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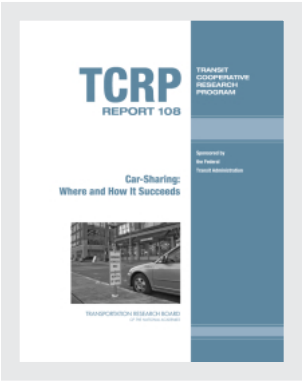

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TRANSIT COOPERATIVE RESEARCH PROGRAM

TCRP REPORT 108

Car-Sharing: Where and How It Succeeds

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Research Sponsored by the Federal Transit Administration in Cooperation with the Transit Development Corporation

TRANSPORTATION RESEARCH BOARD

WASHINGTON, D.C.
2005
www.TRB.org

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TRANSIT COOPERATIVE RESEARCH PROGRAM

The nation's growth and the need to meet mobility, environmental, and energy objectives place demands on public transit systems. Current systems, some of which are old and in need of upgrading, must expand service area, increase service frequency, and improve efficiency to serve these demands. Research is necessary to solve operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the transit industry. The Transit Cooperative Research Program (TCRP) serves as one of the principal means by which the transit industry can develop innovative near-term solutions to meet demands placed on it.

The need for TCRP was originally identified in *TRB Special Report 213—Research for Public Transit: New Directions,* published in 1987 and based on a study sponsored by the Urban Mass Transportation Administration—now the Federal Transit Administration (FTA). A report by the American Public Transportation Association (APTA), *Transportation 2000*, also recognized the need for local, problem-solving research. TCRP, modeled after the longstanding and successful National Cooperative Highway Research Program, undertakes research and other technical activities in response to the needs of transit service providers. The scope of TCRP includes a variety of transit research fields including planning, service configuration, equipment, facilities, operations, human resources, maintenance, policy, and administrative practices.

TCRP was established under FTA sponsorship in July 1992. Proposed by the U.S. Department of Transportation, TCRP was authorized as part of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). On May 13, 1992, a memorandum agreement outlining TCRP operating procedures was executed by the three cooperating organizations: FTA, The National Academies, acting through the Transportation Research Board (TRB); and the Transit Development Corporation, Inc. (TDC), a nonprofit educational and research organization established by APTA. TDC is responsible for forming the independent governing board, designated as the TCRP Oversight and Project Selection (TOPS) Committee.

Research problem statements for TCRP are solicited periodically but may be submitted to TRB by anyone at any time. It is the responsibility of the TOPS Committee to formulate the research program by identifying the highest priority projects. As part of the evaluation, the TOPS Committee defines funding levels and expected products.

Once selected, each project is assigned to an expert panel, appointed by the Transportation Research Board. The panels prepare project statements (requests for proposals), select contractors, and provide technical guidance and counsel throughout the life of the project. The process for developing research problem statements and selecting research agencies has been used by TRB in managing cooperative research programs since 1962. As in other TRB activities, TCRP project panels serve voluntarily without compensation.

Because research cannot have the desired impact if products fail to reach the intended audience, special emphasis is placed on disseminating TCRP results to the intended end users of the research: transit agencies, service providers, and suppliers. TRB provides a series of research reports, syntheses of transit practice, and other supporting material developed by TCRP research. APTA will arrange for workshops, training aids, field visits, and other activities to ensure that results are implemented by urban and rural transit industry practitioners.

The TCRP provides a forum where transit agencies can cooperatively address common operational problems. The TCRP results support and complement other ongoing transit research and training programs.

TCRP REPORT 108

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Adam Millard-Ball, Principal, Nelson\Nygaard, was the principal investigator. Gail Murray, Principal Associate, Nelson\Nygaard, was the co-principal investigator. The other primary authors of the report were Jon Burkhardt, Senior Study Director, Westat, and Jessica ter Schure, Associate Project Manager, Nelson\Nygaard. The GIS analysis and geographic market analysis were led by Christine Fox at Nelson\Nygaard, while Nina Creedman at Nelson\Nygaard provided research support. The online surveys were administered by Karen Burkhardt.

The work would not have been possible without the considerable support received from many car-sharing operators. They encouraged their members and partners to complete the on-line surveys, provided contact details for partner interviews, participated in the Operator's Workshop, and reviewed research drafts. Thanks also go to the participating partners, car-sharing members, the TCRP B-26 panel, and many others who are too numerous to mention.

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FOREWORD

By Dianne S. Schwager
Staff Officer
Transportation Research Board

TCRP Report 108: Car-Sharing: Where and How It Succeeds will be of interest to individuals, organizations, and communities who are interested in knowing more about car-sharing and to those who may want to introduce car-sharing as a new mobility alternative. The report is a substantive resource with considerable information and useful tools for the development and implementation of car-sharing services.

Communities face increasing traffic and parking congestion as well as a need to improve air quality. One way to address these problems is to find alternatives to private automobile ownership. Car-sharing is an innovative mobility option that allows individuals to pay for and use automobiles—on an as-needed basis—through membership programs.

In recent years, a number of European and U.S. car-sharing organizations have experienced rapid growth in membership and geographical coverage. However, little research has been performed on the benefits and feasibility of car-sharing. The goal of TCRP Project B-26 was to provide guidance to assist transit agencies, government officials, and other interested parties in developing successful car-sharing services in transit and other settings.

TCRP Report 108 presents the research team's findings on the

- Current and potential roles of car-sharing in enhancing mobility as part of the transportation system;
- Characteristics of car-sharing members and neighborhoods where car-sharing has been established;
- Environmental, economic, and social impacts of car-sharing;
- Ways in which partner organizations have tried to promote car-sharing;
- Barriers to car-sharing and ways to mitigate these barriers; and
- Procurement methods and evaluation techniques for achieving car-sharing goals.

Appendices A through E of *TCRP Report 108* are included with the report on *CRP-CD-60*. The appendices include an annotated bibliography; a list of partner organizations surveyed and interviewed; survey instruments; and sample documents such as Requests for Proposals (RFPs) and zoning ordinances related to car-sharing. Appendix E was designed as a resource for introducing organizations to car-sharing and encouraging partnerships to initiate car-sharing programs. The appendix includes five stand-alone documents directed to local governments, transit agencies, employers and businesses, developers, and universities, respectively. Each document can be printed out in color and disseminated as an information resource and marketing tool on car-sharing.

TCRP Report 108 and its appendices provide useful information and tools for those interested in initiating car-sharing programs.

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CRP-CD-60

APPENDIX A Car-Sharing Annotated Bibliography

APPENDIX B Geographic Market Analysis

APPENDIX C Data Collection Instruments

APPENDIX D Sample Documents

APPENDIX E Partner Profiles

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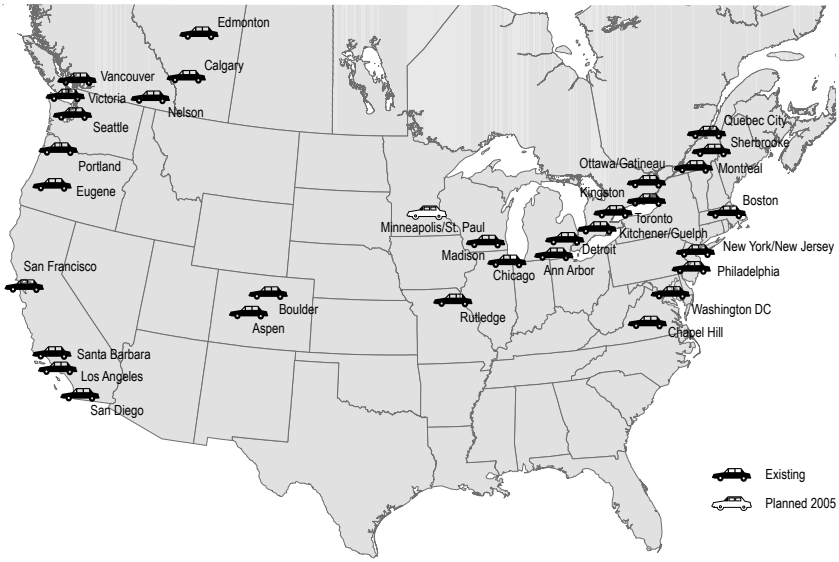
TCRP REPORT 108
CAR-SHARING
WHERE AND HOW IT SUCCEEDS

Executive Summary

What is Car-Sharing?

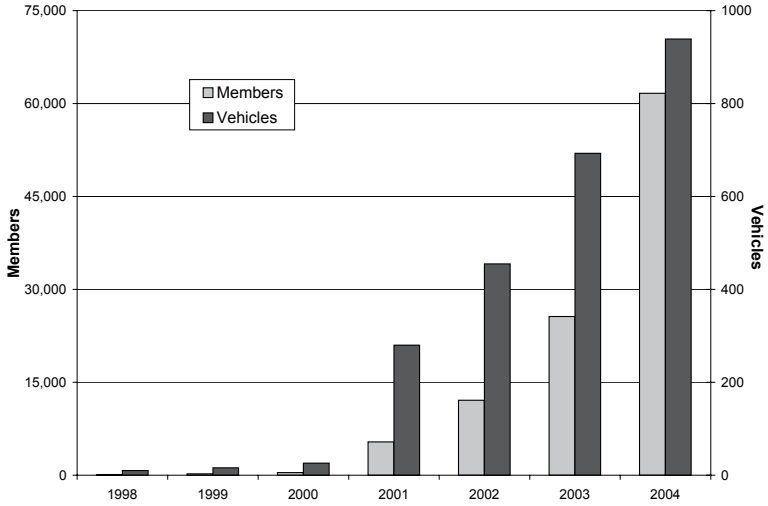
Car-sharing is a service that provides members with access to a fleet of vehicles on an hourly basis. Members reserve a car online or by phone, walk to the nearest parking space, open the doors with an electronic key card, and drive off. They are billed at the end of the month for time and/or mileage.

At the home, car-sharing can substitute for car ownership. At the workplace, it provides access to a vehicle for business use and personal errands during the day, allowing employees to avoid driving to work. By December 2004, operators claimed more than 60,000 members in the United States and nearly 11,000 in Canada. Despite rapid growth, however, car-sharing is still a niche product, accounting for just 0.03% of the US urban population and licensed drivers.



North American Car-Sharing Regions (2005)

US Car-Sharing Growth



Source: Shaheen, Schwartz & Wipyewski (2004); Susan Shaheen, unpublished data. Note that 2004 data are for December, while 1998-2003 figures reflect June data points, meaning the chart overstates the rate of increase from 2003 to 2004.

About This Report

One of the newest additions to the transportation toolbox, car-sharing has the potential to change people's relationship to the car in dense, urban communities. Car-sharing is usually run by independent operators, but can help achieve many of the goals of partner organizations such as developers, businesses, local governments, transit agencies and universities. In turn, these partners are essential to car-sharing's success. This report focuses on what partner organizations can do, the benefits that they can expect to realize, and where car-sharing can succeed. The full report is available at www.trb.org.

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Car-Sharing Operators

Car-sharing organizations can be for-profit companies, cooperatives, or non-profits with an environmental and social change mission. In Aspen, Colorado car-sharing is municipally run. The residential market was the initial focus for most car-sharing operators. However, some have now found that business users are the main source of growth.

Demographic Markets: Who Joins?

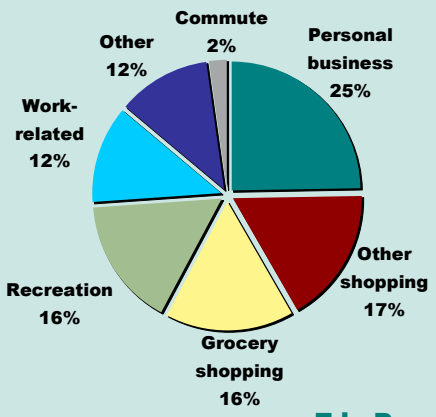
A high level of education is a defining characteristic of car-sharing members in North America. Survey results for this study found that 35% of members have a Bachelor's degree, and a further 48% some post-graduate work or an advanced degree. They tend to be in their 30s or 40s and have middle- to higher-incomes. Almost all members are concerned about environmental and social issues, and are more concerned with what a vehicle can be used for, rather than how it looks or its brand name.

Car-Sharing and Other Transportation Modes

Car-sharing is sometimes called the "missing link" in the package of alternatives to the private automobile. Members can use transit, cycling and walking for most of their daily trips, but have access to a car when required. Car-sharing also complements taxis, which are better suited to one-way trips and provide an option for those who cannot drive, and rental cars which are cheaper for longer journeys.

Uses of Car-Sharing

Members use car-sharing for a range of trips, but rarely for the daily commute to work. Car-sharing is used judiciously; the service is most often used when members have things to carry, need a car to get to their destination, or have multiple stops to make. The median number of trips per month is just two.



Trip Purpose

Guidelines for Where Car-Sharing Succeeds

Variable	Low Growth	High Growth
Demographics		
% 1-person households	30%	40%-50%
Commute Mode Share		
% drive alone to work	55%	35%-40%
% walk to work	5%	15%-20%
Vehicle Ownership		
% households with no vehicle	10%-15%	35%-40%
% households with 0 or 1 vehicle	60%	70-80%
Neighborhood Characteristics		
Housing units per acre	5	5

Note: For most variables, the values are the suggested *minimums* that are needed for a viable car-sharing service in a given neighborhood. For the "% drive alone to work" variable, the values are the suggested *maximums*.

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Geographic Markets: Where Car-Sharing Works

Car-sharing is a complement to other alternatives to the private automobile. It only makes sense as part of a wider transportation package, in neighborhoods where transit, walking and cycling are viable options. Car-sharing is not a panacea – it cannot "paper over the cracks" and compensate for auto-oriented land use policies.

Car-sharing is overwhelmingly concentrated in metropolitan cores – around 95% of members are found in these settings. High density, a good pedestrian environment, a mix of uses and parking pressures all help car-sharing to succeed. Most important appears to be the ability to live without a car – or with just one vehicle. Low vehicle ownership rates are the best predictor of a strong market for car-sharing. University campuses also provide an important market niche.

The picture in smaller communities is mixed. While car-sharing can be found in places such as Aspen, Colorado and Whistler, British Columbia, operators in Halifax, Nova Scotia and Traverse City, Michigan have been forced to close. Operators have also had limited success with expanding to suburban markets near Seattle and San Francisco. The keys to making car-sharing succeed in less urban areas appear to be community support, a strong champion, and volunteer involvement by members.

The Impacts of Car-Sharing

Vehicle Ownership

By providing access to a vehicle for occasional trips, car-sharing enables households to give up their car or a second or third vehicle. On average, about 20% of car-sharing members do this, with even more forgoing the purchase of a new car. Thus, at least five private vehicles are replaced by each shared car – and many studies, including research for this report, show substantially greater benefits.

In turn, reduced vehicle ownership can lead to increased parking availability and less need for new parking. The wider benefits of reduced parking include cost savings; release of land for development; and less stormwater runoff.

Vehicle Travel

Most studies suggest that, on balance, car-sharing reduces vehicle travel – particularly once a program matures and the "novelty" wears off.

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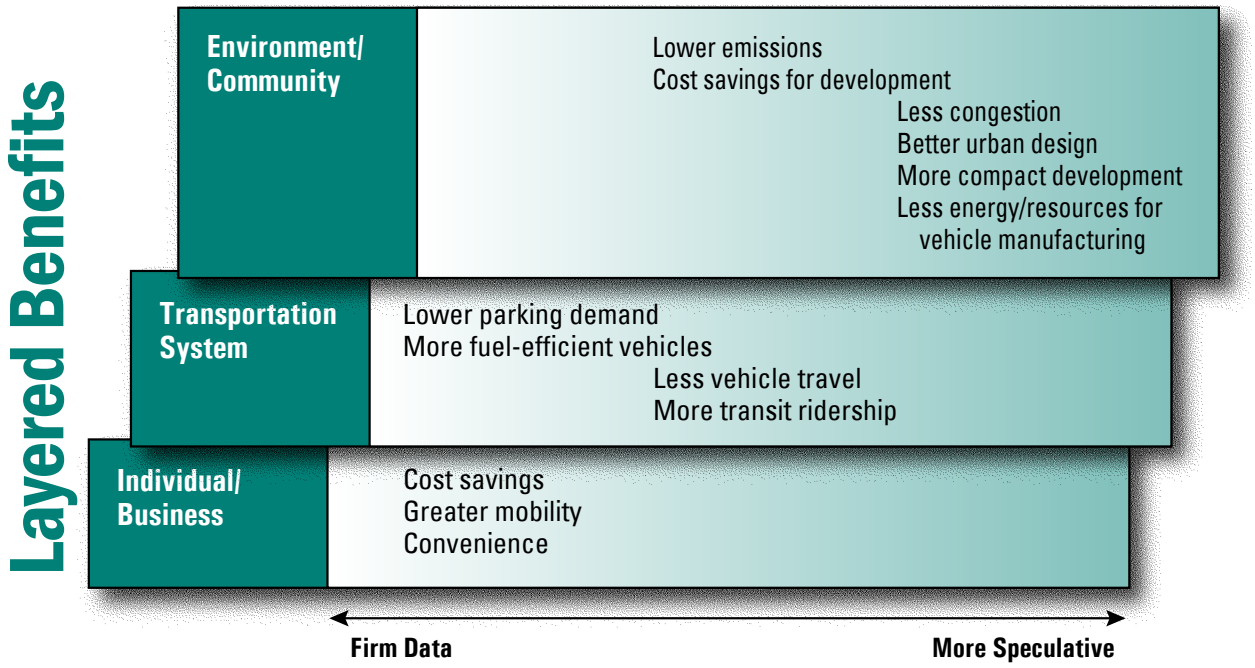
The precise impacts can be hard to measure, however, because of two competing impacts:

- **Reduced Travel.** Car-sharing changes the entire economics of driving, by converting fixed costs into usage fees. When households own a car, each additional trip costs very little, since the investment in car payments, insurance and taxes has already been made. With car-sharing, however, costs are directly proportional to the amount that members drive – providing a strong financial incentive to drive less. When car-sharing is available at the workplace, meanwhile, members can commute by transit, carpool or on foot, since a car will be available for business meetings and errands during the day.
- **Induced Travel.** Some car-sharing members did not previously own a car, and will use the service to make new vehicle trips. In many respects, this is a benefit, since car-sharing is improving mobility. However, these new trips can offset reduced travel by members who sell cars.

Other Impacts

The other impacts of car-sharing include:

- **Lower emissions.** Car-sharing reduces emissions both through cutting vehicle travel, and through the use of newer, fuel-efficient vehicles – in many cases hybrids.
- **Increased transit ridership.** By reducing vehicle travel, car-sharing shifts some trips to transit. In addition, nearly 20% of car-sharing trips are accessed by transit – another source of new ridership. Most of these access trips are made at off-peak times.
- **Cost savings.** Many households and businesses join a car-sharing program because they can save money on transportation.
- **Greater mobility.** Car-sharing allows people without a car to get to new places. Demonstrations are also underway in San Francisco and Seattle to evaluate the mobility benefits to low-income households.



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The Role of Partners

Partner organizations are indispensable to the continued growth and viability of car-sharing. Their help can be as basic as financial assistance and marketing. It can be as concrete as providing parking spaces for car-sharers. And it can be as advanced as integrating policies requiring car-sharing into planning documents, or even codifying policies into tax laws.

Partner Goals

Partners hope to achieve multiple goals through car-sharing. Local governments are interested in environmental and social benefits, such as reduced vehicle ownership and travel, and mobility for low-income households. Transit agencies want to increase ridership and revenue. Developers see the opportunity to provide an amenity for their tenants, and to gain speedier project approvals. Employers and universities use car-sharing as an employee benefit, and as a way to reduce auto commuting and parking demand.

Who Initiates Car-Sharing Partnerships?

Organization Initiating Partnership	%
Car-Sharing Operator	41%
Staff at Partner Organization	30%
Staff at Another Organization	11%
Community/Advocacy Group	3%
Other	8%
Don't Know	8%
Total	100%

Source: Web-based survey for this project

Who are the Partners?

Partner organizations are composed of any entity that helps car-sharing get a stronghold in communities. This study examined the role of five types of partners in detail:

- Local governments
- Transit agencies
- Developers
- Employers and businesses
- Universities

There are many other types of partners, including grassroots community groups; Transportation Management Associations and other rideshare agencies; and federal and State agencies.

Types of Support

Marketing. Partners can assist car-sharing operators by giving them access to customers. For example, an employer can send e-mails and provide mailing lists as a communication channel for the operator. If the partner has a Transportation Demand Management program, car-sharing can be inserted into the overall marketing activities—outreach, promotions and transportation fairs.

Administration. Partners can commit administrative resources toward car-sharing, such as processing grants, lending office space, and providing an interface with other departments or agencies.

Funding. As well as in-kind contributions, partners sometimes provide direct financial assistance to help with start-up costs or special programs such as car-sharing for low-income neighborhoods. Partners can also help apply for external grants.

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Parking. Making reserved parking spaces available for the car-sharing vehicles is one of the most useful actions a partner can take. Parking can be on-street or off-street, but needs to be convenient and visible.

Transit Integration. Car-sharing is a complementary mode to transit. Besides permitting car-share operators to use parking at their stations, transit operators can take a more proactive approach by integrating car-sharing with their fare systems. For example, car-sharing membership fees might be waived for transit pass holders, or a transit smartcard might be used to gain access to car-sharing vehicles.

Memberships. Partners can indirectly provide funding to car-sharing operators by becoming members. In this way, they help sustain the car-sharing program while also demonstrating leadership in promoting car-sharing and lending credibility to the idea. Some partners, such as the City of Philadelphia, have gone a step further by replacing fleet vehicles with a car-sharing program.

Photo: PhillyCarShare.

The City of Philadelphia is replacing many fleet vehicles with car-sharing and expects to save more than $9 million over five years.

Partner organizations such as BART, a rail system in the San Francisco Bay Area, provide valuable marketing assistance, helping car-sharing to grow.

Portland, Oregon installs high-profile orange poles to promote the on-street car-sharing program.

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Barriers and Factors for Success

As with any new concept, car-sharing faces challenges in getting a stronghold as an alternative transportation mode. One of the most fundamental barriers relates to finding a partner; car-sharing does not have a natural "home" in most agencies.

What's more, most partner organizations do not yet have a good understanding of how car-sharing works, and how it can help them achieve their goals. They may have unrealistic expectations about the types of neighborhoods where car-sharing is economically viable, and be skeptical about its benefits. The public and businesses, meanwhile, often fail to appreciate the true costs of automobile ownership and use. This failure makes selling car-sharing as a cost-saving measure difficult.

Other barriers include a lack of start-up funding; regulatory obstacles such as zoning and business licensing laws; the need to find visible, affordable well-located parking; and land-use patterns that favor the private automobile. It can also be difficult to serve low-income populations, since they are unlikely to be a profitable market for commercial operators.

This study identified five key **factors for success** that support the development of car-sharing:

- Identifying a **champion** for car-sharing, such as an elected official or high-placed staff member who recognizes the benefits of car-sharing and works to promote it
- Adopting **supportive policies and regulations**, such as zoning incentives and inclusion of car-sharing in environmental, transportation and corporate sustainability plans
- Providing **funds** to help car-sharing programs become established
- Implementing **supportive actions** such as providing marketing, parking, and integration with transit
- Selecting the **right neighborhoods** that have the density, walkability and transit service to help car-sharing thrive

Most barriers are local, but some issues may be best tackled on a national level. Many operators have expressed interest in a national car-sharing association that could help promote understanding; advocate for regulatory reform; and provide a forum for networking and data sharing.

The Mechanics of Partnerships

Most partnerships with car-sharing operators are informal in nature. In some cases, however, it may be appropriate to issue a Request for Proposals (RFP), particularly when a significant amount of financial or in-kind support is offered.

Contracts and Memoranda of Understanding are often used in formalizing an understanding. For example, where partners provide parking, a simple, boilerplate document can address issues such as liability, the number and location of spaces involved, and the level of any fees.

Until now, car-sharing programs have been subject to relatively little evaluation and monitoring. The main performance measure for operators and their partners has been the "breath test" – is the program still alive and breathing?

As car-sharing matures, however, evaluation will become more important. Performance data can help solidify support for car-sharing within a partner organization and ensure that public money is used responsibly. Evaluation may also be a requirement if some sources of federal

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funding are used. The depth of an evaluation will naturally vary with the extent of the car-sharing program, and the amount of support provided by a partner. The more generous a partner in providing support, the more evaluation and monitoring is warranted.

Bringing Car-Sharing to a New Community

There are a number of ways in which car-sharing can be established:

- **Business venture.** In a few cities, car-sharing may be viable as a profit-making business venture.
- **Public-private partnership.** Partners will usually need to provide financial or other incentives to entice operators.
- **Grassroots effort.** The feasibility of this option depends on the interest and capacity of local groups, and the amount of partner support.
- **Municipally run.** This option requires a strong, ongoing commitment from local government.

Most communities, then, will need to be proactive if they want car-sharing as a local transportation option. Regardless of the organizational arrangement, partners can help catalyze car-sharing through:

- Documenting the characteristics of neighborhoods that could support car-sharing
- Conducting preliminary market research or a feasibility study
- Providing outreach to obtain institutional and community buy-in
- Providing financial or in-kind support
- Integrating car-sharing with wider neighborhood and transportation plans
- Addressing other key barriers, such as licensing and zoning

Car-sharing is fundamentally a niche product that only makes sense in certain markets. The checklist below provides a simple assessment of whether a community is ready for car-sharing. The more criteria that are met, the greater the prospects for success. However, the potential extent of car-sharing has yet to be fully explored, and its ultimate reach will only be determined through experimentation and trial and error.

Car-Sharing Checklist

☑	Does the community have neighborhoods with the right characteristics to make car-sharing viable? Are there neighborhoods with low auto ownership and use, where walking and transit are viable options?
☑	Are there established Transportation Demand Management programs in which car-sharing can be inserted; are there other commute trip reduction strategies that can recruit business members?
☑	What is the depth of interest in car-sharing from different types of partners?
☑	Is there a high-level champion with a strong commitment to car-sharing?
☑	Are there community groups that have shown interest in starting a car-sharing program and have the capacity to get a project off the ground?
☑	What incentives can partners provide for a commercial operator, such as start-up funding, marketing, zoning changes and parking provision?
☑	Is there an anchor member, such as a city or business that wishes to replace its vehicle fleet with car-sharing and can provide guaranteed baseline usage?

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Car-Sharing: Where and How It Succeeds

CHAPTER 1. INTRODUCTION

1.1 Introduction

According to one of the earliest published articles on car-sharing, which referred to the concept as "community garages," the concept had no chance of succeeding in the United States. The reason was ample parking and, more generally, the auto-oriented urban form prevalent in the U.S. Fishman and Wabe (1969, p. 442) concluded:

> *The [community garage] plan proposed here has been made with the new town in mind, but it is just as applicable to most British towns and, with variation, to most British cities. Where it simply will not do is in the United States. American cities have, with almost no exception, become motor cities – adapted to the owner-driver form of transport. Numerous rivers of motorways disgorge their traffic into oceans of parking areas. At their "headwaters", the motorway rivers can be traced through a vast stream network of subsidiary roads to their source, the innumerable cemented driveways and garages (with houses attached). It is now not uncommon in Los Angeles to see a private garage with room for five or six vehicles, much as an old stable had room for a half-dozen horses. The American city can no longer be adapted to a community garage scheme. Their path is irreversible, and they have gone beyond the point of no return.*

Fortunately, Fishman and Wabe's pessimism was misplaced. Certainly, a little more than five years ago, car-sharing in the United States was virtually non-existent beyond a handful of small-scale community-based initiatives and station car demonstration programs. Since then, however, its growth has been rapid. The three largest operators – Flexcar, Zipcar and City CarShare – provide service in metropolitan regions from Seattle to Washington, DC. On top of this, a myriad of smaller-scale car-sharing, station car and other shared vehicle programs operate throughout the country. Meanwhile, Canadian operators – with longer experience than their U.S. counterparts – have introduced car-sharing to virtually every major city, and begun to expand to more suburban and rural areas.

Writing more than 30 years ago, however, Fishman and Wabe were remarkably close in predicting the types of environments where car-sharing would succeed. Certainly, in the types of neighborhoods that they describe, car-sharing has not and is highly unlikely to take off. While a program has been established in the Los Angeles region, it has focused on its transit-rich centers such as Santa Monica,

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Pasadena and downtown. In contrast, car-sharing has expanded far more rapidly in communities where transit, walking and cycling play a great role. As documented in Chapter 3, the availability of alternatives to the private automobile, reflected through overall vehicle ownership levels, is one of the most important predictors of where car-sharing can succeed.

Other critical questions that have still to be fully resolved relate to how car-sharing succeeds, and the public benefits that it brings. What potential does it have to change travel behavior, vehicle ownership patterns, and household transportation expenditure? To what types of markets does car-sharing appeal, and in what types of neighborhoods does it succeed? How can public agencies and other organizations foster the development of car-sharing, and use it to accomplish their goals?

1.2 Research Approach

Unlike most transit agencies, which are the subject of the vast majority of TCRP research, car-sharing in North America is a competitive industry. This competitive nature has important implications for this research, because much of the detailed information on member characteristics, technology and operational performance is considered proprietary by car-sharing operators. Partly for this reason, and partly because operators are far ahead of public agencies and other partners on the car-sharing learning curve, this report does not attempt to provide a detailed manual on how to start up and operate car-sharing services.[1]

Instead, the study focuses on the role of partner organizations – transit agencies, local governments, regional planning agencies, employers and businesses, developers, universities and others with an interest in promoting the development of car-sharing. The report aims to provide them with an understanding of how car-sharing can contribute towards their goals, how they can contribute to its success, and how they can evaluate its performance.

The findings in this report are based on a variety of research methodologies:

- An extensive literature review, documented in the annotated bibliography provided in Appendix A
- A web-based survey of car-sharing members, discussed in Chapters 3 and 4

1. For information on start-up and operational issues, please refer to Brook (2004) or City CarShare (2005).

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- Five focus groups with car-sharing members in San Francisco, Boston and Washington, DC, and an additional focus group with inactive or former car-sharing members (see Chapters 3 and 4)
- A web-based survey and 72 telephone and face-to-face interviews with partner organizations involved in car-sharing, documented in Chapter 5
- A workshop with car-sharing operators, focusing on barriers to implementation and growth, and mechanisms for setting up partnerships (Chapters 6 and 7)
- An analysis of neighborhood characteristics around car-sharing locations, referred to as "pods" in this chapter (Chapter 3)

Survey instruments and the agenda for the car-sharing operators workshop are provided in Appendix C.

1.3 Report Structure

The report consists of the following chapters:

- **Chapter 2, State of the Practice,** provides a brief history of car-sharing, documents its current geographic scope, and discusses different organizational and operational models. It also analyzes the relationship of car-sharing to other modes; discusses current practices such as pricing, vehicle selection and technology; and addresses issues of definitions and terminology.
- **Chapter 3, Market Analysis,** discusses both the characteristics of car-sharing members, and the demographic and physical characteristics of neighborhoods where car-sharing has been established. It finds that car-sharing primarily appeals to higher-educated (but not necessarily higher-income) households, who are concerned about environmental and social issues. The geographic markets for car-sharing, in contrast, are most notable for their neighborhood and transportation characteristics, rather than overall education levels and other demographic variables. There is a particularly strong relationship with vehicle ownership, suggesting that the availability of alternatives to the private car is key for the success of a car-sharing location.
- **Chapter 4, Impacts of Car-Sharing,** confirms previous studies that car-sharing has a substantial impact in reducing members' vehicle ownership and travel, and reducing household transportation costs. Equally significant is an increase in mobility, particularly for people who did not own a car before and can now access a wider variety of destinations.
- **Chapter 5, The Role of Partners,** discusses some of the ways in which partner organizations have tried to promote car-sharing. It focuses on the experience of five types of car-sharing

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partners – local governments; transit agencies; employers and businesses; developers; and universities. These organizations have offered a wide variety of support, ranging from financial support and provision of parking to supportive planning policies and joining the car share as an organizational member. Partner organizations hope to achieve multiple objectives from car-sharing, particularly reducing parking demand, providing mobility options, and improving air quality.

- **Chapter 6, Factors for Success,** identifies some of the most important barriers to car-sharing and discusses how they can be overcome with the help of partner organizations. Specific barriers include a lack of understanding of the car-sharing concept; financial issues; regulatory constraints; and serving specific markets such as low-income households.
- **Chapter 7, Procurement and Monitoring,** focuses on the mechanics of car-sharing partnerships. It covers procurement mechanisms and evaluation techniques, and details performance measures that can be used to track the effectiveness of car-sharing in achieving operator and agency goals.
- **Chapter 8, Conclusion,** discusses some of the broader barriers to car-sharing that might be fruitfully tackled at a national level. It also analyzes different models for how car-sharing services can be established and provides guidance on how partners can bring car-sharing to their own communities.
- **Appendices** include an annotated bibliography; a list of partner organizations surveyed and interviewed; survey instruments; and sample documents such as RFPs and zoning ordinances related to car-sharing. Appendix E, Partner Profiles, summarizes the key findings of the report from the perspective of different types of partner organizations to quickly understand the relevance of car-sharing and the research findings to their specific needs.

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Car-Sharing: Where and How It Succeeds

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Car-Sharing: Where and How It Succeeds

CHAPTER 2. STATE OF THE PRACTICE

2.1 What is Car-Sharing?

Car-sharing has appeared in numerous different forms throughout North America and the world. The term has encompassed open-access shared vehicle programs, intended for occasional trips where a car is needed; station cars for commuters to drive to work from the transit station; and systems for intra-campus mobility, for example in a university setting.

While differing markedly in their objectives, business model, technology and target market, these programs share most, if not all, of the following features:

- An organized group of participants
- One or more shared vehicles
- A decentralized network of parking locations ("pods") stationed close to homes, workplaces and/or transit stations
- Usage booked in advance
- Rentals for short time periods (increments of one hour or less)
- Self-accessing vehicles

It is important to distinguish car-sharing from ridesharing or carpooling, given some international discrepancies in terminology. In the United Kingdom, the term "car-sharing" refers to the shared use of vehicles at the same time – known as carpooling or ridesharing in North American parlance. In British usage, the term "car club" is generally used to denote the practice of sharing vehicles rather than rides (Exhibit 2-1).

Exhibit 2-1 Car-Sharing and Car Club Terminology

Definition	North American Usage (in this report)	British Usage
Vehicles owned by a separate organization and shared between a number of different users, who may use them at different times	Car-sharing	Car clubs
Privately owned vehicles shared for a particular trip	Carpooling, ridesharing	Car-sharing

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Definitions

Rather than a formal definition, most published work provides a description of car-sharing. This description can acquaint readers with a perhaps unfamiliar concept and be as inclusive as possible in embracing a wide variety of programs.

In some cases, however, a precise definition has been needed, generally when a partner organization has wished to provide zoning incentives, tax breaks or other forms of support for car-sharing. For example, the City of Toronto adopted a definition in 2000 in order to grant on-street parking permits to AutoShare. In these instances, car-sharing needs to be defined as a category of services or vehicles, rather than naming a specific operator.

Rydén & Morin (2004) argue that, in Europe, a legally valid definition of car-sharing is "probably the most important legal issue" to help establish and expand car-sharing. It can pave the way for on-street parking bays, a common road sign, and taxation and planning incentives.

An alternative approach, taken by the City of Seattle, is to specify a "City-recognized car-sharing program" in the ordinance (Seattle Municipal Code § 23.54.020). This gives the City the freedom to extend the support to all operators that meet its standards, without the need for a formal definition.

