs specifically for kids and seniors.**

Who Operates Ride-Share?

Dynamic ride-share programs are most commonly operated by private companies and nonprofits. TNCs are generally private companies, while ride-share programs that facilitate casual, interpersonal arrangements are often nonprofit organizations.

How Does Ride-Share Work?

Ride-share programs rely heavily on smartphone technologies and customized iOS® and Android® applications (apps). Interested users can download a ride-share provider's mobile app for free, register with a valid credit card, and start requesting rides right away.

Ride-share works by:

1. **Request**: A passenger requests a ride through an app (via computer, tablet, or smartphone).

2. **Connect**: The software sends the ride request to all nearby drivers who fit the rider's previously established preferences and route (Figure 1).

3. **Pick up**: A driver then has the option to accept or reject the rider's request. Upon acceptance, the driver navigates to the passenger's designated location using global positioning system (GPS) technology that shares the vehicle's progress with both parties.

4. **Pay**: Cashless transactions are facilitated automatically by the app or service. The TNC's charges are calculated based on distance and/or time, like taxis. Ride-share programs like Carma Carpool® and iCarpool® reimburse drivers according to the reimbursement rate authorized by the Internal Revenue Service (IRS) plus a small transaction fee. This is the cost to the rider.

Figure 1. Ride-Share App Alerts a Nearby Driver.

Why Ride-Share?

Many traditional ride-share programs began as part of a larger effort to mitigate air quality concerns and congestion. Similarly, some dynamic ride-share programs have explicit goals to decrease the number of single-occupant vehicles and associated vehicle miles of travel (VMT). Several TNCs are experimenting with allowing drivers to add additional passengers who then split the cost of the ride.

Dynamic ride-share programs have the potential to achieve those goals but currently appeal to many users for cost savings and convenience. The congestion relief and accessibility benefits sometimes suggested are not yet proven; additional evaluation and research should be done to quantify potential benefits.

Benefits of ride-share technology to users include:

- Smartphone integration.
- User-friendly interface.
- GPS tracking functionality.
- Ride-matching algorithm.
- User profiles.
- Social network integration.
- Driver and user rating system.
- Cashless transactions.
- Real-time maps showing nearest driver(s) (*1*).

What Is Car-Share?

Car-share programs provide a user with short-term vehicle access without the financial burdens and responsibilities of private vehicle ownership and a more streamlined and flexible system than traditional rental contracts.

The most common design for car-share services in the United States involves programs that provide fleets of shared vehicles at designated parking spots where each trip must start and end. However, the spots are distributed throughout a geographic area and not concentrated at one specific location, as with a rental car agency.

Figure 2. Designated Home Area for Car2Go Vehicles in Austin, Texas (*2*).

Another car-share model uses floating vehicle fleets that allow point-to-point one-way trips within a certain geographic area. A virtual barrier monitors a vehicle's locations using GPS and ensures that the vehicle is parked at a legal parking spot within the operating geography. Figure 2 illustrates the home geography of the point-to-point program operated by Car2Go® in Austin, Texas (Figure 3).

Peer-to-peer (P2P) car-share programs facilitate exchanges in which individuals share their personal vehicles with others.

Who Operates Car-Share?

Car-share business models in the United States can be for-profit, nonprofit, cooperative, or public-private partnerships. Several traditional car rental companies and car manufacturers are involved in car-share programs. P2P car-share programs, in contrast to car-share programs defined by a unified shared fleet, typically provide a controlled marketplace where individuals enter into sharing agreements.

How Does Car-Share Work?

Car-share vehicles are typically spread throughout a region and concentrated in proximity to residential, employment, and activity centers. Smartphone apps can be used to streamline the process. Typically, the car-share process is:

1. **Reserve:** Reservations can be made in advance or at the time of the rental as long as there is availability. Reservations and vehicle access are generally available 24 hours a day/7 days a week.

2. **Pick up:** Members pick up a vehicle at a parking spot, using a membership card or other device that is embedded with a radio frequency identification (RFID) tag that unlocks the vehicle.

3. **Return:** In the case of fixed parking programs, the car is then returned to the same spot at the end of the reservation. In point-to-point programs, the vehicles are picked up and dropped off at any parking spot in a designated operating zone.

4. **Pay:** Members pay a usage fee on a per-minute, per-hour, or daily basis. Gas, insurance, maintenance, and vehicle storage are usually included in the rental cost. Parking arrangements vary with different operational models (*3, 4, 5*).

U.S. Car-Share

Pros:

- **Enables carless households.**
- **Supports fleet or trip reduction policies.**
- **Helps connect transit riders to final destination.**
- **Succeeds in urban areas.**

Cons:

- **Users must share vehicle with others.**
- **Vehicle may not be available or convenient at all times.**

Trends:

- **P2P car-sharing.**
- **Long-distance trips.**

Why Car-Share?

Car-share programs provide users access to a vehicle, on the fly or with a reservation, when they need to use it. One car-share vehicle can serve multiple users, reducing the time it spends sitting idle, and allows users to pay only for the time they use the vehicle (*6*).

Car-share has been described as a missing link for travelers who mainly rely on transit or other alternative travel modes but sometimes need a car. Car-share can provide an option for the first- and last-mile journeys that face travelers trying to connect from existing public transportation infrastructure to their final destination. Companies or agencies that face parking constraints might join car-share programs so that their employees have alternatives to driving private vehicles for work trips.

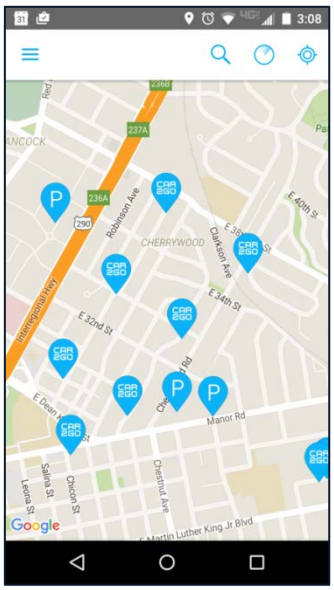


Figure 3. Car2Go App Screenshot.

Car-share programs currently operate mainly in areas with high density, low vehicle ownership rates, parking pressure, and transit service (*7*).

What Is Bike-Share?

Bike-share programs provide access to a network of bicycles for shared use, offering users point-to-point transportation for short trips without the costs and responsibilities of bicycle ownership.

The emerging model in the United States is a scalable, automated operation characterized by real-time bicycle location information, instant rental with a credit card, and physical docking stations for drop off and pick up.

Typically, bike-share systems position bicycles throughout an urban environment, served by self-service docking stations (Figure 5) for immediate access. Users pick up a bicycle at a station and return it to any other station (including the origin) in the network (8).

Who Operates Bike-Share?

Most bike-share programs in the United States run as nonprofits with a private operator, for-profit companies, or public agencies that partner with a private operator. Every program has a unique organizational arrangement of owner, operator, partners, sponsors, and vendors.

U.S. Bike-Share

Pros:

- **Short-distance trips.**
- **Self-serve.**
- **Healthy.**
- **Addresses the first- and last-mile commute for public transit users.**

Cons:

- **Short-distance trips only.**

Trends:

- **Dockless bikes.**
- **Regional programs.**

Figure 4. Bicyclist in Dedicated Bike Lane.

How Does Bike-Share Work?

Shared bicycles are typically scattered throughout a region, with concentrations near residential areas, employment hubs, activity centers, and recreational or tourist sites. Users must join bike-share programs on an annual, monthly, daily, or per-trip basis and can access bicycles at the docking station with a credit card, a membership card, or a smartphone app. Unlike car-share programs, bike-share programs do not typically allow advanced reservations. The process typically involves:

1. **Pick up**: Users can pick up any bike at any station in the system and return it to any other (or the same) station in the system.

2. **Return**: Users drop off a bicycle at any station with an available dock and lock the bike, ending the session.

3. **Pay:** For most systems, preregistration with a paid membership entitles users to trips made in less than 30 minutes without additional cost. Incremental charges incurred after that are charged to the user. Non-members can usually prepay with a credit card at pickup.

Why Bike-Share?

Biking is a healthy travel option that can take travelers off other congested travel routes. Bike-share programs provide a low-cost, flexible, and convenient biking option. Bike-share programs help address the first- and last-mile commute that faces travelers trying to connect from existing public transportation infrastructure to their final destination. Programs also provide a transportation option that can serve short trips, tourist activity, and recreational activity.

Figure 5. San Antonio B-Cycle Bike-Share Station (Photo by G. Griffin).

Some purposes for bike-share programs include:

- Increase the health of communities by encouraging active transportation.
- Connect bikes with transit networks that have long distances between stations (first/last-mile considerations).
- Induce efforts to develop bicycle and pedestrian plans.
- Improve safety for bicyclists and pedestrians.
- Encourage tourism by providing a fun, dynamic mode to move about cities.

Current State of Shared Mobility Programs in the United States

Forty-seven states and the District of Columbia have at least one type of shared mobility program as of 2015.

Forty-nine states and the District of Columbia have at least one type of shared mobility program as of 2015.

Shared mobility programs have functioned at some level in the United States for decades. Alternative modes of transportation appeal to travelers for convenience, financial considerations, and environmental conservation. In recent years, individual carpool arrangements and grassroots bicycle cooperatives have grown into public and private programs and initiatives, meeting the needs of many growing, urban markets.

Figure 6 shows the location of ride-share, car-share, and bike-share programs across the United States. The icons represent the presence of at least one program documented in that location. Although shared mobility programs are concentrated in urban areas and along transportation corridors, the demand for these programs is growing and includes locations in smaller urban areas and university towns.

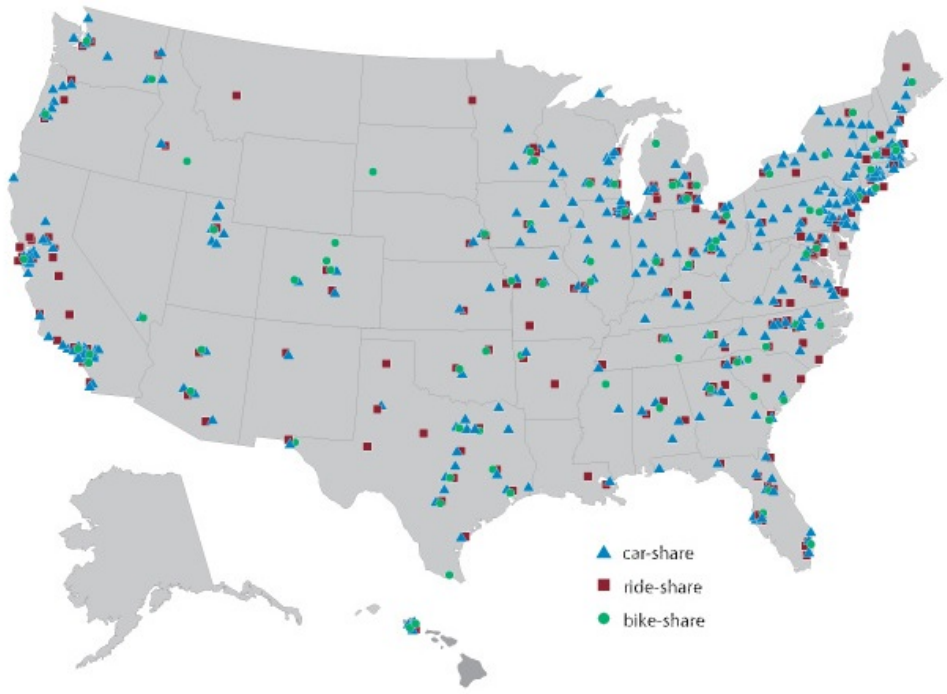


Figure 6. Shared Mobility Programs across the United States as of 2015.

Note: Icons represent the presence of one or more programs in a particular region, but not how many exist.

Ride-Share by the Numbers

There were 27 ride-share programs in the United States as of 2014.

Programs operating in the United States include Uber®, Lyft®, Carma Carpool, ZimRide, and iCarpool. More recently, platforms for long-distance ride coordination, such as eRideShare, Ridester®, Carpool World®, and RidePost®, have led to increased privatization of ride-share and a less formal approach to ride-sharing.

Capturing the actual number of ride-share users in the United States is difficult because:

- Online coordination systems provide the opportunity for individuals to organize their own shared rides independent of the public programs.
- Private providers are hesitant to disclose proprietary information.

U.S. Shared Mobility

Ride-Share:
27 programs
100 U.S. cities

Car-Share:
25 operators
12,000 vehicles
900,000+ users

Bike-Share:
93 programs

Car-Share by the Numbers

Twenty-five car-share programs operate in United States with over 900,000 members sharing over 12,000 vehicles as of January 2013 (*9*).

Major programs operating in multiple cities in the United States include Enterprise Carshare®, Car2Go, Flexcar®, and Zipcar®. Mergers and acquisitions have combined several programs in recent years. In 2013, three large providers in the United States represented 88 percent of total membership (*9*).

Program funding for car-share has included private-sector investment, public start-up funding, and federal grants. In some cases, local governments may not provide direct financial support but instead support car-share through parking provision, marketing, or subsidized memberships for employees or partner organizations.

Bike-Share by the Numbers

Ninety-three bike-share programs were operating in the United States as of December 2015. This includes large-scale operations from companies such as B-Cycle™ and Motivate® (formerly Alta Bike Share [*10*]) in multiple cities.

Current State of Shared Mobility Programs in Texas

Shared mobility programs are active in Texas. Figure 7 shows the locations of shared mobility programs in Texas. The icons represent the presence of at least one program documented in that location.

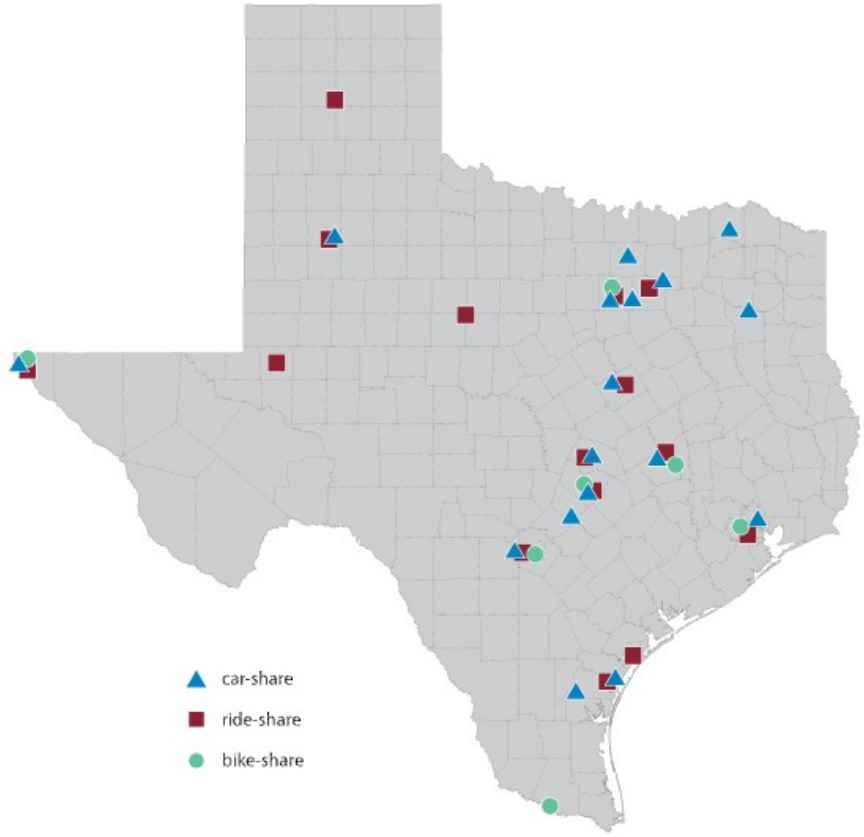


Figure 7. Mobility Program Locations across Texas as of 2015.

One car-share program, RelayRides, is not fully represented on this map because the location of vehicles is not constant or consistent. Private vehicle owners anywhere can add (or remove) their vehicles at any time, therefore making it difficult to capture the number and location of available car-shares with this program.

Ride-Share in Texas

There are currently three dynamic ride-share programs actively operating in Texas: Carma Uber, and Lyft.

Founded in 2007, Carma uses real-time carpooling technology and offers services in Austin, Texas. Carma is participating in a dynamic ride-share pilot project with the Central Texas

Regional Mobility Authority (CTRMA) that began in late 2013 and provides toll reimbursements for users on 183A and Manor Expressway in Austin.

Uber and Lyft began operating in Texas in late 2013. They have more recently developed ride-share services called UberPOOL and Lyft Line that facilitate ride-sharing, rather than just a single rider hailing a driver. These private companies operate in 15 Texas cities. Houston and Austin have recently approved Uber and Lyft to operate legally under new regulations (*11*).

Texas currently has ride-share programs operating in 15 cities, car-share programs operating in 14 cities, and bike-share programs in 8 cities, concentrated mainly within major urban areas or transportation corridors.

Car-Share in Texas

Car-share in Texas started in 2006 with the nonprofit CarShare Austin, which later closed. In 2010, Car2Go launched its first North American program in Austin. Car2Go began with a pilot program operated through a public-private partnership with the City of Austin, offering reserved parking and shared vehicles for city employees to use during business hours. Today, Car2Go has over 300 vehicles available to share in Austin, and membership is open to the public.

There are six other car-share programs operating in Texas: U-Haul Carshare®, Enterprise Carshare, Zipcar, Hertz on Demand®, RelayRides, and Getaround. These programs are active in Austin, Dallas, Houston, San Antonio, and other locations around the state. Among P2P models, Getaround is currently available only in Austin, while RelayRides has an active program in more than 70 locations across Texas.

Bike-Share in Texas

The first bike-share program in Texas began in 2011 in San Antonio through a public-private partnership between local governmental agencies and operator B-Cycle (Figure 8) (*12*). As of August 2015, there are bike-share programs operating in Austin, College Station, Dallas, El Paso, Fort Worth, Houston, McAllen, and San Antonio.

Figure 8. Austin B-Cycle Bike.

The bike-share programs in Texas are operated by both private companies and nonprofit organizations.



Chapter 3. Assessment

This chapter details the steps to assess a region to identify which program(s) best match regional characteristics.

In order to determine the potential role of a shared mobility program for a town, city, or region, stakeholders should comprehensively assess, identify, and understand their region's:

- Desired goals.
- Physical and social context.
- Traveler behavior.
- Market demand.
- Public perspective.
- Political and agency involvement.
- Regulatory environment.

This chapter outlines four steps to understand these key feasibility factors:

1. **Conduct a Market Analysis**—Who are the residents, users, and businesses in the region that may use a shared mobility program?

2. **Perform a Stakeholder Analysis**—Who are the individuals and groups that may be impacted by a shared mobility program?

3. **Review the Regulatory Environment**—How does the local regulatory environment impact a shared mobility program?

4. **Establish Program Goals**—What goals does the region want to accomplish with a shared mobility program?

Conduct a Market Analysis

Market Analysis

Who are likely users of shared mobility?
Where do likely users of shared mobility go?
What is the existing regional environment?
Why do users choose shared mobility?

Who are the residents, users, and businesses in the region that may use a shared mobility program?

The U.S. Department of Transportation (USDOT) recommends conducting a regional demand analysis as a first step in determining the feasibility of a bike-share program; similar efforts have been undertaken for car-share and ride-share programs (*8*). A market, or demand, analysis is a tool to answer these basic questions:

- **Users:** How do the demographic characteristics of this region compare to known shared mobility user characteristics?
- **Neighborhoods:** What geographic characteristics of this region would support a shared mobility program?
- **Purposes:** For what purposes and trips would the shared mobility program be used?

These data are analyzed to:

- Understand how much interest for shared mobility programs exists in a region.
- Estimate the potential demand for a specific type of service.
- Define how shared mobility programs can best achieve local or regional goals.
- Identify possible markets for starting or expanding a program.

Analyze User Demographics

Early Adopters of Shared Mobility Programs

- **Younger adults**
- **Higher education**
- **No or low vehicle access**
- **Smartphone owners**

Who are likely users of shared mobility?

Ride-share, car-share, and bike-share programs have all demonstrated high levels of use:

- Among young, highly educated travelers.
- Within households with low vehicle ownership.
- Among transit users.

Large urban areas offer a larger pool of potential users, but smaller compact cities and towns also can provide a feasible market for shared mobility. Bike-share programs in particular are rapidly expanding into smaller markets.

A demographic analysis characterizes the population in a region and identifies neighborhoods or sub-areas that may include higher concentrations of likely shared mobility

program adopters. These indicators may vary significantly between different cities and regions, and an assessment should include thresholds to identify promising areas that reflect the local conditions.

See more about expanding shared mobility programs (

Expand the Program) in Chapter 5. The rest of this section discusses demographic attributes that can be used to define population segments that may adopt the use of a shared mobility program.

Shared mobility users are most likely to be younger than age 40, but there are users across all age cohorts.

Age

Younger people are more likely to participate in shared mobility programs than other age groups.

A 2014 survey of TNC ride-share users in San Francisco revealed 57 percent of users were between the age of 25 and 34 and that few users were over age 55 (*13*).

In a 2014 survey, Washington, D.C.'s Capital Bikeshare® found that 60 percent of its bike-share members were under the age of 35, compared to 17 percent of workers in the region (*14*). Minneapolis's Nice Ride® program reported that about 50 percent of its members were between the ages of 18 and 34 (*15*).

A 2013 survey of San Antonio Bike Share members found that 26 percent were 50–59 years old, 21 percent were 30–39 years old, 18 percent were between age 18–29, and 11 percent were 60 or older (Figure 9). Compared to the general population of San Antonio, the survey results suggested that the 50–59 age cohort is somewhat overrepresented in the B-cycle membership, while the youngest (18–24 year olds) and oldest (60+) are underrepresented (*16*).

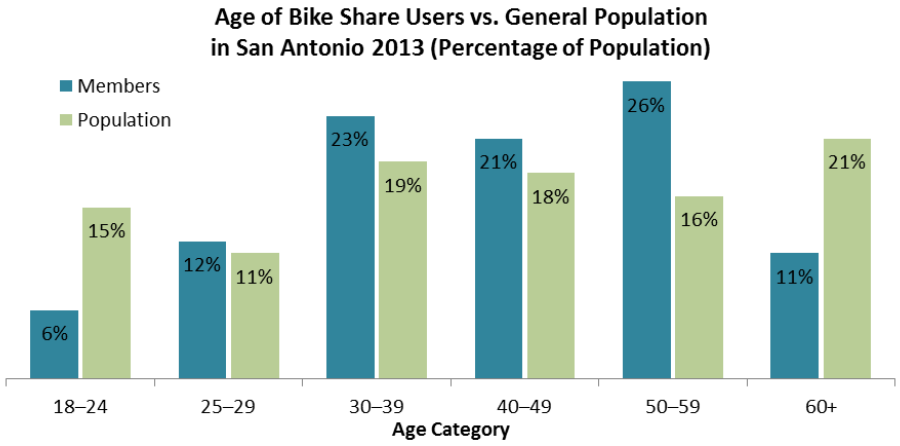


Figure 9. San Antonio Bike Share Membership Age Distribution (*16*).

Small Households

Shared mobility programs may be more useful and economically feasible to individuals in small households.

Smaller households are likely to include few children, own fewer vehicles, and make fewer trips. Housing for small households is often found in higher-density areas, where shared mobility programs can be more economical.

Renters

Shared mobility programs may be more useful and economically feasible to individuals in renting situations.

Renters are likely to be young, lower-income, and non-family households. Rental housing is also more common in higher-density areas, where shared mobility programs can be more feasible.

Transit Users

Individuals and households that use transit may be more likely to use shared mobility programs for a variety of reasons.

Transit-using households may:

- Not have a vehicle.
- Live in areas in which more destinations are in close range.
- Be more likely to use different travel options for different purposes.

Figure 10. Bus Carrying a Bicycle.

However, evidence is not conclusive as to whether or how much shared mobility programs substitute or complement transit trips. One study of several bike-share programs found that in several large cities, bike-share replaced some public transit and walking trips, but in a smaller city, bike-share increased public transit and walking (*17*).

Bicycle Users

Local bicycle use can reveal patterns of demand for bicycling and the existence of bicycle-friendly areas and supporting resources.

Bicycle usage statistics are most valuable for bike-share program feasibility but can also highlight residents who may want to supplement bicycle commuting with other alternatives like ride-share or car-share. The target audience for bike-share is not the same as traditional

cyclists. Many bike-share users are expected to be casual or short-term users, whereas more serious cyclists may not be willing to replace their personal bike.

Spotlight: Capital Bikeshare Users

A comparison of Capital Bikeshare users to regular cyclists in Washington, D.C., found that bike-share users (*18*):

- Are more likely female.
- Are younger.
- Have lower household incomes.
- Own fewer cars and fewer bicycles.
- Are more likely to cycle for utilitarian trip purposes.

Low Vehicle Ownership

Households without, or with limited access to, a vehicle are more likely to use shared mobility programs (*19*).

Nearly 6 percent of all households in Texas do not have access to a vehicle (Figure 11). Carless households are more likely to be smaller households and more common in dense, urban areas. These areas tend to also have expensive parking, a higher concentration of amenities close by, and more abundant travel options—all features that can indicate a higher potential for shared mobility use.

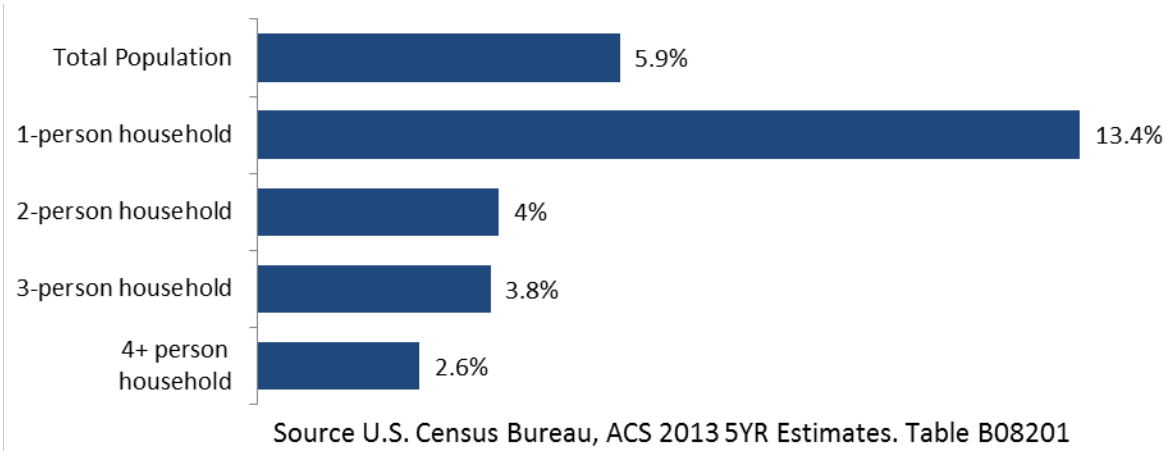


Figure 11. Percent of Households with No Vehicles Available by Household Size in Texas in 2013 (*20*).

Smartphone Ownership

The use of smartphone applications contributes to the conveniences of shared mobility programs that appeal to many early adopters.

Ride-share and car-share programs allow users to access related services with smartphone apps. A smartphone is often the main tool for using a program. In a survey of Texas travelers, respondents suggested the ability to use a smartphone to schedule a ride-share trip or reserve a car-share vehicle was an important factor in the decision to possibly use these programs (*21*). A shared bike can be rented without a smartphone, but members often use smartphones to check for station locations, available bikes, and empty docks. This integration with technology may contribute to the prevalence of young, well-educated users typical to many existing programs.

Smartphone ownership is increasing across most demographic groups but may be a limiting factor for some groups. From 2011 to 2014, smartphone ownership among adults in the United States increased from 35 percent to 64 percent. Adults over age 65 and those living in rural communities are among those least likely to own smartphones, as shown in Figure 12 (*22*).

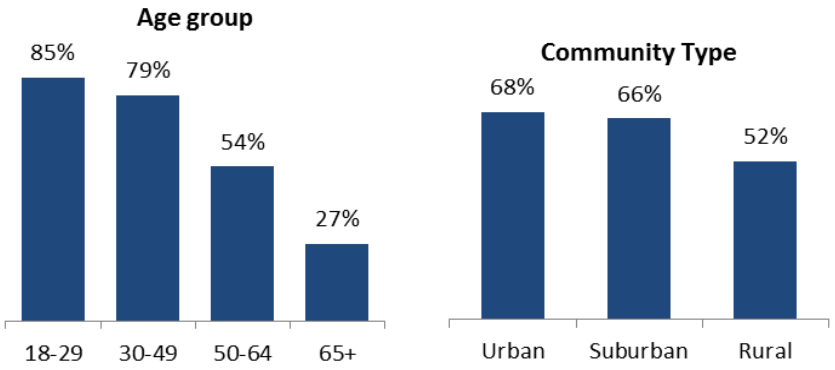


Figure 12. Trends in Smartphone Ownership among U.S. Adults in 2014 (*23*).

Income and Education

Higher-income and educated populations are more likely to use shared mobility programs.

In a 2011 user survey, Washington, D.C.'s Capital Bikeshare found that 95 percent of its members had a four-year degree, and three-fourths made more than $50,000 annually. A 2014 University of California survey found that ride-share users with income levels between $30,000 and $100,000 were disproportionately represented among TNC users in San Francisco, while both the lowest- and highest-income residents were underrepresented relative to the city population. In terms of education, users were more likely than city residents overall to have a bachelor's degree or higher. Table 1 presents the income distribution and educational level for surveyed ride-share program users (*13*).

Table 1. Income and Education of Survey Respondents among Ride-Share Users (*13*).

Household Income	TNC Users	San Francisco	Education Level	TNC Users	San Francisco
$30K or less	9%	26%	Less than bachelor's degree	16%	46%
$30–70K	23%	22%	Bachelor's degree	54%	33%
$71–100K	18%	13%	Graduate degree	27%	21%
$100-200K	27%	25%	Other degree	3%	n/a
$200K or more	11%	25%			
No response	12%	13%			

Income and education levels warrant consideration for two reasons:

- Ride-, car-, and bike-share programs in many regions are used most often by higher-income and highly educated populations; these early adopters are a critical market for providers who are starting up new programs.

Program design and targeted outreach to lower-income populations can expand the reach of a program as a tool to increase mobility and access. This aspect is discussed more in the

- Expand the Program section in Chapter 5.

Assess Neighborhood Characteristics

Where do likely users of shared mobility go?

Where do likely users of shared mobility go?

- **Dense neighborhoods.**
- **Work.**
- **Busy travel routes.**
- **Activity centers.**

In addition to a review of the demographic characteristics in a region, a market analysis is used to identify neighborhood characteristics such as:

- Dense residential areas.
- Recreational space, public space, and sports and event venues.
- Areas with heavy congestion and/or costly parking.
- Major activity centers.

These characteristics have been associated with successful shared mobility programs. A good location may not meet all of these criteria, but at least some are needed to make a shared mobility program work.

Ride-share is suggested for regions with carpool lanes, limited parking, employers with large numbers of employees, and employers in urban areas (*24*). TNC operations like Uber and Lyft have proliferated in urban areas with a large population pool. Casual ride-share programs like Carma can serve longer trips from suburbs to business or activity centers and appeal to travelers who face tolls (*21*).

Car-share tends to succeed in areas with high density, parking pressure, and neighborhood design that allow residents to live without a car (*19*). Round-trip car-share programs often market to city dwellers who only need vehicle access for occasional trips (*21*).

Bike-share programs operate in cities with busy activity centers because the programs depend on both recurring users and casual or short-term users, the latter being an important source of revenue generation (see more in Identify Funding Sources section). Bike-share programs are designed for shorter trips and benefit from higher concentrations of destinations in a compact area.

The rest of this section presents neighborhood characteristics that can be used to estimate the potential success of a shared mobility program.

Population Density

Higher population densities provide access to a larger market in a smaller geographic area, allowing for pilot programs or smaller start-up operations to reach a wider audience.

Many programs develop a business plan that includes phased expansion, starting in dense, urban neighborhoods and expanding later to other communities. Residential density can be analyzed with a geographic information system (GIS) using census data.

Density is one of the most important determinants for shared mobility use and potential use.

Employment Clusters

Workplaces generate demand for transportation, and shared mobility programs can contribute to travel demand management programs, corporate fleet reduction plans, and employee benefit programs.

Dense employment clusters present a potential source of additional demand for shared mobility providers. Ride-share, car-share, and bike-share have all demonstrated use for commute trips, although each program offers different benefits. In addition, mid-day activity can maximize the use of each vehicle in a fleet by generating trips outside of the morning and evening activity typically generated by residential areas. Shared vehicles and bikes can be used for business meetings, lunch breaks, and mid-day errands. Shared mobility programs often partner with, or offer discounts to, businesses. Several programs exist to provide shared mobility solutions to a particular company or business cluster.

Daily commuters are a target market for ride-share, like traditional carpooling, because it can distribute the costs of commuting, save money on tolls, and allow access to high-occupancy vehicle (HOV) lanes. Zimride®, discussed in Chapter 5, provides ride-share service contracts to businesses across the United States.

Ride-share, car-share, and bike-share programs all offer business memberships and other incentives targeted at business users. See the Build and Leverage Partnerships section in Chapter 5 for more info.

Universities

Universities have many of the demographic characteristics that correlate to successful shared mobility programs.

University areas can signify characteristics that correlate to successful shared mobility programs—high residential density, young populations with low vehicle ownership, and parking constraints.

Business and university areas

- **Have demonstrated success as growth markets.**
- **May provide a targeted boost of demand in a larger program.**
- **Suggest possible partners or a location for a pilot program.**

Universities often have robust congestion-reduction and environmental initiatives, so like businesses, universities can incorporate shared mobility programs into efforts to reduce traffic congestion and achieve sustainability goals.

Differences in the geography of a campus may impact the form of a program. Urban campuses like the Massachusetts Institute of Technology (MIT) in Cambridge and the University of Texas in Austin are integrated with the city's car-share program. In contrast, Stanford University and the University of North Carolina Chapel Hill initiated their own standalone projects given their more suburban setting.

Case Study: Students Produce Bike-Share Demand Analysis for University Campus

Texas A&M University launched a bike-share program, MaroonBikes (*25*), in 2013, initiated by a student project that assessed the feasibility of piloting a bike-share program on the campus. The student project, which included a demand analysis, a review of spatial and temporal use patterns, and a survey of campus attitudes, became Phase I of a multiphase bike-share study and ultimately led to the launch of MaroonBikes. Reflecting the particular conditions of a university campus, students collected data including:

- Dormitory occupancy.
- Building square footage and occupancy.
- Class registration numbers and room location.
- Recreation center user trips by time of day.
- Pedestrian and bicycle count data.
- Bicycle and pedestrian condition survey.
- Campus bus trip data.
- Parking lot utilization data.
- Two years of campus transportation-related accident reports (*26*).

Figure 13. Maroon Bikes at Texas A&M University.

Activity Centers

Locating vehicles or bicycles near activity centers can increase program visibility and stimulate use.

Attractions other than home and work generate activity that can boost demand for shared mobility programs. These activity centers may be major destinations for both residents and visitors. Ride-share programs tend to operate in high-traffic areas, and many programs allow customers to use their services in any city that they operate. Car-share benefits from a high concentration of proximate uses. Bike-share programs typically offer short-term rental options that are specifically designed for visitors and tourists.

Types of Activity Centers

- **Downtown districts**
- **Universities and schools**
- **Major employers**
- **Retail clusters**
- **Public parks**
- **Recreation areas**
- **Public spaces**
- **Museums and venues**
- **Tourist attractions**
- **Sports stadiums**

Spotlight: Activity Centers

In Minneapolis, Nice Ride bike-share stations near job sites and food-related destinations correlated with higher trip rates. Denver B-Cycle's 2012 Survey of Users reported 55 percent of users made trips to restaurants, bars, or pubs, and 45 percent used the service for commuting to work at some point (*27*).

Evaluate Regional Environment

What is the existing regional environment?

The demographic and neighborhood characteristics discussed in the previous sections should be reviewed in the context of the surrounding regional conditions. For instance, it is critical to understand the existing transportation networks if programs are intended to serve first- and last-mile trips. In addition, factors such as topography and weather may influence user demand or the design of a program. Regional factors to consider include:

Regional factors include

- **Transportation networks**
- **Transit systems**
- **Bike infrastructure**
- **Topography**
- **Climate**

- Transportation networks.
- Transit systems.
- Bike infrastructure.
- Topography.
- Climate.

More populated cities offer a larger pool of potential users, but smaller compact cities and towns can also provide a feasible market for shared mobility. Considering shared mobility programs in the context of future growth or gaps in transit options can foster program design that better integrates with existing infrastructure.

Current and future land use maps can be a great source of information about regional characteristics and future development that may influence shared mobility programs. Designated land uses identify commercial centers, areas with multifamily housing, and other factors that may impact shared mobility programs. Transportation planning organizations, transit providers, and other regional organizations often track data that can be applied to a regional evaluation for shared mobility programs.

Transportation Network

The existing roadways, transit networks, bike lanes, and sidewalks can reveal patterns and gaps in transportation in a city or region.

One potential goal for shared mobility programs is to mitigate congestion or provide alternatives to heavily congested routes. For example, Carma in Austin, Texas, focuses rides on highly congested routes that connect suburbs to the urban core of the city. Ride-share is often focused on areas with high levels of congestion. Transit nodes can be great locations for all three shared mobility programs because each can serve as a link between transit stations and destinations that are out of walking distance.

Transit Systems

Individuals and households that use transit may be more likely to use shared mobility programs for a variety of reasons.

As discussed earlier, early adopters of shared mobility programs are more likely to be transit users and/or have low vehicle ownership rates. As such, programs have been successful in regions with robust transit systems, where the presence of these users is generally higher. If supporting transit use is a goal, the program design should consider the placement of shared mobility programs relative to transit hubs, and the role of local transit agencies in developing the programs may influence this relationship.

Bike Infrastructure

Existing bicycle infrastructure provides safer routes for biking and suggests existing hotspots for bicycling.

Figure 14. Two Way Bicycle Lane.

The availability of bike infrastructure, particularly bike lanes (Figure 14) and trails, has been shown to support increased bicycling. Co-locating bike-share docks with bike paths can incentivize potential users by providing a direct link to safe and comfortable routes. For bike-share programs, it is also useful to know if local universities, bicycle shops, or employers provide bicycle support facilities (parking, air, lockers, showers, etc.).

Topography

Hills can influence the decision of where to bike.

Bike-share programs may consider the presence of hilly or otherwise challenging terrain. Studies have shown that hilliness may correlate with decreased bicycle commuting, and steep inclines can be even more difficult on bike-share bicycles. This information can be useful in designating dock station locations. Also see Electric-Assist Bicycles in Chapter 6.

Climate

Climate is also a potential concern for bike-share programs.

In a survey of Texans, many expressed concern with the challenges of bike-share in the hot and sunny climate. In cold climates, some bike-share programs choose to suspend operations for the winter season. Some of the most successful bike-share programs that operate year round are located in cities such as Minneapolis, Minnesota; Miami, Florida; and Washington, D.C.

Appeal to the Local Market

Why do users choose shared mobility?

Convenience and affordability have been cited as central reasons people use shared mobility programs

While shared mobility programs are increasingly familiar to some communities, these programs are foreign concepts to other groups. Bicycling is not an everyday transportation mode in all regions, ride-share services may be out of reach financially, and car-share is not visible in less urban settings. Still, the reasons that early adopters choose to use shared mobility services may resonate with other travelers.

Convenience and affordability have been cited as central reasons people use shared mobility programs (*28*). Ride-share can reduce the costs of commuting or offer a faster alternative to a transit or walking trip. Car-share can mitigate or eliminate the financial pressures of car ownership or high costs of parking. A bike-share membership can be cheaper than buying a personal bicycle and avoids the risks of theft and maintenance.

Attitudes, social norms, and cultural values in a region influence the transportation decisions made by the population but can be difficult to quantify. These factors can include the symbolic value of the private automobile or the history of a strong cycling culture. It has been suggested that some users may be drawn to shared mobility programs for an opportunity to use new technology and gadgets. See more about expanding the programs to broader markets, including low-income households and suburban regions, in Chapter 5.