Exhibit 2-2 provides some examples of car-sharing definitions adopted or proposed by various agencies. The common themes are: (i) requirements for users to be members; (ii) access to a common fleet; (iii) billing in hourly increments; and (iv) exclusion of traditional car rentals. The State of Washington definition provides the most concise, effective way to address all these points and is a recommended model for other entities as a standard, common definition. Importantly, it explicitly provides for business and other organizational members, as well as individuals. It defines car-sharing as:

> **A membership program intended to offer an alternative to car ownership under which persons or entities that become members are permitted to use vehicles from a fleet on an hourly basis.**

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Exhibit 2-2 Car-Sharing Definitions

Organization	Definition	Source
North American		
City of Toronto	Carsharing is the practice where a number of people share the use of one or more cars that are owned by a profit or non-profit carsharing organization. To use a vehicle a person must meet the membership requirements of the carsharing organization, including the payment of a membership fee that may or may not be refundable. Cars are reserved in advance and fees for use are normally based on time and miles driven. Carsharing organizations are typically residentially based with cars parked for convenient access within the area of the membership served by the organization.	City of Toronto, 2000
State of Washington	A membership program intended to offer an alternative to car ownership under which persons or entities that become members are permitted to use vehicles from a fleet on an hourly basis.	Revised Code of Washington § 82.70.010 (5)
State of Oregon	A program in which drivers pay to become members in order to have joint access to a fleet of cars from a common parking area on an hourly basis. It does not include operations conducted by a car rental agency.	Oregon Administrative Rules 330-090-0110 (7) (Business Energy Tax Credit)
District of Columbia	Car-sharing vehicle – any vehicle available to multiple users who are required to join a membership organization in order to reserve and use such vehicle, for which they are charged based on actual use as determined by time and/or mileage.	District of Columbia Municipal Regulations, § 9901
State of Minnesota (Pending Legislation). Note that this only includes 501(c) nonprofit operators.	A "carsharing organization" means an organization that: (1) is described in section 501(c) of the Internal Revenue Code; (2) is comprised of members who purchase the use of a motor vehicle from the organization; (3) owns or leases a fleet of motor vehicles that are available to members of the organization to pay for the use of a vehicle on an hourly or per trip basis; and (4) does not assign exclusive rights of use of specific vehicles to individual members or allow individual members to keep a vehicle in the member's sole possession.	Senate Bill SF1229 (Dibble), as introduced 84th Legislative Session (2005-2006)
European		
Belgium (Draft)	Car vehicles put at the disposal of members against payment for a limited duration of use according to contractual conditions determined by [the car-sharing organization], to the exclusion of car rental and leasing.	Rydén and Morin (2004)
Swedish National Road Administration (Draft)	Car-sharing means that a number of persons share the use of one or more cars. Use of a car is booked beforehand, the user paying a fee based on the distance driven and the length of time the car was made use of. Although this is similar in some ways to traditional car rental, it differs in the possibility it provides of booking a car for short periods of time and in the rental agreement being made for an extended period of time, rather than each time a car is used. In addition, each household has its own set of keys, and cars are placed in the vicinity of where members live. In the case of company car-sharing, the keys and the cars are being readily available at the place of work. "Key" is here equal to smartcard or similarities.	Vägverket, 2003

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Accreditation

Alternatively, some municipalities and other organizations – mostly in Europe – have developed accreditation programs. Rather than developing an inclusive definition, these accreditation criteria are deliberately exclusive: they explicitly aim to exclude car-sharing operators that do not meet minimum standards. As well as the operational aspects of car-sharing, they often cover environmental objectives. For example, they may prescribe maximum vehicle emissions levels or require that mileage fees be assessed separately from hourly charges, which may discourage users from driving more than absolutely necessary.

Two examples include "Der Blaue Engel" ("Blue Angel") program in Germany and criteria from the Swedish National Road Administration. Such accreditation programs are always a trade-off between raising the bar for operators, and being too severe. The German criteria, for example, have perhaps proved too stringent and have excluded many car-sharing operators in that country (Rydén & Morin, 2004).

Der Blaue Engel, Germany

The German "Blue Angel" environmental labeling program details several criteria for the accreditation of car-sharing operators, as follows:[1]

- Open to all, subject to credit and driving record checks
- Minimum of 10 participants per vehicle
- 24-hour vehicle booking, pick-up and return
- No minimum booking length above one hour. The rate per hour must not be more than 15% of the daily rate.
- Charges levied on the basis of time and distance
- Regular care and maintenance of the vehicles in accordance with the manufacturer's recommendations
- Compliance with all legal safety requirements
- Compliance with European emissions standards and noise limits

Sweden

The Swedish National Road Administration argues that basic criteria are needed, in case "fictive car-sharing" programs are established to take advantage of special benefits offered to genuine car-sharing operators. These are proposed as follows (Vägverket, 2003):

1. Basic Criteria for the Award of the Environmental Label Car Sharing RAL-UZ 100. Accessed May 19, 2004 at www.blauer-engel.de/englisch/produkte_zeichenanwender/vergabegrundlagen/ral.php?id=20.

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- An administrator
- At least six drivers per car (after one-year start-up time)
- Adequate accounting practices
- Ownership by a legal entity
- Vehicle requirements (e.g. age, safety rating)

2.2 A Brief History[2]

Early Programs

Early attempts to establish car-sharing programs can be traced back as far as the 1940s, to the "Sefage" program in a housing cooperative in Zurich, Switzerland, which opened in 1948. Other European programs in subsequent decades included "Procotip" in Montpelier, France, starting in 1971; Witkar, Amsterdam, which opened in 1973; "Green Cars" in various places in Britain in the late 1970s; and "Vivalla Bil" in Örebro, Sweden, opening in 1983.

In the United States, meanwhile, Purdue University researchers ran the Mobility Enterprise program in West Lafayette, Indiana, from 1983 to 1986. In San Francisco, the Short-Term Auto Rental Service (STAR) was established as a demonstration project by a private firm and ran from 1983 to 1985.

While all could be considered car-sharing programs, the form and technology used varied considerably. Procotip, an early attempt at using technology to enable members to pay for usage by distance, used in-vehicle "meters" fed by tokens. Witkar used electric vehicles, and users were limited to the city center. The STAR program served residents of a large apartment complex near San Francisco State University.

The Purdue University experiment focused on encouraging participants to use smaller, fuel-efficient cars, and reduce their need to own additional vehicles, rather than dispensing with vehicle ownership altogether. Participants were provided with a small "minimum attribute vehicle" for daily trips, as well as access to a shared fleet of special purpose vehicles such as large sedans and station wagons. (Doherty, Sparrow & Sinha, 1987)

What these early programs did have in common, however, is that almost all folded after a short period of time, usually within a few years. A range of reasons has been cited for their failures, including inadequate planning,

2. For a more detailed history of car-sharing, the reader is referred to Shaheen, Sperling & Wagner (1998), and Britton (1999b). For more details on the European history of car-sharing, see Harms & Truffer (1998). Much of this section is based on these references.

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marketing, and financial management; the small size of the service area or membership base; and lack of support from local governments. In many cases, the projects may have been overly ambitious given the technology available at the time (Harms & Truffer, 1998; Cousins, 1999).

One of the few detailed post-mortem evaluations to be published examined the STAR service in San Francisco, which had mixed results, the researchers concluded. It was successful from a consumer perspective, and improved the mobility of participants while reducing their auto ownership needs. However, it did not succeed financially, with specific issues including vehicle reliability, a pricing structure that encouraged long- as well as short-term rentals, and a growing number of members who failed to pay their bills. (Cambridge Systematics, 1986)

Recent Growth

Car-sharing in its current form has its roots in Switzerland and Germany, where programs date back to the late 1980s. The first large-scale car-sharing programs began in Switzerland in 1987 with the independent founding of two cooperatives. These later merged to form Mobility Switzerland, which is still one of the largest car-sharing operators in the world. A year later, in 1988, StattAuto Berlin was founded, and, over the next decade, car-sharing programs began in other European countries, particularly the Netherlands and Austria. By 2004, there were approximately 70,000 car-sharing members in Germany alone, with a further 60,000 in Switzerland. One estimate puts worldwide car-sharing member numbers at 200,000, with a yearly increase of 20-30% (Schwieger, 2004). An estimate from February 2005 suggests that there are about 280,000 worldwide members, with nearly 75% of these in Europe (Shaheen, personal communication).

The concept was slower to arrive in North America. The first formal car-sharing program began in Quebec City in 1994, with the launch of Auto-Com, the predecessor to Communauto. In the United States, a small operator – Dancing Rabbit Vehicle Cooperative – opened in 1998, as part of an "eco-village" in Rutledge, MO.

The first large-scale US program, CarSharing Portland (subsequently sold to Flexcar), also opened for business in 1998, and the early years saw rapid, almost exponential growth in the number of members, vehicles and organizations (Exhibit 2-3). By December 2004, 61,652 members were enrolled in the United States, sharing 939 vehicles, while 10,759 members and 528 vehicles

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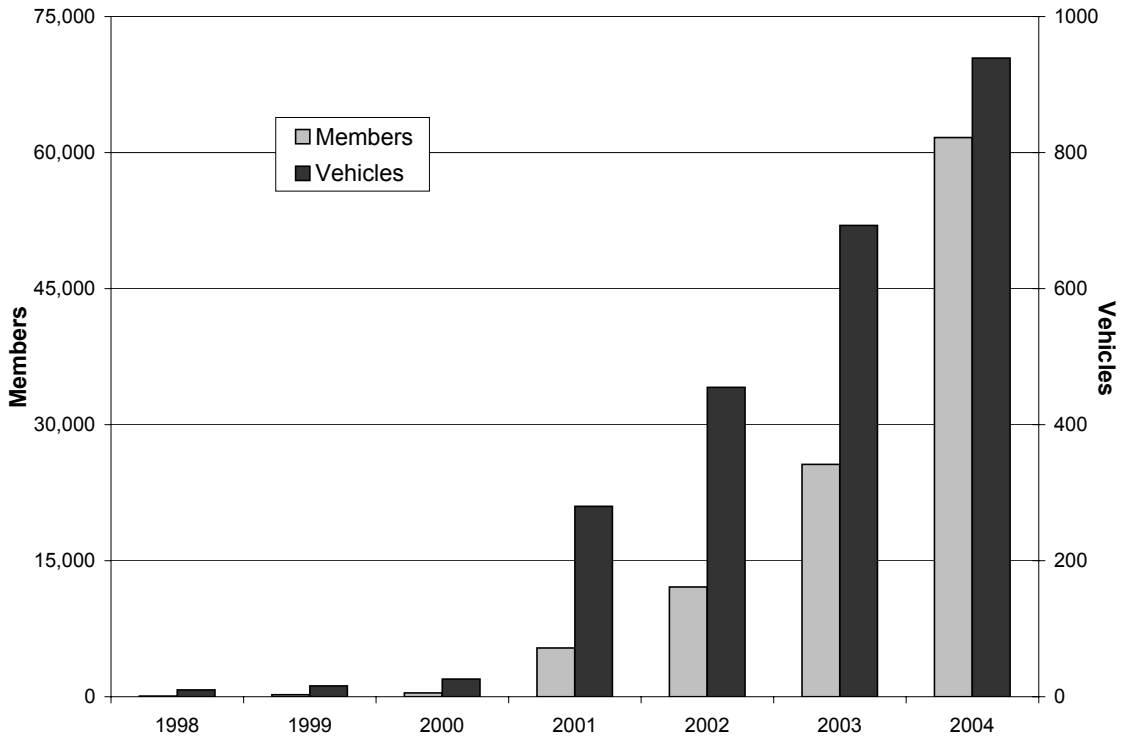
were enrolled in Canada (Susan Shaheen, unpublished data). Car-sharing in North America is now available in 15 metropolitan regions, plus a number of smaller communities (Exhibits 2-4 and 2-5). Planning is under way in several more, such as Detroit and Minneapolis-St Paul where programs are scheduled to launch in 2005.

As of April 2005, Washington, DC was the only region where operators (Flexcar and Zipcar) competed directly for members. Other regions, such as San Francisco and Toronto, have had brief periods of competition. However, both Flexcar and Zipcar have publicly stated that they are looking to expand in new markets, including those where there is an incumbent operator.

Exhibit 2-3 US Car-Sharing Growth



Source: Shaheen, Schwartz & Wipyewski (2004); Susan Shaheen, unpublished data. Note that 2004 data are for December, while 1998-2003 figures reflect June data points, meaning the chart overstates the rate of increase from 2003 to 2004.

This report focuses on car-sharing; however, mention should also be made of bicycle-sharing programs. Typically, they allow a user to pick up a bicycle and drop it off at any rack within a defined zone, usually within a downtown. The concept has evolved into technologically advanced "public-use bicycle" systems, which have used electronic locks with card access to address earlier issues of theft. The programs can be operated by a transportation agency, as with German rail operator Deutsche Bahn through its Call-A-Bike initiative, or an advertising firm. The greatest success has been in Europe, particularly

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Exhibit 2-4 North American Car-Sharing Regions (June 2005)

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Germany and Scandinavia; in 2004, the largest program was Call-A-Bike in Berlin with 1,700 bicycles (DeMaio & Gifford, 2004).

2.3 Models of Car-Sharing

Car-sharing is a broad concept that encompasses a variety of different business and operational models. This section outlines the different models that exist in North America, from the point of view of organizational structure and operational model.

In many respects, these models are closely bound with the geographic context and the target market, both of which are discussed in Chapter 3. For example, rural car-sharing organizations tend to be organized differently – perhaps on a cooperative or voluntary basis – and have a different operational model than those in major urban centers.

Organizational Structure

Car-sharing operators in North America have adopted a range of organizational forms (Exhibit 2-5). The three main types are:

- **For-profit.** Most of the largest operators in North America are privately held, for-profit companies. Examples include Flexcar, Zipcar, and Communauto (which was originally founded as a cooperative, Auto-Com).
- **Non-profit.** These operators are incorporated as tax-exempt 501(c)(3) organizations. Examples include City CarShare in San Francisco, and PhillyCarShare in Philadelphia.
- **Cooperative.** Operators such as the Cooperative Auto Network in Vancouver, BC are run by members, who join by purchasing a "share" in the organization. In practice, this share acts in a similar way to the refundable deposits charged by for-profit and non-profit operators.

Alternatively, but less commonly, a car-sharing operation may be run as a research pilot by universities such as the University of California at Riverside, or by a municipal government. Roaring Fork Valley Vehicles in Aspen, CO is the closest North American example to government-run car-sharing; while the organization is formally a separate non-profit, the City of Aspen provides a staff member to run the operation. However, there are several European examples of transit agencies running car-sharing programs, notably in Italy.

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Exhibit 2-5 North American Car-Sharing Operators (June 2005)

Region	Operator	Type
United States		
Ann Arbor, MI	Ann Arbor Community Car Coop	Cooperative
Aspen, CO	Roaring Fork Valley Vehicles	Municipal
Boston, MA	Zipcar	For-profit
Boulder, CO	Boulder CarShare	Non-profit
Chapel Hill, NC	Zipcar	For-profit
Chicago, IL	I-GO	Non-profit/ Franchise
Detroit, MI	Viacar	For-profit
Eugene, OR	Eugene BioCarShare	Cooperative
Irvine, CA (University of California)	ZevNet	Research Pilot
Los Angeles, CA	Flexcar	For-profit
Madison, WI	Community Car	For-profit*
Minneapolis-St Paul, MN (Planned 2005)	hOurCar	Non-profit
New York, NY (including New Jersey suburbs and Princeton, NJ)	Zipcar	For-profit
Philadelphia, PA	PhillyCarShare	Non-profit
Portland, OR (includes Vancouver, WA)	Flexcar	For-profit
Riverside, CA (University of California)	Intellishare	Research pilot
Rutledge, MO	Dancing Rabbit Vehicle Cooperative	Cooperative
San Diego, CA	Flexcar	For-profit
San Francisco, CA	City CarShare	Non-profit
Santa Barbara, CA	Flexcar	For-profit
Seattle, WA	Flexcar	For-profit
Washington, DC	Flexcar, Zipcar	For-profit
Canada		
Calgary, AB	Calgary Alternative Transportation Coop	Cooperative
Edmonton, AB	Carsharing Co-op of Edmonton	Cooperative
Gatineau, QC	Communauto	For-profit**
Guelph, ON	Guelph Community Car Co-op	Cooperative
Kingston, ON	Kingston Carshare Cooperative	Cooperative
Kitchener, ON	People's Car	Cooperative
Montreal, QC	Communauto	For-profit**
Nelson, BC	Nelson CarShare Cooperative	Cooperative
Ottawa, ON	VrtuCar	For-profit
Quebec City, QC	Communauto	For-profit**
Sherbrooke, QC	Communauto	For-profit**
Toronto, ON	AutoShare	For-profit
Vancouver, BC	Cooperative Auto Network	Cooperative
Victoria, BC	Victoria Car Share Cooperative	Cooperative

* Community Car was founded by the non-profit Madison Environmental Group.

**Communauto started as a cooperative, Auto-Com.

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One of the most important differences among these organizational forms relates to the source of capital and funding. For-profit operators often have access to venture capital, or other sources of private start-up funding. Non-profits are often better placed to tap into government funding, and their tax-exempt status means that they can obtain foundation grants. Cooperatives tend to be partly dependent on their members to provide capital.

Other differences among the different organizational models have also been suggested. For example, non-profits and cooperatives may not have the incentive to expand as much as a for-profit enterprise, while a for-profit may not be the best model to achieve narrowly stated environmental objectives such as vehicle trip reduction (Brook, 2004). For example, several non-profits argue that their rate structures are set to discourage unnecessary auto use, through charging for each mile driven rather than "bundling" packages of hours and miles (see Pricing in Section 2.5). Several partner agencies have expressed a preference to work with non-profits for this reason; non-profits can also be easier to support, since their tax status can defuse community objections to "privatizing street space" when granting on-street parking for car-sharing (Chapter 5). However, for-profits suggest that they are achieving similar environmental objectives – "doing good by doing well."

Introduction of car-sharing to new geographic areas has usually resulted from the establishment of a new, local organization, or expansion by an established operator. Flexcar, for example, is based in Seattle, but also runs programs in Portland, San Diego, Los Angeles, and Washington, DC. Boston-based Zipcar has operations in the New York City and Washington, DC regions, along with separate campus programs at Princeton University, NJ and the University of North Carolina-Chapel Hill.

Replication and Franchising

A recent development has been the introduction of franchising, outsourcing and replication programs. Flexcar, for example, runs the Flexcar Network, under which local operators such as I-GO in Chicago contract with Flexcar for provision of vehicles, technology and back-office functions such as billing. According to Flexcar, franchising makes particular sense in smaller markets, where the company may not wish to pursue operations of its own. In Canada, Communauto has developed its bilingual Réservauto system, which is designed to be adaptable to the needs of other car-sharing operators.

San Francisco-based City CarShare, meanwhile, has a national replication program to provide technical assistance to non-profit operators in other

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regions. PhillyCarShare, for example, was established with this support. In 2005, City CarShare launched a handbook to assist start-up car-sharing operators, covering a range of detailed operational and business planning issues (City CarShare, 2005).

Franchising and similar arrangements are perhaps best developed in Europe. For example, Germany-based Cambio began operating in Aachen and Bremen in 1990. Since then, it has developed joint-venture partnerships to provide services in four additional cities in Germany and Belgium and has a "service relationship" providing software and a call center for operators in seven others. The company provides direct service to 12,800 customers, and reservation and service functions for 4,800 more (Schwartz, 2005). In Italy, meanwhile, Iniziativa Car Sharing (ICS) is the direct provider of technology and support services, including a national call center. ICS is a consortium of 18 cities and provinces, funded by the Ministry of Environment, but individual operators come from both the public and private sectors (Mastretta, 2005).

Operational Model

A fundamental difference has been pointed out between two types of shared vehicle programs: car-sharing (sometimes called "neighborhood" car-sharing) and station car programs. While neighborhood and employment-based car-sharing programs are the focus of this report, it is important to explain how these programs relate to station cars.

Neighborhood Car-Sharing

Neighborhood car-sharing is the basic model that is the main subject of this report, including programs that focus on the employment as well as the residential market. The "neighborhood" term is sometimes used to distinguish it from other shared vehicle programs, such as station cars.

Station Cars

In contrast to car-sharing, which serves a wide variety of trips, station car programs focus on the link between the transit station and the home and/or the workplace. They provide a car at the "home end" of the trip, allowing a commuter to drive to the station in the morning in order to take transit for the line-haul part of the journey to work. The same car is then used by an arriving rail passenger to drive the "last mile" of the journey to a workplace beyond walking distance from transit. Under some more recent pilots such

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as CarLink in the San Francisco Bay Area, the car is also available for employees during the working day. The same trips then happen in reverse in the evening, with the car stored overnight at the residence of the "home end" user (see, for example, Katzev, 2003; Bernard, 2003; Shaheen et al., 2004).

The main difference between car-sharing and station cars is perhaps to be found in the types of users and trips served, with station cars focusing on the commute market with payment by monthly subscription (Exhibit 2-6). In addition, station cars have a defined set of users – one home-based commuter, one work-based commuter, and, in some recent models, midday users. Each car-sharing vehicle, on the other hand, serves a much wider member base, and payment is generally per-use. In contrast to station cars, this arrangement has also helped car-sharing companies earn enough revenue to continue with little or no subsidy.

Until the late 1990s, station cars accounted for the majority of shared-use vehicles and members in the United States. Since then, however, they have been outpaced by the growth in car-sharing. The number of station car programs appeared to peak in 2002, and only two remained in 2003 (Shaheen, Schwartz & Wipyewski, 2004). However, some car-sharing operators have been integrating variants of station car-type programs into their regular fleet, blurring the differences between the two. For example, Flexcar has several weekday van shuttles in Portland, OR, that link the Westside MAX light rail line to employment sites for firms such as Norm Thompson Outfitters. These vans have no defined "home end" user, but are available for all Flexcar members at evenings and weekends. These types of programs are discussed in more detail in the employer and transit agency profiles in Chapter 5.

Although the transit link is less direct than with station cars, most car-sharing programs have located vehicles close to transit from their inception. Transit stations provide a good environment – not just because of the possibility of combined transit–car-sharing trips, but because they often have higher densities, local shops and services and act as a neighborhood center. Chapter 3 discusses the market settings for car-sharing in more detail.

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Exhibit 2-6 Station Car Comparison to Car-Sharing

Characteristic	Station Cars	Car-Sharing
Types of Trip Served	Primarily journey to work. Under more recent pilots, some midday use.	Generally all trips for which a car is required, except the regular journey to work for which it is not cost effective
Trip Frequency	Daily commute to work	Occasional trips; varied usage patterns
Number of Users	1-4 per vehicle*	20-66 per vehicle**
Linkage to Transit	Vehicles used primarily as an extension of fixed-route transit	Vehicles often stationed at transit stations and accessed by transit, but most trips not linked to transit
Where Based	Different locations at different times (home, workplace, transit station)	Generally single "home" base
Price Structure	Subscription-based	Usage-based

* The CarLink II program in Palo Alto, CA had 19 vehicles and an average of 77 users, although some cars had more users (home-based, work-based and midday) (Shaheen, Schwartz & Wipyewski, 2004). Most station car programs have fewer users, since they do not provide for midday use. In December 2004, US station car programs claimed approximately 130 members and 106 vehicles, giving a ratio of 1.2 members per vehicle (Shaheen, unpublished data).

** As of December 2004, US car-sharing programs claimed 61,652 members sharing 939 vehicles, with 10,759 members sharing 528 vehicles in Canada (Shaheen, unpublished data).

Informal Car-Sharing

Small car-sharing programs do not necessarily need to be run on a formal basis. In many cases, neighbors, friends or family members can share a car, either through informal arrangements or more detailed agreements on cost sharing, reservations and maintenance.

Some developments have also incorporated shared cars, such as the Gaia Building in Berkeley, CA, with two electric vehicles available for residents' use as well as City CarShare service in the building (Exhibit 2-7). Indeed, the philosophy of several of the founders of early Swiss car-sharing programs was that cars – and, for that matter, other long-lasting consumer goods – should be shared between a small "user group" of about a dozen families and maintained by volunteer labor (Harms & Truffer, 1998).

Photo: Panoramic Interests

Exhibit 2-7
Electric Vehicles in the Gaia Building
Berkeley, CA, 2002

The main administrative difference between informal car-sharing programs and their more formal counterparts relates to the incorporation of a separate car-sharing organization. Also, formal organizations often provide access to a much larger network of vehicles. However, it is important to recognize that some of the formalized car-sharing programs discussed in this report rely to varying degrees on volunteer labor.

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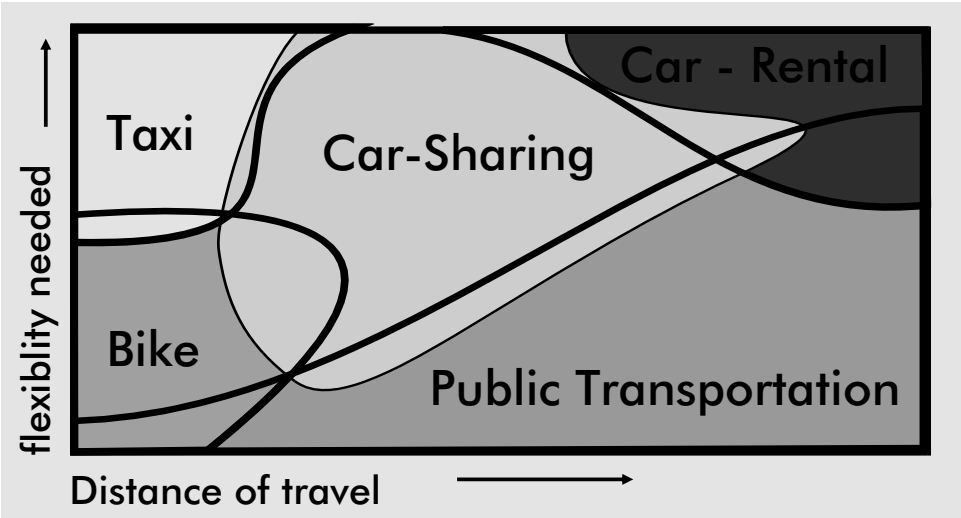
2.4 Relationship to Other Modes

Car-sharing has sometimes been referred to as the "missing link" in the package of alternatives to the private automobile (for example, Britton, 1999a). In other words, transit, taxis, cycling and walking can often meet most mobility needs, but there may still be other trips for which a private car is required. Car-sharing, under this hypothesis, can fulfill these needs and allow users to do without a private car, or a second car (see Chapter 5).

Exhibit 2-8 shows how car-sharing relates to other transportation modes. It provides options for mid-distance trips where flexibility is required – for example, in carrying packages, or reaching destinations that may not be accessible by public transportation.

The remainder of this section discusses the differences between car-sharing and the two closest substitutes – rental cars and taxis. In some cases, the main difference between the three modes relates to the cost of a trip. Since most car-sharing operators charge by hours reserved, and in some cases distance driven as well (see Pricing in Section 2.5), car-sharing is most cost-effective for intermediate length trips. For longer trips, rental cars are usually cheaper, since they tend to be priced by the day and offer unlimited mileage. For short distance but long duration trips – for example, where the car-sharing vehicle must be parked, with charges accruing, at the destination for a long period – taxis tend to be cheaper. Exhibit 2-9 shows cost comparisons based on San Francisco taxi fares, rental car rates and car-sharing tariffs.

Exhibit 2-8 Relationship to Other Modes



Source: Schwartz, Joachim. Presentation at Car-Free Cities Working Group Seminar, London, 1999.

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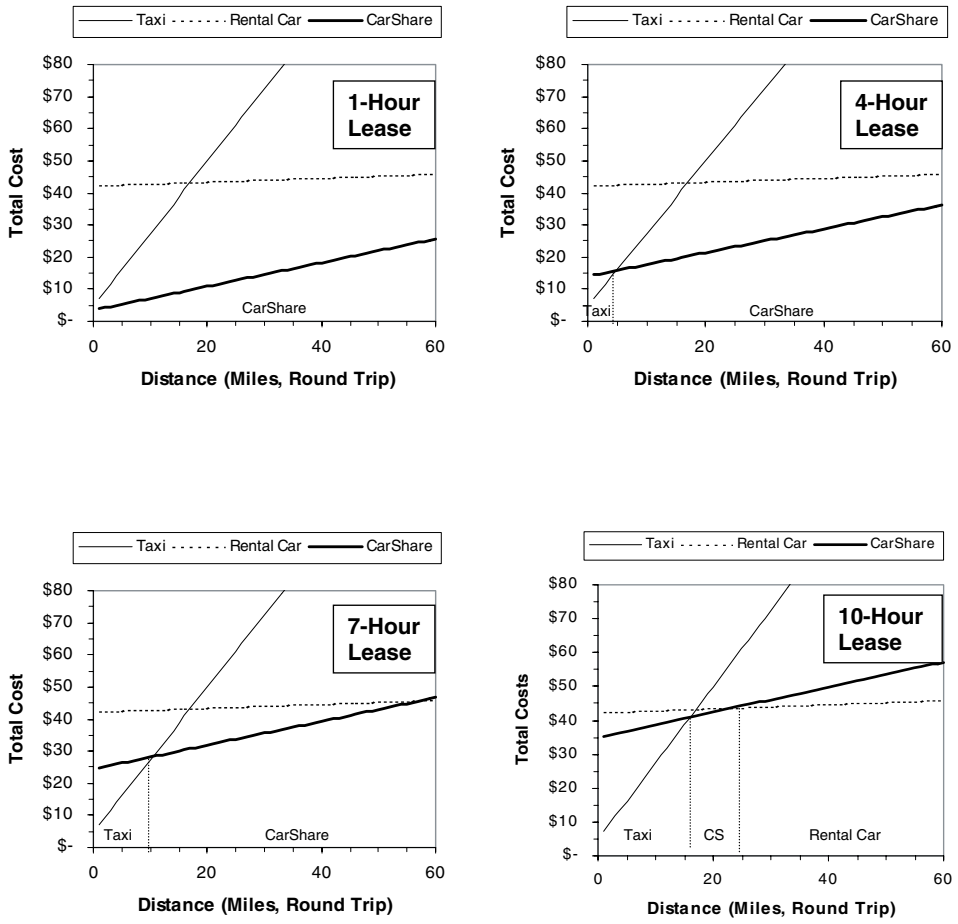
Exhibit 2-9 Cost Comparisons for Rental Cars, Taxis and Car-Sharing



Source: Cervero & Tsai (2003).

Rental Cars

Three key differences distinguish car-sharing from traditional car rentals, its closest equivalent: short-term rentals; a decentralized, self-accessing network of vehicles; and the bundling of gasoline and insurance into rates. In addition, the primary purpose of car-sharing is often to provide an alternative to vehicle ownership.

In contrast, most rental firms have centralized facilities, particularly in airports and downtowns, require a staff member to check the vehicle out, and offer minimum rental increments of 24 hours. As a result, rental firms tend to cater far more to business travelers and other visitors, and people who need a replacement car, rather than occasional, short-duration trips by local residents – the core market for car-sharing operators.

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Indeed, most car-sharing operators have collaborative arrangements with local rental car firms, encouraging members to use rental cars for longer trips. City CarShare members in San Francisco receive discounts with Enterprise, for example, while AutoShare members in Toronto receive discounts with four rental firms, including Budget and Enterprise.

In the longer term, however, there may be greater convergence between the rental car and car-sharing models, and many examples point this way already. At Stanford University, for example, Enterprise now offers hourly rentals (see Section 5.9, Universities).

In Europe, car rental firms often operate car-sharing programs themselves. Avis runs one in London, while Hertz started its "Delebilen" service in Copenhagen in 1998. In Austria, Denzeldrive provides both car-sharing and rental cars using a common fleet of 750 vehicles. According to Bergmaier et al. (2004), Denzeldrive is blurring the two concepts; the main differences are in the pricing structure, minimum duration, and the use of the membership joining fee as a barrier to infrequent renters using the cheaper car-sharing service instead of rental cars.

In addition, a new rental car business model by EasyRentACar in Europe may pose a direct challenge to car-sharing operators, through offering short-term reservations, unstaffed pick-up locations, and a demand-based pricing system. While this approach was driven by cost cutting concerns, the end product bears many similarities to car-sharing. (Meaton, Starkey & Williams, 2003)

The reverse is also true to some extent, as car-sharing operators offer daily and weekly rates that in many ways compete with the rental car offering. Communauto in Quebec, for example, offers a "network rate" with a flat charge per day and 300 km of inclusive mileage, and a "workweek rate", in addition to its standard hourly rates. These rates allow the operator to maximize utilization, and appeal to different market segments – such as freelance workers who need a car every day, but only for a few weeks at a time. Depending on availability, these daily and weekly rentals are fulfilled with Communauto cars, or with an equivalent vehicle from a rental company partner. (Robert, 2000)

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Taxicabs

Early car-sharing programs were sometimes referred to as "self-drive taxis," and the most obvious difference between the two concepts is that taxis include a driver. This difference makes taxis suitable for several types of trip that are not permitted or cost-competitive with car-sharing:

- **One-way trips.** As discussed in Section 2.5, car-sharing vehicles must usually be returned to the same location where they were picked up.
- **Short-distance, long-duration trips.** The user must pay for car-sharing reservations while the car is parked at the destination. This can make taxis more cost-effective for long meetings, concerts and other short-distance, long-duration trips.
- **Trips by users who cannot drive.** Car-sharing operators are generally selective about their members, requiring a relatively clean driving record as well as a valid license, and usually imposing minimum age restrictions of 21 years. Taxis, on the other hand, carry almost all passengers, including those too young to drive, people with disabilities, drivers with suspended licenses, and those who are temporarily intoxicated.
- **Out-of-town trips.** One of the largest markets for taxis is out-of-town visitors. Car-sharing is less suitable for this group of potential users, since they tend to be unfamiliar with local geography and will not be in town long enough to justify membership. However, the two US car-sharing organizations with operations in more than one region, Flexcar and Zipcar, allow members to use cars in any city. In addition, two nonprofits, PhillyCarShare and San Francisco-based City CarShare, have a cross-usage agreement. Vrtucar in Ottawa has similar agreements with AutoShare in Toronto and Communauto in Montreal and Quebec City.

2.5 Current Practice

Customer Groups

Most car-sharing operators offer services to two distinct customer groups – personal users and business users. Personal users join as an individual or household and use car-sharing vehicles for similar purposes as they would a private car. Most car-sharing growth, particularly in the early stages, can be attributed to personal users.

Business users join in order to make car-sharing vehicles available to their employees. Businesses may be interested in car-sharing for several reasons (Brook, 2004), to:

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- Replace, partially replace or augment an existing fleet
- Replace or partially replace car rentals or reimbursement for employees using their own cars
- Replace subsidized employee parking
- Provide an incentive not to drive to work, by making a car available for trips during the working day
- Save on parking charges for employees who drive to work

In most cases, business members use car-sharing services in the same way as personal users. However, some operators offer more tailored programs for business users. Flexcar, for example, allows car-sharing vehicles at or near a firm's office to be reserved exclusively for employees of that firm, either during the working day ("semi-exclusive") or at all times ("exclusive").

As well as allowing car-sharing to tap a new market segment, business members have an important role in smoothing demand patterns throughout the day, and allowing operators to maximize utilization. Most companies tend to use the vehicle during the working day, rather than at evenings and weekends when individual demand peaks (for example, Reutter & Böhler, 2000).