Spotlight: Shared Mobility Survey Results

A survey of Texas travelers provided further insight into what appeals most to people about shared mobility programs. Among respondents who indicated they would likely use dynamic ride-share, the most important factors were avoiding parking fees, eliminating the need to find parking, and taking advantage of lower trip fares than traditional taxicabs. For those who indicated they would likely use car-share, the most important reasons were being able to reserve the vehicle with a smartphone, avoiding parking fees, and reducing/avoiding the cost of car ownership. Survey respondents who indicated interest in possibly using bike-share reported reasons such as viewing bike-share as fun, a way to reach more destinations than walking, and a way to make transit more convenient (*21*).

Conduct a Market Analysis

Combine demographic, neighborhood, and regional data to produce a meaningful assessment of shared mobility program potential in an area.

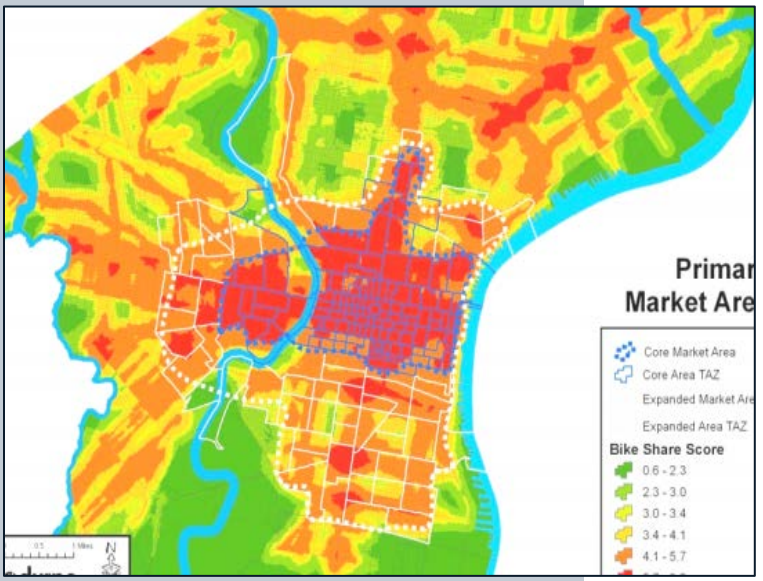
Table 2 provides a summary of the demographic, neighborhood, and regional characteristics that were presented in the previous section. This table can be used to guide a market analysis that is tailored to a particular region or city. Information on these elements may be found in local comprehensive land use plans, transportation plans, or economic development reports.

Although still a small share of travel activity, shared mobility programs are growing in popularity, particularly in urban settings. These data can also provide a foundation for efforts to reach new markets and expand membership for shared mobility programs. Market demand or feasibility analyses have been undertaken for shared mobility programs across the United States. The following case study and Figure 15 demonstrate how input criteria like those discussed in this chapter are analyzed to measure potential demand and feasibility of shared mobility programs.

Table 2. Suggested Market Characteristics for Shared Mobility Program Assessment.

	Statistic	Ride-Share	Car-Share	Bike-Share
User Demographics	Young Population (Percent of Adults Age 18–39)	Yes	Yes	Yes
	Income (Median Income)	Yes	Yes	Yes
	Education (Percent of Adults with Bachelor's Degree or Higher)	Yes	Yes	Yes
	Transit Users (Percent Commuting by Transit)	Yes	Yes	Yes
	Bicycle Use (Percent Commuting by Bike)	No	No	Yes
	Low Vehicle Ownership (Percent No- or One-Vehicle Households)	Yes	Yes	Yes
	Small Households (Percent One-Person Households)	Maybe	Yes	Yes
	Renters (Percent Renter Households)	No	Yes	No
	Smartphone Ownership	Yes	Yes	Maybe
Neighborhood Attributes	Activity Centers	Yes	Yes	Yes
	Expensive or Limited Parking	Yes	Yes	Maybe
	High-Traffic/Congested Roadways or Areas	Yes	Yes	Yes
	Public Space and Parks	Maybe	Maybe	Yes
	Attractions/Cultural Sites	Yes	Maybe	Yes
Regional Environment	High-Traffic/Congested Roadways or Areas	Yes	Yes	Yes
	Transit Service and Access	Maybe	Yes	Yes
	Bike Infrastructure and Facilities	No	Maybe	Yes
	Airports	Yes	Yes	Maybe
	Topography	No	No	Yes
	Weather	No	No	Yes
Equity	Poverty (Percent below Poverty Level)	Yes	Yes	Yes
	Minority Population (Percent Non-White Population)	Yes	Yes	Yes

Case Study: Example of a Quantitative Bike-Share Market Analysis



The Delaware Valley Regional Planning Commission in Philadelphia, Pennsylvania, conducted a two-phase in-house market study. The first phase used a raster-based GIS analysis to identify a primary geographic market area for a bike-share program. Phase 2 applied bike-share trip diversion rates observed in peer cities to estimate daily bike-share trips in the primary market area.

In Phase 1, various demographic, land use, and infrastructure factors considered favorable for bike-share usage were spatially analyzed to define a primary market area—the portion of Philadelphia most likely to use a bike-share program. Planners conducted a weighted sum raster analysis using GIS software. The input factors used to develop the bike-share weighted sum raster analysis were:

- Trip Origin Factors.
  - Population density at the census tract level for persons 17–64 years of age.
  - Non-institutionalized group quarter population density at the census tract level (included dormitories and shelters, but not nursing homes or prisons).
- Trip Attraction Factors.
  - Job density at the traffic analysis zone (TAZ) level.
  - Retail job density at the TAZ level.
  - Locations of tourist attractors (cultural, entertainment, sports, and destination restaurants from Greater Philadelphia Tourism Marketing Corp. database).
  - Proximity to parks and recreation areas.
- Network and Facility Factors (500 meter buffer).
  - Proximity to rail station(s).
  - Proximity to bicycle-friendly streets, including streets with bicycle lanes (Philadelphia Streets Department data set).
  - Proximity to streets with bicycle lanes (Philadelphia Streets Department data set).
  - Locations of bus stops (included surface trolley stops).

In the second phase, a sketch-planning method was developed to estimate the demand for bike-share in Philadelphia on the basis of the demand for existing modes and diversion rates extrapolated from bike-share systems in other cities. The method involved three steps:

1. Calculation of diversion rates for peer cities.
2. Calculation of demand for existing transportation modes in Philadelphia.
3. Application of the diversion rates to existing Philadelphia trips to estimate the demand for bike-share.

Source: (*29*), Map Source: (*30*)

A heat map is a typical product to interpret and present the results of a demand analysis. Individual factors or an index of several factors can be mapped to show how well an area meets the desired criteria. Figure 15 shows an example of a heat map presenting a region's demand in terms of bicycle use, ranging from high to low.

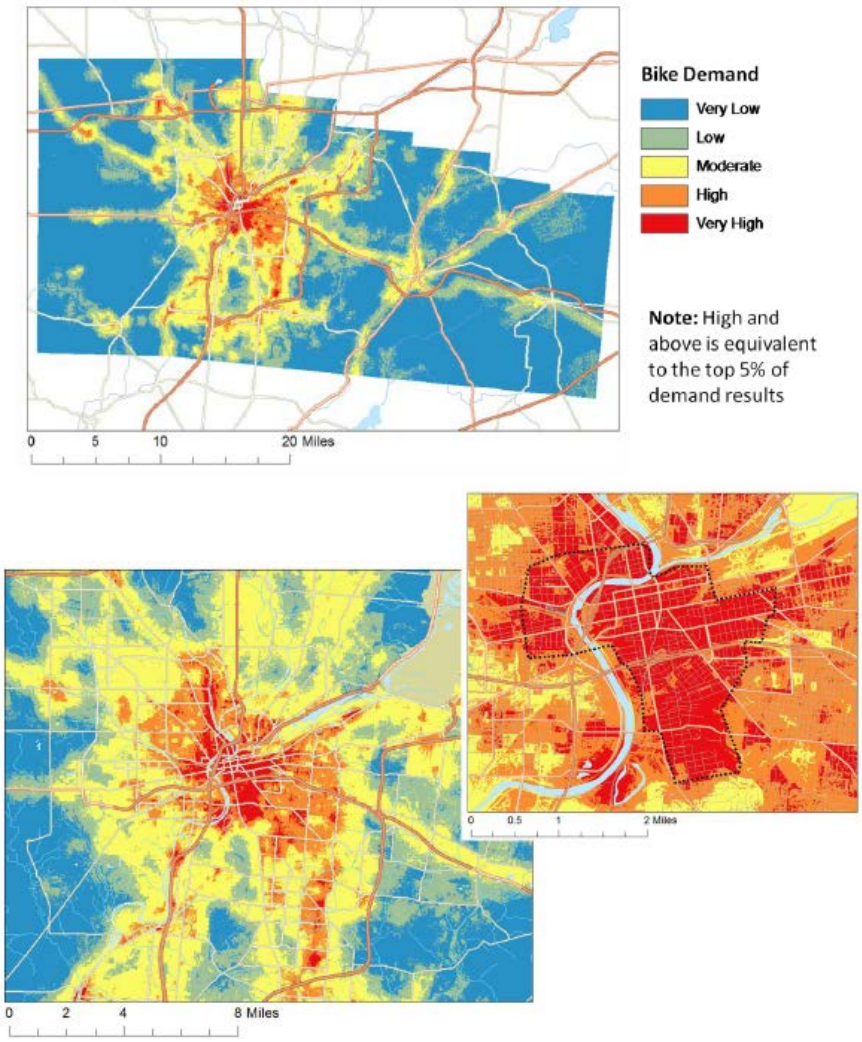


Figure 15. Sample Heat Map Showing Bike-Share Demand Analysis Results for Daytona, Florida.

The experiences of other jurisdictions in Texas and across the country offer guidance and lessons for the market analysis process. Typically, programs with public partners are more likely to undertake market analyses and share them with the public; this is most common in bike-share programs. However, the techniques and methods used for bike-share analysis can be restructured for other shared mobility programs. Links to examples of completed feasibility studies can be found in Appendix A3. Feasibility Analyses and Other .

Shared mobility programs may be targeted at a number of different communities, households, and individuals. Table 3 summarizes some of these potential markets and which programs best serve each sample market.

Table 3. Examples of Target Markets or Zones for Shared Mobility Programs.

	Ride-Share	Car-Share	Bike-Share
Areas or corridors with high concentrations of workers commuting to the same destinations	✓		
Transit stations, employment centers, and activity centers that lack first/last-mile connectivity	✓	✓	✓
Households interested in driving less, increasing active transportation, or using new travel options	✓	✓	✓
Households without a car in order to improve quality of life and increase accessibility	✓	✓	✓
Transit users who need a back-up in case of delays or missed connections	✓	✓	✓
Travelers who want to use a bike only on occasion			✓

Perform a Stakeholder Analysis

Identify the individuals and groups that may be impacted by a shared mobility program.

Shared mobility programs present an opportunity to incorporate new travel options into the existing transportation system in a city or region. A program can create opportunities and challenges for existing residents, businesses, and other community members.

Identifying local stakeholders who may have an interest in a shared mobility program is an important part of the assessment process.

Public involvement professionals suggest engaging stakeholders EARLY and OFTEN. This is an effective way to develop respectful, trusting relationships with stakeholders, improve transparency, and demonstrate credibility.

Stakeholders include all members of the public who are interested and/or impacted by the proposed project or program. This includes elected and other official community representatives, local citizens, community organizers, special interest group representatives, etc. The steps that will lead to successful stakeholder involvement in any public project are:

1. Identify potential stakeholders.
2. Engage with stakeholders.
3. Define the issues.
4. Identify potential partners.

Steps in Stakeholder Analysis

- **Identify potential stakeholders.**
- **Engage with stakeholders.**
- **Define the issues.**
- **Identify potential partners.**

Stakeholder support is essential to obtain public and/or private funding, sponsors for the program, and other valuable partners. It can also be considered an element of marketing and campaigning to publicize the program to the community. Partners should be identified early in the process in order to engage existing groups in various aspects of start-up and program development.

Identify Potential Stakeholders

Identify potential stakeholders by initiating dialogue with those in the community who may have an interest in shared mobility programs.

Asking community members interested in shared mobility programs to assist in identifying other individuals can help ensure that all possible stakeholders are identified. A logical starting point is elected or appointed officials and those that represent relevant agencies or advocacy groups. Nevertheless, it is important to identify all those that may be impacted.

Table 4 includes a checklist of stakeholders and important potential issues for shared mobility programs. This is not meant to be an exhaustive list but a starting point.

Table 4. Stakeholders and Potential Issues.

Stakeholder Group	Examples	Considerations
Shared mobility organizations	Vendors, operators, nonprofits, advocacy groups	Education and outreach, co-promotion, co-location of services, integrated system design
Transit agencies	Rail, bus, paratransit, airports	Parking for car- and bike-share, co-location of services, integration of service or payment
Other transportation organizations or agencies	Transit advocacy groups, transportation demand management (TDM) providers, Safe Routes to Schools, taxis (ride, car), commercial cycle-hire or rentals	How shared mobility programs support or compete with transit or other existing services, co-promotion, education and outreach, discounted memberships
Taxi organizations	City taxicabs, car service companies	How shared mobility programs support or compete with existing services, with particular importance for ride-share
Cycling advocacy organizations	Bike Texas	Existing bicycle advocacy and leadership, co-promotion, education and outreach, particularly for bike-share
Developers	Residential, commercial, and mixed-used developers	Parking or bike dock locations, bundling memberships with lease agreements, co-promotion
Local businesses	Local sports teams, hotels, restaurants, shops	Group or special memberships, parking, TDM program coordination, co-promotion, advertising, events
Major employers	Universities, hospitals and health care providers	Discounted memberships, co-promotion, advertising
Populations with limited mobility or accessibility	Low-income, minority, disadvantaged, and disabled populations	Improving access for disadvantaged populations
Tourism organizations and cultural attractions	Museums, national parks, libraries	Informing visitors about mobility options, co-promotion, events

Engage with Stakeholders

Interviews are an opportunity for stakeholders to explain their concerns and desires to implementers. They are also a mechanism for interviewees to identify other potential stakeholders. Underserved populations can be challenging to engage, as they may lack the organization, resources, or confidence to make their needs known. Multiple means of communication, such as public meetings, focus groups, a project website, surveys, email updates, flyers, newspaper inserts, and social media, can help engage more groups. Some groups may be more trusting and receptive if a member of the group provides the information. Also, information should be available in various languages to reach limited English proficiency populations.

Stakeholder outreach can include public meetings, online surveys, stakeholder meetings, letters to local businesses and organizations, posters and other marketing materials, and an outreach team dispatched to public events.

Tips for Engaging Underserved Populations

- **Identify and interview community leaders.**
- **Create a presence where hard-to-reach populations already are.**
- **Use translators.**
- **Provide options for times and locations of meetings.**
- **Provide childcare or child-centric activities such as coloring books.**

Questions for stakeholders include:

- **Who are the leading groups in your community?**
- **Who are the opinion leaders in your community?**
- **What similar issues have come up in the past?**
- **What are the potential impacts to your group/organization?**
- **What are the desired outcomes that your group/organization would like to see?**
- **What problems do you foresee with this project?**
- **Who/what in the community may not be represented yet?**

Case Study: Public Input on Station Locations

Cities or municipalities involved in bike-share program development often seek public input on bike dock locations during start-up and expansion.

A map of potential station locations can be posted at public meetings and online for public comment, asking respondents to answer questions about specific station locations, such as:

- Is this a good spot for a bike-share station?
- What is your biggest reason why/why not?
- How comfortable would you feel using this station at night?
- Are there any better spots for bike-share in the area?
- Do you have anything else to tell us about bike-share?

Figure 16. Sidewalk Bike-Share Art from Philadelphia Feasibility Study.

In one innovative outreach effort, Philadelphia's Mural Arts Program designed bike-share artwork that was placed directly on sidewalks at potential station locations (see Figure 16). The artwork included questions about each station and provided a phone number for viewers to respond to survey questions via text message (*31*).

Define the Issues

Recognize that there are many perspectives.

Shared mobility programs will present different issues to different stakeholders. It is important to define stakeholder issues so they can be incorporated into selecting a shared mobility program. Issues include impacts, interests, expectations, and concerns that can be both direct and indirect.

While not all issues can be accommodated, a clear understanding of the stakeholders and their issues, along with an effort to prioritize and address those that can be addressed, can create an environment where the outcomes are more likely successful.

Communicating with local stakeholders helps engage them. Engaged stakeholders are also more likely to feel ownership in a project and contribute to its implementation and success.

Potential Stakeholder Impacts

Direct impacts

- **Property impacts**
- **Environmental impacts**
- **Mobility impacts**
- **Daily routine impacts**
- **Livelihood and employment impacts**
- **Aesthetical impacts**

Indirect impacts

- **Quality of life**
- **Growth management**
- **Cultural impacts**
- **Social and economic equity issues**
- **Secondary/long-term environmental impacts**

Identify Potential Partners

Communicate and relate shared mobility goals to the goals of a potential partner; partners may not have a deep understanding of shared mobility programs' operations and benefits.

Most successful shared mobility programs have been built with the active participation of partner organizations. The stakeholder evaluation described in the previous three sections provides a foundation to identify potential partners for a program. The type of support offered by a potential partner will depend on the capabilities, views, and objectives of the partner.

Partnerships can be a win-win opportunity for many groups and can have an influence on the success or failure of a program. Partners can (*32*):

- Increase awareness and visibility for the program.
- Offer advertising space and other co-promotion.
- Support or introduce a program in their community.
- Integrate programs into governmental policies and tax incentive programs.
- Contribute funding for general operating support or specific projects.
- Provide free or discounted parking or docking spaces.

- Integrate with transit. This can include providing parking at transit hubs, linking payment methods, or joint marketing.
- Promote to a partner organization's clients, such as transit riders or carpoolers.
- Create zoning incentives and other planning policies to include shared mobility in new developments.
- Contribute to system design and financial sustainability.

Evaluating the interests of stakeholders can identify how they may benefit from ride-share, car-share, and bike-share programs. Stakeholders may become partners who then act to help a program succeed.

See more detailed discussion of the role and importance of partners in shared mobility programs (Build and Leverage Partnerships) in Chapter 5.

Potential Partners

- **Local jurisdictions.**
- **State and regional agencies.**
- **Parking authorities.**
- **Transit agencies.**
- **Social service providers.**
- **Other public-sector agencies.**
- **Developers.**
- **Universities.**
- **Chambers of commerce.**
- **Downtown alliances.**
- **Economic development groups.**
- **Office-business parks.**
- **Foundations.**
- **Community/advocacy groups.**
- **Local businesses.**
- **Major employers.**

Review Policy and Regulatory Environment

How does the local regulatory environment impact a shared mobility program?

A review of regional planning and existing regulations should begin in the assessment of a shared mobility program, as these issues can shape or, in some cases, prevent the development of a program.

Regulatory Context

- **Does the existing planning framework and code support shared mobility programs?**
- **Does the existing regulatory environment support or hinder shared mobility programs?**

Communication with city agencies and departments can provide a clear understanding of which regulations may be important to shared mobility programs in an area.

Planning and Policy

Does the existing planning framework and policy support shared mobility programs?

Government agencies and jurisdictions are increasingly including ride-share, car-share, and bike-share as strategies in comprehensive, transportation, and environmental planning documents. This can provide credibility for the programs while signaling to providers and partners that a region is supportive of these new travel options.

Planning documents help present the vision and goals of a city or region, including transportation goals. They can also inform shared mobility program design so that they best achieve non-transportation goals as well, such as affordability, quality of life, and environmental stewardship. Even if shared mobility is not explicit in major planning documents, this information can be used to identify how these programs align with mobility and other regional goals.

Understand regional goals and vision from planning documents by reviewing:

- **State funding plans.**
- **Transportation plans.**
- **Comprehensive plans.**
- **Development and zoning codes.**
- **Transportation criteria manuals.**
- **Complete street ordinances.**
- **Pedestrian and bicycle plans.**
- **District plans.**
- **County/local operating budgets.**

Local Regulations

Does the existing regulatory environment support or hinder shared mobility programs?

City or local regulations address many issues that are relevant to shared mobility program design and operations:

- Parking.
- Taxation.
- Maintenance.
- Advertising.
- Development.
- Right of way.
- Environmental restrictions.
- Traffic enforcement.

Figure 17. Car-Share Parking Regulation Signage.

Regulations can vary greatly across regions, but common examples include taxi or ride-share ordinances, local parking codes, and right-of-way enforcement issues. Development codes or regulations, for example, can also include elements that support shared mobility, and these can be used to demonstrate the potential benefits for program vendors or partners. See more in Align Regulations in Chapter 4.

Establish Program Goals

What goals does the region want to accomplish with a shared mobility program?

A shared mobility program can be shaped to achieve a set of goals that reflect the interests of the region by:

- Determining the desired outcomes of the program.
- Comparing the benefits of specific shared mobility programs to desired outcomes.
- Establishing performance metrics for monitoring those outcomes.

Shared mobility programs have experienced tremendous growth in the last decade, but as a relatively new industry, the impacts on travel behavior and local trends are still largely undocumented. Data and comprehensive studies regarding the costs and

Setting Program Goals

- **Determine the desired outcomes of the program.**
- **Compare the benefits of specific shared mobility programs to desired outcomes.**
- **Establish performance metrics for monitoring those outcomes.**

benefits of shared mobility programs are limited, due to both the newness of many programs and the proprietary nature of some data.

Determine Desired Goals

The vision, design, and implementation of a shared mobility program will impact which goals can be achieved and to what degree.

Some principles of goal setting are:

- Goal identification is important because the goals of operators, vendors, and other partners may not always overlap with those of the public agency.
- Goal setting should be complemented with knowledge of existing travel behavior and ongoing performance monitoring. Program design should reflect the combined knowledge of how travelers behave and what goals are most important to achieve in a region.
- Goals and objectives need to be communicated with stakeholders and the public throughout the process.
- Goals and objectives should be revisited as information and lessons are gleaned from experience, through built-in feedback loops (see Figure 18).

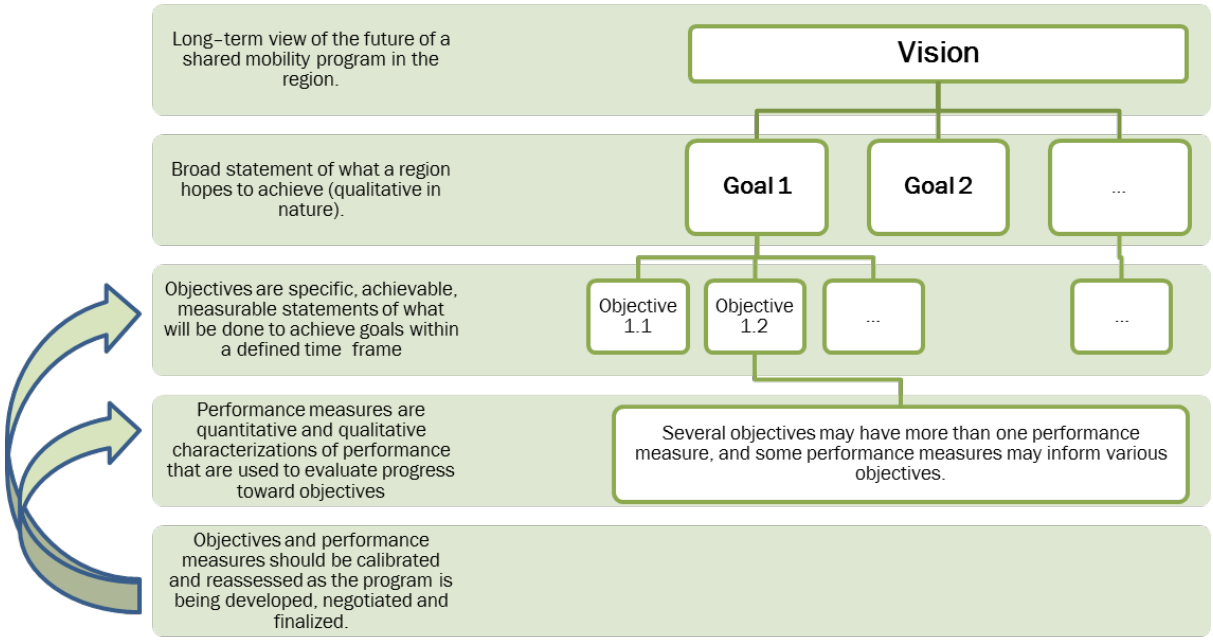


Figure 18. Relationship of Vision, Goals, Objectives, and Performance Measures (33).

Potential Goals

Goals should be based on local travel behavior, the needs of a community, and the conditions of the region.

Shared mobility programs have the potential to lead to changes in auto ownership, vehicle miles of travel, mode share distribution, congestion, parking demand, and air quality. In some regions, there is a focus on how shared mobility modes can complement transit service. As programs begin to establish a user base, efforts are being made to extend these services to regions and populations who lack travel options. Several common goals associated with shared mobility are discussed here.

Potential Goals

- **Expand travel options.**
- **Decrease personal travel costs.**
- **Reduce traffic congestion.**
- **Improve mobility of low-income population.**
- **Complement transit use.**
- **Reduce parking pressure.**
- **Reduce emissions.**
- **Improve community health.**
- **Stimulate local economy.**

Expand Travel Options

Shared mobility programs provide new choices in terms of modes and models of travel.

Car-share, ride-share and bike-share are new travel options that are designed to fill the gaps in the existing transportation network. These programs can offer additional choices for individuals without vehicle access, households sharing vehicles, and regions with limited transit service.

Promote Cost Savings

Programs may offer lower annual and per-trip expenses for potential users.

Transportation expenditures are a significant portion of most household spending. Shared mobility programs are affordable on a per-trip basis and can increase mobility through a channel other than the purchase of a personal vehicle. For example, a household with access to shared mobility programs may be able to forgo the purchase of a second car by supplementing its personal vehicle with shared rides, cars, and bikes.

Reduce Vehicle Miles Traveled and Vehicle Trips

Shared mobility programs may be used to reduce the need to drive personal vehicles for some trips.

Cities, regions and states are looking to decrease congestion, pollution, and other externalities associated with vehicle travel. Shared mobility options may enable some households to give up or forgo a personal vehicle, while for others shared mobility programs offer alternatives to driving alone on a per-trip basis.

Reduce Emissions

Decreasing VMTs and shifting some travel away from personal vehicles can also decrease negative impacts on the environment and air quality.

Ride-share programs can reduce vehicle emissions if the trips generated pool several individual trips into one vehicle, thus increasing vehicle occupancy and reducing vehicle travel. Uber and Lyft have expanded to provide shared rides as part of their suites of services. Car-share may only lead to vehicle emissions reductions when measured over a longer period. Bike-share trips produce no direct pollution or emissions.

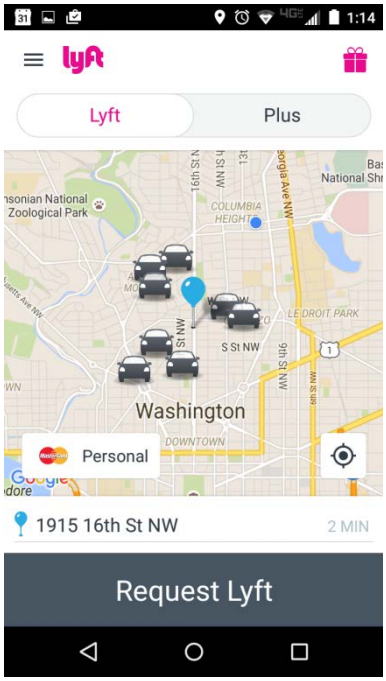


Figure 19. Ride-Share Provider Lyft's Mobile Application Screen.

Promote Health Benefits

Shared mobility programs can contribute to more active travel habits.

Shared mobility programs can be elements of a multimodal transportation network that provides opportunities to drive less and use active forms of travel. Car-share and ride-share programs can support this by decreasing an individual's reliance on a personal vehicle.

Promote Equity

Shared mobility programs have the potential to increase mobility for populations that currently lack travel choices.

A mobility program can target the low-income population by offering access to low-cost vehicles or bicycles. Addressing this type of equity may be a desirable goal for a public agency but can conflict with an operator's desired profit or membership goals. Equity goals will be better addressed by a program that includes a strategy to provide memberships to low-income households without credit card access, individuals without smartphone access, or communities that lack information about shared mobility programs.

Support Transit Use and Integration

Integration with transit service may improve the coverage of both transit and shared mobility.

Shared mobility programs may fill in gaps in transit service such as the final leg from a transit station to the traveler's final destination. To achieve this goal, a program may explicitly place bikes and cars near train, bus, and other travel services to operate as extensions of those services. A partnership with local transit providers that links to station locations and coordinates services will be more likely to increase transit use.

As mobility programs permeate the existing transportation network, providing more seamless connectivity between transit and other mobility programs may improve service.

Support Local Economic Activity

Some studies have suggested that shared mobility programs, in particular bike-share, can stimulate local economic activity.

Figure 20. Bicyclist Waits for Light Rail Train in Austin.

Compare the Benefits of Shared Mobility Programs to Goals

Ride-share, car-share, and bike-share each offer a unique set of potential benefits and costs for a city or region.

Shared mobility programs are still quite new, and there is a lack of consistent data to conclusively state measured benefits. Private operators and vendors are hesitant to share much of the performance data because those data are considered proprietary and competitive. Existing research reveals that use patterns and trends can vary in different regions and with the particular design of a program.

The long-term effects of shared mobility programs on aggregate travel behavior, environmental impacts, economic trends, and social benefits should be observed and monitored. Generating baseline estimates and targets for these metrics is important in establishing a long-term monitoring program.

See Appendix A1. Potential Benefits of Shared Mobility for specific goals and benefits of shared mobility programs.

Set Performance Metrics

Performance measures provide a way to quantify a program's success in achieving its desired goals and clear measures of the effectiveness of a shared mobility program.

The benefits of shared mobility are still being studied, and the short history of many programs means there is not enough data for conclusive quantitative analysis of some of the benefits.

Important principles of performance metrics are:

- One or more performance measures may be used to track the goals and objectives outlined for a program.
- Ongoing monitoring should be built into the long-term plan to measure the program's performance against past years.
- Data-sharing agreements with operators should be designed to provide the data needed to create these metrics.

In programs involving private partners, data-sharing agreements can ensure that operations data to measure performance will be provided.

Summary: Chapter 3

Shared mobility programs may be targeted at a number of different communities, households, and individuals. There is no absolute set of factors that will predict the success of a shared mobility program. Information on these elements may be found in local comprehensive land use plans, transportation plans, or economic development reports. Stakeholders may also be able to provide further information. Local knowledge should be used to adjust an analysis for a particular city or region. The steps outlined in this chapter are summarized here.

Conduct a Market Analysis

- Analyze user demographics.
- Assess neighborhood characteristics.
- Evaluate regional environment.
- Include equity considerations.

Perform a Stakeholder Analysis

- Identify potential stakeholders.
- Engage with stakeholders.
- Define the issues.
- Identify potential partners.

Review Policy and Regulatory Environment

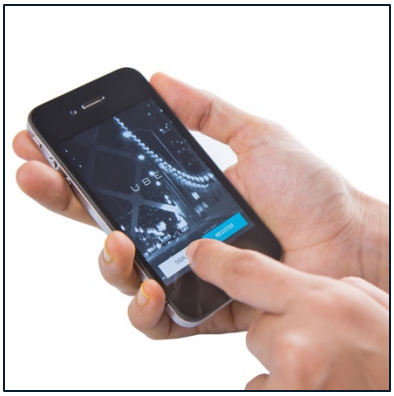
- Determine if the existing city planning framework and policy supports shared mobility.
- Assess whether the existing regulatory environment supports or hinders shared mobility.

Establish Program Goals

- Determine the desired outcomes of the program.
- Compare the benefits of specific shared mobility programs to desired outcomes.
- Establish performance metrics for monitoring those outcomes.

A growing market presents opportunities and challenges for shared mobility organizations that want to reach a diversified customer base. In addition to starting a new program, the assessment steps outlined in this chapter can also be valuable to:

- Inform decisions about fare structures, advertising strategies, and shared vehicle placement.
- Assess the potential for ride-share, car-share, and bike-share on a broader level.
- Help quantify the public benefits of shared mobility.

Chapter 4. Attraction

This chapter provides agencies with information about attracting ride-share, car-share, and bike-share to their community.

After assessing regional characteristics and identifying the shared mobility program(s) that best meet the agency's mobility objectives, the next step is to create an environment that supports and complements shared mobility. Having the right mindset can make the process of attracting these programs to the region more feasible, and often involves coordination among public and private agencies, political and community decision makers, and the public.

There are several key steps to attracting shared mobility programs to a city or region, including:

- Communicate public support.
- Integrate with planning and policy.
- Align regulations.
- Identify funding sources.
- Educate and provide outreach to the public and partners on shared mobility.

Attracting Shared Mobility Programs

- **Does the community support shared mobility?**
- **Do planning and policy documents reflect this support?**
- **Will regulations help or hinder?**
- **How will shared mobility be funded?**
- **Do people know about shared mobility?**

Communicate Public Support

Is there local and regional political support for a shared mobility program?

Political buy-in and public support contribute to a successful shared mobility program. An assessment should consider the leaders, agencies, and departments that may have a role in developing a successful shared mobility program. Local agencies are more likely to support

shared mobility programs if they are made aware of intersecting goals such as equity or environmental protection. For instance, if a city has existing programs to address equity issues, preparation of data on disadvantaged populations and the use of shared mobility, like that described in the previous sections, can communicate these issues to potential public partners.

Bike-share programs are most likely to be led by a government partner, while car-share and ride-share are typically private companies that must work with government agencies.

A 2002 study found that 60 percent of surveyed U.S. car-share operators received public money for start-up costs and 30 percent received some sort of continued funding after the first year (*19*). It is uncommon for local governments to provide direct funding; instead, public agencies can facilitate program applications for internal or external grants. Other ways that local governments and agencies can support shared mobility programs include:

- Providing administration, endorsements, outreach, co-promotions, and media events.
- Including shared mobility programs in applications for grants, loans, and other incentives.
- Providing access to public rights of way for parking, stations, and advertising.
- Becoming shared mobility program customers.
- Encouraging shared mobility programs in development projects.

Particularly in a rapidly changing industry, open communication with partners and public officials can lead to a better program and educate local champions.

Political Environment

- **What agencies should be involved?**
- **When do agencies get involved?**
- **Are there any champions?**
- **What are the funding options?**

Recognize Importance of a Champion

Informing political leaders can result in these decision makers becoming champions of a new program. Champions can also be sought at a more local level. Local political figures or even community organizers can advise on the best messaging, the important aspects, and the strongest implementation based on local knowledge.

One of the first steps to ensure political support is to educate and inform leaders about the benefits of a shared mobility program.

Private and public representatives of shared mobility programs have emphasized the importance of public funding and support during the start-up phase (*21*). One car-share operator noted that it is willing to tolerate years of net loss in a new market if there is clear public support from the beginning.

Involve Agencies and Departments

Government involvement differs among shared mobility programs but one or more agencies will always have a role to play.

Although one local agency or department can take a leading role in a shared mobility program, many other departments may be involved. The level of involvement will vary based on program type, agency responsibilities, existing regulations, and available resources.

Table 5 presents a list of potential agencies and how they might contribute to shared mobility programs.

Table 5. Agencies and Departments Involved in Shared Mobility Program Success.

Agency or Department	Roles
City Planning and Zoning	Harmonize programs with development and zoning
Public Works	Manage right-of-way and infrastructure
Transportation Operations	Oversee parking regulations, bicycle and pedestrian demand, infrastructure decisions
Traffic Enforcement	Enforce parking rules and violations; Inform station and parking locations
Economic Development	Coordinate impact on businesses and tourism; Inform station and parking location,
Environmental Protection	Ensure compliance with regulations, inform environmental goals and performance
Parks and Recreation	Manage connection to public spaces, activities, and active recreation; Inform parking or dock locations,
Policy	Ensure program alignment with city or local policies and procedures
Public Relations	Provide marketing, outreach and program implementation
Historic Preservation	Advise on regulations or limitations in historic districts

The city government in Austin, Texas, coordinates with car-share providers to align parking spots with high-density developments, but this does not extend to coordination with transit or park-and-ride lots because the local transit provider is an independent entity (*21*). A bike-share representative reported that it prefers to partner with active recreation groups at the parks and recreation departments since those groups tend to prioritize street safety improvements and the creation of bicycle-friendly infrastructure.

In another example of how ride-share differs from car-share and bike-share, ride-share TNCs often launch in a new region through a market-driven expansion led by users (drivers and riders), while local government involvement occurs only once a certain use threshold has been reached. In contrast, car-share and bike-share programs have typically involved local agencies from the start, whether as direct partners or in a supporting role to address specific issues such as parking.

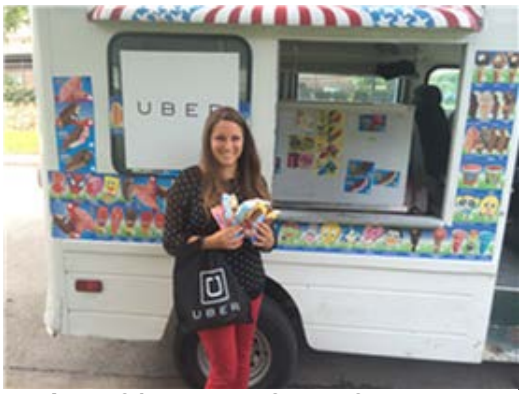


Figure 21. Uber Ice-Cream On-Demand Marketing.

This demand-based expansion has been financially successful for Uber, but the company has also faced heightened scrutiny and criticism. The success of this strategy has varied, leading to bans and protests from local taxi commissions in some regions and negotiated regulations in others. It also serves to cultivate public support that Uber uses as leverage during coordination efforts with local city or regional governments that want to write or edit regulations on the service.

In early expansions, Uber began operating in cities without any planned outreach. As publicity of some of the challenges it faced led to heightened awareness of their activities, TNCs have taken on a more proactive stance (*21*). A specific programmatic goal of a regional ride-share program could be one that involves the agency from the start.

The goals of a provider or partner may not always align with those of a local agency. Presenting clear and well-defined goals from an agency perspective can facilitate a better program design.

Integrate with Planning and Policy

Do planning documents and policy objectives address shared mobility programs?

Government agencies and jurisdictions are also increasingly including shared mobility as a strategy in comprehensive, transportation and environmental planning documents. This inclusion can build credibility for the programs and support shared mobility as viable transportation options (*19*).

Several municipalities have policies that ease zoning regulations and encourage shared mobility in new developments. These policies generally take the following forms (*34*):

- Pedestrian and bicycle master plans.
- Program funding in city or county operating budget.
- Complete streets ordinances.
- Development requirements.
- Trip reduction programs (i.e., reducing vehicle and single-occupant vehicle trips).

Case Study: Planning for Shared Mobility

Berkeley, California, allowed variances to reduce a "one space per three residential units" parking requirement to a developer in exchange for the provision of car-share in a development project. This reduced parking requirement was later adopted into the city's downtown parking requirements (*19*).

In Washington, the Commute Trip Reduction ordinance required a program for employers with over 100 employees, spurring success in the business market for car-share (*19*).

The bike-share program in Chattanooga, Tennessee, accompanied the development of bike-friendly policies and complete street designs in order to safely incorporate the resulting bicycle mode shift into the city. Bike Chattanooga launched as an independent system in July 2012. By July 2014, the city had taken up ownership of the bike-share program and developed a complete streets policy so that it could apply for federal funding to build bicycle lanes and add more bikes and bike docking stations to the network (*21*).

Shared mobility can be a mitigation measure during site planning (as demand management or for affordability) or a zoning stipulation in the development process. Linking these programs to planning and zoning decisions provides a foundation for long-term growth and can reduce the amount of parking or infrastructure that must be provided by a local jurisdiction.

Development and Zoning

Shared mobility programs are increasingly being integrated into local development activities.

Car-share and bike-share parking are increasingly being incorporated into new developments, both residential and commercial. Formal inclusion of shared mobility programs into zoning code, rather than on a case-by-case basis, provides certainty to developers and car-share operators, but there are limited examples of this to date. Instead, there are a number of examples of how shared mobility can be incentivized through exemptions or mitigation requirements. Development requirements or mitigation strategies can include:

- Providing opportunity for inclusion of shared mobility vehicles or bikes in future developments.
- Allowing greater floor area ratios (i.e., developers can build more densely on a site).
- Reducing parking spaces (i.e., decrease the required number of spaces in a new development).
- Substituting parking spaces (i.e., substituting general use parking for car-share stalls).