Pricing

Actual rates vary considerably between different operators, and the national operators such as Flexcar and Zipcar charge different rates in different regions. However, most charge for usage on the following basis:

- **Per hour reserved.**
- **Per mile driven.** Some operators bundle a certain number of miles into the hourly rate but charge for additional miles.
- **Monthly or annual administrative charge.**
- **Application fee.**
- **Penalty fees.** These are often assessed for late returns, late cancellations, parking vehicles in the wrong location, and other violations of terms of service. (Conversely, some operators provide credits for members who wash the car or undertake other tasks.)
- **Refundable deposit.** Not all operators charge this, and some use a credit check instead. For cooperatives, the purchase of a membership share generally serves as a deposit.

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The relationship between these charges is a difficult balancing act, and no pricing structure will benefit all users. A high hourly rate and low mileage fee will benefit those who make longer trips but do not leave the car parked for long periods – for example, dropping off a relative at the airport. A low hourly rate and high mileage fee, in contrast, will make shorter-distance, longer-duration trips more cost effective.

Similarly, the level of monthly or annual fee will determine how administrative costs are allocated between frequent and occasional users, and whether car-sharing is attractive for those who need it as "mobility insurance." When CarSharing Portland introduced a membership fee in 2000, for example, about 30% of the members left. However, revenue changed little, since most were infrequent users (Brook, 2004).

Many operators have introduced more sophisticated pricing mechanisms, in order to make car-sharing financially attractive to as many people as possible. Another aim of these different packages has been to maximize utilization, encouraging greater use of under-utilized vehicles and at off-peak times. The different approaches have included:

- **Off-peak discounts.** Most operators offer free or discounted usage at night. For example, City CarShare provides a 50% discount on the hourly fee between 10 PM and 10 AM. Flexcar offers free hourly usage for members on prepaid plans between 11 PM and 7 AM, although mileage charges accrue.
- **Maximum daily rate.** Most operators cap the daily rate at a certain level. The Cooperative Auto Network charges a maximum $20 daily rate, and Communauto has a $12.50-$16.50 daily ceiling.[3] Zipcar's daily rates vary depending on vehicle and region, but are typically $60-$75. Flexcar designates a certain number of "Freedom" vehicles each month, for which daily charges are capped at 5 or 10 hours of usage.
- **Different tariffs.** Operators such as Vrtucar and AutoShare offer different membership plans depending on frequency of use. Occasional users can choose a plan with a low monthly fee and higher hourly or mileage fee, or a higher monthly fee and lower hourly and mileage rates.

[3] Note that all prices are expressed in US dollars, using the March 2005 rate of $1.215 Canadian to $1 US.

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- **Bundled plans.** Flexcar offers plans that provide a certain number of hours and miles for a fixed monthly fee – for example, 10 hours and 300 miles for $80 per month.[4] These are similar to cellphone plans, in that unused hours do not roll over to the next month, and any additional usage is charged for at a slightly higher hourly rate. Zipcar has similar "monthly commitment" plans, which offer discounted rates and waive the annual fee, with extra usage charged at standard rates. Some higher-value plans allow members to roll over unused credit for one to two months.

There is great potential to use sophisticated, differential pricing mechanisms to maximize revenue and utilization, through encouraging usage at off-peak times and at under-utilized vehicle locations. Similar systems are used by most airlines. Differential pricing has also been proposed as a mechanism to rectify vehicle imbalances in systems where one-way trips are allowed (see Innovative Services in Section 2.6). In these cases, cheaper rates would encourage users to pick up a vehicle at a location with a surfeit of vehicles, and return it at another (for example, Schwieger, 2004). On the other hand, such pricing conflicts with the desire to keep rate schedules as simple and comprehensible as possible, particularly in order for consumers to be able to make decisions on the relative costs of car-sharing compared to other transportation modes.

Exhibit 2-10 shows some of the different pricing plans offered by different operators. This table is not comprehensive, but rather aims to give examples of how monthly, hourly and mileage rates are packaged in different plans. The exhibit also provides costs for some sample trips. Where a range is given for a single operator, the exact cost depends on the chosen rate plan. Higher-usage rate plans will tend to work out cheaper per trip. The Canadian operators have the lowest rates. Of the US operators included in this comparison, Roaring Fork Valley Vehicles in Aspen and, for longer-duration, lower-mileage trips, City CarShare in San Francisco, have the lowest per-trip rates. However, these operators also have higher application and membership fees, which are not considered in the sample trip costs.

[4] Rate in Portland, OR as of March 2005.

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Exhibit 2-10 Sample Rate Structures

Operator	Sample Prices	Sample Trips		
		Groceries (1 hr, 5 miles)	Airport (4 hrs, 75 miles)	Hiking (8 hrs, 25 miles)
City CarShare, San Francisco	$10 monthly fee, $4 per hour ($2 off-peak), $0.44 per mile	$6.20	$49.00	$43.00
Flexcar, Portland	Regular Plan – $35 annual fee, $9 per hour. Each hour includes 30 miles – $0.35 per additional mile Bundled Plan – for example, $35 annual fee, $80 per month including 10 hours and 300 miles. Additional hours at $8.50, including 30 miles. Other bundled plans range from $42.50 to $700 per month, including 5-100 hours and 150-3000 miles	$7.00-$9.00	$28.00-$36.00	$56.00-$72.00
I-GO, Chicago	Regular Plan – $6 per hour plus $0.50 per mile Bundled Plans - $85-$225 per month, including 10-25 hours and 100-250 miles	$8.50	$53.50-$61.50	$60.50
Roaring Fork Valley Vehicles, Aspen	$10 monthly fee, $3.50 per hour, $0.20 per mile. Fixed daily rate of $60	$4.50	$29.00	$33.00
Zipcar, Boston	Regular Plan – $50 annual fee, $8.50-$12.50 per hour depending on vehicle, plus $0.20 per mile after 125 included miles Monthly Commitment – Minimum $50-$250 monthly charge provides 10-15% discount, and waiving of annual fee.	$7.23-$8.50	$28.90-$34.00	$51.00-$65.00
AutoShare, Toronto	Simple Plan – $0 per month, $6 per hour, $0.20 per mile Advantage Plan – $20.50 per month, $4.30 per hour ($3.50 off peak), $0.20 per mile	$5.31-$6.96	$32.19-$38.77	$39.54-$52.70
Communauto, Quebec	Plan C – $29 per year, $1.65 per hour ($1.20 off peak), $0.37 per mile (first 62 miles of trip), $0.24 per mile (subsequent miles) Plan A – $288 per year, $1.65 per hour ($1.20 off peak), $0.20 per mile	$2.64-$3.50	$21.49-$32.71	$18.14-$22.44
Cooperative Auto Network, Vancouver	High Usage – $33 monthly fee, $1.65 per hour, $0.24 per mile Lower Usage – $5 monthly fee, $1.65 per hour, $0.50 per mile	$2.84-$4.16	$24.47-$44.33	$19.13-$25.75

Source: Car-sharing operator websites, March 2005. All prices in US dollars, using an exchange rate of US$1 = CN$1.215.
Note that most operators offer many more different pricing plans than those listed here.
Sample trip calculations assume daytime weekend rates with a standard vehicle, and do not include membership fees, reservation fees or other administrative charges.

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Vehicles

Most car-sharing operators provide services with a core fleet of four-door compact cars, such as Honda Civics or the Scion xA. However, most of the larger operators also make a range of specialty vehicles available to their members, for example to haul large loads. Most commonly, these are pickup trucks or minivans. However, Zipcar in Boston also provides higher-end vehicles (at a higher price) such as BMW 325s, and SUVs such as Ford Escapes, Honda Elements and Toyota Highlanders. The fleet composition for a selection of operators is shown in Exhibit 2-11.

Exhibit 2-11 Sample Fleet Composition

Operator	Core Fleet	Other Vehicles Used
City CarShare, San Francisco	Scion xA Scion xB VW Beetle VW Jetta (wagon)	Honda Civic/Civic Hybrid VW Golf Toyota Tacoma Toyota Prius
I-GO, Chicago	Honda Civic/Civic Hybrid	Honda Element
PhillyCarShare, Philadelphia	Toyota Prius Toyota Matrix	Scion xB Toyota Tacoma
Roaring Fork Valley Vehicles, Aspen	Ford Focus	
Zipcar, Boston	VW Jetta Ford Focus Honda Civic Toyota Matrix Scion xB	Ford Escape Scion xA Toyota Prius Volvo S40 BMW 325 Mazda 3 Mini Honda Element Toyota Sienna Toyota Rav 4 EV Toyota Tacoma Toyota Highlander
AutoShare, Toronto	Toyota Corolla Toyota Echo	Suzuki Aerio BMW 3 Series Dodge Cargo Lexus ES 330
Communauto, Quebec	Toyota Echo Toyota Tercel	
Vrtucar, Ottawa	Toyota Echo	Toyota Matrix Chevrolet Astrovan

Source: Car-sharing operator websites, March 2005.

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Clean-fuel technology has been of particular interest to many car-sharing operators. Usually, this has been introduced through gasoline-electric hybrids, which offer improved fuel-economy compared to conventionally fueled vehicles. Most of the larger operators have some hybrids, typically a Toyota Prius or Honda Civic. In the case of PhillyCarShare, hybrids account for half of the fleet.

The Dancing Rabbit Vehicle Cooperative in Rutledge, MO, meanwhile runs its fleet on biodiesel, and BioCarShare in Eugene, OR has a single car that also runs on biodiesel. However, a program by Zipcar in Denver, using compressed natural gas (CNG) vehicles, was abandoned due to the limited fueling infrastructure; according to Zipcar, members did not want to drive across town to the CNG station.

Battery electric vehicles have also been used, but typically for station car programs and research pilots such as IntelliShare at UC-Riverside, or for limited programs where outside funding has been made available specifically for the vehicles. For example, the IntelliShare research program mainly uses Honda Electric EV+ vehicles. Zipcar has received donated RAV-4 electric vehicles from Toyota, while City CarShare previously operated Ford Th!nk City vehicles following a grant from Weststart-Calstart.

Most mainstream operators, however, have been reluctant to place electric vehicles into their fleets, due to higher operational costs, the limited range of the vehicles, and the downtime required for recharging. City CarShare (2005) puts battery electric vehicles in the category of "what not to do" in its guide for starting up a car-sharing organization, due to cost and reliability issues. "In summary, the huge advantages of electric vehicles in terms of emissions reductions have to be set against the cost and practical drawbacks," it says, suggesting that gasoline-electric hybrids may be a better fit for car-sharing at present.

Schwieger (2004, p. 127) concurs, pointing out: "The combination of electric vehicle and car-sharing appears as a 'dangerous' combination of two difficult topics. The failure of one part determines the fate of the other, despite the fact that they might be successful if they were brought on to the markets as independent products and services."

Operators and their partners also face current difficulties in procuring electric vehicles. For example, the planned Montréal program – a partnership between Communauto, Agence Métropolitaine de Transport and other agencies – is now intending to use hybrids instead.

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Technology

Most earlier car-sharing programs, in both Europe and North America, provided members with universal door keys or relied on the manual, physical "lock box" model of access. For example, the keys for each car might be contained in a wall-mounted safe at each location, which members could access with a master key or personal identification number (PIN). Users telephoned a live operator to make a reservation, and obtained their vehicle key through a self-service, manually controlled key locker. Billing was based on the honor system, with users filling out a trip log including mileage. (Shaheen, Sperling & Wagner, 1998)

Even in the late 1990s, manual systems were the norm, and manual key lockers are still used in many European countries (Traue, 2001). Recently, however, the largest North American operators – along with the newer entrants to the European market – have transitioned to automated reservations and access systems. These systems allow the user to reserve a car online; open the doors with a smart card or electronic key fob (or, in the case of Helsinki, Finland, with a mobile telephone); and drive off, sometimes after entering a PIN. Time and mileage are recorded automatically.

The development of advanced technology has been cited as one of the key factors allowing the recent growth in car-sharing. Manual systems offer significant disadvantages at scale, such as a lack of accuracy for reservations and billing, and vandalism and theft (Shaheen, Sperling & Wagner, 1998). Automated systems, in contrast, streamline routine tasks – particularly reservations – and allow a smaller staff to concentrate on higher-level functions.

The components of modern car-sharing technologies generally include (adapted from MOSES, 2004):

- **Reservation management system.** This allows reservations to be made, modified and cancelled. Various interfaces allow access by call center or customer service staff, and directly by members via the web (Exhibit 2-12) and, in some cases, an automated voice-activated telephone system. The telephone service can be particularly useful for extending a current reservation while the member is on the road.
- **Member database.** This contains contact information, marketing preferences, date joined, and other information specific to each member.
- **Fleet and parking system.** This component identifies the types of vehicles in the fleet, and their locations.

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- **Invoicing.**
- **Other components.** These may include tariff management, a commercial database, performance reporting, emergency management, system configuration, and so on.

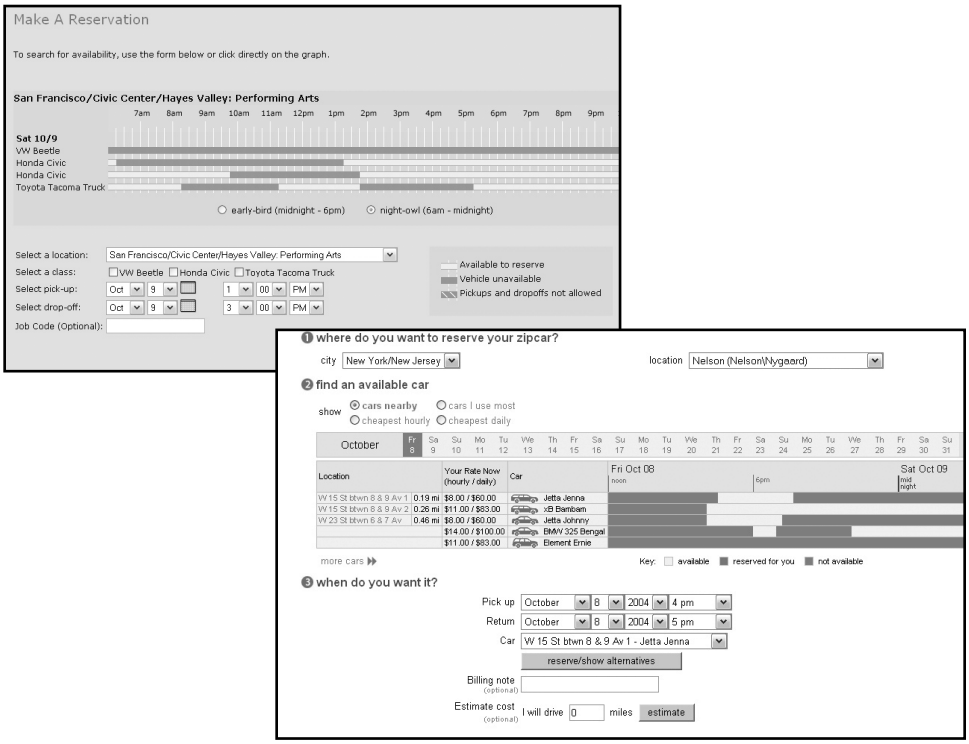

Exhibit 2-12. Most North American operators now have advanced web-based reservations systems. These examples are from City CarShare (left) and Zipcar.

In addition, each car is equipped with an on-board computer and access control mechanism. These handle functions such as access – including, if desired, verifying that the user has a valid registration – and recording time or mileage. Some operators also equip their cars with a Global Positioning System (GPS) device, which allows vehicles to be located in the event of theft, late return, or being parked in the wrong location.

Despite these general common features, technologies vary markedly between different operators, and there is little standardization to date (see, for example, Shaheen, Meyn & Wipyewski, 2003). There are several competing "off-the-shelf" commercial systems, while some operators have developed their own proprietary technology and in some cases licensed this to other operators.

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2.6 Market Development

The early growth of car-sharing in Europe and North America was based on the neighborhood residential model. In other words, the primary customers were individual households, with cars located in primarily residential or mixed-use areas.

The residential market still forms the largest market for many operators. However, operators are experimenting with a range of different business models, some of which have the potential to yield much greater revenue. At the same time, innovative services such as one-way reservations have been explored, which have the potential to reduce the "convenience gap" between car-sharing and car ownership.

Product Life Cycle

Wagner (2005; personal communication) identifies several distinct car-sharing "products." His analysis in Exhibit 2-13 categorizes them in two ways: their historical development and the degree to which they are profitable.

The products on the left of the chart, such as neighborhood car-sharing and alternative fuel vehicles, were the earliest to be introduced. Those to the right, such as Public Car (which would allow non-members to access car-sharing vehicles with a smart card such as a credit card), represent potential future developments.

The other axis represents net revenue, with the products towards the top of the chart being the most profitable ventures. Business car-sharing and fleet-sharing, for example, have generated the most net revenue, and are likely to become even more profitable in the future. The profitability of neighborhood car-sharing is also expected to increase. Alternative fuel vehicles, in contrast, have generally been loss-making ventures (or covered through external subsidies).

While this analysis is based on the European experience, it bears a strong resemblance to that in North America. Several products worth particular mention are discussed individually below.

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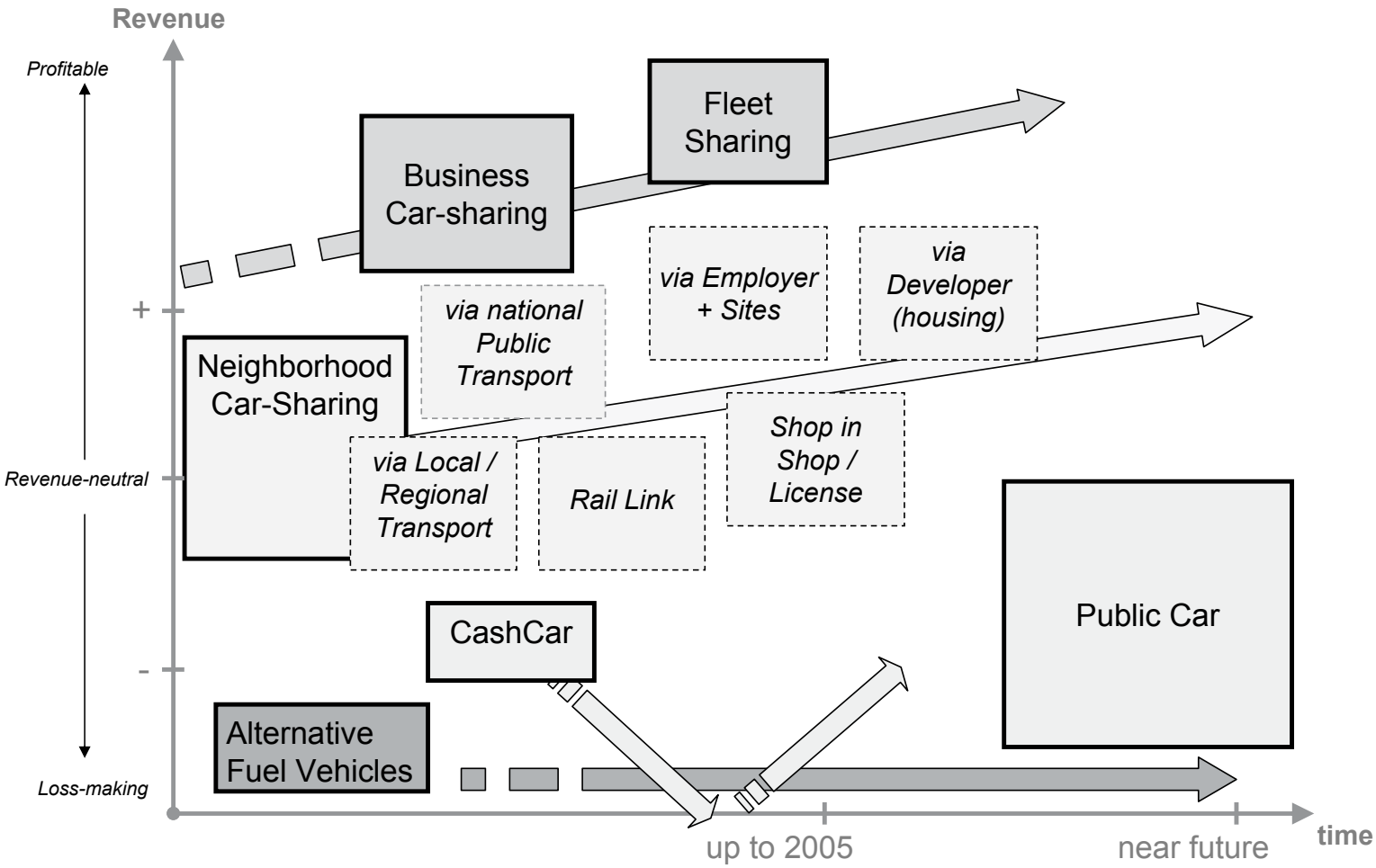
Exhibit 2-13 Car-Sharing Product Life Cycle 1990-2005



Source: Adapted from Wagner (2005).

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Business Car-Sharing

This concept is discussed from the perspective of employer and business partners in Chapter 5. From an operator's point of view, business car-sharing can be one of the most attractive market segments, particularly where there is also a residential market that will use the cars in the evenings and weekends. For example, Flexcar's expansion in Southern California has targeted the business sector. Rather than needing to sign up every individual, a single "sale" to a company brings in many individual users, some of who may also join for personal use.

Fleet Sharing

Fleet sharing is a variant of business car-sharing, which provides an organization with exclusive use of car-sharing vehicles at particular times. (In contrast, most business car-sharing members use the regular car-sharing network in the same way as other members.) For example, the City of Berkeley has exclusive use of four City CarShare vehicles during the working day (Chapter 5). The Postal Service in Switzerland uses 6,000 cars between 4 AM and 11 AM, and is working to substitute 10% of this fleet with car-sharing vehicles (Wagner, personal communication). Fleet sharing provides the customer with the assurance that it will have access to the vehicles, and is financially advantageous for the operator since it guarantees a revenue stream.

Developers

This market includes residential, commercial and mixed-use properties and is discussed in detail in Chapter 5. From the operator's perspective, this approach provides both parking and, perhaps more importantly, ready access to tenants to market the service, particularly if membership fees are included. There is also the prospect of developer subsidies helping to make car-sharing work in more peripheral locations. One major US operator believes that this sector is the next large growth market in car-sharing, following business car-sharing. Several operators have recently had great success in negotiating agreements with developers and planning bodies. Due to the nature of the development pipeline, however, it may take several years before these are completed.

Lease Sharing

Under this concept, an individual leases a vehicle, but makes it available to other car-sharing members when not needed (for example, when traveling away from home), via the common reservation system. Depending on utilization, the member receives a rebate on lease costs.

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The largest trial of lease sharing was the "Cash Car" project in Germany from 1998 to 2003. This did not continue after the pilot, largely due to transactional costs such as cleaning the vehicle (Wagner, personal communication). However, it may have considerable future potential in more peripheral neighborhoods, where a "full-time" car-sharing vehicle may not be warranted. A much smaller number of members – perhaps one to four – are needed to make lease-sharing economically viable, compared to 25 or more per vehicle for car-sharing. Through restricting usage to a small number of users in a "cell" (such as a gated community or apartment building), members could also personalize the vehicle with their own Kleenex, CDs and so on, Wagner suggests.

Innovative Services

The other aspect of market development relates to the provision of innovative services. All large car-sharing organizations in North America at present offer only two-way trips for fixed-period reservations. In other words, the user must reserve a car, drop off the vehicle at the same location where it was picked up, and specify an end time for the reservation (which often may be extended, if the car is available). There are several practical and economic reasons for this:

- It allows the reservations process to function, since the system knows when and where a car will be available.
- It avoids staff time in "shuttling" cars from one location to another to address distribution imbalances.
- It enables members to easily find the car and know where it is located.
- It allows a single parking space to be allocated for each car at its "home" location. In contrast, systems that allow for one-way trips need around twice as many reserved parking spaces as vehicles, in order to function optimally (Nakayama, Yamamoto & Kitamura, 2002). Alternatively, they need to be located in places that have a reserve of free parking (Schwieger, 2004); however, as discussed in Chapter 3, such plans are unlikely to provide the most fertile ground for car-sharing.

These restrictions, on the other hand, also serve to reduce the utility of car-sharing and make it less attractive to potential members. During the focus groups conducted for this study (described in Chapter 3), one of the main disadvantages of car-sharing was considered to be the lack of a one-way trip option. In addition, many disliked the "clock-watching" involved with car-

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sharing. They said that, if their plans changed or they got stuck in traffic, they were stressed over thinking "I've got to get that car back." It reduces their level of spontaneity, participants considered.

Three specific services have been explored, which can be implemented singly or in combination, as ways to overcome these barriers:

- **Instant access**. Members can go directly to an available vehicle, without needing to make a reservation. (Most operators already have an approximation of this convenience, through allowing reservations by phone or internet within five minutes of the start time.)
- **Open-ended reservations**. Members schedule the pick-up time but can keep the car for as long as needed.
- **One-way trips**. Members can drop the car off at a different car-sharing location. **Floating cars,** an extension of the one-way trip concept, allows members to drop the car off anywhere within a defined zone. This is similar to the free "public-use bicycle" programs discussed earlier in Recent Growth, Section 2.2.

One-way trips and open-ended reservations have been implemented, but only in research pilot programs where financial considerations are less important. For example, UC-Riverside's IntelliShare program provides vehicles that can be driven between five stations on and around campus. When making an (optional) reservation or picking up a vehicle, the computer system asks the user for the station where the vehicle will be dropped off (Barth, Todd & Xue, 2004). Other examples include the French Praxitele demonstration, which ran from 1997-1999, and a pilot with StattAuto in Berlin. In most cases, about one in ten trips requires a staff member to relocate the vehicle (Barth & Todd, 2001; Schwieger, 2004).

The Berlin project was based within an existing car-sharing fleet, allowing the impacts to be studied and compared to more conventional car-sharing operations. Vehicle utilization increased by 23% with the open-ended return system, and 15% of reservations were one-way trips. However, the increased utilization did not lead to gains in revenue, since many users simply kept the vehicle once they had reached the daily rate cap, rather than driving it more. One-way and open-ended reservations were seen by members as "good to have," rather than as essential features of a car-sharing program (Schwieger, 2004).

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Schwieger suggests that these "second generation" services, along with others such as floating cars (which are not assigned to any particular location and can be picked up and dropped off anywhere within a defined geographic zone), are important to maintain membership growth. Rather than providing a simple add-on to existing operations, he concludes that they provide an opportunity to relaunch the entire concept. According to Schwieger & Wagner (2003), open-ended car-sharing makes car-sharing as convenient as car ownership; the ability to make one-way trips gives car-sharing even greater flexibility.

Indeed, open-ended reservations are particularly promising once vehicle locations grow large enough to be able to support open-ended as well as fixed-reservation vehicles. This would address one of the key downsides of car-sharing – the lack of flexibility should travel plans change.

However, the likely increased costs and additional complexities – particularly for one-way trips – mean that some operators may continue to focus on the basic business model, and leave taxis to serve the one-way trip market. One car-sharing founder suggests that "it is important to avoid getting caught up in the technology craze." Car-sharing, he recommends, should focus initially on markets that can be served cost-effectively, and avoid the cost and distraction of advanced features that, while perhaps desirable, are not necessary to serve the core market. (Robert, 2000)

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CHAPTER 3. MARKET ANALYSIS

Car-sharing can be called a niche product. At its December 2004 level of 61,652 members, it attracted just 0.02% of the entire US population, 0.03% of US licensed drivers, and the same proportion of urban residents. Even in countries where it has been established far longer, such as Switzerland, car-sharing membership still accounts for less than 1% of the population and 1.4% of driver's license holders. In Germany, market share at the end of 2001 was just 0.12% of licensed drivers (Schwieger, 2004).

That said, car-sharing appears to have the potential to serve a far more significant proportion of the population in the United States among targeted demographic groups, and in particular neighborhoods. This potential can be realized by understanding the market niches where car-sharing is most attractive.

This chapter focuses on identifying and analyzing these niches, at least at this relatively early stage in the development of the concept. They can be characterized in two broad ways:

- **Demographic Markets** – the demographic groups that are most likely to join a car-sharing program
- **Geographic Markets** – the geographic neighborhoods where car-sharing vehicles can be placed to best effect

Obviously, these factors are interrelated, as the demographic characteristics of users will, to some extent, be correlated with certain features of the wider neighborhood. However, there are important differences. Demographic markets primarily refer to the "micro" characteristics of car-sharing users, while the geographic markets refer to the "macro" characteristics of the neighborhood as a whole.

This chapter first discusses the different demographic markets to which car-sharing appeals, and the motivations for members to join. It presents findings from an internet survey and focus groups of car-sharing members, which examined their demographics, travel preferences, and other characteristics, including factors that motivated them to join car-sharing organizations. Each section concludes with a review of findings from existing literature.

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The second section analyzes the geographic market settings of car-sharing, in terms of the types of neighborhoods where car-sharing has been introduced. It provides a qualitative analysis — based on the existing literature, media reports and identification of existing locations — and a quantitative analysis of the demographic and physical characteristics around each car-sharing vehicle location ("pod").

Finally, this chapter reviews some previous research forecasting the potential growth of car-sharing and suggests lessons that should be learned and applied to the research results presented here.

3.1 Demographic Market Segments Attracted to Car-Sharing

Market segmentation is the identification of distinct groups of customers who share specific characteristics and who are likely to exhibit similar purchasing behavior. Market segmentation can be used to highlight patterns of demographic, spatial, behavioral, and attitudinal characteristics shared by persons who are currently using car-sharing services. These patterns demonstrate which kinds of persons (groups of customers, or market segments) are most likely to be attracted to car-sharing services. These persons can then be the focus of targeted marketing campaigns through which car-sharing operators can position their products and services by developing specifically tailored marketing strategies to appeal to the selected target markets.

TCRP Report 36 notes that market segmentation can be used to "improve your agency's competitive position and better serve the needs of your customers." For the transit industry, market segmentation is said to be capable of providing (Elmore-Yalch, 1998):

- Increased ridership
- Improved share of mode choice
- New customers
- Better customers
- More satisfied customers
- Potentially more "profitable" marketing and service opportunities

Market segmentation offers the same potential benefits for car-sharing organizations and their partners.

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Methodology

Web-Based Survey

For this study, a web-based survey of current car-sharing members (approved by the study's Project Panel) was conducted in May, June, and July of 2004. The survey questions are provided in Appendix C. All but one of the large car-sharing companies in the United States and Canada encouraged their members to participate in this survey. (Zipcar, one of the two largest car-sharing companies in the United States, chose not to participate in this survey. Based on information received from Zipcar, and because it is believed that their membership and practices are not substantially different from those of other operators, there is no reason to believe that their lack of participation altered the results of the survey in any specific way.)

Because car-sharing is a highly competitive private enterprise (at least in some metropolitan areas), the study team was not provided lists of car-sharing members. Instead, participating car-sharing companies contacted some or all of their members by mail or e-mail and encouraged them to participate. The members contacted were free to participate or not; if they decided to participate, they were instructed to connect to a specific website. No follow-up contacts were made with members who did not participate. Anyone who completed the survey was eligible to be one of five winners of a US$50 credit on their next car-sharing bill.

Use of this methodology means that the study team did not control how respondents were selected from or contacted by each company, and therefore cannot verify that the respondents are statistically representative of the members of each company. However, we do believe that the companies who participated chose potential respondents in a fashion which accurately represented their entire membership. This methodology obviously focuses on individuals who are Internet users, possibly slighting other car-sharing members who are not computer users. But most car-sharing companies now do the vast majority of their reservations over the Internet, so use of the Internet to survey members should not have introduced any significant bias.

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Results

Six companies (four of which were located in the United States) had more than 85 of their members respond to the web-based survey. Nine car-sharing companies, five in the United States and four in Canada, had 10 or more members respond, as shown in Exhibit 3-1. Three or fewer responses were received from members of five additional companies. (Thirteen respondents were members of other unidentified companies.)

A total of 1,340 complete and valid responses were received, representing nearly 11% of those members contacted by their companies for this survey and almost 5% of the membership of the participating companies. (The majority of members who were not contacted are likely to be inactive ones.) While these response rates are not atypical for Internet surveys using similar methodologies, some caution is advisable in interpreting the results of any survey with response rates in this range because of the possibility that non-respondents may differ from the respondents in ways that are not obvious.

Most of the respondents (978) lived in the United States; 362 lived in Canada. The average respondent had been a member of a car-sharing organization for 19.5 months (the median membership period was 15 months).

Exhibit 3-1 Companies with More Than 10 Respondents to Car-Sharing Member Survey

Company	Location
AutoShare	Toronto, Ontario
Boulder CarShare	Boulder, Colorado
City CarShare	San Francisco, California
Communauto	Quebec City, Montréal, Gatineau and Sherbrooke, Quebec
Flexcar	Seattle, Washington; Portland, Oregon; Los Angeles and San Diego, California; and Washington, DC
PhillyCarShare	Philadelphia, Pennsylvania
Roaring Fork Valley Vehicles	Aspen, Colorado
Victoria Car Share Co-op	Victoria, British Columbia
Vrtucar	Ottawa, Ontario

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Focus Groups

Focus groups of car-sharing members were held in Boston, San Francisco, and Washington, DC. Five 90-minute focus groups were held with current members in January, February and March 2004. One 90-minute group was held with former or inactive members in September 2004. Participants were recruited from member lists supplied by Flexcar (two groups), City CarShare (two groups) and Zipcar (two groups). Fifty-six persons participated in a focus group. Each focus group member was paid $50 for their participation. Audio tapes were made of each session and the sessions were transcribed.

Focus group discussions proceeded according to a Moderator's Guide that included questions on travel using car-sharing (including reasons for using car-sharing and for joining car-sharing, and how life changed for them as a result of using car-sharing); their assessments of the most attractive and least attractive features of car-sharing; what they thought about auto ownership; and their recommendations for improving car-sharing. Participants were instructed not to discuss the benefits or problems associated with particular car-sharing companies. A copy of the Moderator's Guide is included in Appendix C.

Focus group participants tended to be extremely positive about their car-sharing experiences, even those who were not currently using car-sharing services. Findings from the focus groups are included in this chapter and in Chapter 4.

Demographic Characteristics of Participants

Those responding to the web-based survey reported the following demographic characteristics:

- **Age:** The mean age of the respondents was 37.7 years; the median was 35 years. (Note that, due to insurance issues, the minimum membership age allowed by most car-sharing companies is 21.) The lowest age reported was 20; the highest was 75. Thirty-nine percent of the respondents were in the 25 to 34 year old age group; 27.4% were in the 35 to 44 year old age group. Canadians were overrepresented in the 25 to 34 year old age group; US members were overrepresented in the much smaller age group of persons under 25 years old.
- **Income:** Half of the respondents reported annual household incomes of $60,000 a year or more. Thirteen percent reported annual incomes of $30,000 or less; 18% reported annual incomes of $100,000 or more. Incomes were higher in the US: 20% of the members reported incomes over $100,000 per year, while 12 % of

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the Canadian members reported such incomes. Canadian members were more overrepresented in the income groups between US $20,000 and $60,000 per year, and US members were overrepresented in the small group of members with incomes under $10,000 per year.

- **Education:** A substantial focus on the highest education levels, with 35% holding a Bachelor's degree and 48% reporting some post-graduate work or an advanced degree. Only 2% of these respondents had less than some college education. As expected, respondents with the highest education levels had higher income levels than average. There were no significant differences between US and Canadian members in terms of their years of education.
- **Gender:** Slightly more women than men responded to the survey, by a margin of 55% to 45%. However, 52% of the Canadian respondents were male, while 43% of the US respondents were male. Women were more likely to have been involved in post-graduate work than the men in our sample.
- **Race/Ethnicity:** Eighty-seven percent were white or Caucasian; 6% were Asian; 4% were "other"; and 4% were black. Three percent were Hispanic.
- **Household size:** Sixty-four percent lived with at least one other person; the average household size was 2.02 persons. Children were present in 24.4% of households. Canadian car-sharing members were more likely to live with someone else by a ratio of 71% to 61% for US members.
- **Auto ownership:** Overall, 72% of the respondents lived in households with no cars, but 87% of the Canadian members lived in households with no cars, while 66.8% of the US members lived in households with no cars.

Thus, the car-sharing members responding to the web-based survey had the following characteristics in relation to car-sharing members in other studies:

- Their median age was identical to those in other studies.
- Their incomes are definitely at the higher end of the scale, perhaps even higher than reported in other studies.
- Their educational levels are definitely at the higher end of the scale, perhaps even higher than reported in other studies.
- These respondents were slightly more often female than respondents in other studies.
- Racial characteristics and household sizes were essentially the same as those reported in other studies.

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Thus, the demographic information from our internet survey appears to be quite similar, although not identical, to findings from previous studies. This study employed an internet survey of car-sharing members, which means that respondents were self-selected from contacts originating from the car-sharing companies. It is possible that the results of this survey overrepresent findings from members with higher income and educational levels, since such persons are more likely to own and use personal computers. Offsetting this hypothesis is the fact that many car-sharing companies now strongly promote internet scheduling and reservations. Since actual membership characteristic data are closely held proprietary information, it is not possible to ascertain how closely the survey results represent the actual members of these private companies.

Members of specific car-sharing companies had somewhat different demographic characteristics than the averages noted above. It is not clear whether these differences are due to corporate marketing strategies, the demographics of specific localities, or some combination of these and other factors. It is also not certain that the demographic characteristics reported accurately represent the demographic characteristics of all members associated with a particular company. Reported demographic characteristics for companies with the largest numbers of respondents are shown in Exhibit 3-2. More than 85 responses were received from each of these companies.

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Exhibit 3-2 Reported Demographics of Car-Sharing Companies

Car-sharing company	Demographic characteristics more frequent to that company than to all respondents in general
Company A	Age 25 – 34 Live with someone Males Few car owners
Company B	Age 35 – 44; not age 45 – 54 Females Bachelor's degrees Incomes $75,000 and above More grocery shopping trips
Company C	Age 25 – 34 Live with someone Males Very few car owners Incomes $50,000 - $60,000; not $75,000 and over More recreation trips
Company D	Live alone More car owners
Company E	Ages 24 and under and 55 and over; not 35 – 44 Post-graduate education More other shopping trips
Company F	Age 35 – 44 Few car owners Bachelor's degrees Incomes $60,000 to $75,000

Note: Companies are not identified by name for proprietary reasons.

Previous Research Findings

Previous research suggests that factors such as age, income, education, and auto ownership may significantly influence the market segments which are receptive to car-sharing. A meta-analysis of the previous studies is presented in Exhibit 3-3, followed by discussions of individual factors.

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Exhibit 3-3 Literature's General Consensus Regarding Typical Characteristics of Car-Sharing Members

Characteristics	Typical Car-Sharing Member
Age	Mid 30s to mid 40s
Income	Upper middle class (but real variations here)
Education	Upper levels (college degree(s))
Household size	Smaller than average (1 – 2 persons)
Auto ownership	Half own one vehicle
Gender	Slightly more attractive to males

Age

Analysts seem to agree that car-sharing is attractive to a relatively narrow age range:

- Average ages of US car-sharing members are in the mid-30s (Brook, 2004).
- The 24 to 44 age bracket is overrepresented among Cooperative Auto Network members in Vancouver, BC (Jensen, 2001).
- Most members of Communauto, Quebec, are in the 30 to 49 age bracket (Robert, 2000).
- PhillyCarShare members are mostly in the late 20s and 30s (Lane, 2004).
- Members of car-sharing programs are typically identified as young families (30 to 50 years old) (Hope, 2001).
- The typical car-sharer in Germany as well as in the Netherlands is of a medium age (31 to 40 years) (Harms & Truffer, 1998).
- Car-sharing members in Germany, Norway, Switzerland, and Sweden are described as being middle aged (Klintman, 1998).
- Average age of car-sharing members in Gothenburg, Sweden is between the ages of 29 and 49 (Polk, 2000).

Education

High levels of education are the norm:

- "[High] Education levels seem to be the strongest predictor of whether someone becomes an early adopter" (Lane, 2004).
- US car-sharing members are highly educated and most have a college degree (Brook, 1999, 2004).
- High education is a hallmark of Austrian members (Steininger, Vogl & Zettl, 1996).

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- The typical car-sharer in Germany as well as in the Netherlands is well educated (Harms & Truffer, 1998).
- The average member of the Majornas Car Cooperative in Gothenburg, Sweden, is a university- or college-educated male or female (Polk, 2000).
- Car-sharing members in Germany, Norway, Switzerland, and Sweden are described having a higher than average formal education (Klintman, 1998).

Income

Median or higher than average incomes are the norm:

- Income is variable but 31% are in the highest bracket (over $40,000 Canadian) (Robert, 2000).
- Incomes are near the median for all US car-sharing organizations (Brook, 2004).
- There are higher than average incomes in Gothenburg, Sweden (Polk, 2000).
- In Germany, 20% belong to a low-income group; 18% belong to a very high-income group (Harms & Truffer, 1998).

Gender

Previous literature indicates that, contrary to our survey, car-sharing is more attractive to men:

- Car-sharing members are evenly divided as to gender (Brook, 2004).
- Car-sharing members in Germany, Norway, Switzerland, and Sweden are predominantly male (Klintman, 1998).
- Car-sharing members show a predominance of well-educated men in Norway (Berge, 1999).

Household characteristics

There are some substantial disagreements in the previous literature concerning household characteristics:

- Members are evenly divided as to marital status and home ownership (Brook, 2004).
- Members are typified as young families (Hope, 2001).
- The typical car-sharer in Germany lives in a small household (one to two persons) (Harms & Truffer, 1998).
- Most members live in a rental apartment with a partner and/or child (Polk, 2000).

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Review of the Literature

The consensus of the previous literature is that the typical car-sharing member is likely to be:

- Well-educated (college or post-graduate degree)
- Possessing a higher than average income
- Between the ages of 25 and 45
- From a small household

Our survey supports all of these conclusions. The literature also suggests that the typical car-sharing member is slightly more likely to be male, which was not supported by our survey.

Behavioral Characteristics

The internet survey of car-sharing members provided some information about the behavioral characteristics of car-sharing participants. Behavioral information was gathered about trip purpose, auto ownership, trip frequency, expenses, miles driven, and alternatives to car-sharing.

Trip Purpose

Respondents were asked to report all the different purposes of trips made using car-sharing, the major purpose of the *last* trip they made using car-sharing, and trip frequencies. The second question allows some estimates to be made of the relative importance of each trip purpose. Responses were relatively evenly distributed and are shown in Exhibit 3-4.

Canadian members were more likely to use car-sharing for recreational trips than their US counterparts.

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Exhibit 3-4 Car-Sharing Trip Purpose

Purpose	% Using Car-Sharing for This Purpose		Trip Frequency (Trips per Month)**
	On Any Trip*	On Last Trip	
Recreation / social	55.4%	16.0%	1.7
Other shopping	50.9%	16.8%	1.3
Grocery shopping	49.4%	16.2%	1.7
Personal business	44.5%	24.7%	1.6
Work-related	21.2%	12.2%	2.2
Unspecified / other***	9.5%	11.9%	2.2
To and from work	5.5%	2.1%	3.1

* Multiple responses permitted; therefore, percentages add up to more than 100%.
**Frequencies only apply when trips were actually made for that purpose (i.e., zero values are not included). This is particularly important related to trips to and from work, since only 5.5% of respondents made trips in this category.
***Other trips included transporting family and friends (2.5%), moving furniture or hauling large loads (1.7%), medical appointments (1.1%), and visiting relatives (1.0%).

Reasons for using car-sharing for particular trips also illuminate important market segmentation information. Respondents to the car-sharing survey reported that their main reasons for using car-sharing for this last trip (up to three responses permitted, so percentages add up to more than 100%) were:

- Had things to carry 47.8%
- Needed a car to get to their destination 37.8%
- Had multiple stops to make 25.8%
- Cost was acceptable for this trip 24.0%
- Too far to walk 17.9%
- More comfortable than other options 16.7%
- Cost was better than for other travel options 16.0%
- Ease of drop-off [no parking hassles or cost] 14.0%
- Didn't want to use public transit 13.2%

Other reasons for using car-sharing for this trip included:

- Arranging and picking up a rental car would have taken too long
- Can't get there except by car
- Car-sharing was faster and/or more flexible than the other options
- I had to go multiple places in a short time
- Public transportation was not available for this trip
- Public transportation would have taken too long

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Some gender differences were apparent in responses to this question. Men more often cited cost and not wanting to use other modes as motivating factors for using car-sharing for the last trip. Women more often cited having multiple stops and needing a car for that particular destination.

The youngest car-sharing members (24 or under) more often cited an acceptable cost for this trip, greater comfort than other options, and having things to carry as reasons for using car-sharing than other age groups, and less often cited having multiple stops. The 45 to 54 year olds more often than others cited having multiple stops and carrying passengers.

Individuals of different income levels cited different reasons for using car-sharing for the last trip, as follows:

- Incomes between $10,000 and $20,000 per year (4% of the sample): More often cited having passengers, greater comfort than other options, and other reasons, and less often cited not wanting to travel by taxi.
- Incomes between $20,000 and $30,000 per year (7.7% of the sample): More often cited an acceptable cost for this trip, having things to carry and not wanting to use public transit, and less often cited needing a car for that destination.
- Incomes between $30,000 and $40,000 per year (11.3% of the sample): More often cited an acceptable cost for this trip.
- Incomes over $75,000 per year (35% of the sample): More often cited needing a car for that destination and better cost than other options.
- Incomes over $125,000 per year (10% of the sample): Were less often concerned about having things to carry.

Respondents felt that car-sharing partly replaced other modes and allowed them to make trips that they would not be able to make otherwise. If car-sharing had not been available for this particular trip, 29.3% of the respondents would not have made the trip. Another 20% would have used public transportation; 12.6% would have used a rental car; 10.5% would have gone by taxi; and 9.3% would have borrowed someone else's car. Some of the other respondents would have postponed or rescheduled the trip for when a vehicle was available or would have made multiple trips by walking or other modes. Those who lived in households with cars would have used their own car for this trip or would have ridden with someone else. Persons with the least education (high school diploma or less) and lowest incomes ($20,000 or less) would not have made the trip, suggesting that car-sharing

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is improving mobility most for low-income households. Men and persons with the highest incomes would be more likely than others to take a taxi.

Having access to an automobile was seen as a distinct advantage by many car-sharing members. They were asked "For which of your trips do you feel that you really need to travel by car (including a personal vehicle, car-sharing, or a rental car)?" The most frequent responses (multiple responses permitted, so percentages add up to more than 100%) were:

- Recreation / social trips 65.3%
- Other shopping 44.9%
- Grocery shopping 42.1%
- Personal business 36.0%
- Work-related trips (e.g., meeting clients) 19.4%
- Other kinds of trips 11.4%

The other kinds of trips for which a car was deemed necessary mirrored the answers above concerning trip purposes: transporting family and friends, moving furniture or hauling large loads, medical appointments, and visiting relatives.

Auto Ownership

Nearly 28% of all respondents to the survey lived in a household with an owned vehicle. Excluding no-car households, the average number of vehicles owned was 1.35. In 81.2% of the households with cars, the car-sharing member was, at least some of the time, a driver of that car (or those cars). The features of car ownership that were liked most included instant access at any time of the day or night (76.4%) and a variety of other benefits (10.8%). Chief among these other benefits was the ability to travel long distances at an affordable rate and customizing the car's use to one's own preferences (keeping child seats in the car, carrying animals, smoking in the car). Having a vehicle of their own choice and being sure that the car is well cared for were important to only 3% and 2% of the respondents, respectively.

Five percent of the respondents reported that they don't like anything about owning a car. The most disliked features of owning a car are shown in Exhibit 3-5, and relate largely to costs and hassles.

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Exhibit 3-5 Most Disliked Features of Car Ownership

Feature	Percent Respondents
Cost of insurance and upkeep	38.3%
Hassle of owning a car	28.8%
High purchase costs of cars	15.9%
Parking hassles and costs	9.2%
Other factors*	5.2%

* Negative environmental consequences and social costs were a large portion of these other factors.

Trip Frequency

Respondents reported making an average of 3.34 trips per month using car-sharing. The median number of trips per month was two. US members were overrepresented in the lowest trip frequencies (less than three per month); Canadian members were overrepresented in all trip frequencies greater than three per month, but especially those trip frequencies of more than six per month. The number of trips per month varies considerably depending on the trip purpose, as shown in Exhibit 3-4.

Monthly Expenses

Respondents reported paying, on average, slightly more than $60 per month for their use of car-sharing services.

Mileage Driven

Respondents reported driving, on average, about 3,850 miles per year at the current time. This figure applies both to shared vehicles and vehicles owned by household members. This is approximately 63% of the mileage that they previously drove, which is a substantial reduction in driving.

Alternatives to Car-Sharing

If car-sharing services stopped, the current car-sharing members reported that they would:

- Use transit more often 38.6%
- Get rides from friends 35.7%
- Use taxis more often 33.9%
- Buy a car 30.5%
- Walk more often 14.8%
- Other responses 23.1%

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Multiple responses were permitted, so these percentages add up to more than 100%.

Among the hundreds of other (open-ended) responses to this question, the most frequent by far was to rent cars more often (8.2% of all respondents). A surprising number of respondents provided answers that were somewhat exaggerated but imply a sense of loss (be sad, cry a lot, "Die a horrible, painful death," move out of the US, shoot myself, sink into despair, suffer). A few suggested that they would "do anything I could to start it up again." A number of people would borrow cars more often, use their cars more often, or not make specific trips. A few thought that there would be no impact on them.

Attitudinal Characteristics

Car-sharing members are thought to hold strong views about a variety of environmental and social concerns. Respondents to the internet survey were asked a number of questions about such concerns, and their responses generally confirmed the anticipated strength and depth of their feelings:

- **Social activists:** Almost half of the 1,340 respondents (48.3%) strongly agreed with the statement that "It's my responsibility to help create a better world." Another 41.5% agreed with this statement, creating an overall 89.8% who agreed or strongly agreed. The social activists tend not to be members of any specific demographic subgroup.
- **Environmental protectors:** Respondents to this survey of car-sharing members were at least as strongly concerned about environmental issues, if not more concerned, than car-sharing respondents in other studies. When asked about the statement, "I am very concerned about environmental issues," 47.8% said that they agreed and another 39.3% said that they strongly agreed, for an overall total of 87.7% in agreement with this statement. Environmental concerns were also voiced in a large number of responses to other questions. The environmental protectors are more likely to be among the oldest car-sharing members (in terms of age, not length of membership) and are slightly more likely to be living with someone else.
- **Innovators:** Car-sharing members are thought to be innovators and experimenters. This was confirmed in their responses to the statement "I like to try out new ideas": 30.9% strongly agreed and 55% agreed, for an overall 85.9% agreement. The innovators were more likely to be in the lowest income group and to be under 34.

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- **Economizers:** Car-sharing members are also thought to be cost-sensitive. This preconception was borne out in their responses to the statement, "Saving money is very important to me" – 31.6% strongly agreed and 50.7% agreed with this, for an overall 82.3% agreement. Economizers are most definitely not auto owners; this relationship is very strong. Car-sharing members (at least the economizers) appear to be much more aware of the costs of automotive travel than are auto owners in general. Economizers also tended to be under age 34 and in the lowest income group.
- **Not car status consumers:** On the other hand, very few car-sharing members derive a strong sense of status from their vehicles. With respect to the statement, "The car I drive is an important reflection of my personality," only 2.3% strongly agreed and another 14.7% agreed, leading to an overall agreement of only 17%, the lowest of the attitudinal factors measured. Persons who were more likely to agree that their car did reflect their personality were much more likely to own a car. They also tended to have incomes greater than $75,000 per year, and to be between the ages of 25 and 44.

Motivations for Joining Car-Sharing

Asking why people join car-sharing helps to identify groups of customers who can be targeted by specific messages. This approach is "based on the belief that the benefits that people seek in consuming a given product are the basic reasons for the existence of true market segments… When properly executed, this approach is widely acknowledged as one of the best ways to segment markets" (Elmore-Yalch, 1998).

Web-Based Survey

The internet survey conducted for this project offered respondents the opportunity to identify many motivating factors for joining and using car-sharing. According to the respondents, **their reasons for joining car-sharing were that:**

- They liked the car-sharing philosophy: 81.2%
- They could eliminate the hassles of owning a car 64.6%
- They liked having another mobility option 54.1%
- They wanted to spend less on transportation 35.5%
- Car-sharing services came to their neighborhood 35.2%
- They couldn't afford to own/maintain/garage a car 31.8%
- They were aware that car-sharing was now available 31.6%

Multiple responses were permitted, so these percentages add up to more than 100%.

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Some of the more interesting "Other" reasons, cited in 13% of the responses, included:

- "As a musician, I needed a way to get to gigs that was flexible, convenient, and inexpensive."
- "Birth of a son . . . nice to be able to get places by car occasionally with him in tow."
- "Costs beat renting for a day!"
- "Friendlier for the environment."
- "Had my car stolen 3 times. Decided to sell it."
- "I don't own a car and don't want to, but sometimes I need one."
- "I want to support this kind of energy efficient, environmentally friendly effort."
- "Liked having freedom (not asking friends for rides)."
- "Live in a rural ecovillage that does not allow personal cars."
- "Reduced us from 3 cars to 1 car plus car-sharing."
- "Wife left me, took car."

Among all the reasons cited, **the primary reason for joining was:**

- Eliminated the hassles of owning a car 21.8%
- Liked the car-sharing philosophy 19.1%
- Liked having another mobility option 15.5%
- Couldn't afford to own/garage/maintain my car 14.5%
- Other reason 29.1%

For those who already own cars, they were much more likely to join car-sharing if their employer paid the cost, if their car broke down, or if they liked the overall philosophy. Men were more likely than women to say they joined because they just found out about it or they liked the philosophy; women were more often responsive than men to having their employer pay the cost. People who lived with someone were more likely than those who lived alone to be motivated by employer payments and a car that just broke down.

Canadians were overrepresented among the following primary reasons for joining car-sharing: wanted to spend less on transportation, just found out about it, couldn't afford to own / maintain / garage my car, and car broke down or needed extensive repairs. US members were overrepresented in these reasons: my employer pays for membership or other expenses, and car-sharing services came to my neighborhood.

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Cost savings are the most attractive feature of car-sharing, according to respondents (Exhibit 3-6). Environmental and ease-of-use features were also cited by most respondents, but were not the primary attraction. The least attractive features of car-sharing are considered to be costs and, to a lesser extent, the need to make reservations (Exhibit 3-7).

The apparent contradiction, with costs considered both the most and least attractive feature of car-sharing, may be explained as the results of different perceptions. Car-sharing may appear cheap to people who have never owned a car, but expensive to those who have owned one for many years.

Exhibit 3-6 Most Attractive Features of Car-Sharing

Feature	% Citing This Feature*	% Citing As Most Attractive Feature
Less costly than owning a car	85.3%	31.9%
The overall philosophy of car-sharing	78.9%	16.4%
Helps the environment	77.0%	10.2%
Less hassle than owning a car	74.9%	16.7%
Can pay for a car only when using a car	74.6%	12.2%
Easy to use	60.3%	1.8%
Easy to make reservations	57.9%	0.5%
Don't have to ask for rides from others	49.5%	5.2%
No parking hassles	41.7%	1.7%
Reliability – cars are there when I need them	35.9%	2.0%
Other	4.3%	1.5%

* Multiple responses permitted; therefore, percentages add up to more than 100%.

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Exhibit 3-7 Least Attractive Features of Car-Sharing

Feature	% Citing This Feature*	% Citing As Least Attractive Feature
Hourly costs are too high	33.9%	20.2%
Mileage costs are too high	26.2%	10.6%
Hard to extend the rental time	24.1%	7.7%
Have to reserve a vehicle too far in advance	22.1%	7.1%
Hard to get vehicles at the times I need them	21.3%	8.8%
Distance/effort to get to the vehicle	19.6%	7.1%
Hard to get a vehicle when I need it	17.2%	5.5%
Vehicles not available close to me	15.9%	6.1%
Vehicles not always clean	13.3%	3.2%
Membership costs are too high	9.3%	3.0%
Billing procedures	7.0%	2.3%
Vehicles are in inconvenient / unsafe locations	5.8%	1.2%
Vehicles not always in good working order	5.5%	1.2%
Vehicles not attractive or not the right size	4.7%	1.4%
Hard to get information or reservations	3.4%	0.7%
Other	16.7%	13.8%

* Multiple responses permitted; therefore, percentages add up to more than 100%.

Some very specific complaints (which may not apply in all situations) included:

- "All trips must be round trips; have to pay for time when car is idle."
- "Bad for visiting and browsing (when hours are long)."
- "Can't be spontaneous – may not be able to get a car."
- "Difficult to judge how long to reserve the car – I often use it less than the time reserved."
- "Feel under time pressure while doing errands with a shared car."
- "Hard to extend rental time because I don't have a cell phone."
- "Hard to give up a reservation and not get billed for the time."
- "Must drop the car off where I picked it up."
- "No guarantee that a car will be there when I need it."
- "Some car share members do not respect the cars."
- "The phone system misunderstands me."
- "Too expensive for a long trip or a long stay at your destination."

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Focus Groups

Participants in focus groups held in Boston, San Francisco, and Washington, DC had similar perspectives on what they considered to be motivating factors for joining car-sharing. Focus group participants reported that the most persuasive motivators for them were that car-sharing:

- Provided a philosophy that strongly resonated with them
- Offered them another "mobility option"
- Eliminated the hassles of owning a car
- Reduced their transportation costs
- Became attractive after they moved into a neighborhood where it was available
- Fills a "mobility gap" for big purchase trips as well as for places and times of day that are not served by transit

Some of the specific comments about motivations for using car-sharing were:

- "It offers the use (and cost) of a vehicle for only those hours needed."
- "It is more attractive when closely integrated with public transit services."
- "I feel liberated by not having a car – liberation means a combination of having more money and more choices of what to do with that money – and no hassles."
- "I know that sometimes I will need to use a car but car-sharing makes more sense to me in terms of the energy and the environment [than owning a car]."
- "It seemed like a great idea and I started to feel almost a sense of pride watching it grow. I guess I could identify with the people starting it and wanted to encourage the effort."

Previous Research

Previous analysts have offered the following observations concerning motivations for joining car-sharing. In general, these support the findings from the web-based survey that there are multiple reasons for joining, including economic, environmental and convenience factors:

- According to Lane (2004), convenience was the most important reason cited for joining (41%), followed by affordability (20%), personal freedom (16%), environmental friendliness (10%), fewer hassles (6%) and improved productivity (2%). Lower-income members were more likely to cite affordability and personal freedom – higher-income ones were more likely to cite convenience.

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- Steininger, Vogl & Zettl (1996) found that motivations of Austrian members for joining (in priority order) were:
  - Their own contribution to traffic mitigation
  - Lower car use due to environmental concerns
  - The desire to have a car available at good value for money
  - An interest in seeing fewer cars produced
  - Not being required to produce the effort to care and maintain the car
  - A desire to drive newer cars which are less polluting
- According to Harms & Truffer (1998), motivations for joining car-share services have changed over time. In Switzerland, early adopters were ecologically motivated, and the organization had a social value as most members knew one another. Although environmental consciousness is still important, it lost ground to financial and pragmatic motivations as the program grew.
- Polk (2000) found that, in a study in Sweden, economic and practical reasons were the most important reasons for joining, with environmental, cooperative ideology less important, and social (opportunity to meet others) not important at all.
- Based on a study in Seattle and Berlin, Schwieger (2004) suggests that US members are more rational about their decision to join car-sharing, while the German members were drawn by emotional reasoning.
- A survey of Cooperative Auto Network members in Vancouver, BC highlighted a mix of environmental, economic and practical concerns, as shown in Exhibit 3-8 (Jensen, 2001).

Exhibit 3-8 Reasons for Car-Sharing Membership: Cooperative Auto Network (CAN) Members

Reasons	Very Important	Important	Total
CAN is less expensive than leasing or buying a vehicle	65%	30%	95%
I'm concerned about the environment	53%	39%	92%
Convenience – I don't have to spend time or money on maintenance	50%	40%	90%
I like the cooperative structure of CAN	20%	55%	75%
I wanted access to a variety of vehicles	8%	36%	44%
I wanted access to a second car	4%	6%	10%

Source: Jensen (2001)

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Some other reasons that appeared on the CAN survey included:

- Wanting to support the idea of car-sharing and collective ownership
- Not wanting to own a car
- Enjoying the reliability of well-maintained and new cars
- Promoting a non-consumer lifestyle
- Maintaining driving experience
- Less stressful than owning a vehicle

One recent avenue of research has focused on the "trigger points" that are thought to be important for joining. For example, Brook (2004, p. 4) suggests:

> *Member surveys repeatedly indicate that very few people actually sell a vehicle and join a carsharing organization when they first hear about carsharing. In most cases, it appears that people continue their existing transportation patterns, whether they own a vehicle or rely on public transportation, walking or bicycle, until some event in their lives prompts them to consider alternatives. This "trigger event" may be a change of jobs, marital status, moving to a new home (particularly if it's in a new city), etc. For car owners it may be the prospect of major out of pocket costs to repair an older vehicle, failure to pass a required smog test or a major accident.*

This hypothesis has been tested with extensive qualitative research in continental Europe. In particular, Harms (2003) concludes that car owners have to experience a disruption in their routine behavior before they consider car-sharing. These disruptions might be changes in a person's life situation, or to mobility requirements, opportunities or abilities (for example, the breakdown of a household car). In turn, the disruption of routines fosters a more conscious, rational decision-making state, which is more favorable to the adoption of car-sharing. In Britain, meanwhile, a study of rural car-sharing found that 77% of joiners had experienced one of these trigger events, such as moving (25%), selling a car (19%) or changing job (14%) (Carplus, cited in Cairns et al., 2004).

A general consensus of the previous studies suggests that primary motivations for joining a car-sharing organization will include the characteristics shown in Exhibit 3-9.

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Exhibit 3-9 General Literature Consensus Regarding Motivations of Typical Car-Sharing Members

Motivations	Relative Importance
Desire to save money	High to very high
Concern about environmental issues	High to very high
Convenience – not dealing with maintenance, etc	High to very high
Changes in one's personal life situation	Moderate to high
Positive attributes of the car-sharing experience	Moderate
Work-related conditions	Moderate to low

Of these motivations, some of the best predictors of car-sharing membership are said to be the desire to save money, concern about environmental issues, and the convenience of not owning a car (or another car).

Reasons for Terminating Car-Sharing Memberships

For this project, a focus group was conducted with individuals who were no longer active car-sharing members. Members of this group were surprisingly enthusiastic about car-sharing and said that they would definitely use it again. "I certainly enjoyed the service while I had it. It was great to have that as an option." Most participants had not actively used car-sharing in 12 months or more, but they kept their membership as a "just in case" kind of insurance: "if something happened to my car, having car-sharing would be fabulous." These focus group participants could be called "pragmatists" in that they had used car-sharing when the specific details of the economics and trip logistics made sense to them and had used other modes when they made the most sense. These individuals had stopped using car-sharing because of a significant life change:

- Most of these individuals had purchased a vehicle, and this purchase was currently providing most of the transportation that they needed.
- Several individuals had moved their residence to a location less conducive to car-sharing.
- Marital status changes (often in conjunction with the above reasons) accounted for the next most frequent reasons for no longer using car-sharing.

There is very little published data on the reasons for terminating car-sharing memberships. One of the few exceptions is AutoShare in Toronto, which has

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reported about a 20% customer-turnover in its first five years. Reasons for leaving included the following (data from www.autoshare.com):

- 26% moved out of Toronto
- 20% acquired a car (e.g. through marriage, inheritance, etc.)
- 17% reported miscellaneous reasons (not related to service quality/cost)
- 15% reported that their lifestyle has become completely car-free
- 12% had to buy a car for a new job
- 10% felt that AutoShare was too expensive
- 3% reported that "AutoShare didn't work for me"
- 2% were inconsiderate and were asked to leave

Multiple responses were permitted, so these percentages add up to more than 100%.

Summary of Demographic Market Segments Attracted to Car-Sharing

From the results of the internet survey of members of car-sharing organizations, the focus groups with persons using car-sharing, and previous literature about individuals likely to be attracted to car-sharing, a general consensus appears to be that car-sharing currently appeals to persons who are:

- Residents of dense urban areas
- Highly concerned about environmental and social issues
- Highly educated
- Middle to upper income, but still cost-sensitive
- Not high-mileage drivers
- Considered to be innovators
- From smaller households (two persons or less)
- More concerned with what a vehicle can be used for, less concerned with how it looks or its brand name attributes
- Generally in their 30s or 40s (although this can vary greatly by specific location and other service attributes)

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3.2 Geographic Markets

Car-sharing is overwhelmingly concentrated in the cores of the largest metropolitan regions. In the United States in 2003, 94% of membership was concentrated in eight metropolitan regions – San Francisco, Los Angeles, San Diego, Portland, Seattle, Boston, New York, and Washington, DC (Shaheen, Schwartz & Wipyewski, 2004). The same picture, although to a lesser extent, is true in Canada and in Europe.

While car-sharing operates in some smaller communities such as Aspen, CO, in others such as Halifax, Nova Scotia the organization has been forced to close down. In Traverse City, MI, the 20-member formal car-sharing program ended in June 2002 after two and a half years, primarily because sufficient volunteer labor could no longer be found, and the program was not large enough to support paid staff.

Note that in this section, the following terms are used:

- Pod – a location with one or more car-sharing vehicles
- Pod neighborhood (or pod area) – the area within 1/2 mile of a car-sharing pod

Current Market Settings

A range of studies have identified several common neighborhood characteristics necessary for car-sharing to succeed (Muheim & Partner, 1998; Klintman, 1998; Brook, 1999, 2004; Bonsall, 2002; Meaton, 2003). These include:

- **Parking pressures.** Car ownership is more expensive and less convenient in places where parking is scarce, making car-sharing a relatively more attractive option. If residents have to walk a block or two to their car, they may as well walk the same distance to a car-sharing location.
- **Ability to live without a car.** Car-sharing is not designed to meet a household's entire mobility needs, but to work in concert with other modes such as transit (see Chapter 2). The availability of good public transportation is therefore key, along with local shopping opportunities and a pedestrian and bicycle network.
- **High density.** Density has two major impacts on the viability of car-sharing. Firstly, it means that there is a larger customer base within walking distance of each car-sharing vehicle; doubling the density will double the number of potential customers for a given vehicle. Secondly, it means that these potential customers will have a higher propensity to join, since dense neighborhoods have lower rates of vehicle ownership and travel (Exhibit 3-10). This is partly due to the effects of density itself, since the higher the den-

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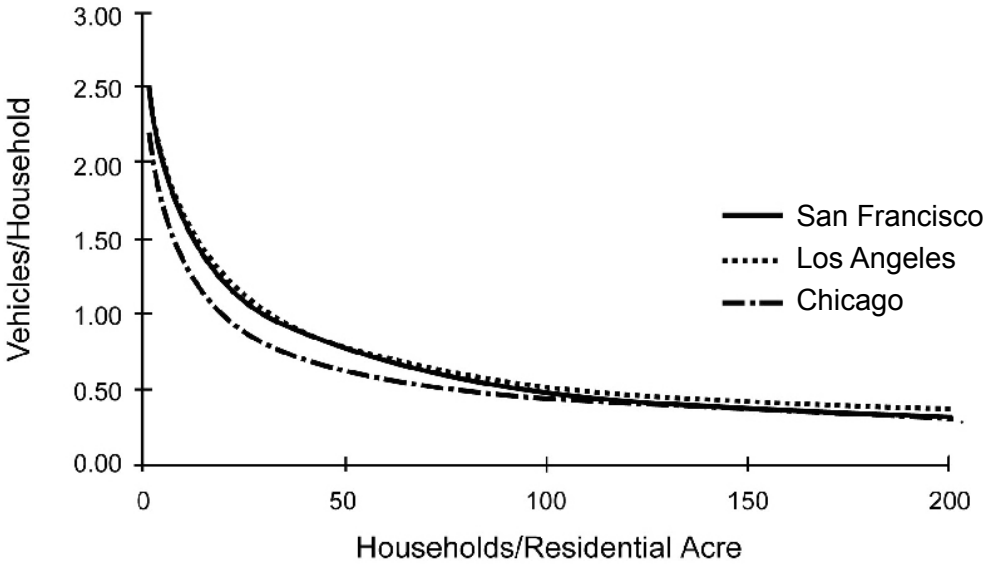
sity, the greater the number of nearby destinations and the shorter the trips; and partly because density correlates strongly with other factors, such as the availability of local shopping, parking costs and the pedestrian environment.

- **Mix of uses.** Business members have been shown to have an important role in increasing utilization rates and evening out the demand cycle, since they tend to use the cars during the working day. In contrast, people using car-sharing for personal trips have a peak demand in the evenings and at weekends. The potential for this pairing of user groups with different demand patterns is greatest in mixed-use neighborhoods, where car-sharing can attract both business and individual members.

Exhibit 3-10 Density vs. Household Vehicle Ownership



Source: Holtzclaw et al. (2002). A similar curve is found when plotting density against vehicle travel (vehicle miles traveled per capita)

These factors are highly intercorrelated. Parking, for example, tends to be scarce in dense, mixed-use neighborhoods with good transit, while density is one of the most important factors determining the viability of high-frequency, high-speed transit.

Other Market Settings

These types of urban neighborhoods – dense, mixed-use with scarce parking and good transit – appear to offer the best potential for car-sharing. However, there are also other types of market setting where car-sharing has been introduced and appears to be viable. Three types are discussed in this section: university campuses; apartment buildings; and small towns and villages.

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Several potential future markets have also been suggested, such as national parks, military bases and other settings where land use and transportation decisions are controlled by a single entity.

University Campuses

University campuses have been one of the most fertile environments for car-sharing. They tend to have constrained parking and a highly educated community with many "early adopters" who have a desire to reduce their impact on the environment. Many campuses have requirements that parking and transportation services be self-funding through parking fees and fines and other user charges, which means that they are more likely to need to explore aggressive Transportation Demand Management (TDM) programs, including car-sharing (see, for example, Toor & Havlick, 2004).

Many campuses are situated in urban centers and can be considered part of the "core" urban market for car-sharing – even though they may have developed partnership arrangements with a car-sharing operator (see Chapter 5). For example, Massachusetts Institute of Technology in Boston, the University of California-San Francisco, and the University of Washington-Seattle are all located in urban centers that share the basic characteristics for car-sharing viability – good public transportation, high density, mixed uses and parking scarcity. In many cases, vehicles are likely to serve users from both the campus itself and surrounding neighborhoods.

In other cases, however, campus car-sharing operates in more geographically isolated contexts, outside of the urban core. Examples include:

- Stanford University, CA
- Princeton University, NJ
- University of North Carolina-Chapel Hill

In addition, several other campuses, while located in major metropolitan areas, are geographically separated from surrounding high-density neighborhoods. Examples include the University of California-Los Angeles and the University of British Columbia-Vancouver.