Local governments may also institute policy initiatives that support car-share, such as:

- Fleet reduction (i.e., when agencies replace all or part of their municipal fleets with car-share services).
- Risk share (i.e., when a partner organization purchases a block of memberships or guarantees vehicle use, offers vehicle subsidies, or pays the difference between costs and revenue of a vehicle placement).

Bike Planning

Planning for biking, bike-share, and bike infrastructure together can encourage bicycling and improve the safety of riders.

The availability of bike infrastructure (Figure 22), particularly bike lanes and trails, has been shown to support increased bicycling. As biking increases in the United States, it is important for bike-share programs to be aware of and take advantage of investments in bicycle infrastructure. Co-locating bike-share docks with bike paths can incentivize potential users by providing a direct link to safe and comfortable routes. As bike-share use increases, data from the program can also be used to identify where new investments would be most effective.

Local agencies should consult or create a bicycle and pedestrian plan that complements their city and/or region's long-range development plans.

When designing or expanding a bike-share program, it is critical to place docking stations near existing or proposed bike infrastructure whenever possible.

Figure 22. Bike Infrastructure.

Align Regulations

Are there regulations in place that will affect a provider's ability to operate?

The regulatory environment can have significant consequences for ride-share, car-share, and bike-share programs, particularly in its effects on costs and location decisions. Regulations can be supportive, as in the case of trip reduction ordinances, or harmful, as with higher tax rates on car-share programs. They can also help to shape programs to better meet the needs of a city or region.

Research indicates that these programs may contribute to less congestion, increased use of active transportation and associated health benefits, lower development costs, and reduced parking demand. See A1. Potential Benefits of Shared Mobility. These public benefits suggest that public policies should be designed to support or encourage these types of programs.

Presenting a clear regulatory environment is critical to attracting shared mobility programs to an area because local regulations and policies control and shape the legal operation of such programs. This can include regulations governing operations, private-sector relationships, funding, and infrastructure development.

Different regulations apply to different programs. The following subsections describe how regulations affect ride-share, car-share, and bike-share programs.

The regulatory considerations for ride-share programs are undergoing rapid transformation.

Ride-Share Regulations

Of the three mobility programs, dynamic ride-share, has received considerable press regarding regulations. Between taxi companies protesting that Uber drivers operate without proper licensing to city councils outlawing the services, the regulatory considerations for ride-share programs are undergoing rapid transformation. See more in the Case Study: The Dynamic State of Ride-Share Regulations.

Ride-share systems vary considerably, and regulations should allow for the differences between them. Some communities regulate Uber and Lyft similar to taxi services, since they both charge a fee for service exceeding the cost of the trip. Conversely, Carma and iCarpool's systems fit under a federal definition (*35*) of ride-share that limits the fee a driver can receive to recover the driver's cost of a trip, and are not usually regulated. U.S. Public Law 112-141 defines real-time ride-sharing as "where drivers, using an electronic transfer of funds, recover costs directly associated with the trip provided through the use of location technology to quantify those direct costs, subject to the condition that the cost recovered does not exceed the cost of the trip provided." Each service varies in terms of safety regulations and driver background checks, and government agencies are considering how ride-share programs should be regulated in the long term.

Car-Share Regulations

The regulatory environment can have significant consequences for car-share programs, particularly in its effects on costs and location decisions. Public policies designed to support or encourage car-share programs can help communities reap the benefits of car-share (*36*). Regulatory considerations for car-share programs include the following major issues:

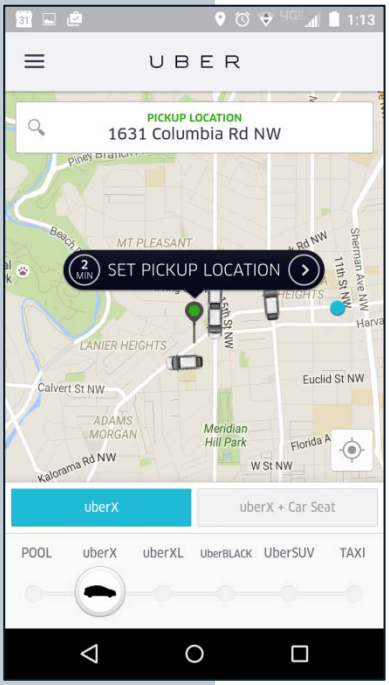
- Parking.
- Taxation.
- Insurance.

Common policies to provide car-share parking include

- **Provision of on-street parking.**
- **Provision of off-street parking.**
- **Exemptions from parking limits.**
- **Creation of car-share parking zones.**
- **Free or reduced cost parking spaces.**
- **Free or reduced cost parking permits.**
- **Universal parking permits (parking allowed in any on-street location).**
- **Formalized processes for assigned on-street parking spaces.**
- **Recommended use of parking meter revenue.**

Car-share programs rely on on-street and off-street parking in order to provide convenient and accessible access to shared vehicles.

Case Study: The Dynamic State of Ride-Share Regulations



Ride-share programs, particularly those operated by TNCs, have faced scrutiny regarding various aspects of their operations. As such, regulatory battles have erupted in many cities, regions, and states to define and regulate ride-share services.

Some jurisdictions have passed bans on ride-share services that operate as cars-for-hire but bypass the existing regulations for taxi providers. Others have developed ordinances that hold new ride-share programs to standards for vehicle inspections, background checks, insurance, and other operations features.

Many recent regulations address the activity of TNCs. Colorado passed the first state-level ride-sharing law in 2014, and at least 11 cities in the United States have legalized TNCs. With changes in the regulatory environment for ride-share occurring so rapidly, an updated review of state and local regulations should be undertaken during the assessment of any shared mobility program. Figure 23 presents the status of ride-share ordinances in U.S. cities as of January 2015.

See Texas ride-share ordinance examples in A2. Texas Ride-Share Ordinances.

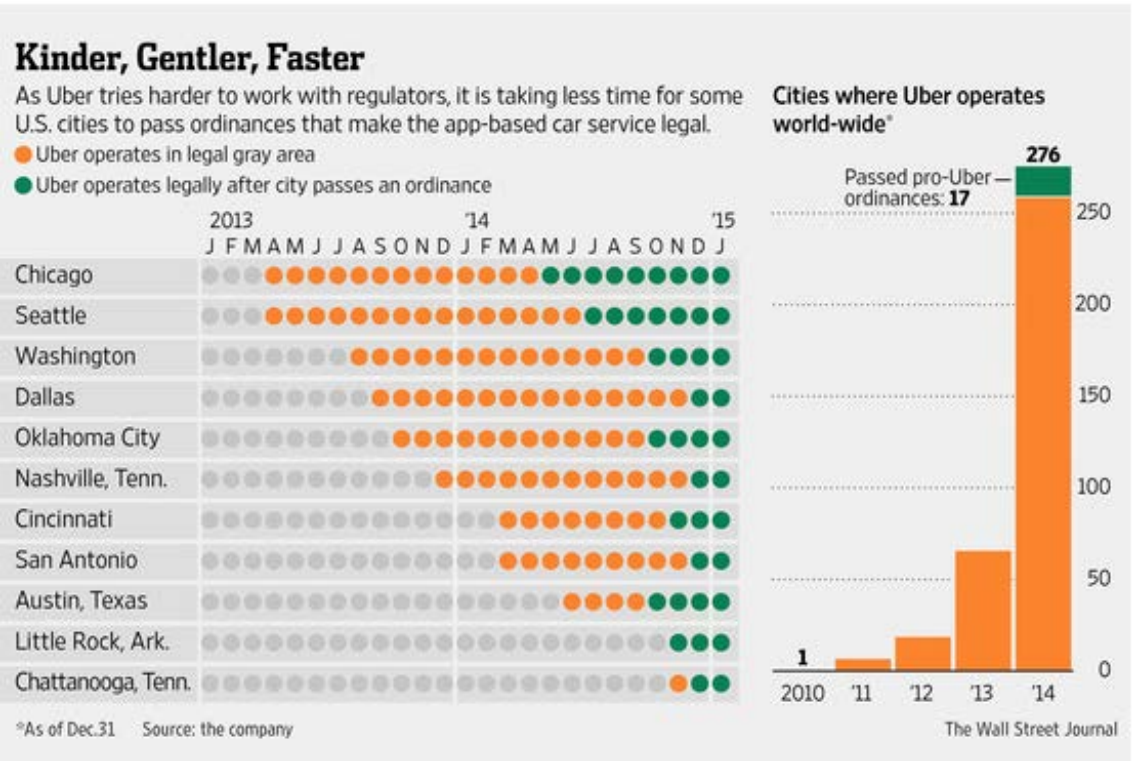


Figure 23. Regions with Pro-Ride-Share Laws (37).

Parking Provision

Three major concerns for car-share parking are locations, costs, and interference with other regulations.

Figure 24. Designated On-Street Car-Share Parking.

Finding and financing parking spaces can be a barrier to car-share expansion in both new and existing markets. Local governments are an important partner for car-share programs because they control on-street parking and the planning and zoning of off-street parking. For a car-share operator, parking costs may constitute a significant burden on start-up and operating costs, while local governmental agencies have to weigh other political, economic, and social considerations.

Car-share programs across the country have to negotiate with local governments regarding parking allocations and costs. In early operations, street parking was free or subsidized for car-share programs as a means of support from local governments. As car-share has demonstrated success as a business operation, local agencies are increasingly negotiating parking terms to generate revenue or to use as leverage to ensure the programs meet public goals. The terms of the arrangements have included free parking, graduated increases from subsidized to market rates, bidding for parking rights, and calculated rates based on parking meter revenue.

In many cases, car-share programs are paying cities for parking access. Parking deals have become more common with the expansion of one-way car-share programs such as Car2Go, where the fleet vehicles are not designated to a single parking space. In many cities, car-share providers pay the city for the opportunity to offer its members access to free street parking. In some cases, car-share programs pay more than the revenue generated by private car owners paying for curbside parking (*38*).

Taxation

Tax codes can have an accommodating or limiting effect on these programs. High taxes can raise the user costs of car-share and reduce the potential social benefits that can be achieved.

Identify tax policies that may impact shared mobility and consider whether they help or hinder the achievement of local goals.

Car-share programs tend to be taxed by local and state governments in the same manner as traditional car rentals, often resulting in higher average taxes relative to typical sales tax. Nationally, the average tax on car-share services is 18 percent for 1-hour reservations and 14 percent for 24-hour reservations. Average sales tax is just over 8 percent. However, tax credits have been given at municipal or state levels, including sales tax credits, rental car tax exemptions, and employer and property owner tax credits.

Spotlight: Tax Credits Support Car-Share

The State of Oregon passed legislation to allow tax credits for businesses enacting energy-saving activities, which included car-share operators. This program is administered by the Oregon Department of Energy. Washington State offered a tax credit to employers and property owners who provide financial incentives for commute trip reduction measures including car-share (*19*).

Insurance

In general, commercial liability is the most common form of insurance in these programs.

Insurance for car-share programs is a substantial cost but is no longer considered a major barrier, as it was when programs first emerged. Car-share organizations in the United States typically have $1 million liability insurance per accident per claim. Some have reduced this limit to $300,000, which is more similar to personal vehicle insurance than fleet insurance.

Today, car-share programs must consider insurance issues with regard to two particular market segments. First, younger drivers, particularly on college campuses, represent a significant growth market for many large car-share operators. The second challenge is for the emerging P2P car-share industry, which gets tangled in traditional personal vehicle insurance regulations. Determining liability when a car owner lends his or her car to an unaffiliated driver through a third-party facilitator is a less-familiar concept in the insurance industry. Alternative insurance models, such as usage-based insurance, could prove to be a viable option that is well suited to the needs of car-share users and providers.

Bike-Share Regulations

Several regulatory or planning aspects impact bike-share programs, including (*39*):

- Advertising restrictions.
- Insurance.
- Buy America.

Advertising Restrictions

Advertising in various forms has been a demonstrated source of financing for shared mobility programs. However, local restrictions on outdoor advertising can limit or impact its use in some communities. Washington, D.C.'s Capital Bikeshare operates in multiple jurisdictions with different local regulations. In Arlington County, Virginia, a county ordinance restricts the use of outdoor advertising in public areas while the District of Columbia does not (*40*). This led to an operation in which each jurisdiction makes independent decisions about local advertising revenue while users experience a unified bike share program across the region. Arlington County is considering amending its ordinance. In San Diego, where similar sign ordinances limited the use of advertising, the City Council approved ordinance changes that would allow advertising and sponsor ads on bike dock stations when they approved the contract for a bike share program (*41*).

Insurance

In general, commercial liability is the most common form of insurance in these programs, except in cases in which bike-share programs are insured by a sponsor or local government entity. Although all North American programs require a liability waiver, many are required to carry liability insurance as a condition of permission to place kiosks on either public or private land. Most operators perceive liability insurance as a necessary protection against potential legal action. Liability waivers serve as protection only with respect to legal actions by users.

Buy America Regulation

Programs that receive federal funding for capital costs may be subject to the Buy America requirement. FHWA and the Federal Transit Authority (FTA) have separate restrictions. Funding from FTA requires that any bike-share "end product and its components must be produced in the United States." The FHWA Buy America requirement requires that "steel and iron purchased on a contract funded with Federal funds must be produced in the United States" (*42*).

Spotlight: Bike Docking Station Location Considerations

Bike docking station locations will ideally be placed in proximity to a large number of potential users. However, there are regulatory, maintenance, and safety considerations related to the placement of bike docks that must also be considered. Some issues to address are:

- Who owns and maintains the sidewalks?
- What are the implications of locating docks and kiosks on public or private land?
- Are there safety concerns with bike parking in on-street parking areas and sidewalks?
- Who is responsible for liability issues?

Identify Funding Sources

Knowing that financial support and funding sources exist and are easily accessed is important when deciding whether or not to start or participate in a program. In addition to user fees and membership revenue, most shared mobility programs require additional funding sources, particularly during start-up. These sources can include:

Funding for shared mobility typically comes from a combination of private, public, and in-kind sources.

- Government funding.
- Sponsorship and advertising.
- Private investment.

Government Funding

Many options exist for government funding of shared mobility programs. Although the precise programs and eligibility requirements may change rapidly, Table 6 provides an overview of potential funding sources and the administering agency.

Table 6. Potential Federal Funding Sources for Shared Mobility Programs (*43*).

Funding Source	Agency
Congestion Mitigation Air Quality Improvement (CMAQ)	FHWA, FTA
Value Pricing Pilot Program (VPPP)	FHWA
National Planning and Research	FTA
Job Access and Reverse Commute (JARQ)	FTA
Clean Air Transportation Communities (CATC)	Environmental Protection Agency (EPA)
Building Blocks for Sustainable Communities	EPA
Surface Transportation Program (STP)	FHWA
Transportation Alternatives Program (TAP)	FHWA

Case Studies: Federal Funding Support for Shared Mobility

Ride-share: Carma's pilot project received funding from the Federal Highway Administration's Value Pricing Program (*44*).

Car-share: The Center for Neighborhood Technology recruited the City of Chicago to partner as the sponsoring government agent for CMAQ funds for the nonprofit I-GO car-share venture. A CMAQ grant awarded the city $250,000 to start I-GO and a second grant in 2005 to expand the program. Although the city had concerns about taking on responsibility for performance of the nonprofit, it secured the funding and remained involved in monitoring and reporting to FTA (*19*).

Bike-share: The Bike Chattanooga program began as a grassroots effort in which a roster of grants and supporting resources from various locations were compiled to start a bike-share project. A health fellowship was secured with the National Science Foundation (NSF) to conduct research on potential health benefits of the bike-share program for the region. NSF funding required data collection, which resulted in one of the first systems to acquire GPS-enabled bicycles. Following the NSF funding, $2 million in CMAQ funding was used to acquire capital assets. Because Chattanooga is a smaller market and the supply of annual members is limited, prices on the system remain high. The city now owns the equipment and contracts with Motivate to operate and maintain the system. The nonprofit Chattanooga BikeShare works to integrate the bike-share system with transit and other activities to promote healthy active lifestyles as per the original fellowship directive with NSF (*45*).

The level of community or local government funding for a project will depend on the shared mobility program type, business structure, operating model, and program details.

Sponsorship and Advertising

Sponsorship and advertising are both methods of financing shared mobility programs.

Private institutions are increasingly supporting shared mobility programs. Local agencies can be active to connect partners with programs and to educate major local employers about why they might want to sponsor shared mobility programs. Sponsorship and advertising are both methods of financing shared mobility programs in a city or region, and various arrangements have been devised to benefit both the program and the sponsor.

Public and private entities can sponsor either an entire bike-share system or specific kiosk locations, often in exchange for advertising space. Sponsorship arrangement can vary from city to city:

- In New York City, the city allows the bike-share company the freedom to raise sponsor and advertising revenue.
- In Toronto and Boston, the cities manage the sponsors and associated revenue because they want to be able to pick their own sponsors.
- In Denver, three core sponsors collectively provide the majority of sponsorship revenue, or about one-third of the total annual Denver Bikeshare budget.
- In Boulder, Colorado, the bike-share program operator pursues multiple, smaller sponsorships and allows placement of ads on capital equipment. This is typical for programs in smaller cities.
- The City of Fort Worth offers bike-share station naming rights, station host sponsorships for organizations that would like a station on or adjacent to their property, and branded bikes with four advertising panels (*46*).

Private Investment

Private investment is another funding source for mobility programs.

Most of the large ride-share and car-share programs are owned and operated as private corporations, successfully raising private capital for start-up. See more in Understand Organizational Models in Chapter 5.

Spotlight: Ride-Share Investment

Uber raised $1.2 billion in funding from a group of mutual fund managers and venture investors in 2014. Overall, the company has raised $1.5 billion since its inception in 2010 (*47*).

Lyft leveraged venture financing to expand its ride-share service to different cities around the United States. Lyft has raised more than $330 million from external funding since it started in 2007 (*47*).

Spotlight: Car-Share Investment

With the growth of for-profit car-share programs, industries that have invested in car-share include:

- Auto manufacturers (e.g., Daimler [Car2Go], Peugot, BMW).
- Rental companies (e.g., Avis, Hertz, Enterprise, WeCar).
- Car-share brands (e.g., Zipcar, StattAuto, GoGet).

Spotlight: Bike-Share Investment

Bike-share programs are often run by a nonprofit or public agency. Private companies are typically involved as sponsors who provide funding in exchange for naming rights or advertising space on bikes, docks, and other material. Citibike in New York City started in May 2013 with more than 6,000 bicycles. Citibank® paid $41 million to be the program's lead sponsor, followed by MasterCard® at $6.5 million (Figure 25) (*48*).

Figure 25. Citibike in New York City.

Educate and Provide Outreach

Local agencies can leverage their role in the community to educate the public on ride-share, car-share and bike-share.

Financial support is not the only tool that local government agencies have to support shared mobility. Local agencies can market the shared mobility programs in other outreach efforts and on their websites, link new programs to regional trip planning services, or provide on-street parking and docking space for increased visibility.

Shared mobility programs can also fit well into existing campaigns for broader active living, public health, and travel demand management programs. These programs may have overlapping goals that could be met with the inclusion of shared mobility.

Shared mobility programs are growing in popularity but still claim a relatively small share of travelers. Reaching new markets and expanding membership are important next steps for these programs. Local agencies can support new programs by educating the population on shared mobility, how the programs work, and how they could benefit a community.

Not everyone is familiar with shared mobility programs. Local agencies can leverage existing resources and programs to educate and inform potential users.

Summary: Chapter 4

While the role and level of involvement of a public agency will vary with the program type, organization, and operations, there is always a role for public agencies as partners in ensuring that new programs operate seamlessly with existing programs and provide a public benefit. The first way that a public partner can achieve this is to create an environment that supports or does not hinder shared mobility. This chapter discussed several key steps to attracting shared mobility programs to a city or region, which are summarized here.

Communicate Public Support

- Recognize importance of a champion.
- Agency and department involvement.

Integrate with Planning and Policy

Some jurisdictions are starting to include shared mobility in their comprehensive plans or transportation planning. Several municipalities have policies that ease zoning regulations and encourage shared mobility in new development. These policies can include:

- Comprehensive and transportation plans.
- Pedestrian and bicycle master plans.
- Development requirements.
- Trip reduction programs.

Align Regulations

Regulation alignment can vary based on the type of program and the particular history of regulations in a region. The agencies and departments identified in the previous section can provide institutional knowledge for this information.

Identify Funding Sources

- Government funding.
- Sponsorship and advertising.
- Private investment.