Apartment Buildings

Developers in many cities have sought to partner with car-sharing organizations, for a variety of reasons including parking management and providing an amenity to tenants (Chapter 5). In most cases, the cars are part of the operator's regular network and function as part of the core network.

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For example, Zipcar has a vehicle at the Market Commons development in Clarendon, VA, which is located on-street (albeit on a private road), and accessible to all members. City CarShare's vehicle in the 8th and Howard apartments in San Francisco is located in the apartment building's garage, but is open to all members.

Other vehicle locations, however, rely on members drawn from the apartment building itself, and are closed to other members. This means that the neighborhood characteristics are less important – although factors such as public transportation still play an important role. For example, many of Viacar's vehicles in Detroit apartment complexes are available for the buildings' tenants only.

Small Towns and Villages

While urban areas may offer greater potential, car-sharing programs have also been introduced in smaller cities and more rural areas. Examples include British Columbia, where the Cooperative Auto Network has vehicles in small towns in the Vancouver region, and Rutledge, MO, where the Dancing Rabbit Vehicle Cooperative is part of an "ecovillage" development.

Europe provides even more examples: Switzerland, Austria, Germany and the Netherlands all have car-sharing programs in rural areas. In Austria, for example, villages with a population as low as 1,000 people are served (Koch, 2002); in Sweden rural car-sharing cooperatives serve towns of a similar size, such as Färnebo. In the UK, the UK Countryside Agency has funded pilot projects in 13 areas (see, for example, CarPlus, 2004; The Countryside Agency, 2004).

Car-sharing has also been established in many small cities, such as Aspen, CO and Kitchener, ON. While these operate at a different scale compared to major metropolitan operations, they share many of the same characteristics such as the availability of good public transportation and local services.

Small-town and village car-sharing appears to be characterized by a high degree of personal involvement by the members. In some cases, this is provided by volunteers, such as at the Dancing Rabbit ecovillage, or in Traverse City, MI where the withdrawal of the volunteers led the program to close. According to studies in Britain, the presence of a strong local champion is more important in making rural car-sharing feasible than factors such as good public transportation (Meaton, 2003).

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Other programs, however, have had success through sharing administration with a "parent" car-sharing organization. The Cooperative Auto Network has five rural locations in Tofino, Nanaimo, Courtenay, Cortez and Whistler, operated through its Vancouver headquarters. It will place cars anywhere that 16 "committed pioneers" are willing to both purchase shares in the co-operative, and actively pursue other members. A similar approach is used by Mobility Switzerland. It will open a new location where 20 members are already signed up, and where at least five new customers can be recruited during the first year. Other criteria include the availability of reasonably priced parking, proximity to transit, and good lighting for personal security (Mobility Switzerland, 2004).

Analysis of Existing Locations

The studies discussed in the previous section were largely qualitative in nature, assessing the broad characteristics of neighborhoods with car-sharing. This section provides more quantitative data on the market settings for car-sharing, through an analysis of census data. These detailed neighborhood characteristics are critical to the success of car-sharing, not least since the distance of a car-sharing pod from members' homes is strongly correlated both with the propensity to use car-sharing (Katzev, Brook & Nice, 2000), and with member satisfaction. This satisfaction related to distance from a pod covers not only convenience, but surprisingly also reliability, car availability, ease of use and cleanliness (Lane, 2004).

Use of Census Data: An Example from Madison

Census data have been used by many operators in determining where to locate new pods, and the feasibility of starting service in a particular city. For example, in Madison, WI the car-sharing feasibility study used this source to determine which neighborhoods to take forward for a market study (Grossberg & Newenhouse, 2002). The researchers analyzed four variables, selected based on a literature review, for each census tract within the city limits:

- Percentage of workers commuting by non-auto modes
- Average vehicles per household
- Residential density
- Percentage of population aged 16-24

The initial screening was undertaken using the commute mode split variable, and 12 tracts with the lowest auto mode splits taken forward. These

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12 tracts also had low vehicle ownership rates. Three tracts were eliminated at the next stage, because they were located near the university campus and more than 50% of residents were aged 16-24 and would not be eligible for the service (Community Car requires at least five years driving experience). While two of the remaining tracts were low density on average, they were retained since they incorporated high density areas.

This example shows how census data can play an important role in determining the feasibility of car-sharing in different settings. However, it raises several questions, particularly regarding the choice of variables. Intuitively, commute mode split, vehicle ownership and density (which tend to be closely correlated) are likely to be strong indications of the fertility of the ground for car-sharing. However, car-sharing has been successfully established on several university campuses, raising doubts about the importance of age-related demographic variables. More importantly, there has been little quantitative research into the existence of any thresholds, and whether different variables may play an explanatory role.

Methodology

This section documents the results of a GIS-based analysis of the market settings of car-sharing pods in various cities. Census data were analyzed for all 13 US cities that have significant car-sharing operations – Aspen, Boston, Chicago, Denver-Boulder, Los Angeles, Madison, New York, Philadelphia, Portland, San Diego, San Francisco, Seattle, and Washington DC. Programs with fewer than four vehicles (such as Ann Arbor) and those on university campuses outside metropolitan regions (e.g. Chapel Hill) were excluded from the analysis. Full technical details of the GIS-based analysis are found in Appendix B.

In contrast to the Madison example discussed above, which used census tracts, a much finer grain of analysis was used for the GIS analysis – census block groups. In the City of Madison (population 208,000), for example, there are 153 block groups but just 63 tracts. Sixteen variables (see Exhibit 3-11) were analyzed at two different scales:[1]

- One-half mile radius from every pod – considered the typical distance people are willing to walk to a pod
- Regional averages, for comparison purposes (for all variables except intersection density and residential density)

1. For an initial analysis of six cities, data were analyzed for a ¼-mile radius and ½-mile radius, and results were found to be similar.

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The analysis looked at a range of census variables that may have an influence on the viability of car-sharing. These variables encompass demographics, commute mode share, vehicle ownership and neighborhood characteristics. Exhibit 3-11 compares the results for pod neighborhoods to the regional averages. This comparison helps identify the characteristics of pod neighborhoods that differ from other parts of the region.

Exhibit 3-11 Summary of Demographic and Neighborhood Characteristics

	Pod Neighborhood Average			
	Vehicles Weighted Evenly*	Cities Weighted Evenly**	Regional Average***	Difference
	1	2	3	=1-3
Demographics				
% 1-person households	51.8%	51.0%	27.2%	24.6%
% households with children	12.5%	12.5%	32.4%	-19.9%
% of rental households	71.5%	70.5%	39.6%	31.8%
% households earning > $100,000	18.2%	16.7%	17.9%	0.3%
% with Bachelor's degree or higher	54.6%	52.4%	34.0%	20.6%
Commute Mode Share				
% drive alone to work	33.0%	39.3%	69.4%	-36.4%
% carpool to work	6.6%	6.7%	11.6%	-5.0%
% take transit to work	30.8%	23.7%	8.8%	22.0%
% bike to work	2.1%	3.1%	0.8%	1.3%
% walk to work	21.9%	21.1%	4.4%	17.5%
Vehicle Ownership				
% households with no vehicle	40.0%	34.7%	11.3%	28.7%
% households with 0 or 1 vehicle	82.0%	76.9%	46.0%	36.0%
Average vehicles per household	0.84	0.97	1.66	-0.83
Neighborhood Characteristics				
Housing units per acre	21.7	17.1		
Intersections per acre	0.37	0.34		
% units built before 1940	43.6%	34.9%	16.9%	26.7%

* Mean of data for all individual vehicles, meaning that pods with more vehicles will be weighted more strongly.
** Mean of means for each city, i.e. each city is weighted the same regardless of car-sharing fleet size.
*** Mean of means for each region.

Household and Neighborhood Characteristics

Almost without exception, pod neighborhoods in all 13 cities have distinctly different characteristics compared to their surrounding regions. Even the least dense pod neighborhoods with the lowest transit use still have higher

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densities and higher transit usage than the regional norm. Some of the main differences include:

- **Household Size and Composition and Education.** One-person households are far more common in the areas surrounding pods. The presence of children is noticeably less likely as well. Residents living in pod-areas are also far more likely to rent and hold a Bachelor's degree or higher.
- **Income.** Surprisingly, income was not a noticeable factor in the resident profiles of pod neighborhoods in the 13 cities. On average, pod-area residents' income levels are within 1% of region-wide averages, but there are substantial variations from city to city.
- **Mode to Work.** Residents in pod neighborhoods are far more likely to take transit and walk to work, rather than drive, compared to their regional counterparts. The high mode share for walking is also indicative of mixed-use development.
- **Vehicle Ownership.** Residents of car-sharing neighborhoods own substantially fewer vehicles compared to the regional average, and are more likely to be car-free.
- **Neighborhood Characteristics.** Car-sharing vehicles in most cities (Aspen, Chicago, Denver-Boulder, and Los Angeles are exceptions) tend to be located in older, historic, neighborhoods, which are likely to be more walkable and have less off-street parking. Car-sharing neighborhoods also tend to have higher densities; in most cities, they fall into the range of 7 to 25 housing units per acre.

Explaining Variations in Car-Sharing Service

The previous section analyzed the fundamental characteristics of car-sharing neighborhoods. This section takes the analysis further, by analyzing the amount of car-sharing – the level of service – that different neighborhoods can support.

The level of service concept is often used with other modes, such as automobiles and transit. For this study, a "car-sharing level of service" indicator was defined to indicate the total amount of service – i.e., the number of car-sharing vehicles – in a given neighborhood. This allows analysis of the amount of service that can be supported by neighborhoods of different types.

The car-sharing level of service was calculated for each pod based on the total number of vehicles within the half-mile radius. Exhibit 3-12 shows an example of how the level of service was calculated. In this example, the level of service for the pod located in the center of the circle is 10 because

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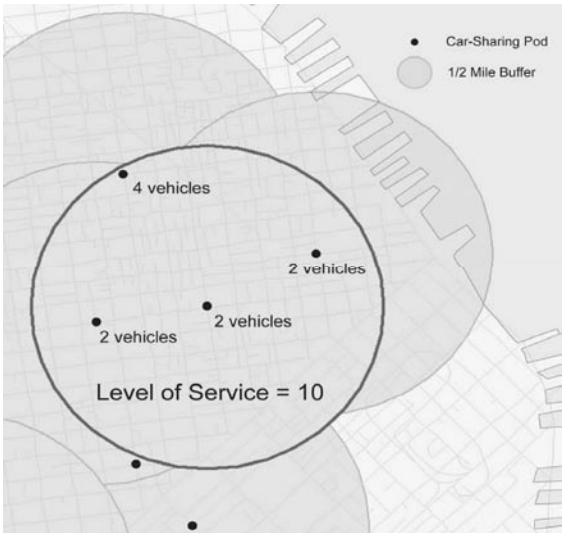
there are a total of 10 vehicles in various pods within the half-mile buffer. The variables were tested for the entire data set as a whole, and individually for the eight cities with a medium-sized to large car-sharing operation (25 vehicles or more).

Exhibit 3-12 Level of Service Calculation



The results of the correlation analysis are shown in Exhibit 3-13. An asterisk indicates a strong relationship between the variables (statistically significant at the 5% level); two asterisks indicate a very strong relationship (statistically significant at the 1% level).

For all the cities analyzed, level of service correlated negatively with drive alone to work and average vehicles per household – in other words, neighborhoods with lower drive-alone and vehicle ownership rates tend to have more car-sharing service. Level of service also correlated positively with households with no or one vehicle and households with no vehicle. Other variables with consistently statistically significant correlations (negative or positive) with car-sharing level of service include the percentages of one-person households, households with children, and rental households; commute mode share for walking and carpooling; intersection density; and residential density.

Given that most variables have a high degree of correlation, it is interesting to look at which do *not* correlate – either for the data set as a whole, or for certain cities. These variables include transit commute mode share, which

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Exhibit 3-13 Correlation with Car-Sharing Level of Service

Pearson Correlation with Car-Sharing Level of Service									
Variable	Boston	Los Angeles	New York	Philadelphia	Portland	San Francisco	Seattle	Washington DC	All Records
% 1-person households	.619(**)	0.124	.699(**)	.679(**)	.822(**)	.236(*)	.758(**)	.441(**)	.478(**)
% households with children	-.548(**)	0.106	-.593(**)	-.627(**)	-.729(**)	-.552(**)	-.646(**)	-.303(**)	-.412(**)
% of rental households	.198(**)	0.317	.230(*)	.404(*)	.760(**)	.317(**)	.653(**)	.383(**)	.301(**)
% households earning > $100,000	.356(**)	-0.15	0.148	0.145	-.308(**)	0.037	-.425(**)	-.308(**)	-.066(*)
% with Bachelor's degree or higher	.210(**)	-.483(**)	.381(**)	.573(**)	-0.028	-0.055	-.472(**)	-0.04	0.063
% drive alone to work	-.441(**)	-.620(**)	-.406(**)	-.627(**)	-.851(**)	-.480(**)	-.758(**)	-.653(**)	-.431(**)
% carpool to work	-.503(**)	0.338	-.414(**)	-.596(**)	-.715(**)	-.608(**)	-.708(**)	-.340(**)	-.363(**)
% take transit to work	0.033	.492(**)	0.043	-.626(**)	.607(**)	.477(**)	.277(**)	.198(**)	.104(**)
% bike to work	-.149(*)	-.425(*)	.202(*)	0.109	0.005	-0.046	-.318(**)	.688(**)	-0.003
% walk to work	.374(**)	0.337	.376(**)	.718(**)	.915(**)	.281(*)	.850(**)	.538(**)	.512(**)
% households with no vehicle	.427(**)	.661(**)	.551(**)	.667(**)	.902(**)	.361(**)	.832(**)	.681(**)	.399(**)
% households with 0 or 1 vehicle	.522(**)	.485(**)	.400(**)	.735(**)	.793(**)	.422(**)	.770(**)	.633(**)	.488(**)
Average vehicles per household	-.495(**)	-.620(**)	-.497(**)	-.722(**)	-.839(**)	-.405(**)	-.819(**)	-.680(**)	-.458(**)
Housing units per acre	.751(**)	-.445(*)	.379(**)	.843(**)	.636(**)	.656(**)	.671(**)	.890(**)	.174(**)
Intersections per acre	.374(**)	0.114	-.259(**)	.577(**)	.710(**)	.475(**)	.642(**)	.519(**)	.290(**)
% units built before 1940	.311(**)	-0.024	-.208(*)	-0.26	0.144	.583(**)	0.142	.475(**)	.223(**)

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

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correlated positively in most cities but not in Boston, New York, and Philadelphia. Income, education, bicycle commute mode share and the percentage of units built before 1940 were other variables that did not have a consistent correlation with car-sharing level of service.

The correlation analysis shows that as level of service increases, so does the proportion of rental households, one-person households, households with low vehicle ownership, and transit and walking mode shares. Similarly, as level of service increases, the proportion of households with children, commuters who drive alone or carpool, and average vehicles per household decreases.

Through multiple regression analysis, several models were tested for their ability to predict the level of car-sharing service for a neighborhood. It should be noted that New York appears as a case unto itself – it has very high residential density and very low vehicle ownership rates, and was therefore excluded from the regression analysis. For the other 12 cities, the best models were found to use vehicle ownership rates combined with walk mode share. This model predicts almost 50% of the variation in car-sharing between different neighborhoods. In other words, these characteristics of a neighborhood are half of the explanation for car-sharing success. Full details of the multiple-regression analysis are provided in Appendix B.

The walking mode share variable suggests that car-sharing level of service is higher in areas that have a mix of residential and employment uses and areas that are more pedestrian friendly. Commute mode share for walking has the strongest correlation with car-sharing level of service of any of the variables examined. The average vehicles per household variable has an intuitive connection to car-sharing success; in neighborhoods with lower vehicle ownership, more households are able to fulfill their daily needs without a car. While this formula provides a partial explanation of car-sharing success, there are clearly other factors that combine with these neighborhood characteristics to fully explain where car-sharing will succeed, such as the amount of capital that operators have to expand to the fullest market potential.

Member Perceptions of Neighborhood Type

Another source of quantitative data on market settings comes from the survey of car-sharing members. In addition to the information on demographics (discussed earlier in this chapter) and social and environmental

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impacts (Chapter 4), various questions explored the types of neighborhood in which car-sharing members live. This enables issues such as parking availability to be explored, along with subjective impressions of the quality of transit and the pedestrian environment – none of which are available through census data.

Respondents to the internet survey furnished a good deal of information about the settings in which they lived. Most of them were center city residents. They described their living environments as shown in Exhibit 3-14. As can be seen, these findings serve to confirm the results from the census data.

Exhibit 3-14 Locational Information for Car-Sharing Members

Locational descriptors	Agree	Strongly Agree
My neighborhood has a good walking environment	46.2%	40.3%
My neighborhood has good public transit service	48.5%	37.9%
It's easy for me to walk to a grocery store	37.2%	29.5%
More than once, I have spent a long time looking for a parking spot in my neighborhood	26.3%	21.2%

Nearly 60% of all respondents lived in a home that had a driveway, garage, or other off-street parking space, but nearly half of those persons (29% of total respondents) did not use that parking space. Of those who did use such a parking space, only 13% paid for its use. Combined with the fact that less than half of respondents report difficulties parking in their neighborhoods, this suggests that parking difficulties are just one of many factors influencing the success of car-sharing in a given neighborhood.

Summary of Results

One of the main conclusions that can be drawn from this analysis is that car-sharing users are not necessarily representative of the neighborhoods surrounding car-sharing pods. For example, as discussed in the earlier part of this chapter, 83% of members surveyed have a Bachelor's degree or some post-graduate work. In contrast, 55% of residents living close to pods have a Bachelor's degree, higher than the regional average of 34% but still far below the 83%. Most importantly, although this variable has explanatory power in some cities, it is not consistently related to car-sharing success. In Portland, San Francisco and Washington, DC, there is little relationship

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between education levels in a neighborhood and the amount of car-sharing service.

Another indication comes from income. As discussed in the earlier part of the chapter, there is a wide income spread among car-sharing members. The pod neighborhoods in Chicago, however, have some of the highest proportions of high-income households in any of the cities examined,[2] even though the car-sharing program there has targeted low-income households.

These differences between member and neighborhood characteristics are not unexpected, given that car-sharing's member base consists of such a small proportion of residents. Instead, it seems that car-sharing is appealing to a large number of highly educated, but not necessarily high-income, gentrifiers and young professionals. They are living in urban neighborhoods which are characterized by a high proportion of rental housing; single-person and childless households (even though car-sharers may live with a partner or children themselves); pedestrian friendliness; and relatively high density.

This suggests, then, that the most rewarding path for analysis is to focus on neighborhood and transportation characteristics that promote car-sharing, rather than on finding neighborhoods that match the individual demographic characteristics of car-sharing members. For example, even though high education levels are one of the hallmarks of car-sharing members, the neighborhoods with the highest percentages of college graduates may not be the most fertile turf for car-sharing. Indeed, both Flexcar and City CarShare have been forced to close pods in Palo Alto, CA – home of Stanford University and one of the most highly educated communities in the United States.

Instead, certain transportation characteristics may be the most important to identifying potential markets for car-sharing. Variables such as commute mode split, household composition and – in particular – vehicle ownership seem to be the best proxies for the types of neighborhoods where car-sharing succeeds. They indicate places where transit and walking are realistic alternatives, and where a car is not needed for everyday travel. They also indicate places that attract a high proportion of single, childless households. Specifically, average vehicles per household and number of people who walk to work within a half mile of a pod location appear to be the most important variables for predicting car-sharing success as determined in the multiple-regression analysis. The percentage of households with no or one

2. Aspen, Boston, Denver-Boulder and New York also have over 20% of households earning more than $100,000 per year.

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vehicle also appears to have a strong, non-linear relationship with car-sharing success (see Appendix B).

Surprisingly, physical factors such as density, intersection density and age of housing do not stand out as primary indicators. The role of density is discussed in more detail in the next section.

Role of Density

The results provide some conflicting suggestions about the overall importance of residential density. This variable is clearly important in some manner for car-sharing. As noted above, it is an indication of the potential customer base for a pod – doubling the density will double the number of customers within walking distance. It also serves as a good proxy for the auto-orientation of a neighborhood. Holtzclaw et al. (2002), for example, found that residential density served as the best predictor of vehicle travel, explaining 63%-86% of the variation in vehicle miles traveled in San Francisco, Los Angeles and Chicago.

However, the density levels for pod neighborhoods are far below what might be expected from a review of other research. For example, 25% of pod neighborhoods have a density of 8.5 households/acre or less.

For comparison, single-family "sprawl" often clocks in at around three units to the acre, while San Francisco Bay Area data suggest that transit ridership increases noticeably at 10 households per residential acre (Holtzclaw, 2002). A threshold of 15-25 units per acre is often cited as a desirable minimum for transit oriented development, while 4-6 units/acre appears to be the minimum for even basic hourly frequencies (for a broader discussion, see Kuzmyak et al., 2003; Dittmar & Poticha, 2004).

One explanation may be that many pods are situated close to rail stations with large amounts of surface parking, which lowers gross densities, or are in mixed-use centers with lower residential densities but a large daytime population. Certainly, relatively high walking rates (22% on average for all pod neighborhoods) suggest a predominance of mixed-use development. However, it is also possible that density is not as dominant in explaining car-sharing market settings as it is, for example, in the case of transit.

Car-Sharing Thresholds

In summary, then, how can a current or would-be car-sharing operator, or a transit agency or other partner organization, assess the types of neigh-

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borhoods where car-sharing may be viable? Some guidelines, based on the analysis in preceding sections, are shown in Exhibit 3-15, which shows two sets of thresholds: low service, where car-sharing may be viable but where limited growth can be expected, and high service, where car-sharing is likely to flourish.

These thresholds are not precise requirements. Rather, they are intended as guidelines to show the approximate neighborhood characteristics that help to sustain car-sharing.[3] There are certainly examples of successful car-sharing operations that do not meet these thresholds, particularly in the special niches discussed earlier in this chapter. However, these guidelines can assess the extent to which neighborhoods do have supportive characteristics. Combined with the other considerations discussed in Chapter 8, such as support from partner organizations, they can help determine the likelihood of success.

Exhibit 3-15 Guidelines for Where Car-Sharing Succeeds

Variable	Level of Service	
	Low	High*
Demographics		
% 1-person households	30%	40%-50%
Commute Mode Share		
% drive alone to work	55%	35%-40%
% walk to work	5%	15%-20%
Vehicle Ownership		
% households with no vehicle	10%-15%	35%-40%
% households with 0 or 1 vehicle	60%	70-80%
Neighborhood Characteristics		
Housing units per acre	5	5

* High service roughly equates to 10 or more car-sharing vehicles within a half-mile radius.

Note: For most variables, the values are the suggested *minimums* that are needed to achieve a given level of car-sharing service. For the "% drive alone to work" variable, the values are the suggested *maximums.*

3. These values were approximated from analyzing percentiles and scatter plots for each variable.

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3.3 Growth Potential

While car-sharing is a niche product at present, the potential for growth has excited many researchers. A range of market demand studies, conducted principally in Europe, has estimated a market potential of anything from 3% to 25% of the population. Most of these studies have identified the segments of the population that would use car-sharing – often based on survey data – and then used this to estimate total market potential. For example:

- **United States.** A 2004 study of the market potential in Baltimore, MD suggests that car-sharing could replace at least 4% of private vehicles. This simulation was based purely on cost savings; for more than 4% of vehicles, car-sharing would be cheaper than vehicle ownership (Schuster et al., 2005).
- **Austria.** The *minimum* market potential for "pioneer households" was estimated at 13.5% of households in two urban residential neighborhoods in Graz, based on the following criteria (Steininger, Vogl & Zettl, 1996):
  - Age between 25 and 43
  - University degree or equivalent
  - Own at least one car, but not in a high price bracket
  - Yearly car mileage of one car below 15,000 km
  - Share of trips by car less than 33%
  - Current participation in environmental activities
- The same study estimated the *maximum* market potential in the same neighborhoods at a far higher level – 69%. This estimate was based on the assumption that the decision to join a car-sharing program would be made solely on rational economic grounds: 69% of households had at least one car driven less than 15,000 km per year and would thus probably realize cost savings from car-sharing.
- **Germany.** The potential market demand was estimated at 3% of the population, or approximately 2.45 million people (Baum & Pesch, cited in Shaheen, Sperling & Wagner, 1998).
- **Sweden.** The "theoretical potential" was estimated at 25% of households, based on those who could travel to work by non-auto modes, without prolonging their commute time by more than 30 minutes. The "practical potential" was estimated at 5.6%, based on market research surveys asking if a household would be prepared to join a car-sharing organization. Both the "theoretical" and "practical" potential were limited to households possessing the following characteristics: living in communities of at least 10,000 inhabitants; at least one household member between the ages of 18

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and 70; and at least one person in the household having a driver's license (Vägverket, 2003).

- **Switzerland.** The market potential was estimated at 1.7 million members, or 23% of the population, based on three criteria (Muheim & Partner, 1998):
  - Possession of a driver's license
  - A residence that is not too remote (living in the developed zones of municipalities with at least 2,000 inhabitants)
  - A journey to work that does not have to be made by car (journey to work would not be lengthened by more than 30 minutes)

In reality, despite impressive growth rates, the actual take-up has fallen far short. Current membership rates are a factor of 12 to 30 times lower than those forecast about a decade ago (Harms, 1998). Mobility Switzerland, for example, had about 60,000 customers in November 2003 (Mobility Switzerland, personal communication) – 3.5% of the forecast potential. At least partly, this appears to be due to the "routine" nature of car use; as discussed earlier in this chapter, many members appear to join following a "trigger event" such as moving residence or changing jobs.

Again, this evidence tends to give further support to the conclusion from the analysis of market typologies. Rather than solely being informed by the characteristics of potential members, market potential studies should focus more on whether neighborhood characteristics will allow car-sharing to be successful. They should also consider whether the institutional characteristics are in place, i.e. the depth of support from partner organizations. These issues are explored in the following chapters.

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CHAPTER 4. IMPACTS OF CAR-SHARING

4.1 Introduction

The chair of the UK government's advisory body, the Commission for Integrated Transport, has called car-sharing a "mode without a downside,"[1] and car-sharing proponents have identified a number of public benefits that can be produced by car-sharing. These range from environmental benefits, such as reduced vehicle travel, to social impacts such as increased mobility for low-income households.

Exhibit 4-1 summarizes the potential benefits from car-sharing. This chapter discusses each in turn, and analyzes the extent to which the benefit has been confirmed by empirical evidence – both from previous research, and from the member survey and focus groups conducted as part of this research.

While there is a considerable body of existing empirical research on the impacts of car-sharing, much of it, with some notable exceptions, is disappointing in quality, or conducted by operators themselves or other advocates with a strong interest in promoting car-sharing. Sample sizes are often small, and in-depth research is often conducted early in the program's history, meaning that the behavior of early adopters may not reflect that of members in later years. Many studies – particularly those conducted by operators – are not published in full, with only a summary "fact sheet" released. Meanwhile, many car-sharing members are themselves evangelists for the concept – a particular problem where the methodology relies on respondents to predict how they would have behaved in the absence of the car-sharing program, for example if they would have bought a car.

Having said that, there is remarkable consistency between the majority of studies regarding the overall impacts of car-sharing, if not their precise magnitude. There is general agreement that car-sharing reduces vehicle travel and vehicle ownership, and while the extent of these benefits is still in doubt, this is likely as much due to local circumstances – both geographic and the nature of the car-sharing program – as to research design.

1. Professor David Begg, cited in Cousins (2001).

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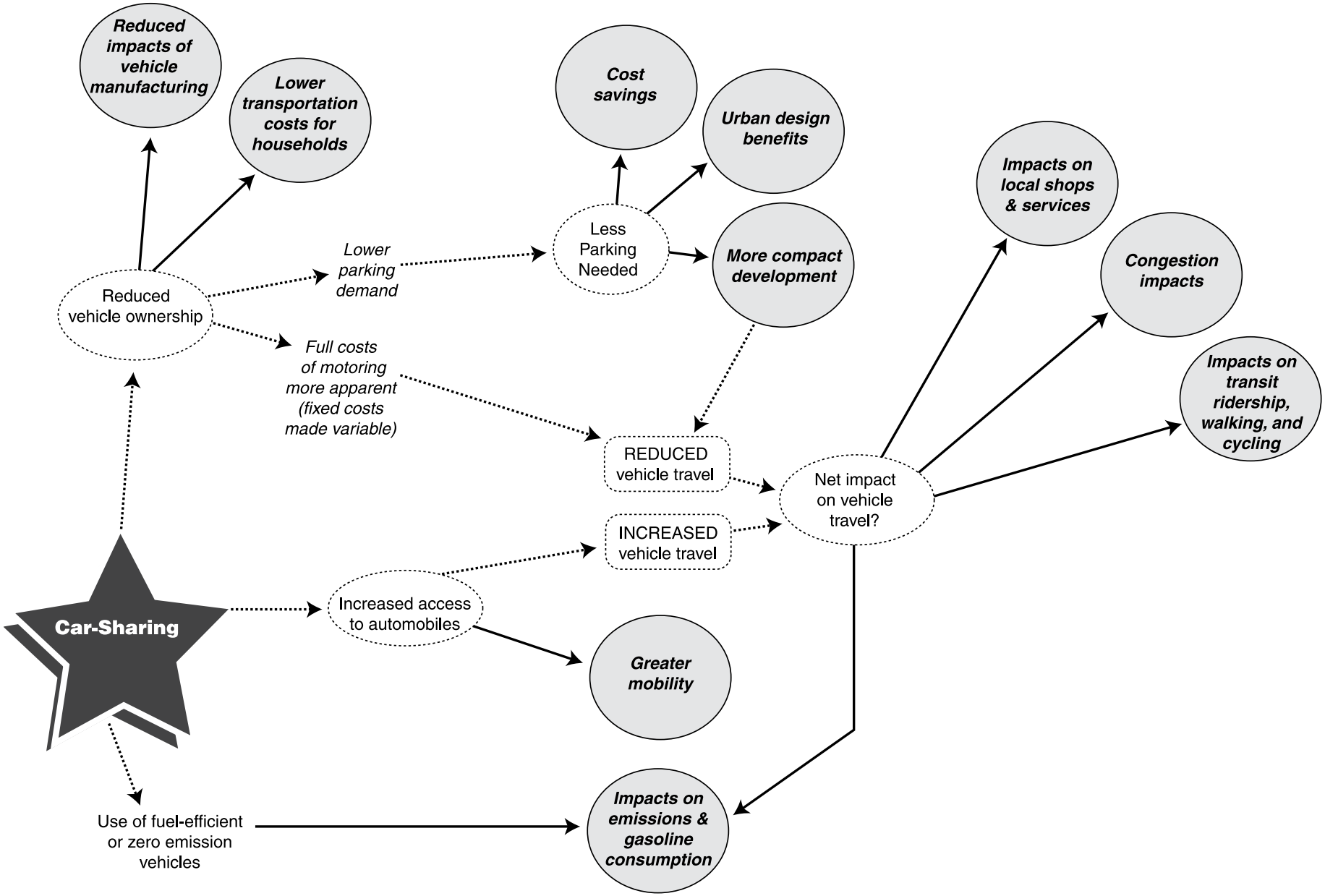
Exhibit 4-1 Potential Benefits of Car-Sharing



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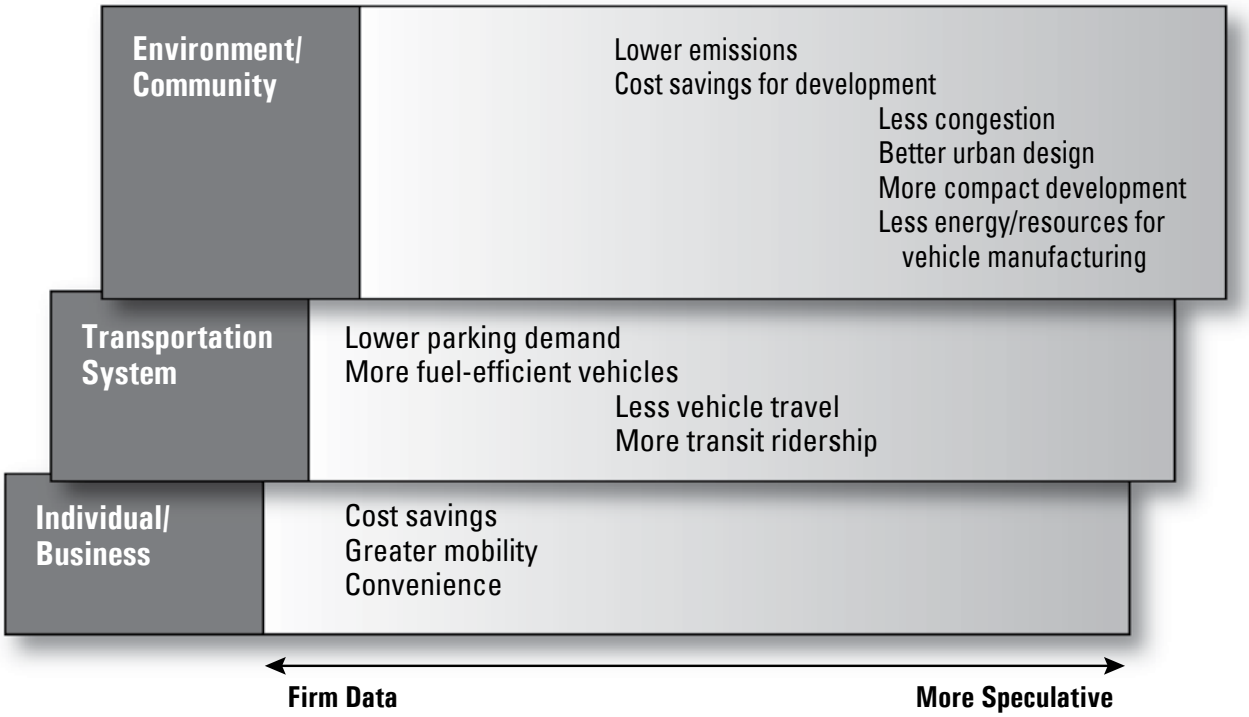
Another way of understanding the impacts of car-sharing is to consider "layered" benefits (Exhibit 4-2). The first layer relates to benefits to the individual household or business member. The second layer consists of transportation system impacts, while the third considers the wider environmental and community benefits, which are often the desired outcomes. As this chapter will show, and Exhibit 4-2 indicates, the best data on the impacts of car-sharing exist at the individual level. While the gains at the environment and community level are substantially greater, they are not as well understood at present.

Exhibit 4-2 Layered Benefits of Car-Sharing



This chapter assesses a number of actual and potential environmental, economic, and social impacts of car-sharing. Does car-sharing eliminate second and third vehicle purchases per household? Many car-sharing companies make substantial claims in this area (from 4 to 10 fewer vehicles on the road for each one car-shared vehicle). This could be one factor in calculating reduced vehicle trips in a metropolitan area, leading to the environmental benefits mentioned above regarding increased public transit usage.

How does use of car-sharing services change the number and type of auto trips? Do car-sharing members make more effective use of transportation

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resources by increased trip chaining? Do car-sharing members make fewer auto trips and greater use of public transit? Can significant reductions in total auto mileage be documented? Our web-based surveys of current car-sharing members can answer these questions.

This chapter addresses these questions and others in three sections: vehicle ownership, travel behavior changes and related impacts, and transportation cost changes. The final section of this chapter provides a simple standard methodology that may help car-sharing operators and their partners evaluate impacts in the future.

4.2 Vehicle Ownership

Potential Impact

One of the major public benefits promoted by car-sharing operators is the ability of their programs to reduce private vehicle ownership. By providing access to a vehicle for occasional trips, a household may be able to give up its car, or a second or third vehicle, whether through cost, convenience or environmental motivations. At the workplace, car-sharing may help employees avoid driving to work, and allow businesses and cities to reduce the size of their vehicle fleets. Car-sharing, proponents argue, should therefore be seen as a parking demand management strategy.

Indeed, many operators have sought to explicitly link their programs to reductions in vehicle ownership. Almost all advertise the cost savings that could be realized from selling a car, and some offer savings calculators to compare the costs of car-sharing and vehicle ownership (Exhibit 4-3). Some operators have taken this a stage further. CarSharing Portland participated in a citywide vehicle scrap program for cars that failed smog tests; the scrappage fee paid for the $500 security deposit that CarSharing Portland requires from members. In Bristol, England, a promotion with the local bus operator provided free transit passes to members who gave up their cars.

In turn, reduced vehicle ownership may mean that less residential parking has to be provided, and allow businesses to lease fewer parking spaces. This is primarily an issue in urban areas where parking is scarce, and the provision of new parking is expensive. Specific benefits may include:

- **Improved availability of parking**. This benefit may accrue particularly in older urban areas where most households are dependent on curb parking (although latent demand may mean that the spaces fill up with other autos).

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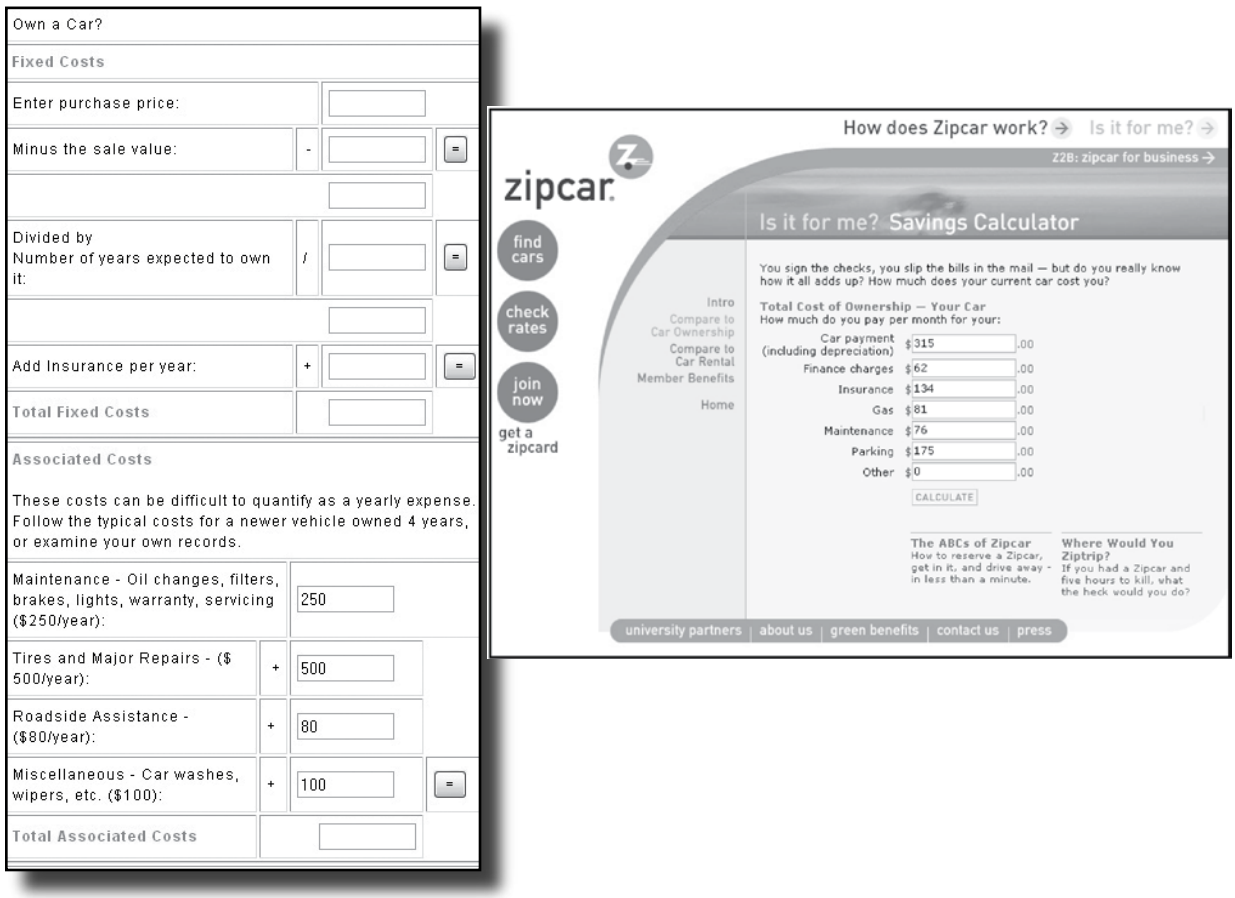
- **Reduced need to construct new public parking.** This may be relevant in limited circumstances, where new public parking is planned to serve an older residential or mixed-use neighborhood.
- **Reduced parking ratios for new development.** The incorporation of car-sharing into or nearby new development allows its impact on parking demand to be taken into account at the time that parking ratios are determined.

The benefits of reduced parking provision, provided that parking availability is maintained, are extensively documented elsewhere (for example, Millard-Ball, 2002; Shoup, 2005). They include cost savings to developers, residents and cities; release of land for new development or open space; and reduced impermeable surface area leading to less stormwater runoff.

The precise cost savings will depend on the net cost of new parking provision, after parking revenue from user fees. These figures are extremely site specific, varying with factors such as the cost of land, financing methods, land costs (including opportunity costs), the type of parking, and the level of charges, if any. Average monthly costs per stall in 1997 dollars, including

Exhibit 4-3 Example Cost Savings Calculators



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land, construction, design, contingency and operating costs, are typically $68 for surface parking, $135 for above-ground structures and $240 for below-ground facilities (Kuzmyak et al., 2003).[2] Shoup (2005) calculates that each parking space at the University of California-Los Angeles costs at least $127 per month in capital and operating costs, plus external costs of at least $117.

In major metropolitan areas where most car-sharing programs are located, these costs are likely to be significantly higher. In San Francisco, for example, a parking space adds $20,000-$30,000 to the cost of each housing unit – upwards of $50,000 in some parts of the city (San Francisco Planning Department, 2002). This equates to a monthly cost of $480, assuming a 24-year service life, a 9% interest rate and $50 in monthly operating costs. In Palo Alto and San Jose, CA, new parking structures have been built at a cost of more than $50,000 per space (Shoup, 2005).

There will not be a 1:1 relationship, however, between the number of vehicles given up by car-sharing members, and the number of parking spaces saved. Firstly, for existing residential developments, the effect depends on whether the freed-up spaces are available for other users – for example, if curb parking is predominant, or if the parking is physically "unbundled" from the unit. If each unit has separate, reserved off-street parking spaces, such as an attached garage that is difficult to rent to other users, the impacts of car-sharing may be more limited.

Secondly, the impacts of car-sharing on parking ratios in new development will depend on the ability and willingness of the developer to take advantage of the opportunity. In many instances, constraints may be imposed by minimum parking requirements levied by the local jurisdiction, the requirements of lenders, or market preferences.

The impact of car-sharing on residential parking demand has received the most attention. However, car-sharing also has the potential to reduce the need for parking at the non-residential end of the trip, such as at workplaces and stores. To some extent, these impacts will be indirect and depend on the extent to which car-sharing is able to reduce vehicle travel, as discussed in the following section. For example, if customers walk or take transit rather than driving to a store or leisure facility, fewer parking spaces will be required. However, there may be significant direct impacts if an employer is able to

2. Capital costs are amortized over a 24-year service life at a 9% interest rate.

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downsize or eliminate a vehicle fleet through joining a car-sharing program, or if car-sharing is introduced as an employee trip reduction strategy. These types of programs are discussed in detail in Section 5.7.

Empirical Evidence

Impacts on vehicle ownership have been a relatively simple area to explore in methodological terms and have been the subject of a large number of studies. Typically, the impact is calculated as follows:

% members who give up a car[3]** members per car-sharing vehicle – 1 = vehicles reduced*

As shown in Exhibit 4-4, an average of 21% of members give up a vehicle after joining a car-sharing program. This figure is similar both in North America (21%) and Europe (22%). Fewer studies provide data on vehicle: member ratios. However, assuming a ratio of 1:27 (an assumption discussed later in this chapter), this equates to each car-sharing vehicle replacing five to six privately owned vehicles, or a net reduction of four or five.

Some studies credit a reduction in vehicle ownership for members who state they avoided buying a car as a result of joining the car-sharing program. While this is certainly the case for many members, this form of survey question is more speculative and is likely to overstate the overall impacts. On average, 34% of members state that they avoid buying a car, with figures as high as 77% (Exhibit 4-4).

In contrast, one study that used a control group methodology suggests that just 4% of members avoided purchasing a vehicle (Cervero & Tsai, 2003). This is calculated as the difference between the number of members and non-member controls who purchased a vehicle (Exhibit 4-5). This control group methodology is subject to several limitations and may not be representative, and may therefore understate this figure,[4] but it does suggest that the true value lies somewhere in between.

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3. Note that some studies report the number of members who give up a car as a percentage of those who owned a vehicle before joining the program. Properly, this should be expressed as a percentage of total members, in order to keep units consistent with "members per car-sharing vehicle."

4. The control group was originally designed to consist of non-members with similar motivation levels, interest and ideological leanings to members. Control group members had registered to join City CarShare, but had not actually joined – for example, because a pod was not located close to them (Cervero & Tsai, 2003). By the time of the later surveys, however, City CarShare had expanded to cover most of San Francisco, and there may have been other reasons for control group members not to join – such as finding that they could do without a car altogether. In addition, the control group sample size was small, with just 54 responses to this survey.

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Exhibit 4-4 Impacts on Vehicle Ownership

		% of Respondents Who Have...				Vehicle Ownership Before Joining			
Reference	Region	Given Up a Vehicle (primary or second)	Forgone Purchase of a Vehicle	Members Per Car-Sharing Vehicle	Private Vehicles Replaced per Shared Car**	None	One or More	Sample Size	Comments
EUROPEAN STUDIES									
Wagner (1990)	Switzerland	26%							
Hauke (1993)	Bremen	42%	16%						
Baum & Pesch (1994)	Germany	23%	32%						
Krietemeyer (1997)	Munich	19%	34%					596	
Lightfoot (1997)	Netherlands	44%							
Meijkamp & Theunissen (1997)	Netherlands	17%	5%						
Perner, Schöne & Brosig (2000)	Dresden	10%	28%					318	
Cambio, unpublished survey	Bremen, Aachen & Cologne	21%	11%						Cited in Koch (2002)
Olsen & Rettig (2000)	Denmark	7%	26-35%	14	1.0	57%	43%		Further 31% gave up a car independent of car-sharing
Hope (2001)	Edinburgh	32%		16	5.1	42%	58%	38	
Koch (2002)	Bremen	9%	26%						Figures refer to members with combined car-sharing/annual transit pass.
Holm & Eberstein (2002)	Dresden	10%	21%	35	3.5				
Krietemeyer (2003)	Munich	12%	35%					700	
Rydén & Morin (2005)	Bremen	34%	17%	19	6.5			301	
Rydén & Morin (2005)	Belgium	21%	14%	18	3.8			272	
European Average		**22%**	**22%**	**20**	**4.0**	**50%**	**51%**	**371**	
NORTH AMERICAN STUDIES									
Cambridge Systematics (1986)	San Francisco, CA	12%	43%	11	1.4			122	Assumes 1.9 individual users per household
Robert (2000)	Montreal, QC	21%	61%	17	3.5	49%	52%	153	
Robert (2000)	Quebec City, QC	29%	56%	17	4.7	38%	63%	208	

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Exhibit 4-4 Impacts on Vehicle Ownership (cont'd)

		% of Respondents Who Have...				Vehicle Ownership Before Joining			
Reference	Region	Given Up a Vehicle (primary or second)	Forgone Purchase of a Vehicle	Members Per Car-Sharing Vehicle	Private Vehicles Replaced per Shared Car**	None	One or More	Sample Size	Comments
Katzev (1999), Katzev, Brook & Nice (2000)	Portland, OR	26%	53%	13	3.5	59%	41%	64	
Cooper, Howes & Mye (2000)	Portland, OR	23%	25%					89	
Zipcar (2001)	Boston, MA and Washington, DC	15%	35%	20	3.0				Details of methodology not available
Flexcar (2001)	Seattle, WA	6%							Cited in Vance (2004). Figures refer to net change in vehicle ownership, with 15% giving up a vehicle and 9% adding a new vehicle to the household.
Jensen (2001)	Vancouver, BC	28%	57%	18	5.0	86%	14%	370	Figures refer to those who gave up a vehicle 0-6 months before joining CAN. Figures for "forgone purchase" exclude "don't know" responses.
City CarShare (2002)	San Francisco Bay Area, CA	20%	63%	25	5.0	65%	35%	130	Excludes those who did not give an answer
Flexcar, unpublished survey	Washington, DC	*	42%	53		67%	33%		Details of methodology not available
Cervero & Tsai (2003)	San Francisco, CA	24%	4%	25	6.0				Figures refer to net change in vehicle ownership per member (-0.24) and per non-member control (+0.04). Source for members per vehicle is City CarShare.
Vance, Williams & Rutherford (2004)	Seattle, WA	15%	40%					48	Figures refer to net change in vehicle ownership, with 23% giving up a vehicle and 8.5% adding a new vehicle to the household.
AutoShare, email	Toronto, ON	15%	25%	22	3.3				Details of methodology not available
Communato (2004)	Quebec (4 cities)	32%	77%	20	6.4			2167	
Lane (2005)	Philadelphia, PA	21%	44%	23	4.7				
North American Average		***20%***	***41%***	***24***	***5***	***61%***	***40%***	***372***	
Combined Average		***21%***	***34%***	***23***	***4.5***	***58%***	***42%***	***372***	

*25% of members who do own cars have sold or are considering selling their car.

*** Excluding impacts of forgone purchases.*

Many surveys do not distinguish between respondents who have given up a car because of car-sharing, or for some other means. Where available, the data in the table refer to those who have given it up because of car-sharing.

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Exhibit 4-5 Change in Household Vehicle Ownership – San Francisco City CarShare

Change in Vehicle Ownership	Members (A)	Non-Members (B)	Difference (A-B)
Reduced by Two or More	2.5%	0	2.5%
Reduced by One	26.6%	8.0%	18.6%
Did Not Change	63.2%	80.0%	-16.8%
Increased by One	7.2%	12.0%	-4.8%
Increased by Two or More	0.4%	9.0%	0.4%

Source: Cervero & Tsai (2003). Figures refer to change in household motor vehicle ownership within the first two years of the San Francisco City CarShare program.

In the web-based survey of current car-sharing members, conducted for this study in 2004, all but one of the major car-sharing companies in the United States and Canada encouraged their members to participate in this survey by connecting to a specific website. A total of 1,340 complete and valid responses were received, representing an 11% response rate (see Chapter 3 for details of survey methodology). In this survey, respondents reported the following results of their car-sharing membership as shown in Exhibit 4-6.

Exhibit 4-6 Effects of Car-Sharing Membership on Auto Ownership

Effect	Neither agree nor disagree	Agree	Strongly agree
Was able to sell my car	59.9%	3.9%	7.4%
Was able to sell the family's second car	26.5%	32.1%	17.5%
Postponed buying another car	16.6%	39.1%	31.4%

Source: Car-Sharing Member Survey.

The strongest impact in these results is the delay in purchasing another car, reported by 70.5% of all respondents who agreed or strongly agreed that they were able to postpone buying a car because of their participation in car-sharing. Not to be overlooked is the nearly 50% of all respondents who reported that they were able to sell their second car because they were involved in car-sharing. In total, 55.2% of the respondents agreed or strongly agreed that they were able to sell their car, the family's second car, or both.

As discussed earlier in this section, the net reduction in vehicle ownership per car-sharing vehicle depends not only on the percentage of members who give up a car, but also on the vehicle: member ratio of car-sharing organizations. Based on data from Shaheen (personal communication), the vehicle:

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member ratio in December 2004 was 1:66 in the United States, and 1:20 in Canada. The US ratio has shown a substantial decrease in recent years, influenced by two key trends:

- Many of the reported members are likely to be inactive or lapsed members. Promotional incentives and changes in pricing policy mean that many of these individuals did not have to pay an application or renewal fee; they use the car-sharing service occasionally or not at all.
- The increase in the business market means that many members are employee members, who primarily use car-sharing at the workplace during the day. The primary environmental objective for this market segment is to help them avoid driving to work, rather than to allow them to give up a vehicle.

The web-based survey for this project was distributed by car-sharing operators to their members via e-mail lists or newsletters. The researchers believe that respondents are representative of those who received the survey, and that they are more likely to represent the active, individual members who are included on these e-mail lists. (Because only 9.5% of respondents reported that their employer paid all or part of their car-sharing costs, we conclude that the respondents better represent individual members than corporate or other members.)

This means that it is inappropriate to apply the 1:66 vehicle:member ratio to the 55% of respondents who reported giving up a car. Instead, a 1:27 ratio is used, which represents the vehicle: member ratio in the United States in 2002 (Shaheen, Schwartz & Wipyewski, 2004). The 1:27 ratio represents a good estimate of the ratio of vehicles to active, individual car-sharing members, given that the promotional incentives and pricing structures noted above were less prevalent in 2002; and that business usage comprised a much smaller segment of the market; although it may be a slight underestimate given continuing efforts by car-sharing operators to improve efficiency and increase utilization. The 1:27 ratio is also consistent with the studies reported in Exhibit 4-4.

Applying this ratio means that **each car-sharing vehicle is estimated to take 14.9 private cars off the road** – a net reduction of 13.9 vehicles. Applied to the entire US fleet of 939 car-sharing vehicles in December 2004, the estimate yields a net reduction of more than 13,000 cars. If members who reported delaying the purchase of a vehicle are included, the net reduction is substantially greater.

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A total decline of more than 13,000 cars might indeed be large enough to create a noticeable impact on auto ownership and traffic in the neighborhoods where these individuals lived. We can say that these numbers represent a minimum number of autos taken off the streets, because those persons who sold more than one car as a result of car-sharing membership should probably be added to these calculations. Unfortunately, data from the internet survey do not allow us to precisely calculate the numbers of cars sold.

Persons who reported being able to sell their own car still tended to have access to another car in the household. They also more often tended to be living with someone else, male, and in the upper income brackets (over $100,000 per year).

Those who reported that they were able to sell the household's second car more often tended to have lower annual incomes (below $20,000) and not upper incomes (above $125,000). They were also more often female, not car owners, and less than 34 years of age and not over 45.

Those who reported that they postponed buying another car more often tended to have lower annual incomes (below $30,000) and not upper incomes (above $125,000). They also tended to be younger (under age 34) and not in the 55 to 64 age bracket.

These results are surprising in several ways. Firstly, they suggest far more dramatic impacts on vehicle ownership than previous studies. As shown in Exhibit 4-5, previous studies indicate that around 20% of car-sharing members sell a car. Exhibit 4-6 suggests that the percentage may lie at more than 50%, with by far the greatest impact being on second car ownership. Meanwhile, 70% of members have been able to postpone buying a car – again, far greater than the figure suggested by previous studies.

One possibility is that the long-standing nature of the car-sharing members responding to the survey – on average, they had been members for 19.5 months – has allowed greater time for these impacts to become evident. Alternatively, it could indicate that car-sharing operators are targeting second car owners rather than car-free households as the market matures beyond the early adopters. Note that other, recent studies have also suggested vehicle ownership impacts of greater magnitude than previous research. Lane (2005), for example, reports that each PhillyCarShare vehicle removes an average of 22.8 cars from the roads – 10.8 cars from members who give up a car, plus 12.0 cars from members who avoid purchasing a vehicle. Often,

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the greater impacts are due to decreasing vehicle:member ratios, rather than to a greater proportion of members selling their cars.

Another, simpler way of examining changes in vehicle ownership is to ask members what they would do if car-sharing services stopped. These results are discussed in full below, but it should be noted here that nearly one-third stated that they would buy a car.

4.3 Travel Behavior Changes and Related Impacts

Potential Impacts

Reduced Vehicle Travel

Car-sharing, according to its proponents, can have a major impact on the travel behavior of its members by reducing the number and length of trips. This is largely a function of changes in vehicle ownership: once members give up their cars, the automobile will no longer be the "default mode" for every trip. Rather, it is argued, members will weigh up the cost, travel time and comfort of different modes of travel, such as transit, car-sharing and walking, on a more rational basis, before deciding which to use for a particular trip. In turn, reduced vehicle travel translates into a range of other benefits – some straightforward, such as reduced emissions, and some more speculative, such as increased physical activity and support for local shops and services.

The manner in which car-sharing converts fixed driving costs into variable ones may be largely responsible for these changes in travel behavior. The costs of driving can be divided into fixed costs, such as car payments and insurance, and variable costs, such as gasoline, tolls and non-residential parking. Once the decision has been made to own a car, these fixed costs are (correctly) treated as sunk costs by a household (Steininger, Vogl & Zettl, 1996), and perceptions of the cost of a trip are based on variable costs – or even just gasoline and parking – alone. Since fixed costs account for the majority of driving costs – 80% or more for a car that is driven 10,000 miles per year or less – this means that the economics of driving are heavily skewed (Exhibit 4-7).

Most car-sharing operators, in contrast, charge for time used and/or mileage driven, meaning that almost all driving costs become variable and are highly visible to members. In the perceptions of members, driving therefore becomes more expensive, and car-sharing members, "mindful of the cumulative costs of driving," practice a "more resourceful form of automobility"

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(Cervero & Tsai, 2003). As shown in Exhibit 4-8, there is a striking contrast between the marginal costs of a trip for car-sharing and private vehicle ownership. It suggests that the threshold for the cost-effectiveness of car-sharing is 5,000 miles per year.[5]

Exhibit 4-7 Components of Driving Costs

Variable (Operating) Costs	Cost Per Mile
Gas and oil	$0.061
Maintenance	$0.039
Tires	$0.015
Added depreciation (per 1,000 miles above 15,000/yr)	$161
Fixed (Ownership) Costs	**Cost Per Year**
Insurance	$1,181
License, registration, taxes	$167
Depreciation (15,000 miles/yr)	$3,051
Finance charges	$554

	Miles Driven per Year		
Annual Costs	**10,000**	**15,000**	**20,000**
Fixed Costs	$4,953	$4,953	$4,953
Variable Costs	$1,150	$1,725	$3,105
Total Costs	$6,103	$6,678	$8,058
Fixed costs as a % of total costs	**81%**	**74%**	**61%**

Source: Adapted from American Automobile Association (2003).
Figures are for a small car (2003 Chevrolet Cavalier LS).

5. See Section 4.4 for a discussion of the applicability of AAA motoring cost data.

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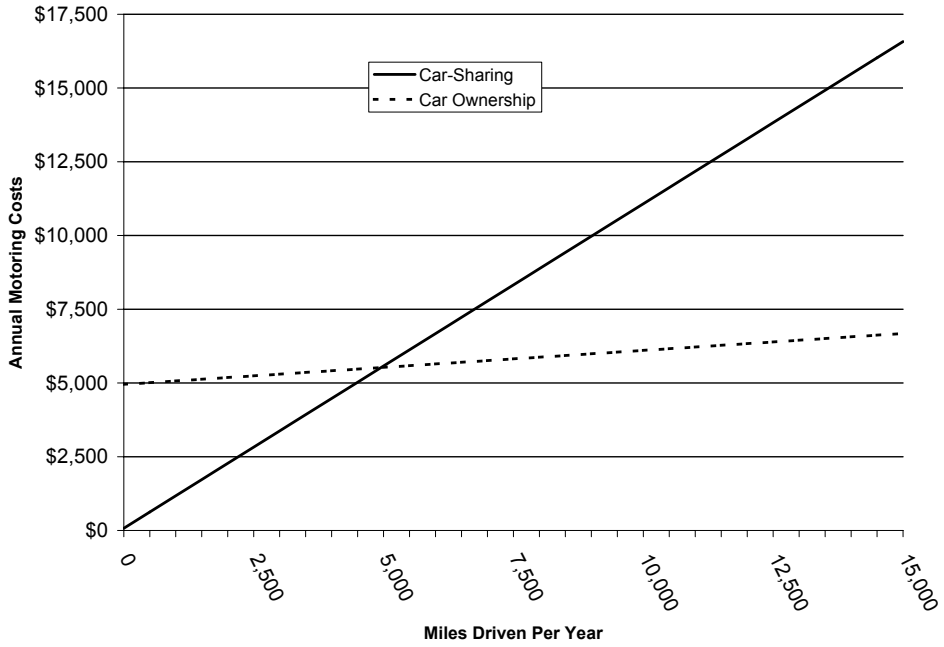
Exhibit 4-8 Cost per Trip, Car-Sharing vs. Ownership



Motoring costs based on AAA figures. Car-sharing costs based on I-GO (Chicago) July 2004 rates, assuming hourly costs equate to $0.60 per mile, i.e. members drive 10 miles per hour reserved. Actual costs will be lower if rental cars are used for longer trips.

While changes in vehicle ownership may be the main driver behind reduced vehicle travel, proponents have also suggested other mechanisms through which car-sharing can produce these benefits:

- **Provide access to a car during the working day.** Many employees drive to work because they need a car during the working day – for example, to visit clients or run errands. According to surveys in the San Francisco Bay Area, 11% of commuters cite the need for a car for work as an impediment to commuting by transit, bicycle or carpool (RIDES for Bay Area Commuters, 2003). Providing car-sharing at workplaces may help to eliminate this barrier, and many employers have introduced car-sharing as a part of their commute trip reduction program.
- **Promote compact development.** As discussed in the section above, car-sharing can help to increase development densities through lowering parking ratios. In turn, a large body of research suggests that compact development reduces vehicle travel – as residential density doubles, vehicle miles traveled per capita falls by approximately 20% (Holtzclaw et al., 2002). While this mechanism is perhaps the most difficult to confirm directly through empirical studies, it may represent the most important long-term benefit if car-sharing is introduced on a large scale.
- **Provide mobility insurance.** "Guaranteed Ride Home" programs have had considerable success in persuading people to carpool or ride transit to work, through providing a guarantee that they will not be stranded in the event of an emergency – such as a sick

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child, or needing to work late. Car-sharing may function in the same way, if cars are provided close to the workplace or at transit stations.

Induced Vehicle Travel

At the same time as car-sharing may reduce vehicle travel among some members, it provides easier access to a vehicle for members who did not previously own a car. While some car-sharing trips may have been otherwise made by rental or borrowed cars, or by taxi, others are likely to represent new vehicle trips. Members may use car-sharing to access new destinations, or substitute for trips previously made by transit, bicycle or walking.

It is important to recognize that induced travel can be viewed as a benefit, if car-sharing is serving to promote greater mobility and reduce travel times for members. One example often cited by car-sharing proponents concerns lower-income households, where providing access to a car may help to overcome issues of social exclusion. Another, in the context of campus car-sharing, relates to providing mobility for students who may be subject to restrictions on bringing their own cars to school. However, induced travel will offset or reverse any reductions in vehicle travel from members who drive less.

Transit Ridership

Changes in transit ridership will largely depend on the net impacts on vehicle travel. Should overall vehicle travel fall, i.e. with reduced travel outweighing induced travel, this is likely to be realized partly as an increase in transit ridership, along with greater walking and cycling. Should vehicle travel rise, car-sharing may substitute for some trips formerly made by transit.

There are also three potential impacts on transit ridership specifically:

- **Combined transit/car-sharing trips.** Many car-sharing operators point to the potential to take transit for the line-haul segment of the journey, before picking up a car-sharing vehicle at the station to travel the "last mile" to the destination. This may be particularly important to reach suburban locations from congested central cities, or where there are bridge tolls or similar psychological barriers. For example, a Manhattan resident might take Metro North rail service to White Plains, NY, and pick up a car there to drive the final leg of the journey.
- **Access to car-sharing vehicles.** In some cases, members may not live within easy walking distance of a car-sharing location, or vehicles at the closest location may already be reserved. In these cases, they may use transit as an access mode.

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- **Changes in peak orientation.** Most transit trips, especially those that utilize the park-and-ride facilities at transit stops, are heavily peak oriented, placing demands on the system at a time when capacity is most constrained (see, for example, Chesapeake Bay Foundation, 2001). In contrast, car-sharing trips often take place at evenings and weekends, when surplus capacity is available. This has particular implications where station lots regularly fill to capacity, and where park-and-ride commuter spaces are given over to car-sharing. In this instance, peak commuter trips are likely to be replaced by off-peak transit-car-sharing trips.

Emissions and Gasoline Consumption

As with transit ridership, the impacts of car-sharing on emissions and gasoline consumption will largely depend on its net impact on vehicle travel. However, there may be additional benefits from the use of more fuel-efficient cars by car-sharing operators. Even if vehicle travel remains unchanged, reductions in emissions and fuel consumption could therefore be expected.

These additional benefits may be realized in three main ways:

- **Use of alternative-fuel vehicles.** Hybrids and electric vehicles have been used by many car-sharing operators (Chapter 2), and some automobile manufacturers have seen this as a way to meet mandates for the introduction of low-emission vehicles (Shaheen, Wright & Sperling, 2002). However, they account for a relatively small proportion of the car-sharing fleet at present.
- **Replacement of older vehicles.** It has been suggested that car-sharing members tend to own disproportionately older, more polluting vehicles. To the extent that these are given up as members join the program, car-sharing will bring further emissions benefits. (See, for example, Rydén & Morin, 2005.)
- **Use of smaller cars.** The core fleet of most car-sharing operators consists of compact, fuel-efficient cars such as a Scion or a Honda Civic. Larger station wagons, sport utility vehicles and pick-up trucks are available for special purposes (Chapter 2). This means that members have the ability to select the "right" vehicle for a specific purpose, rather than using a large household car for all trips, from errands to camping expeditions. At present, however, this impact is more speculative compared to the benefits from alternative-fuel and newer, fuel-efficient vehicles, for which there are firmer data (see following section).

Exhibit 4-9 shows some comparisons among vehicles commonly used by car-sharing operators, indicating that use of hybrid vehicles can more than halve gasoline consumption and reduce smog-forming emissions.

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Exhibit 4-9 Fuel Economy and Emissions Ratings of Vehicles Commonly Used by Car-Sharing Operators

Vehicle	City MPG	EPA Air Pollution Score*
Toyota Prius (hybrid)	60	8-9
Honda Civic	29-36	2-6
Scion xA and xB	31-32	2-3
Dodge Neon	25	3
Volkswagen Jetta	22-24	3-9
Ford Explorer 2WD	15-16	1-6

* Air Pollution Score refers to pounds of smog-forming emissions per 15,000 miles. A rating of 10 indicates the lowest emissions (0-1.0 lb).
Source: US EPA (www.fueleconomy.gov), figures for 2005 models.

Empirical Evidence

Methodological Considerations

In general, the empirical evidence on changes in travel behavior is less definitive compared to that concerning vehicle ownership impacts. This is partly a reflection of complex methodological problems. Surveys offer the simplest approach, but self-reported data on vehicle mileage – particularly for years past – is unlikely to be reliable (Katzev, 2002). Travel diaries tend to only cover a short time period for a small sample. While mileage driven in car-sharing vehicles is readily available from most reservations systems, this does not include mileage driven in rental cars, borrowed cars, or other household vehicles. Research also runs into questions of causation. While members may drive less once they join a car-sharing program, is this due to car-sharing itself, or was their decision to join a reflection of external factors causing them to reduce their vehicle travel, such as moving to a more urban area?

An alternative, more sophisticated approach, employed by Cervero & Tsai (2003), uses travel diaries coupled with a control group methodology. However, while potentially avoiding problems of inference, this approach does bring its own set of problems. In the Cervero research, weekdays/weekends and work/non-work days were analyzed separately. However, the only statistically significant change in vehicle travel was obtained for weekday work days – whereas any induced travel would be expected to be on weekends, when shared cars are used the most.

It is extremely difficult to find a good control group. In the Cervero research,

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the control group consists of members who had expressed interest in joining a car-sharing program, but had yet to do so, for example because service was not available in their neighborhood. However, subsequent expansions mean that car-sharing is now available to most San Francisco residents, suggesting that there are other factors behind the reason not to join. There are major differences between the sample of members and the control group, such as differing levels of education, car ownership, and baseline vehicle travel. As Lane (2005) points out: "These differences imply differing mobility needs that may have contributed to (1) contrasting decisions of whether to join City CarShare, or (2) affected changes in travel behavior independent of membership."

Changes in Vehicle Travel

Exhibit 4-10 summarizes published studies on the impacts of car-sharing on vehicle travel. As can be seen, many studies show no statistically significant change. However, those that do suggest that car-sharing does lead to reduced vehicle travel, although the magnitude of the change varies considerably.

The key variable is often the relative proportion of members who gave up a vehicle – who will usually drive less as a result – and members who gain access to a car, who will account for most of the induced travel. It should be noted that the magnitude of the former will generally outweigh that of the latter. As Lane (2005) points out in the Philadelphia context, "any upward movement in the miles driven by members who gained access to a car is limited to the small amount they currently drive PhillyCarShare's vehicles, which averages just 29.9 miles per month (33.9 for members who avoided acquiring a car, and 27.5 miles for members who simply gained access)."

There is also evidence that the impacts on vehicle travel change over time, as a car-sharing program matures. An evaluation of the City CarShare program in San Francisco found a net increase in vehicle travel after the first year, but a reduction after two years. Cervero & Tsai (2003) conclude:

> *Evidence of travel suppression stands in stark contrast to first-year impacts wherein members' average VMT had increased. Early adopters, many drawn from the ranks of environmentalists and avid cyclists who owned no car, began logging vehicle miles on the streets of San Francisco; with time, as the program has attracted a more mainstream clientele, the novelty of car-sharing has worn off, and members have shed car ownership, "induced travel" appears to have been replaced by "reduced travel."*

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Both the San Francisco and Portland studies also suggest that vehicle travel per member declines over time – possibly as they become more aware of the real cost of each vehicle trip, or as the "novelty effect" of car-sharing wears off over time (Katzev, Brook & Nice, 2000; Cervero & Tsai, 2003).

There is even less information on the cost-effectiveness of car-sharing as a trip reduction strategy, given the difficulties in calculating both the public investment and the total reduction in vehicle travel. The results of these types of calculations will depend on the way in which "public investment" is calculated, since many programs have received a combination of financial and in-kind support from several different agencies. One study suggests that car-sharing is relatively expensive compared to other demand management programs, but that the costs should decline as operators become more self-sufficient. Using British data, Cairns et. al. (2004) estimate the cost at about 15 cents per mile of travel reduced.[6] On the other hand, communities that have offered limited public support for car-sharing have received the trip reduction benefits essentially for free.

It is important to note that studies have focused on the impacts of residential car-sharing. Only one study reported here has considered business car-sharing in detail, and the overall effects were unclear.