Educate and Provide Outreach

Reaching new markets and expanding membership are important next steps for these programs. Local partners can support new programs by educating the population on shared mobility, how the programs work, and how they could benefit a community. Shared mobility programs can also fit well into campaigns for broader active living, public health, and travel demand management programs.


Chapter 5. Management and Operations

This chapter focuses on successfully managing the shared mobility programs that exist or are purposefully attracted to a region.

There is not a one-size-fits-all management approach for these types of programs at the local, regional, and state level. Generally, successful management of shared mobility means:

- Oversee the business operations.
- Build and leverage partnerships.
- Control program costs and revenues.
- Expand to new markets.
- Continue ongoing evaluation.

How to Manage Shared Mobility

- **Oversee the business operations.**
- **Build and maintain partnerships.**
- **Manage program costs and revenues.**
- **Expand to new markets.**
- **Evaluate and monitor.**

Oversee the Business Operations

The degree of involvement of a public partner will dictate its role in operations, but in all cases, a public partner will want to oversee operations and ensure the program meets its public goals.

The business models of shared mobility programs are still evolving as multiple organizations and businesses experiment with different organizations, partnerships, and cost and revenue structures. This means that operations and organizations differ widely among programs, geographic areas, operating companies, and partner agencies.

Understand Organizational Models

The organization and operations of programs can vary significantly, and each program is shaped by the local context.

In the course of recent development of shared mobility programs, a number of shared mobility program business models have emerged. Common ways these programs can be structured and managed are:

- **Nonprofit owned and privately operated**: a nonprofit is selected or created to manage the program and contracts a private entity to run the services.
- **Publicly owned and privately operated:** a government entity owns the assets but contracts with a private entity to run the services.
- **Publicly owned and operated:** a government entity owns the assets and provides the services.
- **Privately owned and operated:** a private entity owns the assets and provides the services.

Given variations in ownership, system administration, operations, and regional characteristics, there can be overlap among and variation within these models. Local regulations, participation from local agencies, sponsors, and partners, and the start-up nature of shared mobility programs result in high experimentation with operational models.

Ride-share programs are often privately owned and operated. Carma is a nonprofit operation that partners with public agencies. Car-share is currently dominated by privately owned and operated programs, but nonprofit operations have been successful as well. Bike-share systems most commonly operate as nonprofit or publicly owned programs with contracted private operators. Fort Worth Bike Sharing was started by the Fort Worth Transportation Authority but was made possible by community partners, including the City of Fort Worth, Bike Friendly Fort Worth, Huitt-Zollars, and several others.

Figure 26. BlueCross Sponsored Bicycles.

Coordinate Responsibilities

Often the organizational structure involves an implementing agency or agencies, an operator, and other partners (vendors, sponsors, advocacy groups, etc.). The responsibilities of the shared mobility program can be divided among partners.

The implementing agency is the entity that oversees the planning and implementation of a shared mobility program.

The operator oversees the day-to-day operations, including maintenance, redistribution, customer service, payment processing, and marketing.

Some negative or undesirable effects can be anticipated, avoided, or reduced when the roles of participating agencies and partners are well defined early on. Management of a shared mobility program includes the division of duties among the involved partners. Table 7 shows typical contributions by a local government and a partner agency.

Table 7. Typical Contributions per Partner to a Shared Mobility Program.

Partner Organizations	Local Governments
▪ Outreach and marketing. ▪ Administration. ▪ Parking. ▪ Financial contributions. ▪ Memberships. ▪ Planning, policy, and tax issues. ▪ Transit integration.	▪ Access to office or conference space. ▪ Staff time for marketing or parking management. ▪ Research or insight on planning. ▪ Policy development or assistance in resolving internal barriers and building internal support. ▪ Marketing through government websites. ▪ Regional trip planning services. ▪ Provision of on-street parking. ▪ Secure external funding. ▪ Fleet reduction efforts. ▪ Risk-sharing arrangements.

Address Risk-Sharing

Every venture contains a level of uncertainty associated with external factors. Introducing shared mobility programs will almost always involve some risk for local transportation agencies. Examples of risk include:

- Excessive operating costs generated by damage/vandalism targeted at bicycles, vehicles, and stations or the necessity of redistributing bicycles around the system.
- Consumption of public space in a restricted environment.
- Undesirable modal shifts (for example, from walking or public transport to public bicycles on non-congested routes).
- Negative image in the event of problems: poor operation of the service, accidents involving program bikes or vehicles, limited use of the service, etc.
- Undesirable side effects such as competition with commercial taxi and cycle-hire services.

A partner organization can mitigate or share risk by making financial or in-kind commitments to a program. This can include purchasing a block of memberships, offering subsidies for memberships, and agreeing to share costs of a vehicle station or bike dock.

Monitor Safety and Security Issues

As with any transportation program, safety and security of travelers must be considered.

Safety has not been a major issue for shared mobility programs. Programs are designed to comply with existing requirements and business practices. Issues that are worthy of consideration based on the program type are discussed below.

Ride-Share

Travelers and public agencies have expressed concern with the unregulated nature of new ride-share programs, particularly TNCs. Drivers are required to provide additional information (e.g., proof of registered vehicle, driver's license, age) to comply with the requirements established by each ride-share provider and, in the case of TNCs, may be required to undergo background checks. Upon approval, they can start accepting ride matches from nearby passengers.

Car-Share

Most car-share programs operate similar to traditional car rental using standard vehicles, so these programs have not created significant new safety concerns for users. All car-share providers must ensure that shared vehicles meet local safety and registration standards. Peer-to-peer programs may need to consider the additional safety challenges of regulating personal vehicles that are less standardized than fleets.

Bike-Share

For bike-share programs, safety issues are mainly the same as for biking in general. Some methods to address bicycle safety are:

- Development of safe biking facilities.
- Public education on safe motorist and bicyclist behavior.
- Consideration of impacts of road conditions, construction, debris, and railroad tracks.

Spotlight: Helmet Availability for Bike-Share

While helmet use for adults is not regulated in Texas, helmet availability can present challenges to bike-share programs for reasons including the inconvenience associated with carrying a helmet, lack of helmet ownership, lack of helmet availability for last-minute trips, and difficulties associated with providing sterile shared-use helmets (*49*). Several bike-share programs in the United States offer helmets, sell helmets, provide helmets with a membership, or offer discounted rates on helmets through partnerships with local bicycle stores (*49*). However, the majority of cities with bike-share do not require helmet use.

Examples of helmet dispensing technology and other innovative technologies to encourage helmet use and enhance user safety exist (*50*). Pronto Bike Share in Seattle, Washington, launched in 2014 with helmet dispensers at every station, due to a regional mandatory helmet law (*51*). In 2013, in partnership with Helmethub, the City of Boston set up helmet vending machines at several bike-share stations. Helmets could be rented for $2 and returned at the end of the trip. Helmets were cleaned after each use before being distributed again (*52*).

Build and Leverage Partnerships

Partners are critical to on-going success of a program.

Shared mobility programs can increase visibility, expand their market, and better achieve their goals through partnerships.

As discussed in Chapter 3. Assessment, individuals, organizations, businesses, and other local stakeholders can partner in shared mobility programs to provide financial, institutional, political, and other in-kind support. A program benefits from an opportunity to directly reach a large pool of potential users, and partners can benefit from discounted rates, social benefits, proximate vehicles or bikes, and co-promotion. Partnerships can be a tool to attract new programs or reach new users. Stakeholder support is essential to obtain public and/or private funding and sponsors for the program.

Engaging partners with goals that complement shared mobility can leverage limited capacity, especially during a start-up phase, and expand benefits. Some key partners that have played a central role in shared mobility programs to date are discussed in this section.

Spotlight: City of Philadelphia

The City of Philadelphia in its bike-share business plan suggests that when working with community organizations, the city should:

- Limit the number of partnerships—to keep messaging consistent and manage limited resources.
- Establish partnerships early—to build ownership and ensure organizations participate where they can offer the best investment.
- Clearly define the role of the organization—to best use limited resources, define specific roles and responsibilities, and provide an appropriate budget if necessary (33).

Universities

Shared mobility programs operate in many university areas in both large cities and small towns across the United States.

Universities offer a large pool of likely users in a cohesive environment. Universities prove to be a viable partner for several reasons:

- Parking is often limited and/or expensive.
- There is an existing communications network.
- Universities typically represent a unified destination.
- Academic populations are more likely to be environmentally aware.
- Academic funds cannot usually be used for parking and transportation.
- Universities often already focus on traffic and parking demand management, so shared mobility programs can be integrated easily into a larger travel demand management program or sustainability program.

Zimride, a ride-share program operating across the country, was originally launched at Cornell University to facilitate shared rides among students. Zimride (Figure 27) now exclusively focuses its operation on connecting users within a particular university or business (*53*).

Figure 27. Zimride Logo.

Car-share has expanded tremendously on campuses across the country in the past few years. Zipcar has over 300 university campus programs, including many schools across Texas.

Bike-share programs often include university campuses in their system and some, such as B-Cycle in Austin, offer semester-based memberships to attract students.

Developers

Partnerships between developers and mobility programs can be mutually beneficial—developers can incorporate the service into a tenant amenities package, and the visibility of bicycles or car-share vehicles provide exposure for the mobility program.

Residential and commercial developers have partnered with car-share and bike-share programs. Land and real estate developers benefit from shared mobility programs as an amenity to offer tenants, a contribution to sustainability/corporate responsibility, a parking mitigation tool to reduce parking requirements, and a money-saving opportunity in some cases. Partnerships between ride-share programs and developers are not typical. Ride-share does not require physical infrastructure or access to parking.

Shared vehicle parking and/or bike docking stations can be provided by developers and property managers. A developer who provides free parking spaces in a housing complex may be granted a reduction in the parking space requirement for the site. Subsidized membership provided by a developer to car-share and bike-share organizations or tenants supports the program by increasing membership. Memberships can be temporary, subsidized, or linked in perpetuity to individual units. This is also emerging as a strategy to increase access to shared mobility services among residents of affordable or low-income housing.

Transit Agencies

Transit agencies may be interested in shared mobility programs as a means to improve station access, increase ridership, and improve overall mobility.

By creating new first- and last-mile options, transit agencies may attract more riders who might otherwise choose to drive the entire trip. Like developers, transit agencies may allow bike-share and car-share parking on transit-adjacent property. Ride-share programs may be applicable for guaranteed ride home programs that provide a back-up option for transit.

As partners, transit agencies can assist with marketing, provide parking and fare discounts, or allow fare integration. They can offer marketing support through a website, trip planners, or demand management programs. Parking in park-and-ride lots can be an important tool for car-share operators, but transit agencies must consider impacts on their existing users and what to charge for parking. Discounts are found in several U.S. examples, but fare integration is nearly nonexistent.

In Seattle, the transit agency contributed public funds to a private car-share company to help “demonstrate the viability of car-sharing and…test the different markets” (19).

Southeastern Pennsylvania Transportation Authority in Philadelphia viewed car-share as a complement to public transportation and chose to partner with a nonprofit operator. Its belief was that a nonprofit would be less interested in the bottom line and not promote car-share as a substitute for transit use (*19*).

Dallas’ transit agency DART partners with car-share and ride-share providers to offer transit riders access to these services through its free transit planning application. DART sees these partnerships as a way to increase travel choices and bridge the first and last mile from a transit stop to a final destination (*54*).

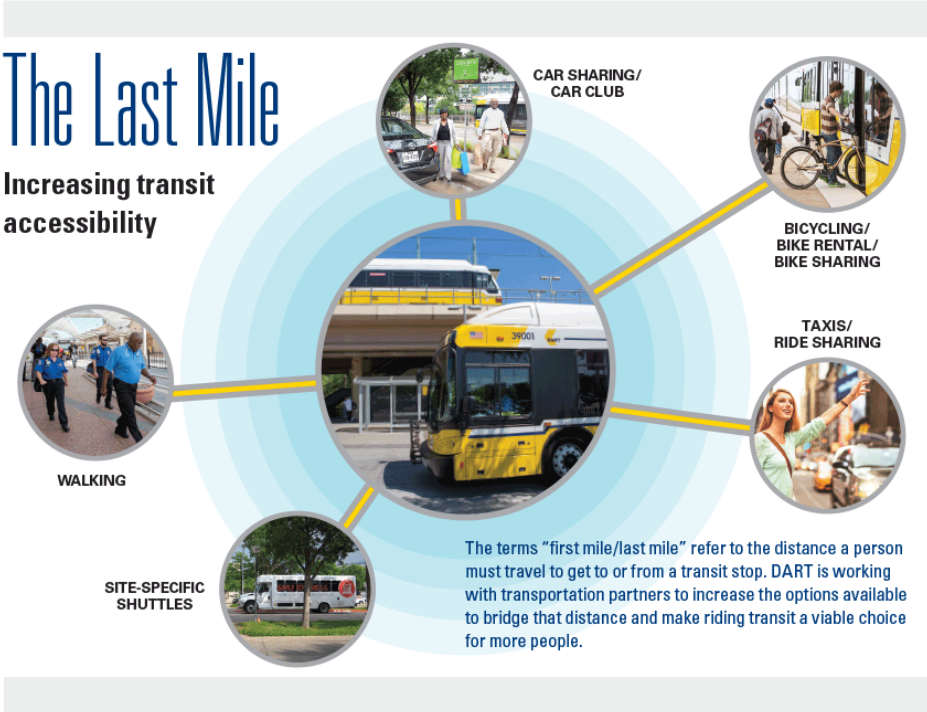


Figure 28. DART’s Last Mile Strategy (*55*).

Businesses

Many private companies participate in shared mobility programs, providing funding or other support in exchange for marketing and an opportunity to provide a service in their community.

Ride-share programs have leveraged partnership opportunities to expand their market. TNC operators collaborate with various partners to give introductory credits to users through events, including sporting events and concerts. In Houston and Washington, D.C., local businesses offer bike-share members discounts or special deals.

Shared mobility programs often seek out partnerships with large institutions, such as universities or local employers. Several bike-share programs have attracted local health insurance companies to be major sponsors through a shared interest in active transportation. See more on Sponsorship and Advertising in Chapter 4.

Programs also offer services structured specifically to meet the needs of business users. For example, many car-share programs highlight their services specifically to replace company fleets or problematic reservation and reimbursement programs, often offering turn-key systems that can be customized for an organization (*56*).

Business customers may benefit from car-share in the following ways:

- As an alternative to owning a fleet (or to underused vehicles in a fleet).
- As an alternative to reimbursing employees for driving their own vehicles.
- As an additional incentive to participate in a subsidized transit pass/commute trip reduction program or when subsidized employee parking is reduced, by providing access to a car for personal trips during the middle of the day.
- As a substitute for, or at least partial replacement for, rental cars for trips shorter than a day (*56*).

Spotlight: How Shared Mobility Attracts Business Users

In Houston, a car-share program was incorporated into a commute solutions program, offering lower overnight rental rates to provide an alternative ride home if transit or carpool options fell through.

General Motors® (GM) implemented a bike-share program for employees to travel within its 330-acre Warren, Michigan, campus. The program's initial success and reported increases in employee satisfaction and productivity led GM to expand the program to include 70 bikes and 14 stations in April 2015. The provider, Zagster™, offers bike-share solutions for businesses as well as hotels, universities, and property managers (57).

Airports

Ride-share and car-share programs operate at airports in many regions in the United States.

Local restrictions vary, and in some cases ride-share TNCs have been banned from picking up passengers at airports. Airports have developed partnerships with car-share organizations such as the following:

- Zipcars are located at dozens of airports, including in Austin, Dallas, and Houston (58).
- Car2Go partners with The Parking Spot, a near-airport parking provider, to provide car-share vehicles near the airports in Austin, Texas, and Columbus, Ohio. Members can pick up or drop off a vehicle at a designated spot near the airport terminals.

Local Governmental Agencies

Shared mobility is still a young industry, so partnering with other organizations can have many benefits. Leveraging partner skills, assets, and knowledge can stretch thin budgets and allow programs to be nimble

Carma's ride-share system in Austin operates as a federally funded pilot program in a partnership with CTRMA and TxDOT. The ride-share pilot program offers exclusive toll reimbursements to Carma users. "Carmapoolers" can get between 50 percent and 100 percent toll reimbursement depending on the vehicle occupancy while traveling along the 183A toll road or Manor Expressway (59), and expanded to include TxDOT tollways in the Austin region. To receive this incentive, users register their TxTag (a toll tag administered by

TxDOT) and license plate information. Toll reimbursements are made monthly by CTRMA and credited directly to the user's TxTag account.

The regional transit agency, Chattanooga Area Regional Transportation Authority, signed on as a partner during the initiation of the region's bike-share program. It helped secure funding from FTA and is actively coordinating transit activity with the bike-share program.

Denver Bikeshare partnered with the Denver Housing Authority, which funded capital costs for new stations. In exchange, Denver Bikeshare works with the housing authority's property managers to operate the program at a subsidized rate in city affordable housing developments. As of November 2014, 162 low-income members had joined the Denver Bikeshare system through two different housing authority properties. Residential developers often initiate station expansion in Denver and are willing to help finance these stations. Denver Bikeshare also works with the City of Denver's GIS team to align use data and trip behavior characteristics with land use patterns to make informed decisions about station placement.

Control Program Costs and Revenues

Shared mobility start-ups often receive some combination of local, state, or federal government funding. Operational costs typically are funded through a combination of user fees, advertising, and sponsorships. As a result, goals and requirements are attached to the use of these funds and ultimately shape the business structure of their system. The feasibility of a program in a given community is affected by start-up and annual operating costs. These costs need to be within a community's ability to pay or to find sponsors to support. User fees are usually minimal and may only cover some of the actual cost.

If the system is priced too high, then there is a risk of losing annual members.

If the system is priced too low, there is the risk of overuse and inability to cover operational and maintenance costs.

Cities have different political and financial cultures, and these affect the revenue structure of the program. For example, bike-share systems across the United States are born of a diverse patchwork of funding.

- In Washington, D.C., several local public agencies own the capital, while private-operator Motivate is contracted as the operator.
- New York City chose to pursue a public-private partnership strategy with Citibank, whereby one major sponsor (Citibank) provided the capital investment funding. The city also contracts with Motivate to operate the system, placing the financial risk burden on Motivate to make the system sustainable.
- In Chicago, a hybrid program is in place whereby the capital equipment was funded by a federal grant. However, if the bike-share system loses money, it receives a subsidy from the city to cover the loss.
- In Toronto, Canada, a flat fee is paid each year to Motivate to operate and maintain the system, while the city retains ownership over the equipment. Toronto also manages sponsors and advertising revenue.

Ride-share, car-share, and bike-share programs must balance the system network size with the anticipated use and cost to operate when designing the system.

Pricing also has an effect on use and financial sustainability. Offering a longer-term subscription is vital to encourage higher overall use rates.

Capital and Operating Costs

Table 8 shows the major costs for these program types according to fixed and variable costs.

Table 8. Major Costs for Shared Mobility Programs.

Fixed Costs	Variable Costs
▪ Salary and Benefits ▪ Rent ▪ Technology ▪ Marketing and Public Relations	▪ Driver Wages/Vehicles/Bicycles ▪ Insurance ▪ Parking ▪ Gasoline ▪ Cleaning and Maintenance

Capital purchases and subcontracts are influenced by these regulations depending on the type of funding used to support the system. Denver Bike-Share noted that Buy America grant requirements apply when federal grants are used for capital purchases. However, grant requirements may change as federal-level funding changes. There is currently a trend at the federal level away from providing funds for capital funding of bike-share systems.

Operating costs vary depending on the type of shared mobility program and the size of the system. Costs will also vary as the program evolves and expands.

Ride-Share Costs

For ride-share programs, real-time providers or facilitators offer free smartphone applications to facilitate matches between drivers and riders. In exchange for acting as an intermediary (or broker), these providers charge a fee for every payment transaction between the driver and passenger. These fees cover business expenses related to platform development, customer support, licensing, and communication costs. The following examples describe the fare split used by dynamic ride-share companies:

- Lyft and Sidecar drivers receive 80 percent of the payment from the passenger(s), while the other 20 percent goes to the ride-share provider.
- Carma carpooling employs a similar model where drivers get 85 percent of the total transaction from each passenger, limited to the IRS reimbursable rate. Another distinction of Carma is that the driver can optionally not charge specific riders, in which case the service is operated for free.