6. Using April 2005 exchange rate of $1.885 US to one British pound.

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Exhibit 4-10 Research on Vehicle Travel Impacts

Context	Results	Reference
European Research		
Germany	The share of travel accounted for by motor vehicles fell from 63% to 41%, after members joined.	Baum & Pesch (1994), cited in Harms & Truffer (1998)
Austria	For users who previously had a car available, annual VMT fell by 62%, from 10,088 to 3,855 miles. For users with no car previously available, annual VMT rose by 118%, from 830 to 1,809 miles.	Steininger, Vogl & Zettl (1996)
Netherlands	Reduction in VMT for both former car owners (37% reduction) and members who did not previously own a car (29%).	Meijkamp & Theunissen (1996), cited in Lane (2005)
Switzerland	Members who give up their cars after joining reduce their annual motor vehicle travel from 5,779 to 1,616 miles per year – a reduction of 72% (or 58% if travel by motorcycle is included).	Muheim & Partner (1998)
Bremen, Germany	Average VMT fell by 32% after members joined, from 3,144 miles per year to 2,133. Figures refer to those with a combined car-sharing/transit annual pass.	Koch (2002)
United Kingdom	Members who previously owned a car (51% of the sample) reduced VMT by 1,123 miles per year (26%). Members who did not previously own a car increased annual VMT by 473 miles. Note small sample size (n=96).	Ledbury (2004)
Bremen, Germany	Average VMT reduction of 1,925 miles per year (45%), leading to a 54% reduction in CO_2 emissions*. This includes a small group of members (7% of the sample) who increased annual VMT by 500 miles (60%).	Rydén & Morin (2005)
Belgium	Average VMT reduction of 1,865 miles per year (28%), leading to a 39% reduction in CO_2 emissions*. This includes a small group of members (7% of the sample) who increased annual VMT by 745 miles (14%). Most respondents (65%) reported no change.	Rydén & Morin (2005)
Bremen, Germany and Stockholm, Sweden	Business car-sharing may lead to a slight increase in total car mileage for work-related purposes, given easier access to vehicles. However, nearly 30% of employees report that car-sharing has helped them drive to work less often.	Rydén & Morin (2005)
North American Research		
Portland, OR	Vehicle mileage for those who owned a vehicle at time of joining fell by 18%, from 103.3 to 84.4 miles for the week of the trip diary, although this result was not statistically significant. For those who did not own a vehicle, it rose from 0.3 to 24.9 miles.	Katzev, Brook & Nice (2000)
Portland, OR	Travel diaries suggested a 7.5% reduction in vehicle travel after joining, but results not statistically significant.	Cooper, Howes & Mye (2000)
San Francisco, CA	Members' daily VMT (weekday/workday) fell from 2.80 to 1.49** miles. Among the control group of non-members, it rose from 5.45 to 20.85. These figures refer to second-year impacts; first-year impacts showed a net increase in VMT.	Cervero & Tsai (2003)
Arlington, VA	Members reported a reduction in VMT of 43%, or 3,250 miles per year. 45% of respondents reported reducing driving after joining car-sharing, while 35% said they increased their driving. Nearly half of respondents (49%) said they walk more often because of their involvement in car-sharing, and 54% said they use transit more often.	Price & Hamilton (2005)

* Based on changes in vehicle fleet mix, since car-sharing vehicles tend to be more fuel-efficient. Includes increased emissions from public transportation.

** This measure is referred to as "mode adjusted VMT" by Cervero & Tsai.

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The results of our internet survey also show a substantial decline in the number of miles driven. (It should be noted that since aggregate annual figures were requested and that travel diaries were not used, the accuracy of the figures reported may be less than ideal.) Respondents, on average, reported driving about 3,850 miles per year (320 miles per month) at the time of the internet survey. This is approximately 63% of the average mileage that they previously drove, which is a substantial reduction in driving of almost 40% (Section 3.1). Note that Zipcar, which did not participate in the survey, claims an even greater reduction based on its own 2004 survey – an almost 80% reduction in VMT from 5,295 to 1,068 miles per year after joining car-sharing (Zipcar, 2005).

While, on balance, there was a substantial net reduction and more than 45% of households reported driving less, many households did increase their VMT substantially (Exhibit 4-11). Since there may have been many recent changes in the lives of these members (employment, marriage, home location, etc.), not all of the changes in vehicle miles should be attributed to their participation in car-sharing.

Exhibit 4-11 Self-Reported Changes in Vehicle Travel

Change in VMT After Joining Car-Sharing	Percent of Respondents
Reduced Travel	
By less than 50%	18.3%
By more than 50%	27.5%
No change reported	28.6%
Increased vehicle travel	
By less than 50%	11.5%
By more than 50%	14.7%

Figures refer to respondents who provided both before and after information.

Source: Car-Sharing Member Survey.

Changes in VMT and percentage changes in VMT did show some variation according to specific characteristics. In terms of changes in vehicle miles traveled:

- **Auto ownership:** There was a bi-modal split among the respondents who did not currently own cars, meaning that more than average numbers of respondents reported either a substantial decrease in mileage (more than 7,500 miles per year) or a substantial increase in mileage (more than 2,500 miles per year).

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- **Age group:** Another bi-modal split was in evidence among persons in the 25 to 34 year old group, who reported either a substantial decrease in mileage (a decrease of 5,000 miles or more) or a substantial increase in mileage (more than 2,500 miles per year).
- **Gender:** Another bi-modal split: females reported either a substantial decrease in mileage (a decrease of 5,000 miles or more) or a slight increase in mileage (from 1 to 2,500 miles more).
- **Education:** Persons with a Bachelor's degree more often than average reported a small increase in mileage (from 1 mile to 2,500 miles more).
- **Operator:** Members of one car-sharing company were more likely to report decreases of 2,500 to 10,000 miles than the members of other car-sharing companies, whose members tended to show no larger or smaller than average figures for any of the changes in mileage.
- There were no substantial variations evident due to income or household size.

In terms of percentage changes in vehicle miles traveled:

- **Auto ownership:** There was a bi-modal split among the respondents who did not currently own cars, meaning that more than average numbers of respondents reported either a substantial percentage decrease in mileage (76% or more) or a substantial percentage increase in mileage (more than 26%).
- **Age group**: Persons in the 25 to 34 year old group more often than average reported a 26% to 75% increase in mileage.
- **Gender:** Females more often than average reported a percentage increase in mileage of 50% or more.
- **Education:** Persons with a Bachelor's degree more often than average reported a small increase in mileage (from 1 mile to 2,500 miles more).
- **Household size:** Persons in two-person households were more likely than average to report mileage decreases of from 1% to 50%.
- **Operator:** Members of one car-sharing company were more likely to report decreases of 26% or more than the members of other car-sharing companies, whose members tended to show no larger or smaller than average figures for any of the percentage changes in mileage.
- There were no substantial variations evident in percentage changes in mileage due to income or education.

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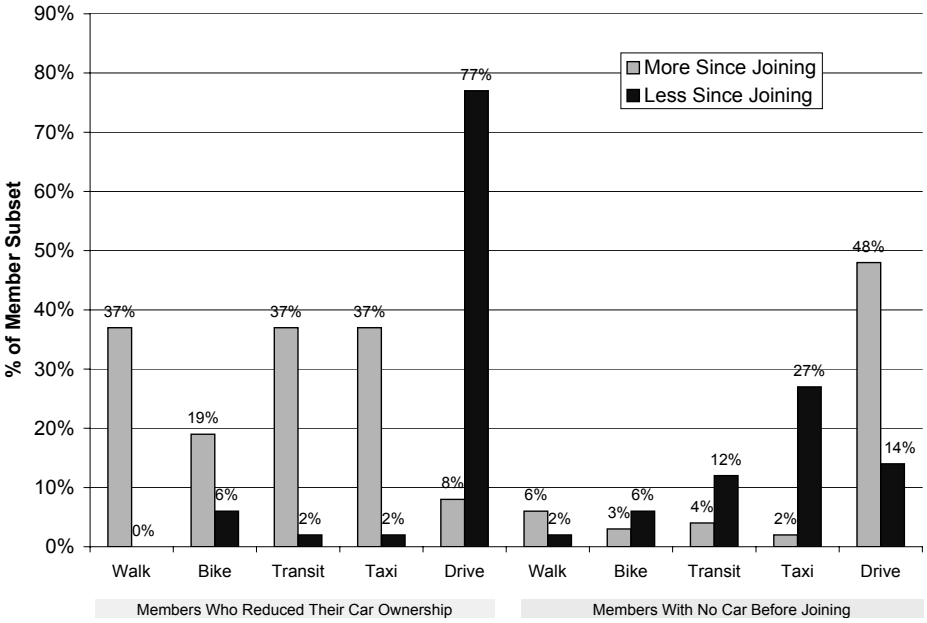
There are complex travel effects for those persons who, as a result of joining car-sharing, sold their car or the family car. Of those who sold a car and provided information on changes in vehicle miles traveled, 36.9% decreased their miles traveled, 28.6% made no change, and 34.5% increased their VMT. More than half of those persons who sold cars and increased their mileage driven (56.7%) had greater than 50% increases in their miles driven.

Other Travel Behavior Impacts

While a relatively small number of studies have examined changes in vehicle miles traveled – which generally requires the use of travel diaries – others have gathered more qualitative information on changes in travel behavior. Typically, questions ask whether the respondent walks, cycles or takes transit more or less after joining. Exhibit 4-12 shows an example from Philadelphia, which is fairly typical of results obtained elsewhere.

Exhibit 4-12 Self-Reported Changes in Travel Behavior, PhillyCar-Share Members



Source: Lane (2005)

Other surveys have probed the issue of mode of access to car-sharing – important if the effects on transit ridership are to be quantified. In San Francisco, 68% of City CarShare trips were accessed on foot, 18% by transit, and 9% by bicycle (Cervero & Tsai, 2003). City CarShare also reports considerable success in encouraging its members to make combined transit/car-sharing trips, particularly to avoid congestion and tolls on the San

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Francisco-Oakland Bay Bridge. For example, 25% of trips using the City CarShare vehicle at Ashby BART station in Berkeley are taken by members with a San Francisco home address, compared to 2-3% at other Berkeley and Oakland locations.[7]

In Germany and Belgium, Rydén & Morin (2005) report that the net increase in transit ridership is 685 miles per member per year, with the largest increase occurring on weekends. They find that 5% of members ride transit less, 22-32% ride more, and 63-72% report no change. Muheim & Partner (1998) reports that most of the increased transit demand from car-sharing in Switzerland takes place at off-peak times.

There is also empirical support for the theory that car-sharing promotes the use of more fuel-efficient vehicles. Cervero & Tsai (2003), for example, found that vehicles owned by car-sharing members in San Francisco tended to be older – on average nine years old, with an odometer reading of 73,000 miles. They conclude that City CarShare reduces gasoline consumption and emissions, partly because of reduced automobile travel, but also because car-sharing vehicles tend to be small, fuel-efficient and carry several people. Rydén & Morin (2005) conclude that car-sharing vehicles consume 11% less fuel on average, compared to the vehicles given up by members.

Results from our internet survey support many of the positive travel behavior outcomes of car-sharing noted in other studies, in terms of both a reduction in vehicle travel and an increase in overall mobility. These qualitative outcomes are shown in Exhibit 4-13.

Respondents reported being able to get to destinations that were formerly not accessible and to travel more often. One of the focus group respondents reported that "I'm less reluctant to go to suburban parties now because I used to have to stay overnight or get a ride back from a drunk stranger – now I can zip out and zip back and it's so easy." Respondents also reported that they made more multi-purpose trips (i.e. trip chaining) and used transit more often. Overall, 83.1% of the respondents said that they felt safe when using public transit: 54% agreed with this statement and 29.1% strongly agreed. On the other hand, several focus group members reported that they take fewer longer-distance local trips with car-sharing than with an owned car because of the costs associated with higher mileage trips.

Exhibit 4-13 also provides specific results for respondents who reported

7. Analysis of 2004 City CarShare data by Bryce Nesbitt.

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selling a car due to joining car-sharing. The most notable differences are that persons who sold a car more often reported driving less and saving money on transportation.

Focusing on impacts, Exhibit 4-14 adds to demographic information from the internet survey presented in Chapter 3 by indicating how the impacts of car-sharing differ by demographic groups. Age seems to make the most difference of all the demographic variables, having particularly strong relationships in terms of making fewer trips by auto, using transit more often, and walking more often. Income levels come into play in a number of instances, but education does not, which is somewhat surprising.

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Exhibit 4-13 Effects of Car-Sharing Membership on Travel Behavior

Effects of involvement in car-sharing	Members	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
Make fewer trips by auto	All	6.2%	10.0%	14.9%	35.3%	33.7%
	Gave up car	2.3%	4.2%	9.2%	36.4%	47.8%
Save money on transportation	All	6.3%	14.9%	16.7%	33.1%	29.0%
	Gave up car	3.5%	13.5%	14.7%	26.8%	41.5%
Able to get to places I couldn't	All	8.4%	6.0%	26.7%	26.3%	32.6%
	Gave up car	5.8%	5.1%	26.9%	27.6%	34.6%
Able to travel more often	All	9.1%	20.8%	25.4%	23.3%	21.4%
	Gave up car	9.1%	24.3%	28.4%	21.3%	16.9%
Use transit more often	All	9.7%	22.1%	28.6%	23.1%	16.6%
	Gave up car	8.7%	27.1%	31.0%	20.5%	12.7%
Walk more often	All	10.3%	18.1%	34.3%	22.6%	14.7%
	Gave up car	9.0%	21.8%	37.4%	20.9%	10.9%
Can make more multi-purpose trips	All	20.6%	12.1%	45.0%	8.3%	14.1%
	Gave up car	19.6%	13.5%	50.4%	6.4%	10.1%

Source: Car-Sharing Member Survey.

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Exhibit 4-14 Reported Demographics of Car-Sharing Companies

Effects of car-sharing	Demographic characteristics more frequent to this group than to all respondents in general
Make fewer trips by auto	Ages 34 and younger; not 55 and older * Females Not car owners Incomes less than $20,000 and not over $125,000 Members of one Canadian company more often strongly agreed
Save money on transportation	Males Age 55 to 64 Members of one Canadian company more frequently strongly agreed; members of one US company more often disagreed or strongly disagreed
Able to get to places I couldn't	Not ages 24 and under Females Incomes of $50,000 to $60,000 and $100,000 to $125,000, but not less than $30,000 Members of one Canadian company more often strongly agreed
Able to travel more often	Age 55 and over; not ages 24 and under Males Incomes $10,000 or less
Use transit more often	45 and older; not 24 and under * Members of one US and one Canadian company more often agreed or strongly agreed
Walk more often	55 and older * Members of one US and one Canadian company more often agreed or strongly agreed; members of one US company more often disagreed
Can make more multi-purpose trips	Age 65 and over; not ages 24 and under Not car owners Incomes not less than $20,000 Members of one US company split their answers: they more often than average disagreed or agreed than members of other companies

* This is an especially strong relationship.

Source: Car-Sharing Member Survey.

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Car-Sharing: Where and How It Succeeds

As noted in Chapter 3, having access to an automobile was seen as a distinct advantage by many car-sharing members, since there are many destinations and activities in today's world that are much more accessible by cars than by any other mode. Respondents reported that car-sharing was particularly important to them for recreation and social trips, other shopping, and grocery shopping. Special activities like transporting family and friends, moving furniture or hauling large loads, going to medical appointments, and visiting relatives also were made much easier and more comfortable when using a car.

Effects on travel behavior would not be complete without an assessment of how car-sharing members got to those cars. The overwhelming majority walked to the car-sharing vehicle (Exhibit 4-15) – unsurprisingly, since most members have car-sharing within a few blocks of both their home and workplace (Exhibit 4-16).

Exhibit 4-15 Mode of Access to Car-Sharing

Mode of Access	Percent of Respondents*
Walk	75.2%
Public transportation	18.6%
Bicycle	8.7%
Passenger in car	2.6%
Taxi	0.9%
Other	1.7%

* Multiple responses permitted.

Exhibit 4-16 Distance to Car-Sharing

Distance to Car-Sharing Location	From Home	From Work
At work	N/A	9.0%
Within a block	28.0%	23.2%
Within several blocks	57.2%	47.2%
Need to take transit/other vehicle	14.7%	20.3%

The converse of information about changes in travel behavior due to car-sharing is the speculation by car-sharing members about how their lives would be different if they did not have access to car-sharing. (Some of this information is also discussed in Chapter 3.) If car-sharing had not been available for the last trip taken using car-sharing, 29.3% of the respondents to the internet survey would not have made that trip; another 20% would

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have used public transportation. If car-sharing services stopped, respondents reported that they would take a number of actions[8], including using public transit more often (more than one-third of the respondents), while about one-third reported that they would get rides from friends, one-third would use taxis more often, and just less than one-third would buy a car.

Overall, these results suggest some complex impacts on transit ridership. On the one hand, car-sharing is clearly substituting for many transit trips. Members are choosing car-sharing because they had things to carry, for example, or had to make multiple stops (see Chapter 3); while feasible by transit, these trips may be time-consuming or difficult. This substitution effect, however, is likely to be somewhat less than the 20% who stated that they would have used public transportation for their last trip had car-sharing not been available, because many of these respondents have also given up a car since joining car-sharing and would presumably have used their own vehicles instead. Moreover, any substitution effect is limited by the relatively infrequent use of car-sharing – members in our survey report a median of two trips per month (Section 3.1).

On the other hand, many new transit trips are being generated. Partly this is due to the use of transit as an access mode, which (at 19% of car-sharing trips) is likely to cancel out any substitution effect from use of car-sharing instead of transit. On top of this, there is evidence of a wider increase in transit ridership, most probably resulting from a reduction in vehicle ownership and workplace Transportation Demand Management programs. Nearly 40% of members state that they use transit more often as a result of their involvement in car-sharing.

As well as using car-sharing, 81.2% of the respondents also rent cars from time to time, for the multiple reasons shown below:

- Rented cars cost less for longer trips 84.5%
- Don't have to worry about mileage charges 44.0%
- Have more types of vehicles with rentals 15.1%
- Other reasons 19.3%

8. Multiple responses permitted.

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Other reasons for renting a car included:

- Ability to use the car at will – no reservation process – better availability at the last minute when I need a car
- Business trips out of town – car-sharing is not available everywhere
- One-way long-distance trips
- Mode that costs less for that particular trip
- Vacations and long weekends – can't book car-sharing cars for that long
- Work-related trip and the company already has arrangements with a rental car company.

These comments are highly consistent with the results of the focus groups, in which respondents reported that renting cars made more sense for long trips, one-way trips, and trips to other cities for business or vacation purposes. But most car-sharing members disliked "the hassle of renting cars" and would gladly use car-sharing for longer trips or one-way trips if these options were available. Another compliment to car-sharing in contrast to renting was "The cars are nice too. They're not your typical rental cars."

4.4 Transportation Costs

Potential Impacts

While car-sharing has been cited as a way for households and businesses to lower their transportation costs, it is difficult to generalize given different expenditure and travel patterns. In the example shown in Exhibit 4-8, the threshold below which car-sharing is cheaper is about 5,000 miles per year. However, this threshold will vary considerably depending on:

- The degree to which travel patterns change – e.g. if transit, walking or cycling substitutes for some trips previously made by automobile
- The fee structure of the car-sharing operator, and the overall level of charges
- The proportion of driving costs accounted for by car-sharing, and the degree to which rental cars and taxis are used where these would be cheaper for a given trip
- The out-of-pocket costs of vehicle ownership, which may differ markedly from the AAA estimates – particularly if there are no car payments or finance charges outstanding, or (in the other direction) if residents have to pay for parking

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- The degree to which vehicle use can be shifted – for example, if the primary vehicle can be used more intensively in households where car-sharing replaces a second car

Similar factors will affect potential savings from businesses that replace fleet vehicles with a car-sharing membership. This is a more complex area, and many organizations find it difficult to account for the total costs of managing vehicle fleets. Some organizations such as the cities of Philadelphia and Berkeley calculate significant cost savings, and these are discussed in Section 5.5, Local Government, and Section 5.7, Employers and Businesses.

Empirical Evidence

The impacts of car-sharing on transportation costs have attracted little attention from researchers. There are, however, some exceptions. The first-year evaluation of CarSharing Portland found that members estimated they saved $154 per month in transportation costs. According to surveys of PhillyCarShare members, 40% say that car-sharing has saved them money, while about 16% are choosing to spend more (Lane, 2005). Average savings, for those who could quantify the amount, were $2,059 annually. Zipcar claims an average of $435 in monthly savings from replacing vehicle ownership with car-sharing, for those members that report a saving (Zipcar, 2005).

In general, it can be assumed that most households and businesses will approach this decision in a rational, economic manner, and not substitute car-sharing for vehicle ownership if it would increase their driving costs. Many car-sharing operators provide web-based cost calculators to assist members in making the comparison (Exhibit 4-3).

Results from the internet survey showed low levels of expenses on car-sharing on a monthly basis: the average per month expenditure for car-sharing was reported to be $61.26; the median was reported to be $40.50. The minimum was $1.00 and the maximum reported was $500 per month. (We assume that all of these costs were out-of-pocket costs and did not include annualized membership fees or deposits.) Eighty-seven percent of respondents paid for all costs themselves. Seven percent split the costs with their employers; in 2.5% of all reports, the employer paid all costs, and a similar number had some other arrangement (such as splitting costs with someone else or writing off the costs as a business expense).

Some focus group members reported savings of $100 or more that they attributed to using car-sharing instead of alternative modes. Other focus group

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members reported that "You have more money to spend on other things [after joining car-sharing]." Another report was that "Now I can spend more money on rent than on the car." One focus group member reported that "I consider [the cost of car-sharing] a lot, but when I got my annual summary, I had spent $1,100 last year on car-sharing, and somebody at work told me that's less than I would pay for insurance if I owned a car."

We noted in Chapter 3 that a certain portion of car-sharing members could be classified as "economizers." These would include at least some of the 82.3% of the respondents who agreed or strongly agreed that "saving money is very important to me." They generally do not own cars, have lower incomes, and are younger than other car-sharing members. In our focus groups, these persons were highly attuned to the costs of specific trips, and tended to base their mode choices for specific trips, to a large extent, on cost.

4.5 A Proposed Standard Methodology

Several car-sharing operators and partner organizations interviewed as part of this research expressed a desire for a simple methodology that could be consistently used to assess the local impacts of car-sharing in a given community, and benchmark performance against other cities. This section proposes a standard methodology that would fulfill this need. See Chapters 7 and 8 for a more general discussion of evaluation techniques and of potential mechanisms to aggregate these data on a national scale.

The major considerations for this methodology are:

- **Simplicity and conciseness.** It is designed to be straightforward to add on to any form of member communication, such as an application form or market research effort, without the need for a dedicated survey. Naturally, this does not preclude car-sharing operators, their partners or independent researchers from adding questions or supplementing them with other research techniques such as travel diaries.
- **Longitudinal.** One of the major constraints of simple evaluation surveys of car-sharing has been their reliance on self-reported information for vehicle ownership and use for years past. This makes it difficult to assess the extent of the impacts, particularly if persons have been car-sharing members for several years. The recommended methodology uses a longitudinal analysis similar to the techniques used by I-GO in Chicago and the City of Alexandria, VA.

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The recommended questions are adapted from those used for the online survey for this project, as follows:

- **How many vehicles** are owned or leased by you and members of your household?
- On average, how many days a week do you **drive alone** to work or school?
- Do you hold a monthly or annual **transit pass**?
- Approximately how many **miles do you drive per year**? (Include miles in your own vehicle, plus those in borrowed, shared and rental cars.)
- If car-sharing stopped, would you **buy a car**?
  - Yes – almost certainly
  - Yes – probably
  - No – probably not
  - No – almost certainly not

These questions should be included on both the membership application form and on annual renewal materials. (If no annual renewal is necessary, surveys should be distributed annually.) The responses should be included in the operator's membership database. This approach has two advantages:

- It allows for longitudinal analysis, i.e. changes for individuals to be tracked over time, and minimizes reliance on respondents' memories or hypothetical responses. Note that some of the questions (such as number of days driving alone to work or school) have little meaning if the survey is conducted as a single snapshot; the value of the data lies in the ability to compare year-on-year changes.
- It is likely to maximize response rates, since no separate survey form needs to be returned.
- It allows responses to be linked with other membership data, if desired, such as frequency of car-sharing use and residential or workplace location.

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4.6 Conclusions

Car-sharing members report that car-sharing has significant impacts for them. A more difficult question is how large these impacts are for the entire community.

Probably the most profound effect on car-sharing members is the potential for reducing the numbers of vehicles that they own. The biggest reported impact was the ability to postpone buying another car, followed by the ability to sell the household's second car. Being able to sell the only household car was a distant third in this set of benefits. Car-sharing should indeed reduce the numbers of vehicles owned by car-sharing members. This in turn should have ripple effects on the amount of traffic, air pollution, and parking requirements within neighborhoods where car-sharing is active and attractive. (But one focus group member said "I'm happy that car-sharing is getting bigger and bigger, but I don't see cars coming out of my neighborhood and going away, and I wish I did.")

Overall, car-sharing members make fewer trips by auto after becoming active in car-sharing, and their total mileage driven decreases substantially. These changes have positive environmental impacts, are associated with increased transit use, and lead (to some extent) to an increased reliance on walking, which in turn should have long-term health benefits.

Persons involved in car-sharing often realize savings in overall transportation expenses. This is attributable to lower monthly capital costs, lower insurance expenses, lower gasoline and maintenance expenses, and lowered parking expenses. But many car-sharing members report that not having "the hassles of car ownership" is an even greater benefit to them than saving money.

A wider range of more distant destinations becomes available to many car-sharing members. In particular, car-sharing members report being able to travel to larger "big box" stores as one of the key benefits that they realize.

Lane (2005) suggests that car-sharing leads to shifts in environmental values, awareness of costs, and trip-making decisions. The evidence that we have seen suggests an opposite direction of causality: persons with high regards for environmental values are likely to be attracted to car-sharing, as are persons who have a strong focus on travel costs. Car-sharing does change the calculus of trip-making decisions: car-sharing members are much more likely to weigh alternative travel times and modes than other travelers. One

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focus group member reported that "You really think about using the car. It becomes a really thoughtful process." Another respondent reported that "After being a pedestrian here for so long and then having car-sharing, it's made me think more of the car as a tool." A possibly negative feature of current car-sharing operations is that members are highly sensitive to the consequences associated with exceeding reservation times, and do feel under significant pressure to return the vehicles within the specified time frame.

Does car-sharing membership affect long-term residential location decisions? Nearly three-quarters (72%) of PhillyCarShare members say that car-sharing locations are important to where they choose to live (Lane, 2005). In Quebec, the figure is 50% (Communauto, 2004). These findings were not specifically substantiated by the data collected for this project, but one focus group member reported that "If I ever move out of Boston, I want to find a place that has a car-sharing program because I don't want to buy a car. I've never owned a car and I don't want to."

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CHAPTER 5. THE ROLE OF PARTNERS

5.1 What are Partner Organizations?

Car-sharing has only begun to grow as an alternative transportation mode in the United States and Canada. As Chapter 3 pointed out, just 0.03% of the US urban population belonged to a car-sharing organization in 2004. A key reason is the lack of knowledge about what car-sharing is and how it works.

Dr. Marcus Enoch, in a 2002 presentation to the European Union's Mobility Services for Urban Sustainability Project, noted:

> *Overall, the formation of nation-wide organizations to "educate" policy makers and the wider public as to the role and benefits of car share clubs appears to have been a key reason that such schemes prospered in Switzerland and Germany. It is interesting to note that one of the major barriers faced by car share clubs in Canada and the USA, where such knowledge is not yet widespread, is the ignorance of local authorities of the whole car share club concept. (Enoch, 2002, p.1-2)*

If car-sharing is to realize its maximum potential as a transportation option, it will need the help of partner organizations. When Dr. Enoch speaks of local authorities, he is referring to assistance from cities, counties and regional agencies, working as partners with the car-sharing organizations.

A review of the literature on car-sharing, as well as a 2004 survey and 72 personal and phone interviews conducted for this research study, reveals a wide range of potential partner organizations. Survey and interview respondents included cities, counties, state and regional agencies, rideshare agencies, universities, developers and property managers, employers and businesses, transit agencies, consultants, community advocates, a church, and car-sharing operators. (See Appendix C for survey and interview questions and a list of respondents.)

Partner organizations are composed of any entity that helps car-sharing get a stronghold in communities. This help can be as basic as financial assistance and marketing. It can be as concrete as providing parking spaces for car-sharers. And it can be as advanced as integrating policies requiring car-sharing into planning documents,

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or even codifying policies into tax laws. As used in this chapter, partners are those organizations that see a benefit from car-sharing and take actions to help it succeed.

5.2 Which Organizations are Involved?

To obtain a better understanding of the role of partner organizations in the United States and Canada, a survey and literature search were conducted for this research study, with follow-up personal and phone interviews with 72 partner organizations.

Survey Distribution and Response

Announcements about the survey and how to access it on the internet were distributed by car-sharing organizations to their partners. Additional links to the survey were distributed via the World CarShare and Transportation Demand Management listserves, and through direct e-mails to individual contacts found through a web search. This information was supplemented by a literature review and the web search.

Representatives of 49 partner organizations answered the survey.[1] Respondents were located in all sectors of the United States; six were located in Canada. About 58% worked in a public agency, and, of those, most worked for a government organization. The remaining respondents represented a private or non-profit organization. Exhibit 5-1 lists the types of partner organization responding to the survey.

Interviews

Using the survey respondents as a base, site visits and telephone interviews were scheduled to gain more complete answers to the issues raised in the survey. Additional interviews were scheduled with people suggested by the base list of interviewees and by TCRP panel members and car-sharing industry representatives. One of the researchers made site visits to partner organizations in the cities of Seattle and San Francisco, and several in the Washington, DC vicinity. The visits added texture and depth to the research through observation of the car-sharing programs in the field. All other interviews were conducted by phone. A total of 72 interviews were held to encompass the breadth of partner organizations. This included interviews

1. Since many potential survey respondents were contacted directly by car-sharing operators, or via e-mail listserves, it is not possible to calculate a response rate. Therefore, the sample may not be representative of partner organizations as a whole. For these reasons, and due to the sample size, the survey results should not be interpreted as being statistically significant, even though in some cases numerical results are reported.

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with government agencies, universities, transit properties, employers, and developers. Exhibit 5-1 summarizes the types of people who were interviewed. Appendix C lists the names of these partner organizations.

Exhibit 5-1 Partner Survey Respondents and Interviewees

Type of Partner Organization	Survey Respondents	Interview Respondents
City or county	14	27
Regional Agency	5	2
Public utility	1	
State agency	2	1
Rideshare/TDM agency	6	1
University	7	9
Developer/Property manager	2	10
Community/Advocacy group	3	
Religious institution	1	
Employer	1	6
Transit Agency		11
Consultants to government & developers	2	2
Architect	1	
Vehicle/Service provider*	1	
Technology service provider*	1	
Supermarket	1	
Car-share operator*	1	3
TOTAL	49	72

* Note that since the survey was distributed to a wide variety of potential respondents, including via e-mail listserves, not all of these organizations may be the types of partners that are the focus of this chapter. However, their responses are included for the sake of completeness.

5.3 Summary of Survey Results

The survey respondents were about evenly divided between describing their partnership with the car-sharing organization as formal or informal. About half of the partner organizations who answered the survey said that the car-sharing organization had initiated the partnership. The same number said that staff at their own organization or another organization had initiated the partnership. The majority reported that their overall understanding of car-sharing, its impacts and economic viability had substantially improved as a result of their participation in the partnership, compared to knowledge they had about car-sharing before they entered into the partnership. Overall, most respondents considered that they now have a good or excellent understanding of key aspects of car-sharing. Exhibits 5-2 and 5-3 summarize these answers.

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Exhibit 5-2 Who Initiates Car-Sharing Partnerships?

Organization Initiating Partnership	Number	%
Car-Sharing Operator	15	41%
Staff at Partner Organization	11	30%
Staff at Another Organization	4	11%
Community/Advocacy Group	1	3%
Elected Officials	0	0%
Other	3	8%
Don't Know	3	8%
Total	37*	100%

* Twelve organizations did not respond to this question.

Exhibit 5-3 Understanding of Car-Sharing Before and After Partnership

	Total Responses	Poor	Moderate	Good	Excellent
How would you rate your understanding of...					
How car-sharing works – for example, what car-sharing is, and how it operates?					
Before the Partnership	38	13%	45%	34%	8%
Currently	42	0%	17%	31%	52%
Change		-13%	-28%	-3%	+44%
Where car-sharing is economically viable – for example, judging the neighborhoods in which car-sharing is likely to attract members?					
Before the Partnership	38	32%	37%	29%	3%
Currently	42	7%	24%	43%	26%
Change		-25%	-13%	+14%	+24%
The impacts of car-sharing – for example on vehicle ownership, vehicle travel and air quality?					
Before the Partnership	38	21%	50%	24%	5%
Currently	42	5%	17%	55%	24%
Change		-16%	-33%	+31%	+19%
Figures may not add up to 100% due to rounding.					

Types of Support

The contributions of partner organizations that were surveyed have ranged from limited—such as, marketing assistance—to substantial—such as, reduced parking requirements when a residential development incorporates car-sharing. According to the literature search, most of the substantial contributions have occurred in Europe, where car-sharing had its roots and is, therefore, more well-established and understood. However, many of these have been taken up and extended by partners in North America, albeit on a more limited scale.

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The assistance mentioned by partners in the survey can be broadly summarized in the following categories:

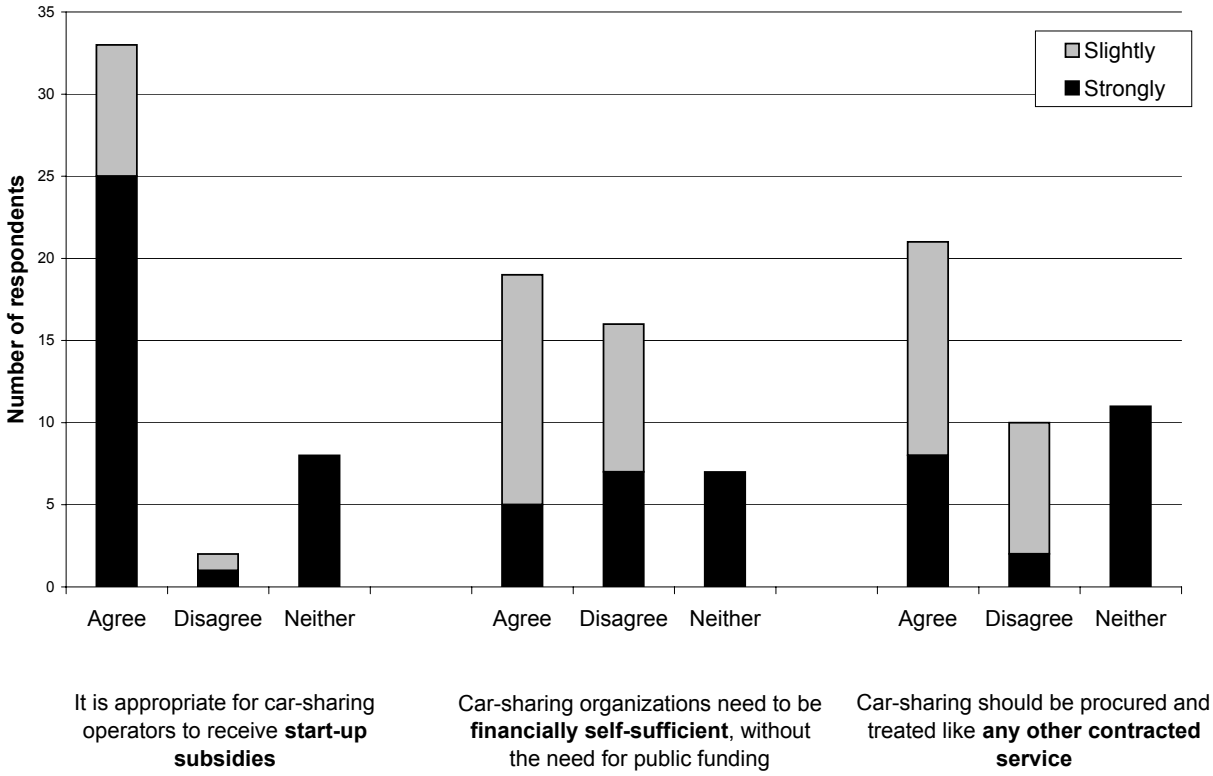
- Marketing
- Administration
- Parking
- Financial contributions
- Memberships
- Planning, policy, and tax issues
- Transit integration

Sections 5.4 through 5.9 describe these categories in detail with extensive examples culled from the survey, the literature search and the partner interviews.