Car-Share Costs

Similar to bike-share, car-share program costs include vehicles, parking spaces, operations, and maintenance. In addition to the costs of standard vehicles, car-share programs require technology investments such as membership card readers, GPS transponders, and in-dash display panels. Parking spaces are usually rented from local governments and private companies.

Bike-Share Costs

For bike-share, average operating costs have been reported as $150 to $200 per bike each month. One bike-share program stated that half of its annual budget is devoted to labor costs for operations and maintenance (*21*). Specifically, staff and equipment for rebalancing shared bikes can be the largest operating costs for bike-share programs (*60*).

Figure 29. Bike-Share Pay Station.

Spotlight: Rebalancing Bike-Share Bicycles

Rebalancing is the term for the task of bike-share program operators to move bicycles from full to empty docking stations. Not only is this a costly element of bike-share operations, it is also a complex problem that varies with time of day, day of week, weather, events, and area topography. Trucks and vans are used to shuffle bikes between stations throughout a service area, so minimizing the movement of these vehicles is another aspect of rebalancing. Continued experience with real-time monitoring of bike-share systems and advanced algorithms to predict use trends will likely improve the rebalancing process (*61*). Another strategy that is used to mitigate the problem is a bike corral at busy destinations. A corral is a bike docking station manned by a bike-share staff to check in bikes once the regular dock fills up, essentially offering unlimited docking. This is increasingly used during large events, and in Washington, D.C., two corrals are operated on weekday mornings to serve commuters (*62*).

User Fees and Membership Costs

User fees and membership costs are common funding sources for all three shared mobility programs. Table 9 describes the user fees associated with shared mobility programs.

Table 9. User Fees and Membership Costs for Select Shared Mobility Programs.

Ride-Share	Base Fare	Per Minute	Per Mile	Other Fees	
Uber (Austin, TX)	$1.50	$0.30	$1.90	$1.00	
Lyft (Houston, TX)	$1.13	$0.17	$1.10	$1.00	
Car-Share	**Annual**	**Monthly**	**Daily**	**Hourly**	**By the Minute**
Car2Go (Austin, TX)*			$85	$15	$0.41
Zipcar (Chicago, IL)**	$0–$60	$0–$50	$64–$75	$7.27–$8.50	
City CarShare (San Francisco, CA)***	$60–$240		$48–$64	$5.75–$7.50	
Bike-Share	**Annual**	**Monthly**	**Daily**	**Hourly**	
DecoBike (San Diego, CA)	$99–$199	$20–$50	$15	$7	
Citibike (New York, NY)	$150		$10		
Capital Bikeshare (Washington, D.C.)	$75	$25	$7		
Fort Worth Bike Sharing (Fort Worth, TX)			$8	$1.50–$6.00	
San Antonio B-Cycle (San Antonio, TX)	$80	$9–$11	$10		

* Plus $35 one-time sign-up fee and $0.45 per mile after 150 miles per trip.

** Plus $25 one-time application fee.

*** Plus application fee and per-mile rates depending on selected membership type.

Expand the Program

Greater use and benefits can be achieved if shared mobility programs work to include more travelers.

Shared mobility programs tend to focus efforts on a small geographic area or a particular segment of the population during the start-up phase. These areas and populations may present the strongest potential for user uptake. To grow the program and offer the benefits to more residents, the program should seek to expand.

A survey of car-sharing industry experts worldwide revealed that 70 percent expected "continued market diversification" through 2020 that would depend heavily on public policy and multimodal integration.

Many of the demographic characteristics presented in Chapter 3 and discussed throughout this guidebook relate mainly to the early adopters of shared mobility programs. However, as programs become more established, the potential benefits may be of even greater value to underrepresented groups who traditionally experience less accessibility and mobility. Efforts may include outreach to:

- Rural and suburban regions.
- Women.
- Minority populations.
- Low-income residents.

Rural and Suburban Regions

Although most shared mobility programs have developed in urban areas, rural and small-town programs exist in many states. Shared mobility programs are nimble, can vary greatly in size and geographic extent, and work well in combination with other types of transportation. A market analysis can help identify the best uses and design to serve the particular conditions and needs of a region.

Spotlight: Bike-Share in Rural Environments

Although most shared mobility programs have developed in urban areas, there are rural and small-town examples.

We-cycle in Aspen, Colorado, is home to a 100-bike, 14-station nonprofit program serving a population of 7,000 residents in a mountain town that attracts summer tourism (*63*).

Greenville, South Carolina's B-Cycle bike-share opened in 2012 with a goal of connecting public institutions in the downtown area. Eight stations and 28 bicycles were located near the city transit center, City Hall, and the local community center. The payment structure replaced the typical 30 minutes of free use per trip with 60 minutes to accommodate the lower-density placement of stations (*64*, *65*).

Women

Among bike-share users, women typically demonstrate lower use rates than men. In New York City, the bike-share program hosts rides with women's groups and targets marketing at women (66). Car-share membership has typically not shown a gender imbalance. Data on the rate of ride-share use is not available, but some TNCs have faced criticism for perceived dangers for female passengers and drivers (67).

Figure 30. Female Bicyclists. Photo by S. Turner.

Minorities

Minorities are underrepresented among users of all three shared mobility programs. Efforts are being made by many programs to increase awareness among minority groups and to ensure that service areas are more inclusive. Some barriers to participation among minority groups may be cultural, such as a lack of understanding of what these services are or how to use them. Efforts to expand include increased and targeted outreach, bike and vehicle parking in neighborhoods with large minority populations, and subsidized memberships for minority residents (68).

Low-Income Communities

Shared mobility programs can provide much-needed travel options to low-income populations or neighborhoods with low transportation accessibility.

Low-income households may have the greatest potential to benefit from shared used mobility but have not been numerous among early adopters (69). Several programs and strategies are now being used to try to increase the number of low-income and minority users of shared mobility programs.

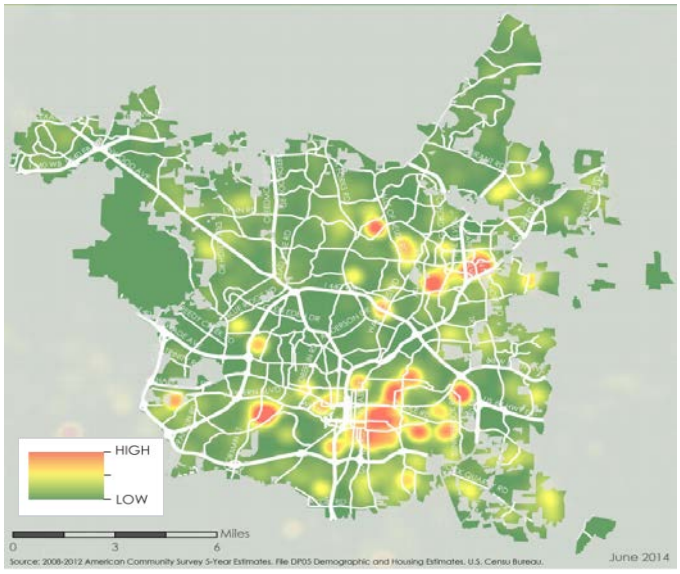


Figure 31. Equity Index Map from Raleigh, NC, Bikeshare Feasibility Study (70).

Raleigh, North Carolina, developed a social equity index for a bike-share feasibility analysis based on two statistics: (1) the percentage of population living in poverty, and (2) the percentage of non-white population (70). This technique can be used to identify communities that could benefit from access to new and low-cost travel options.

Continue Ongoing Evaluation

Government partners should continue to monitor and evaluate programs to ensure that they provide transportation choices and support stated goals.

Each new program provides a new source of information on the operation and success of shared mobility. Yet questions remain about how and how well shared mobility programs achieve policy goals. Monitoring and evaluation of activity and use can help understand user behavior, inform transportation planning, and support program expansion.

Case Study: Equitable Access to Shared Mobility

According to its representative, the Denver bike-share program partnered with the Denver Housing Authority, which funded capital costs for new stations. In exchange, Denver Bike Sharing worked with the housing authority's property managers to open the program at a subsidized rate in affordable housing developments. At the time of the interview, 162 low-income members had joined the Denver bike-share program through two different housing authority properties.

City CarShare® is a San Francisco Bay Area nonprofit that aims to improve the environment and quality of life in local communities through its car-share program (*71*). It runs a program called *Community*Share, offering subsidized membership fees and driving costs to low- or moderate-income residents of housing associated with local partners that include an economic development corporation, housing organizations, Project Access developments, and a community development organization and through San Francisco's Working Families Credit programs (*72*).

In Philadelphia, efforts to develop a regional bike-share program have focused heavily on bringing the program to low-income residents. The program, Indego, is the first bike-share in the United States to offer a monthly membership plan, which is specifically designed to be more accessible than an annual lump sum. Indego has also partnered with a bill payment provider that enables cash payments (*73*).

Philadelphia's bike-share program is also leading the Better Bike Share Partnership to focus on research, program development, and outreach to make bike-share "relevant to and inclusive of all communities." (*31*). This three-year initiative includes independently conducted focus groups with low-income communities in its effort to develop a socially equitable model for bike-share.

Data-sharing agreements can ensure that information for measuring the activity and benefits of shared mobility programs is collected. Public agency partners are more often including data-sharing agreements in contracts. Bike-share programs tend to have more open data policies than ride-share and car-share because of the larger role often played by public agencies. For all programs, data sharing can facilitate better evaluation of programs and monitor their success on particular goals.

Measurements can come from sources including:

- **Automatically generated system data.**
- **Annual or repeated user surveys.**
- **Administrative and marketing figures tracked by program staff.**

Data-sharing agreements require operators to report on the activity and use of shared mobility programs. Such agreements should be incorporated into negotiations at an early stage of program development whenever possible. These agreements typically require private providers to share data, such as trip times, distance, and origin and destination zones, on a specified schedule with city partners. This information allows cities to monitor and evaluate particular goals, but some data elements can be a challenge to the proprietary expectations of private companies.

In any case, privacy regulations prevent the release of proprietary information that includes personal data on origin and destination trips. Those elements of the data can be anonymized or deleted.

Measurements can come from sources including:

- Automatically generated system data.
- Annual or repeated user surveys.
- Administrative and marketing figures tracked by program staff.

Spotlight: Data Programs

Ride-share: Carma partners with CTRMA in order to provide HOV use data; in exchange, the driver gets a reimbursement on tolls (*21*). In January 2015, Uber signed an agreement to share anonymized trip data with the City of Boston, the first such partnership for the TNC (*74*).

Car-share: In Washington, D.C., where data-sharing requirements were incorporated into the initial contracts with car-share operators, the DOT requires an annual survey of users, quarterly data on monthly utilization rates, geographic distribution of membership, and growth rates of membership.

Bike-share: Most bike-share programs provide anonymized trip data through open data portals.

Case Study: Measureable Evaluation Metrics

In 2007, the District of Columbia Department of Transportation (DDOT) wanted to reevaluate its car-share programs and practices, given several years of practical operation (*4*). DDOT's experience informed a set of questions to consider for any shared mobility program and to guide ongoing performance monitoring and evaluation. These questions can be used to shape a program evaluation:

- Are more people aware of the shared mobility program?
- Are more people using the shared mobility program?
- Are the people using the shared mobility program:
    - Giving up existing personal vehicles or forgoing the purchase of new ones?
    - Reducing their vehicle miles traveled and fuel consumption?
    - Increasing their use of transit or non-motorized travel options?
- Does actual experience with the shared mobility program indicate that it helps reduce traffic congestion and air pollution?
- Does actual experience with the shared mobility program indicate that it can enhance mobility options for low-income people?
- Has the program created hardships for people who do not participate?

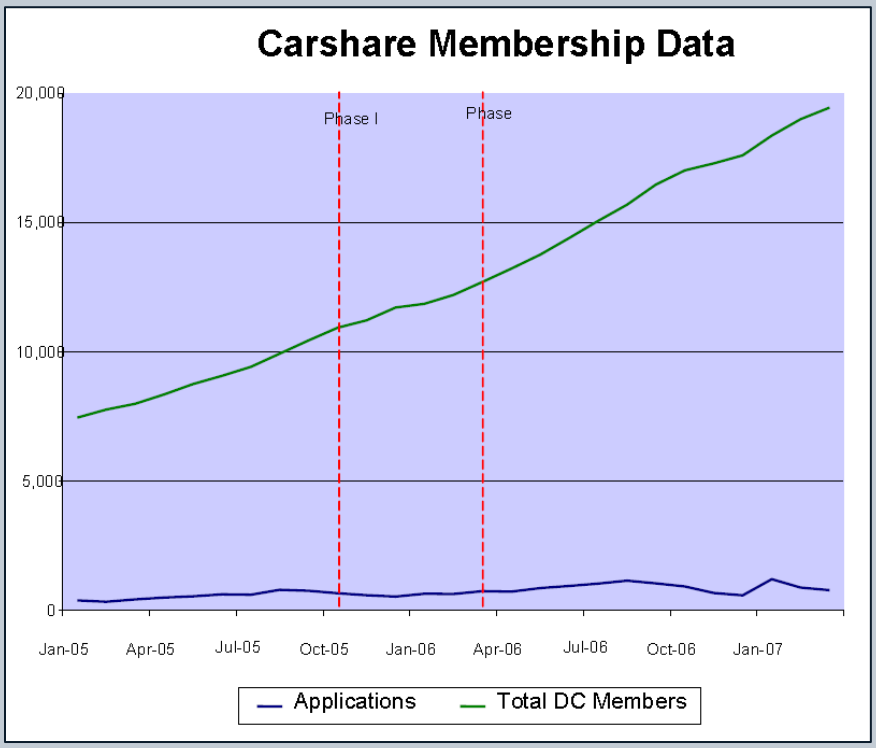


Figure 32. Example of Membership Growth Tracking Data (*4*).

Summary: Chapter 5

There is not a one-size-fits-all management approach for these types of programs at the local, regional, and state level. This chapter presented several strategies to manage and maintain a sustainable shared mobility program; these are summarized here.

Oversee the Business Operations

- Understand general organizational models.
- Coordinate responsibilities.
- Address risk-sharing and safety issues.

Build and Leverage Partnerships

Shared mobility programs can increase visibility, expand their market, and better achieve their goals through partnerships. Tips to make the most of partnership opportunities are:

- Limit the number of partnerships.
- Establish partnerships early.
- Clearly define the role of the organization.

Control Program Costs and Revenues

Shared mobility start-ups often receive some combination of local, state, or federal government funding. Operational costs typically are funded through a combination of user fees, advertising, and sponsorships. As a result, goals and requirements are attached to the use of these funds and ultimately shape the business structure of their system.

Expand the Program

As programs grow and succeed, it is important to expand to new markets. From the public perspective, this may include markets that are not necessarily early adopters but groups who may stand to benefit more from the services provided by shared mobility programs. Expansion target groups include women, rural and suburban regions, and low-income and minority travelers,

Continue Ongoing Evaluation

Local partners should continue to monitor or evaluate programs to ensure that they are supporting local goals and improving quality of life. This can include:

- Measurable evaluation metrics.
- Data-sharing agreements.

Chapter 6. Emerging Trends

This chapter discusses emerging trends in shared mobility programs.

Shared mobility programs are evolving rapidly. Many programs are embracing technology to enhance functionality and ease the user experience.

Shared Mobility Management Trends

- **Universal transit cards**
- **On-demand public transit**
- **Universal mobility apps**
- **Cross-city integration**
- **Competition apps**
- **Travel demand management incentives**

Management Trends

Transportation System Integration

Shared mobility programs offer new opportunities for accessibility and the potential to reduce strain on existing transportation networks.

While some efforts have been made to integrate ride-share, car-share, and bike-share individually with existing public transportation systems, shared mobility services can be most effective if integrated with multiple elements of existing systems.

Each shared mobility strategy fits within specific roles for users within the larger transportation system.

Shared mobility services can be most effective if integrated with multiple elements of existing systems.

While car-share can eliminate the need for a second household vehicle by providing access for sporadic usage, bike-share can aid transit in closing the first- and last-mile connections, allowing transit service to become door-to-door competitive. Ride-share has the ability to provide non-daily or emergency travel for individuals relying on alternative transportation for commute trips within the system.

Many programs are already working toward multimodal platforms and integrating shared mobility into existing systems.

Universal Transit Cards

South Korea's T-money card provides access to all transit services across multiple cities, and is accepted as a method of payment by taxis and at select convenience stores.

Universal transit cards or passes are uncommon in the United States but are found in locations around the world (*75*). In the United States, the most common universal pass system is provided through contractual agreements between transit agencies and universities. Every student is given universal access to transit services, and that access is verified or linked to their school ID and paid for by student activity fees collected by the university (*76*). Regional transit cards are also common, such as the Clipper Card in the Bay Area, and allow for seamless payment integration in regions with several transit service providers (*77*).

On-Demand Public Transit

The mobile technologies that have enabled the popularity of shared mobility programs have the potential to improve public transit service. Data collected from current transit riders could feed advanced algorithms that eventually allow transit vehicles to follow demand-responsive routes. Transit providers could provide real-time pick-up and drop-off locations, wait time, and travel time via smartphone apps, like Uber and Lyft currently do for their programs. Some niche shared mobility programs offer this type of dynamic bus travel in select U.S. cities (*78*).

Case Study: Mobility-on-Demand

The City of Helsinki, Finland, is exploring the idea of a mobility-on-demand system that uses a single subscription to let travelers access and pay for public transit and multiple shared services (*79*).

The premise behind this action is to reduce the necessity of auto ownership within the city by allowing users to price their trip by mile, by trip, or as a monthly fee. Initiated through government agencies, the vision is to open all data to the private market, allowing for competitive trip planning marketplaces to emerge.

The first steps toward this goal were initiated in 2012, when Kutsuplus (Finnish for "call plus") was initiated. Essentially a flex bus system, Kutsuplus allows users to call an automated microbus service, with price depending on time of day and willingness to carpool. The service costs more than public transport but less than a taxi, and is viewed as a tool in last-mile transit connectivity (*80*).

Universal Mobility Apps

Mobile technology and transportation data availability have enabled the development of universal mobile applications that provide real-time travel information. Building upon existing travel information services (mapped directions, travel time, and travel cost estimates), the innovation is to combine all transportation options into a single interface that allows a user to directly compare multiple attributes (e.g., wait times, travel times, traffic, costs, calories burned) of public transportation, ride-share services, car-share availability, bike-share availability, biking, walking, or driving a personal automobile (*81*). The end goal is a universal mobility app that incorporates personal preferences of its members and helps users find their best ride given the specific trip and their personal preferences.

RideScout and City Mapper are examples of a transportation integration platform that allow for a real-time comparison of all transportation options. On June 5, 2014, RideScout won the USDOT's Data Innovation Challenge award (*82*). As of 2015, RideScout is in operation in 69 cities across the United States. City Mapper is available in 30 cities worldwide as of October 2015 (*83*).

Cross-City Integration

Several shared mobility programs allow customers to use the services in cities other than the one in which they joined. Ride-share TNCs like Uber can be used in any city where it operates. Car2Go and Zipcar memberships are valid in other U.S. cities where the programs operate. B-cycle, a bike-share operator contracted in dozens of cities, markets a B-connected campaign. This integrated B-cycle system allows annual members to easily use systems outside of their home city.

Competition Apps

NuRide is a mobility app that encourages alternative transportation through gamification and competition (i.e., Fitbit, Foursquare, smartypig).

Figure 33. NuRide Logo (*84*).

Currently funded by participating state and local governments, NuRide allows users to earn points for each recorded non-automotive trip (carpool, transit, bike, walk, telecommute, etc.) with the potential to earn up to $300 a year worth of discounts and coupons from participating partners. Currently, NuRide is only available in participating localities, including San Antonio and Houston, Texas (*84*).

Transportation Demand Management Program Integration

Shared mobility programs can support demand management efforts.

Transportation demand management (TDM) is the term given to efforts to redistribute system demand through the use of alternative modes or travel during non-peak hours. This is achievable through multiple strategies and programs that fall into the TDM toolbox. These tools can be established individually or, as in most cases, implemented in concert to provide larger system impacts than can be achieved alone. Traditional TDM techniques include encouraging businesses to enact flex hours or offer subsidized transit passes for employers. Employing dynamic pricing on roadways and implementing intelligent transportation systems helps optimize congestion-prone zones.

Much of what shared mobility programs are able to accomplish occurs in conjunction with existing TDM programs. An employer's ability to offer car-share opportunities can allow workers the flexibility to use transit for commuting, with access to an automobile in an emergency. Bike-share can play a role as a last-mile link between transit stations and a traveler's final destination. Ride-share offers smartphone-based carpooling opportunities that reduce existing logistical barriers in traditional car-share strategies.

In recent years, shared mobility programs have emerged as innovative strategies in the TDM toolbox.

Spotlight: Multimodal Toolkits

In 2014, the Denver Regional Council of Governments created Multimodal Toolkits, a program targeted at improving non-automobile transportation for low-income residents. Based on a unique partnership between Boulder Housing Partners (BHP), eGo CarShare, and Boulder B-cycle, the program received a $100,000 CMAQ grant that will fund the program for two years.

The program includes a discounted cost for transit passes (often free), free membership to the regional bike-share, and discounted (50 percent) car-share rentals. Results have shown that 78 percent of the initial 280 BHP residents in the program have used at least one alternative mode (*85*).

Spotlight: GreenTrip

GreenTrip is a certification program of TransForm, a mobility advocacy group in the San Francisco Bay Area. GreenTrip is a traffic reduction and innovative parking certification program that allows developers to reduce parking requirements in exchange for viable shared mobility strategies including locating bike-share and car-share parking on site, decoupling rent and parking costs, and offering free or discounted transit and/or car-share memberships that are linked to each unit at a 40-year time frame (*86*).

TransForm

Our communities. Our transportation. Our future.

Program Trends

Ride-share, car-share, and bike-share programs are experimenting with new strategies and tools that are specific to the modes. These program trends are summarized in Table 10 and discussed in more detail in the rest of this section.

Table 10. Emerging Trends for Shared Mobility Programs.

Ride-Share	Car-Share	Bike-Share
▪ Handicapped accessibility. ▪ Long-distance ride-share. ▪ Autonomous vehicles.	▪ Handicapped accessibility. ▪ Long-distance car-share. ▪ Alternative fuels.	▪ Cargo bicycles for large loads. ▪ Electric-assist for children. ▪ Bike-share for children. ▪ Smart bikes.

Ride-Share Trends

Long-Distance Ride-Share

While not prevalent in the United States, long-distance ride-share programs are common in Europe. One online ride-share marketplace (BlaBlaCar.com) has experienced rapid growth in long-distance ride-share in recent years. Drivers post planned trips and the number of available seats for their journey, along with personal and vehicle information tied directly to social media accounts.

Users, also through social media accounts, can use the website to search for city-to-city trips at prices capped at cost saving levels. This means drivers will not make a profit on their trip (they reduce their costs) and riders are guaranteed cheap intra-city travel (*87*).

Handicapped-Accessible Rides

One issue that is raising concern with the growth of TNCs such as Uber and Lyft is the lack of handicapped accessibility when compared to the traditional taxi services with which they directly compete. Potential regulations to require TNCs to offer accessible services are being explored currently by the San Francisco Metropolitan Transit Authority (*88*).

Autonomous Vehicles

Autonomous and connected vehicle technologies are being developed, and some predict these advancements could be applied to ride-share models. Both Google and Uber have expressed interest in developing driverless taxis and are in preliminary research and development phases (Figure 34) (*89*). Uber is partnering with Carnegie Mellon University to develop autonomy technology (*90*).

Figure 34. Google's Self-Driving Car.

Car-Share Trends

Handicapped Accessibility

City CarShare in San Francisco created the first wheelchair-accessible car-share vehicle in 2008, called AccessMobile. The program offers minivans that accommodate two people using wheelchairs along with three other passengers and a driver.

Long-Distance Car-Share

Several car-share providers are exploring long-distance or city-to-city car-share services, rather than the current focus on travel within a single city or region. This type of service continues to blur the line between car-share and traditional car rental programs but reflects the provision of flexibility and choice that defines many of the shared mobility programs.

Alternative Fuels

Gasoline- and diesel-fuel vehicles are the most common, but many programs are incorporating low-emission vehicles, hybrids, and electric vehicles into their fleets. Car2Go's fleet comprises entirely smart, two-door, two-passenger vehicles. Electric vehicles have been incorporated into the fleets of Zipcar, Car2Go, City CarShare, and others.

Figure 35. Car2Go Smart Car.

Cargo Bicycles for Large Loads

B-Cycle Madison, Wisconsin, initiated a cargo tricycle pilot program in 2013 with specialized stations and tricycles in addition to traditional bike-share. The program aims to increase total bike-share accessibility by providing tricycles for trips requiring larger carrying capacity (*91*).

Electric-Assist Bicycles

An electric-assist bicycle (Figure 36) is a standard bicycle augmented with an electric motor to assist with pedaling and up-hill travel. Madrid, Spain, was the first European city to launch a fully electric bike-share system in 2014 (*92*). An electric assist can enable more people to travel by bike and expand the bike-share system to a wider geographic audience. Electric-assist bicycles have the potential to turn bike-share into a regional system, instead of one limited to a downtown or tourist area.

Figure 36. Electric-Assist Bicycle.

Bike-Share for Children

Vélib', the world's third largest bike-share program, located in Paris, France, expanded to the toddler market in 2014 (*93*). P'tit Vélib' has 300 children's bicycles in four different sizes for kids 2 to 10 years old. It also provides child helmets. The bikes are available at five different locations around the city—strategically placed near public parks and pedestrian-only areas. These bikes must be returned to the same station as pick up.

Smart Bikes

Smart, or dockless, bikes are embedded with bike-share technologies so that the bike dock infrastructure is not required. The GRID bike-share program in Phoenix, Arizona, uses smart bikes that are equipped with solar-powered, GPS-enabled locks and can be parked at either the official stations or traditional public bike racks within the service district. An additional $2 charge for district parking encourages official station usage, and a $1 credit for returning a district park bike to a station incentivizes system balancing (*85*). These bikes can decrease the capital costs associated with docking stations, offering a lower-cost option to pilot a bike-share program.

Summary: Chapter 6

Shared mobility programs offer new opportunities for accessibility and the potential to reduce strain on existing transportation networks and support demand management efforts. Evolving rapidly, many shared mobility programs are embracing technology to enhance functionality and ease the user experience. This chapter discussed emerging trends in shared mobility programs, which are summarized here.

Transportation System Integration

Shared mobility services can be most effective if integrated with multiple elements of existing systems. Many programs are already working toward multimodal platforms and integrating shared mobility into existing systems through the use of universal transit cards, on-demand public transit, universal mobility apps, cross-city integration, and creating incentives and competitions to encourage shared mobility usage

Transportation Demand Management

Shared mobility programs have emerged as innovative strategies in the TDM toolbox. Much of what shared mobility programs are able to accomplish occurs in conjunction with existing TDM programs, such as providing commute choices, first and last mile transportation linkages, flexible membership options, and changes in traditional parking standards.

Program Trends

Ride-share, car-share, and bike-share programs are experimenting with new strategies and tools that are specific to the modes, summarized here.

Ride-Share

- Handicapped accessibility.
- Long-distance ride-share.
- Autonomous vehicles.

Car-Share

- Handicapped accessibility.
- Long-distance car-share.
- Alternative fuels.

Bike-Share

- Cargo bicycles for large loads.
- Electric-assist for children.
- Bike-share for children.
- Smart bikes.

Appendix

A1. Potential Benefits of Shared Mobility

Shared mobility programs have the potential to offer multiple benefits to the communities and regions where they are implemented. However, research on the benefits of these programs is somewhat limited at this time due to limited operations and a lack of publicly available data. This section summarizes existing research findings on the benefits of ride-share, car-share, and bike-share.

Ride-Share Benefits

The success of ride-share programs across the United States suggests that they provide a service that may be filling a gap in the existing set of transportation services. Currently, ride-share programs operate in larger urban areas, offering a new user experience for point-to-point travel. The use of new technology enabling real-time and dynamic ride-matching has the potential to increase the use of ride-sharing.

Ride-Share Benefits

- **Cost savings (e.g., fuel and parking).**
- **Equity.**
- **Vehicle trip reductions.**
- **Emissions reductions.**
- **Reduction in Impaired Driving**

The technological and operational aspects offered by TNCs, such as Uber, suggest that their business model could be replicable in small towns or rural areas where car and vanpool programs have previously demonstrated success, but there is no research at this time to confirm that notion.

Cost Savings

A 2010 Virginia Tech study exploring the benefits of ride-share found that the main factor attracting survey participants to ride-share is cost. In that survey, 82 percent of the 125 participants said they would consider ride-share to save travel costs (*94*). A comparison of Uber and taxi trip costs found that Uber trips are less expensive than taxi trips in 20 out of 21 U.S. cities, including Dallas and Houston (*95*).

Vehicle Trip Reduction

Existing evidence suggests that the extent to which ride-share reduces vehicle trips varies by program design. For instance, Carma is designed specifically to combine several drive-alone trips into one ride-share trip.

However, TNC programs have less potential to generate traffic or environmental benefits. Table 11 presents the results of a survey in San Francisco on how a ride-sourced/ride-share trip would have been made otherwise. The results show that few trips would have been

made with a personal vehicle, and some would have been made by low-impact modes such as walking or biking (*13*).

Table 11. Survey Results on Travel Mode Replaced by TNC Ride-Share.

Survey Question: How would you have made this trip if uberX/Lyft/Sidecar were not available?			
	All Respondents	Do you have a car at home?	
		Yes	No
Taxi	39%	41%	35%
Bus	24%	17%	33%
Rail (BART, streetcar, Caltrain)	9%	7%	10%
Walk	8%	9%	6%
Bike	2%	2%	3%
Drive my own car	6%	10%	0%
Get a ride with friend/family	1%	1%	2%
Other*	11%	12%	10%
Total	**100%**	**100%**	**100%**
N**	302	175	124
*Other includes several responses indicating the respondent would have used another ridesourcing service, even though they were instructed not to. **N = the number of respondents.			

Emissions Reductions

Carma is an example of a ride-share program that is designed to achieve social goals. Carma's Austin, Texas, operations are documented to have reduced car trips and avoided 160,600 lb of CO_2 emissions as of October 2014. The program generated over $2,500 in toll refunds to travelers using toll roads, in addition to $3,600 in commuting costs shared and 8,200 gallons of gas saved (*96*).

Equity

According to another study led by MIT, a successful ride-share program could provide commuters with major benefits including travel time and cost savings (fuel and parking). The study also stated that a ride-share program could promote greater equity in the transportation sector by ensuring that mobility is maintained for lower-income travelers (*1*).

Reduction in Impaired Driving

Reducing impaired driving is a potential benefit of ride-share. A 2015 survey published jointly by Uber and Mothers Against Drunk Driving reports that 88% of respondents believe that Uber has made it easier to avoid driving while under the influence of alcohol, and 78% of respondents agree that they are less likely to drive after drinking since Uber has launched in their city (97).

Car-Share Benefits

Car-Share Benefits

- **Cost savings.**
- **Vehicle ownership reductions.**
- **VMT reductions.**
- **Emissions reductions.**

The findings of multiple studies indicate that car-share may contribute to less congestion, increased use of active transportation and associated health benefits, lower development costs, and reduced parking demand.

Some of the benefits attributed to car-share have been well documented in literature (especially in neighborhood-residential markets), while other aspects are either difficult to quantify or have not been well studied.

Four well-documented benefits attributed to car-share, mainly focused on neighborhood-residential markets, include:

- Lower individual transportation costs.
- Reduced vehicle ownership.
- Reduced VMT.
- Lower greenhouse gas emissions.

Cost Savings

Studies have reported that 25 percent of North American car-share members have sold a vehicle and an additional 25 percent have forgone a vehicle purchase, which eliminates household expenses on car payments, maintenance, insurance, parking, and fuel.

Shifting vehicle use to a system operating on a variable cost structure may lead to behavioral shifts. The per-use charges are thought to make users more aware of trip costs and the need to weigh the costs and benefits of all available travel options.

Vehicle Ownership Reductions

For individuals and households, car-share can be a low-cost alternative to owning a car, depending on how often and how far a person normally drives. These savings may depend on the enabling role of transit accessibility for car-share.

Car-share programs are not designed to replace a frequent driving commute. Households with the ability to commute by transit are more likely to be able to replace a personal vehicle with a car-share membership.

VMT Reductions

Surveys and academic studies have indicated that:

- On average, each residential car-share household experiences a 44 percent reduction in VMT (98).
- Between 12 and 54 percent of car-share members walk more often, 13 to 54 percent take public transit more frequently, and 10 percent bike more often (98).
- PhillyCarShare™ reported increased use of non-automotive transportation options among members who gave up a car. Forty percent of members who gave up a car reported that they walked more, while 34 percent reported an increased use of public transportation, 18 percent reported more frequent bicycling, and 13 percent reported taking more taxis (*99*).

A car-share trip that replaces a public transit trip may contribute to more VMT, CO_2 emissions, and roadway congestion. However, in another scenario, if a local resident joins a car-share organization and, as a result, foregoes the purchase of a second car, this could redistribute that car's trips among car-share, ride-share, transit, and non-motorized modes to decrease overall household VMT.

Emissions Reductions

Various studies have reported reductions in emissions:

- Household gasoline consumption declined by 34 percent in a survey of over 2,000 car-share members in North America (5).
- On average, each household that adopts car-share reduces carbon emissions by 0.84 tons per year (*100*).
- A 2013 study of over 2,000 car-share members surveyed in North America found that car-share led to a 27 percent reduction in carbon dioxide emissions. If the avoided emissions of forgone vehicle purchases are also considered, the North American estimate increases to a 56 percent reduction in emissions by car-share members. European studies indicate similar reductions of between 39 percent and 54 percent (5).

Bike-Share Benefits

Bike-share is generally designed for short trips in relatively dense urban areas. Programs operate in cities in Texas and across the United States that vary in population, urban form, and culture. Despite the fact that the outcomes vary with location and system design, consistent benefits have been identified.

Bike-Share Benefits

- **Cost savings.**
- **Transit integration.**
- **Health benefits.**
- **Emissions reductions.**
- **Local economy boost.**

Cost Savings

A bike-share membership provides a low-cost transportation option. A bike-share membership typically costs between $50 and $115. In contrast, the average annual combined fixed and variable cost of vehicle ownership was approximately $9,000 in 2013 (*101*), and the cost of operating and owning a bike is about $308 per year (*102*),

The marginal cost of each bike-share trip is often free for short trips, which incentivizes marginal bicycle trips and keeps costs low for individual users. Like car-share programs, bike-share members are not responsible for the additional costs of maintenance, storage, or theft.

Bike-share members may replace vehicle trips with bicycle trips, but bike-share is generally viewed as one element of multimodal travel rather than a direct replacement for a personal vehicle.

Emissions Reductions

As a non-motorized form of travel, biking produces less CO_2 and pollutants than any motorized form of travel. Additionally, most bike docking systems are solar powered. Solar docks do not require a connection to the power grid and thus can reduce installation costs and offer a higher level of flexibility in station relocation.

Health Benefits

Bike-share has been found to increase cycling mode share between 1.0 and 1.5 percent in cities with existing low cycling use (*103*). The International Bicycling Fund suggests that the average person can lose 13 lb in one year by switching to commuting by bicycle (*104*).

Among Texans surveyed during this research, the most important reasons that respondents gave for possibly using bike-share included that bike-share is fun and a way to get exercise. Similarly, bike-share users in New York City reported bike-share is appealing for exercise, recreation, and fun (*105*).

Transit Integration

Some programs have located bike-share stations to meet the goal of providing first- or last-mile connections to transit service. Evidence has shown that bike-share trips sometimes replace trips that would have been made on transit, such as in a busy, congested downtown area, but bike-share trips are used to complement transit when coupled with remote transit nodes as a last-mile connection.

Local Economic Activity Boost

Survey results suggest that bike-share programs can have a positive impact on the local economy. More than 8 in 10 respondents of the Capital Bikeshare survey said they were either much more likely (31 percent) or somewhat more likely (52 percent) to patronize an establishment that was accessible by Capital Bikeshare (*106*). A 2011 study looking at 58 separate projects found that $1 million invested in bicycle infrastructure produced 11.4 jobs, compared to 7.8 jobs for road-only projects (*107*). Researchers in Minneapolis, Minnesota, reported that Nice Ride users spent, on average, an extra $1.29 per week on new trips because of Nice Ride. When that total was projected out for the overall survey sample, it amounted to more than $900 per week in new economic activity, or about $29,000 over the Nice Ride season (April through November) (*108*).

A2. Texas Ride-Share Ordinances

Dallas, Texas, developed regulations that serve as a compromise between ride-share companies, traditional taxicabs, and public safety. The ordinance accommodates ride-share into its existing vehicle-for-hire ordinance. According to one report, TNC representatives applauded Dallas for its ability to balance public safety concerns and open-market entry (*109*). City officials believe the new rules will set the stage for officials to pursue a regional car-for-hire policy and plan to continue working with the North Central Texas Council of Governments to craft such a policy. The new ordinance states that:

- Hail-able vehicles, such as taxis, will have maximum rates, while others' fares will be unregulated.
- All drivers must undergo a background check.
- Vehicles must now undergo a 31-point inspection.
- There will be two tiers of commercial insurance: one for when an operator is available to accept riders and another for when he or she is picking up or carrying riders.

San Antonio, Texas, passed a highly restrictive ordinance regulating TNCs in December 2014. After weeks of public protest and an announcement that Uber planned to end services in San Antonio, the city council amended the ordinance set to go into effect on March 1, 2015 (*110*). The ordinance will require drivers for ride-share companies to have:

- A 10-fingerprint background check.
- A drug test.
- A review of their driving record.
- An initial and yearly vehicle inspection (including random checks).
- Proof of personal insurance.
- Documentation of these requirements.
- A driver and vehicle permit, issued at a cost of $175.

A3. Feasibility Analyses and Other Useful Resources

As shared mobility programs proliferate across the United States, many jurisdictions are pursuing feasibility and market analyses to determine the role these programs may play in their region. The following is a list of select reports that provide detailed examples of this type of study from other regions and federal or institutional reports providing general guidance.

Ride-Share

Ridesharing Options analysis and Practitioners' Toolkit.
John Volpe National Transportation Systems Center. Prepared for U.S. Department of Transportation, Federal Highway Administration, December 2010.
http://www.planning.dot.gov/documents/ridesharingoptions_toolkit.pdf

Markets for Dynamic Ridesharing? Case of Berkeley, California.
University of California Transportation Center. UCTC FR-2011-01. February 2011.
http://www.uctc.net/research/papers/UCTC-FR-2011-01.pdf

Car-Share

City of San Antonio Car-Sharing Feasibility Study.
Public Financial Management. Prepared for City of San Antonio, January 10, 2011.
http://www.sanantonio.gov/sustainability/Transportation/CarShareStudy.aspx

CarShare Vermont Market Study Update and Feasibility Study – Final Report.
Resource Systems Group, Inc. Prepared for CarShare Vermont, May 24, 2013.
TCRP Report 108: Car-Sharing: Where and how it succeeds. 2005.
http://www.nap.edu/catalog/13559/car-sharing-where-and-how-it-succeeds

Bike-Share

Raleigh BikeShare Feasibility Study.
City of Raleigh, North Carolina. Prepared for Bike Raleigh, Spring 2014.
http://bikeraleigh.org/bikeshare/docs/Raleigh_Bikeshare_Feasibility_Study_FINAL.pdf

Bike Easy Bicycle Share Feasibility Study New Orleans.
Bike Easy. Sponsored by Uno Transportation Institute, May 2012.
http://bikeeasy.org/events/archives/598/

Philadelphia Bike Share Strategic Business Plan.
Toole Design Group, LLC and Foursquare ITP. Prepared for Pennsylvania Environmental Council, August 22, 2013.
www.bikesharephiladelphia.org/philastudy/completebusinessplan.pdf

Frequently Asked Questions and Answers Concerning Bike Sharing Relative to the United States Department of Transportation.
Federal Highway Administration. July 5, 2012; Last updated October 20, 2015.
http://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/faq_bikeshare.cfm

Shared Mobility Resources

El Paso Market Analysis Case Study – 0-6818 Supplemental Report.
Prepared by Texas A&M Transportation Institute, November 2015.

Connecting Low-Income People to Opportunity with Shared Mobility.
Institute for Transportation & Development Policy and Living Cities. December 2014.
https://www.itdp.org/wp-content/uploads/2014/10/Shared-Mobility_Full-Report.pdf

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