Attitudes Toward Subsidies of Car-Sharing

Seed money can be invaluable in conducting feasibility studies and helping a car-sharing operation get up and running. More than 75% of partners who answered the survey question said that it is appropriate for car-sharing organizations to receive start-up subsidies. Exhibit 5-4 illustrates the partners' opinions about whether car-sharing organizations should receive subsidies, be financially self-sufficient, or treated like any other contracted service.

Exhibit 5-4 Partners' Responses on Subsidizing Car-Sharing



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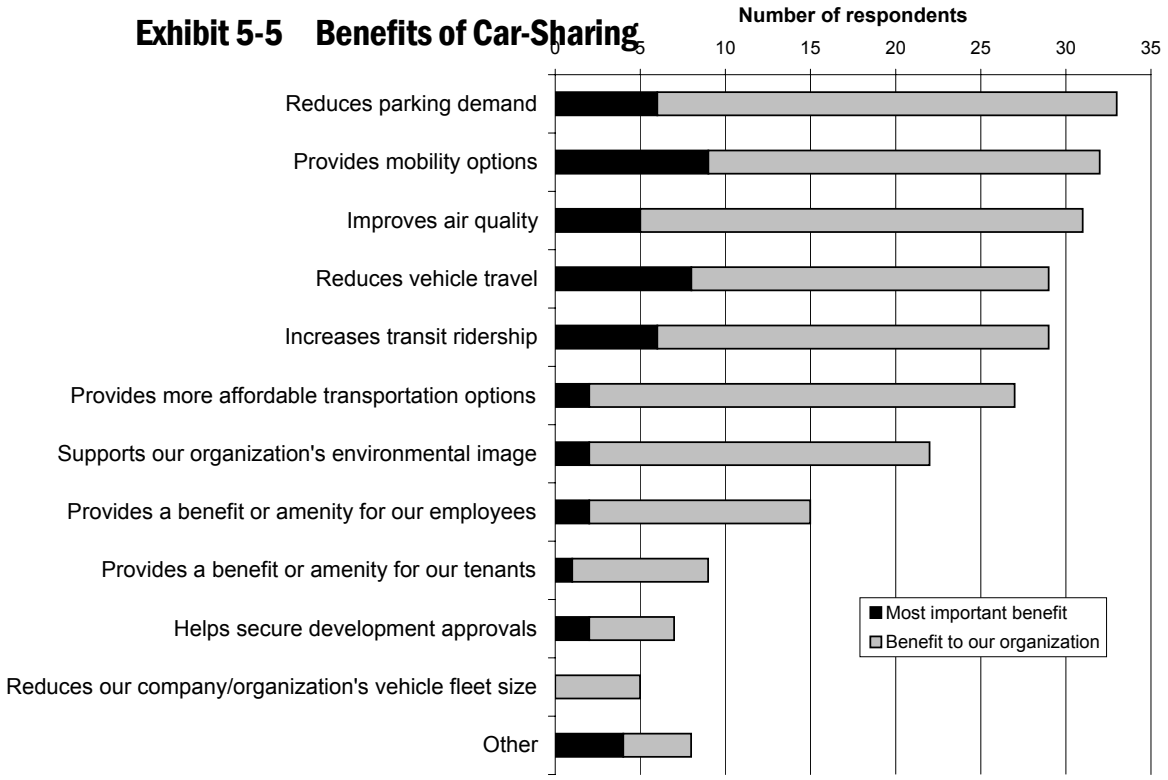
Perceived Benefits

Survey respondents were asked, "In your opinion, how can car-sharing help further the goals of your organization?" As shown in Exhibit 5-5, most partners see multiple benefits – on average, respondents selected more than five options. However, when asked in a follow-up question to choose which of the benefits was the most important for their organization, no clear choice emerged.

Exhibit 5-5 Benefits of Car-Sharing



Survey respondents considered, on balance, that car-sharing had been successful in helping to achieve their most important goal. However, many were not yet collecting hard data to support this belief. Chapter 7 discusses the various approaches used by respondents to evaluate car-sharing's success and makes recommendations on quantitative techniques to measure performance.

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5.4 Contributions of Partner Organizations

The following sections examine in detail the contributions partner organizations have been making to further the success of car-sharing. They combine examples derived from the literature search, the survey, and the partner interviews to provide a rich menu of assistance that could be offered to nascent car-sharing operations.

To focus prospective partners on what others have done in their industry, the following sections present profiles of five different types of partners:

- Local governments
- Transit agencies
- Employers and businesses
- Developers
- Universities

Each profile then outlines the strategies used by the partner organizations to help promote car-sharing. The profile begins with a discussion of the goals and benefits the partners hope to achieve. It describes how partners got started and who made the first contact. Extensive examples derived from the various partner organizations are given under the heading Types of Support. Support includes marketing; administration; parking; financial contributions; memberships; planning, policy, and tax issues; and transit integration.

This chapter focuses on successful examples of partnerships with car-sharing operators. The following chapter, Chapter 6, discusses the barriers that the partner organizations faced in implementing their partnerships and how they were overcome.

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5.5 Local Government

Local government agencies are undoubtedly the most common partner to car-sharing operators. The explanations for this strong relationship are, among other things, that (i) they have multiple goals that car-sharing can help to achieve; (ii) they are responsible for many functions that make them natural partners, particularly parking, transportation and planning; and (iii) they may be responsive to public support for car-sharing.

Goals and Benefits

Of all the partner profiles evaluated in this study, local governments have by far the broadest range of car-sharing related goals. These goals are to a large extent linked to wider plans and goals to:

- Reduce VMT and emissions
- Reduce car ownership
- Reduce parking demand
- Increase both the general population's and low-income households' possibilities to have access to a car

Furthermore, for some local authorities, a car-sharing fleet instead of the normal fleet is believed to result in cost savings. Some of these goals are further explored below.

Several cities that have partnered with car-sharing operators cite a reduction in VMT as one of the major goals that they hope to achieve through car-sharing. Car-sharing breaks the link between car use and car ownership. It also increases the awareness among both users and non-users about the true costs of driving. The City of Seattle, WA is one of the local governments that shares these goals, listing reduced VMT, reduced vehicle ownership, more mobility, and more awareness of the costs of driving as aims of its car-sharing program. "We're not so single-minded that we just want to reduce car trips. Some people will drive more, but we want to see a net reduction in trips," said one interviewee. Another example is the City of Aspen in Colorado, which has an overall goal to keep traffic at 1993 levels in perpetuity. Car-sharing is one way of continuing to reach that goal.

Staff at Arlington County in Virginia considers car-sharing as a support to wider policies and can be seen as "one tool in the larger TDM tool box." This is confirmed by several other local governments, such as St Paul in Minnesota and Brookline in the outskirts of Boston, Massachusetts.

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Exhibit 5-6 A hybrid vehicle used by City of Berkeley employees and other City CarShare members

Reducing greenhouse gas emissions and improving air quality are other local government goals, which can partly be met through reduced vehicle travel, and partly by introducing hybrid vehicles. Car-sharing also benefits air quality since the vehicles tend to be newer and more fuel efficient.

Reduced car ownership is sometimes a means to reducing vehicle travel, but is often an end in itself. Households owning one or more cars in transit-oriented and dense neighborhoods are often seen as a primary target group, since there is a potential to reduce car ownership in these areas. Car-sharing also yields more efficient land use by reducing the parking demand and providing more space for residential or commercial uses.

Another goal is to provide a mobility option that broadens opportunities for people, especially when combined with transit. The District of Columbia Department of Transportation states that car-sharing yields an enhanced quality of life for all residents and for households without a car in particular. Car-sharing may also help satisfy the mobility needs of low-income households, as well as reduce their transportation costs.

Cities have contracted with car-sharing operators to meet cost-saving goals. Philadelphia, PA saved $1.8 million in 2004 by converting its fleet to car-sharing vehicles operated by PhillyCarShare. Berkeley, California also

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anticipates financial savings from its fleet reduction program due to lower costs for vehicle replacement, maintenance, fuel, insurance and staffing (Exhibit 5-6).

Finding a Partner

Most partnerships between local government and car-sharing providers are informal in nature and are also initiated as such. It is very common that the car-sharing operator approaches the local government. Zipcar has, for instance, approached both Boston and Brookline in Massachusetts regarding possible partnerships. In Boston it was mainly about encouraging car-sharing in new developments. In Brookline the partnership was more a question of getting visible, metered spaces in commercial areas. Chicago, Washington, DC and the City of Berkeley are other cities that have been approached by the operators and decided to become partners with a provider.

In other cities, partners have been more proactive. The rideshare coordinator of the City of Alexandria in Virginia was introduced to car-sharing at a conference in the late 1990s and subsequently sought out possible operators. The City of Cambridge in Massachusetts and Seattle, Washington are other local government agencies that have initiated partnerships. In rare cases, the agency may even start its own car-sharing organization, as with the City of Aspen, CO which launched Roaring Fork Valley Vehicles in 2001.

For more information about procurement of car-sharing by local governments, see Chapter 7, Procurement and Monitoring.

Types of Support

Local governments provide a wide range of support to encourage the expansion of car-sharing, in line with their multiple functions. However, there are considerable variations in the extent of their assistance. Most commonly, it is limited to in-kind support, since it is often difficult to justify direct financial contributions to private car-sharing operators when budgets are being cut elsewhere.

Marketing support is a central part of involvement, which most local governments provide in one way or the other. Some, such as the City of Berkeley and the Department of Transportation in Washington, DC also provide some administrative support. Others do not need to invest much time or money, since administration is considered to be part of the car-sharing operator's responsibilities.

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Provision of parking has been one of the most tangible forms of support, since most local governments control both on-street and some off-street parking. Some agencies also provide funding, often from external grants. The last section of this profile will deal with the planning, policy and tax-related issues that local governments across the continent have established or are about to establish to promote the growth of car-sharing.

Marketing

Marketing is a simple, low-cost mechanism for local government agencies to assist car-sharing operators and promote better understanding of car-sharing among the public. In most cases, it takes the form of an in-kind contribution, but in some cases the marketing is a more extensive, grant-supported activity.

Assistance can be of many different types, such as information on websites and in newsletters; distribution of materials at transportation fairs and employer outreach events; media coverage through issuing press releases; and provision of on-street parking spaces as a means to promote car-sharing. For instance, Brookline and Cambridge in Massachusetts link to the local car-sharing operator on their websites. In the San Francisco Bay Area, the Metropolitan Transportation Commission includes City CarShare in a regional trip planning service accessed online or by phone.

Some of the most effective marketing partnerships have been conducted through wider Transportation Demand Management programs, where car-sharing is promoted as one TDM element along with ridesharing, transit and other strategies. For example, in Arlington County in Virginia, car-sharing is promoted as part of a larger TDM package (Exhibit 5-7) and includes car-sharing locations on its parking and transportation maps (Exhibit 5-8). Alexandria in Virginia is one of many cit-

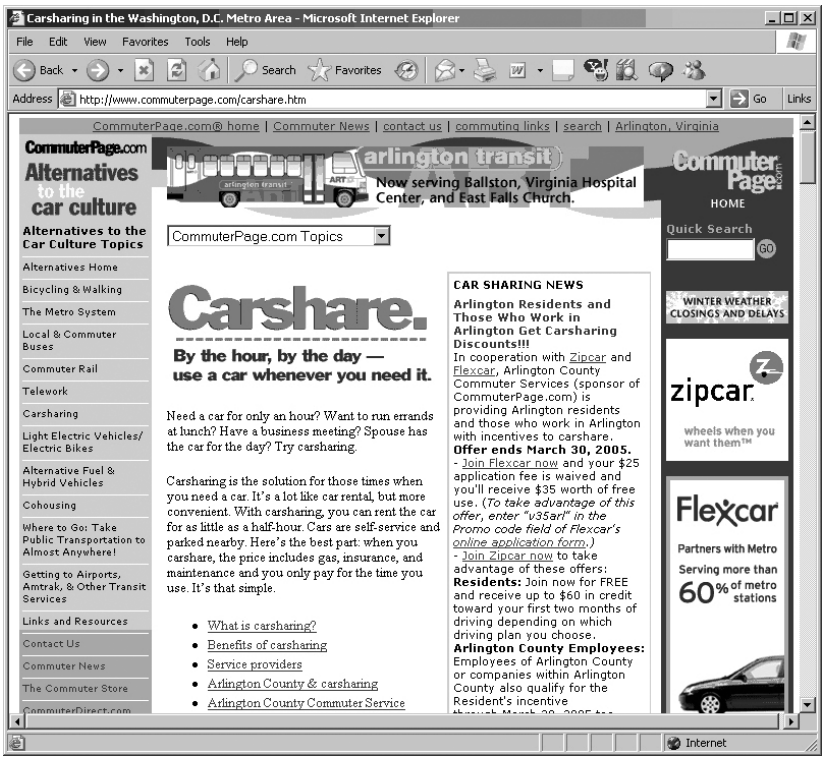

Exhibit 5-7 Arlington County's website about car-sharing and all alternatives to the car culture.

Source: http://www.commuterpage.com/carshare.htm, accessed on March 28, 2005.

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ies to promote car-sharing through transit fairs, employer fairs and other employer outreach as part of the overall rideshare program. Car-sharing is a centerpiece of Seattle's One Less Car Challenge (Exhibit 5-9).

Administration

Some local governments offer administrative assistance to car-sharing providers, such as lending office or meeting space and providing technical guidance. The most significant administrative help, however, is the time agency staff invest in promoting car-sharing and managing the use of parking spaces. This is especially important in the start-up phase of car-sharing in a community. For instance, at San Diego Association of Governments (SANDAG), the project manager invests about 150 hours per year and an associate about 200 hours per year. This is covered by external funding in the initial stages of the partnership and will not be a long-term commitment.

The City of Berkeley, CA provides a conference room for orientations for City CarShare users. City staff has also invested a great deal of time in the initial phase of the project, to investigate the potential of introducing a car-sharing fleet and to apply for grants for hybrid vehicles. Other cities have committed

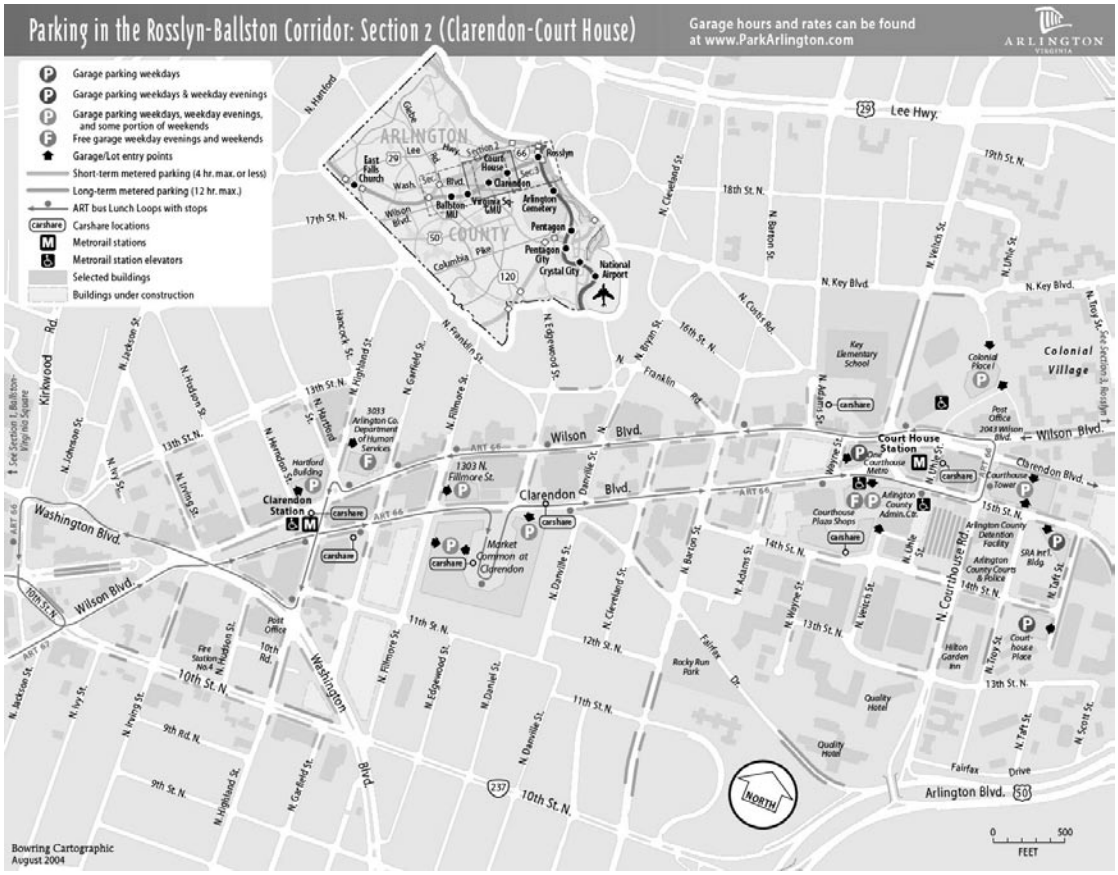

Exhibit 5-8 Arlington County's parking and transit maps highlight the locations of car-sharing vehicles.

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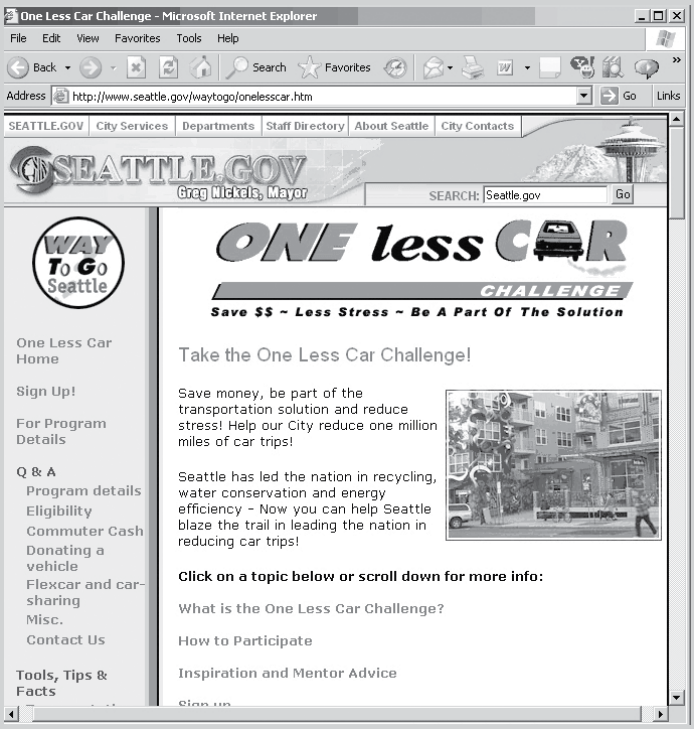
Exhibit 5-9 Seattle's One Less Car Challenge

Seattle has incorporated car-sharing into its One Less Car Challenge program, which aims to increase walking, biking and transit ridership by helping households to give up their cars. There are two levels of commitment. In Level 1, households agree to give up driving one of their cars for a month. In return each participant receives a $20 discount on the $35 annual Flexcar membership, and $50 of free Flexcar usage. In Level 2, the household gives up a car for at least one year, and in return receives $50 of Flexcar use per month for 12 months, as well as the membership discount. The usage credits are provided by Flexcar, and represent the most tangible incentive for households to join the program. The City considers car-sharing to be a critical part of the program – not only in providing the incentives, but also through giving households the confidence to give up a car, since a shared vehicle will be available.



Source: http://www.seattle.gov/waytogo/onelesscar.htm, accessed on March 28, 2005.

staffing resources to assist with parking and policy development. The City of Aspen in Colorado, meanwhile, funds the staffing and office costs of its subsidiary, Roaring Fork Valley Vehicles.

Administrative assistance can also take the form of building internal agency support for car-sharing, and resolving internal barriers. For example, the District Department of Transportation (DDOT) in Washington, DC has been promoting the car-sharing concept in meetings, on transportation task forces and in position papers. It has also intervened to help resolve several barriers to car-sharing under the jurisdiction of other departments, such as zoning and regulatory issues related to the classification of car-sharing spaces as a commercial use or a place of business (see Chapter 6 for full details). Along with on-street parking provision, staff believes that this type of assistance is the most effective, appropriate form of support to private car-sharing operators.

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Parking

Finding and financing parking spaces are often the largest barriers to car-sharing expansion. Local governments often control both on- and off-street parking and can thus provide some public parking. Marked parking zones for car-sharing, free metered parking on-street, and discounts in municipal lots are typical examples of parking support. There are two major issues for local jurisdictions to resolve – whether to charge for the parking, and whether to provide it on- or off-street. Each of these issues is discussed below.

Several local authorities have chosen to provide off-street parking for car-sharing. Off-street parking is easier to enforce and maintain. For example, street sweeping schedules are not impacted by off-street parking, and it is also preferable because the vehicle is protected and not subject to burial by snow removal equipment. These are benefits listed by Cambridge, Somerville and Brookline, which are cities in the greater Boston area, and by other areas with cold climates.

Exhibit 5-10 Off-Street Parking in Philadelphia

Philadelphia Parking Authority (PPA) provides space for Philly CarShare (PCS) in about half a dozen different facilities, mainly in residential areas. A process has been set up to locate new parking spaces as PCS expands:

1. PCS meets with neighborhood community groups, to assess the level of interest in having a car-sharing vehicle in the neighborhood and where it should be located.
2. The community groups provide feedback.
3. If appropriate, PCS requests parking from the PPA, which evaluates the requests. So far, none have been denied.

PPA provides all parking spaces for free, since car-sharing helps to achieve its larger goal of maximizing parking availability, and it is worth the minimal amount of revenue lost.

Several cities are providing on-street parking, as well as or instead of off-street provision. These cities include Portland in Oregon, Seattle in Washington, and Vancouver in British Columbia. Others, such as San Diego in California, are considering whether to follow suit. Philadelphia has both on- and off-street car-sharing spaces, and PhillyCarShare consults with community groups to determine the best locations in a given neighborhood (Exhibit 5-10).

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One large benefit of on-street parking is that car-sharing vehicles, which usually sport an identifying logo, are visible to everyone when they are parked at the curb, even when not being used, which is a useful marketing tool. For instance, DDOT in Washington, DC views the provision of on-street parking as a public education strategy, as well as a means to provide parking to operators. As discussed in Chapter 6, however, the original proposals met with public opposition. Partly to address these concerns, the final regulations included provisions that car-sharing operators must follow in order to be granted on-street parking, including requirements for locating vehicles in low-income neighborhoods, procedures for eliminating private parking spaces when a public space is granted, and DDOT consultation with affected neighborhoods. (See Appendix D for full document.)

Other cities turn to on-street parking for practical reasons, such as the Town of Brookline in Massachusetts which has very stringent parking regulations. No one can park on-street for more than two hours. Hence, all residents, employees and anyone else who needs to park a car for longer must park in off-street lots. Zipcar's spaces are exempt from these restrictions and are parked on-street instead.

Brookline has developed a license agreement with Zipcar delineating the parking locations for six car-share vehicles at a cost of $750 per year per space. The preface of the license agreement supports car-sharing by stating, "the availability of Zipcars for use by the residents of Brookline reduces their need for personal automobiles, reduces vehicular congestion and auto-generated pollution, reduces the demand for parking spaces, and represents an important element of a comprehensive and balanced transportation system." (See Appendix D for full document.)

The City of Portland has perhaps had the greatest experience with on-street parking. It has installed "Options Zones," identified by a tall orange pole with a bike rack, and symbols of a car, bike, tennis shoe, and bus (Exhibit 5-11). The poles attach to a parking meter head, simplifying installation and allowing easy removal if a space needs to be relocated. Options Zones are near areas with good transit service and provide a visible way for car-

Exhibit 5-11 An Options Zone in Portland, Oregon.

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Exhibit 5-12 Seattle On-Street Parking Process

The City of Seattle has established a process for handling Flexcar's requests for on-street parking spaces, as follows:

1. The City asks Flexcar to recommend spots.

2. The recommended spots are reviewed by transportation planning staff.

3. Transportation staff forwards requests to Traffic Controls and Parking Management. This division reviews competing demands on the block such as parking, taxi stands and loading, and other issues such as safety and turning radii. Traffic Controls & Parking Management approves or denies the request. This is a similar process to other requests, for example for loading zones.

4. The City sends a letter to adjacent property owners. This is partly intended as an advance warning that the space will be converted, and partly as publicity for Flexcar. It also reinforces the idea that the curb parking is public property. Sometimes the property owners object, which is taken into account.

Currently, on-street parking spaces are only provided in neighborhoods with lower parking demand, which do not have parking meters or residential permits. This is intended to avoid conflicts, enforcement issues and loss of meter revenue. However, the City is planning to revisit this issue in the coming year, through developing more formal criteria for allocating on-street spaces which take into account factors such as car-sharing visibility and a hierarchy of users.

There are legal issues involved as well – it is not legal for the City to grant an on-street space to a specific company. However, the City can grant space for a class of vehicles. Hence, the signs indicate "Carshare vehicles only." Initially, the parking spaces were provided for free to Flexcar, but now there is a $250 flat, one-time fee to cover the staff time setting it up.

Seattle's signs read "Carshare vehicles only".

sharing members to identify the location of the vehicle. Portland includes car-sharing in the Option Zone as a type of marketing for car-sharing, and to demonstrate the City's commitment to mobility options.

From the operator's viewpoint, on-street parking also adds security. It is often located on busy, pedestrian-oriented streets, with passers-by—not tucked away in a lot or garage. In addition, amenities such as bus stops, street lighting, pay telephones, and trash cans are usually nearby.

Cities have split on whether to charge car-sharing operators for parking. According to one study, 73% of car-sharing programs reported receiving

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parking subsidies – 60% from public entities, 33% from private companies, and 20% from both public and private sources (Shaheen, Schwartz & Wipyewski, 2004). Some cities have provided free parking on- or off-street since the beginning of the program, and do not intend to stop doing so. To a few cities, charging for parking was never even discussed since they consider this to be their main contribution to car-sharing, in lieu of direct financial support. Berkeley, CA and Vancouver, WA are just a few of the cities which provide free parking.

Reasons not to provide free parking include perceptions of a parking shortage or fears that it would lead to other organizations wanting free parking as well. One city that was surveyed said: "It is difficult to offer free parking in public facilities or on the street for car-sharing, because it sets a precedent that we would do the same for other users who require dedicated public parking spaces." Partly for this reason, Seattle limits on-street parking for car-sharing to neighborhoods with lower parking demand (Exhibit 5-12).

Other cities have decided to give a start-up subsidy to the car-sharing operator by providing free parking, but as the operator becomes more profitable the parking fees are slowly increased to market rate. Cambridge and other cities in the greater Boston area have followed this model.

Almost all local governments have provided parking at the origin end, i.e. at the "home" location of the car-sharing vehicle. Free, destination-end parking has not been seen as an effective means of support. However, there are occasional examples. For example, in 2000, the City of Toronto donated 25 on-street parking permits so that car-sharing members could park overnight near their home.

Financial Contributions

Approximately, 60% of US car-sharing operators responding to a 2002 survey received some public money for start-up costs, and 30% continued to receive funding after their first year. In contrast, limited government funding has been available in Canada (Shaheen & Meyn, 2002).

A large part of local governments' financial contributions come from external grants, which provide seed money for new vehicles, hybrids, start-up support or other specific purposes. Some cities have also been able to finance car-sharing with internal grants. Others are giving direct support from their general funds. One model, which Arlington County has tried, is to provide a revenue guarantee to operators as a form of risk-sharing to help them

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Exhibit 5-13 Risk-Sharing in Arlington County, Virginia

Car-sharing was already well established in the Washington metropolitan region, but staff at Arlington County, VA was keen to see it expand more rapidly in the County. Flexcar, for example, only planned to add two or three cars in the following year. Staff designed a program that would encourage Flexcar and Zipcar to expand in Arlington, while avoiding subsidies that would simply boost their profit margins. As well as on-street parking and marketing, the County provided a revenue guarantee for each vehicle for the first six months, through contributing the difference between user fees and the estimated $1,500 per month cost of providing the vehicle. The guarantee ramped down rapidly, as follows:

1. $1,500 per vehicle per month for the first two months (minus revenue)
2. $1,000 per vehicle per month for the second two months (minus revenue)
3. $500 per vehicle per month for the third two months (minus revenue)

The program is funded through the County's Commute Alternatives budget, which uses CMAQ funds. A total of $50,000 was allocated, but in practice membership and revenue have grown so rapidly that this ceiling was never reached. With the help from the subsidies, the fleet had grown by 15 new cars in the first year to a total of 27 in the Rosslyn-Ballston corridor. Staff considers the program a great success.

explore new markets (Exhibit 5-13). All of these types of contributions are explored below.

Seed money can be seen as the most valuable type of financial contribution a local government can provide. It can finance feasibility studies and help a car-sharing organization get up and running. A start-up enterprise needs seed money to purchase vehicles, to market the service, and to cover lower "farebox recovery" rates in the early years of a program.

Cities have applied for federal, state and local grants to financially support car-sharing. Federal grants have mainly come from the Environmental Protection Agency (EPA), the Federal Transit Administration's Job Access and Reverse Commute program (JARC) and its Congestion Management and Air Quality (CMAQ) Improvement Program. In Oregon, for example, the Department of Environmental Quality secured money from EPA to initiate a car-sharing program in Portland. $25,000 was allocated for a feasibility study and $50,000 was earmarked to purchase two vehicles for the start up. Vancouver, WA also received an EPA grant, as discussed in Exhibit 5-14.

Two State sources that have been used for car-sharing are Pennsylvania's Alternative Fuels Incentive Grant Program, which provided $82,500 to help purchase hybrid vehicles for PhillyCarShare, and the California Department of Transportation's Community Planning Grant program.

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Many local grant programs have also supported car-sharing. Roaring Fork Valley Vehicles in Aspen, CO received a local grant of $30,000 from the Community Office for Resource Efficiency (CORE), which is a local non-profit organization. These funds come from an energy mitigation fee assessed on new homes that use more energy than the local energy code permits. Toronto, Canada also provided start-up loans of (CN)$20,000 through the Toronto Atmospheric Fund for AutoShare.

Other funding sources are coming from parking revenues and general funds. The City of Seattle contributed start-up funding of $60,000 from their general fund over a two-year period, which went to provide off-street parking in private garages. Hennepin County, Michigan and the cities of Berkeley and Oakland in the San Francisco Bay Area are other local governments that have provided car-sharing operators with start-up grants. In some cases, other city departments may even support car-sharing. Roaring Fork Valley Vehicles recently received money from the City of Aspen's Housing Department for a new vehicle. This money had been set aside for alternative transportation for affordable housing.

Public agencies also indicate that they have provided lines of credit to car-share organizations. The City of Kitchener in Ontario, Canada supplies a (CN)$30,000 line of credit that must be repaid in nine years. People's Car has used this credit to purchase new vehicles.

Therefore, public investment in car-sharing can boost its development in the community, shorten the time it would take for car-sharing to spontaneously appear, or overcome a start-up barrier that may have prevented it from ever starting at all.

Memberships

Several local governments, or individual departments, have established memberships with a car-sharing operator. There are two reasons for this type of partnership. First of all, these memberships contribute to the growth of the service. Secondly, several cities have saved money by – partly or completely – switching from under-utilized vehicles in a fleet to a car-sharing program, where they only pay for the time they use the vehicles. In other words, this type of partnership can have a positive outcome for both partners. One way, which is not very common yet, is to switch from a municipal pool of cars, or department-owned vehicles, to a car-sharing fleet. Another way is to support individuals and businesses by subsidizing their membership fees.

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Exhibit 5-14 The Green Fleet Program in Vancouver, WA

When CarSharing Portland (which was later purchased by Flexcar) started in 1998, staff in Vancouver, Washington became interested in extending the program across the river. Vancouver, which is a suburb of Portland, established a "Green Fleet" program with a $65,000 Clean Air Transportation Communities grant from the Environmental Protection Agency (EPA). This fit well with the original intent of the grant, which was provided to reduce vehicle travel and greenhouse gas emissions. Through the EPA grant, Vancouver became Flexcar's first service expansion from an established urban area into a suburban market.

Instead of Flexcar's typical sedans, Vancouver used part of the grant to pay for the extra costs of introducing two hybrid vehicles when it started its car-sharing program in 2002. In total, the grant has covered the additional costs of four hybrid vehicles—three Honda Civics and one Toyota Prius—providing an early demonstration of an all-hybrid fleet in a single car-sharing service area. Vehicles are located near on-street bike racks to make them accessible to bike riders. There are also four Flexcar vans, of which two are placed in Vancouver and two in the county during evenings and nights. A pickup truck outfitted with a bike rack was also originally stationed in Vancouver and later relocated to Portland.

The rest of the money was spent on marketing and subsidized memberships for businesses that have joined since 2002. The grant, which expired in 2005, has provided incentives to new corporate members to join, through paying for the first month of usage. For instance, both Clark County and departments at the City of Vancouver have become corporate members. The institutions have received a pool bicycle that they can use for shorter trips instead of taking a car. Private firms have also received Green Fleet incentives to join. When signing up as corporate members, employees can receive free personal memberships.

Fleets

Fleet partnership arrangements, where car-sharing partially or fully replaces a municipal vehicle fleet, bring a potential win-win combination of cost savings for municipalities and membership growth for the operator. Beyond that, they help the car-sharing operator to increase the usage of a vehicle and thereby bring in more revenue. Most car-sharing operators experience peak demand at evenings and weekends, while municipal usage is likely to be highest during the working day. This means that operators may be able to improve their "farebox recovery" and utilization rates substantially, if vehicles are located where they can be used by both municipal employees and local residents. Several variations on car-sharing as a substitute for fleet vehicles are described below, and in Exhibit 5-15.

The City of Berkeley has implemented a program to replace 15 fleet vehicles with four City CarShare vehicles. Berkeley residents are able to use the car-sharing fleet vehicles on weekday evenings and weekends. The City is

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Exhibit 5-15 Fleet Reduction in Philadelphia

Philadelphia is the first large city in the world to replace its vehicle fleet with car-sharing, which it terms Automated Vehicle Sharing. The motivation was not to support PhillyCarShare but instead to save money through drastically reducing the City's fleet, in the face of a budget crisis. "Car-sharing helped us to mitigate the impact of this fleet reduction," according to Public Financial Management, the City's consultant. About 310 vehicles had been taken out of the fleet by March 2005. The target is 500 vehicles, including all the City's sedans and SUVs.

The City's calculations show savings of more than $9 million over five years. Many of the previous fleet cars were little used for work purposes, and employees would often drive them home at night. In other words, car-sharing is not necessarily cheaper on a per-trip basis, the City found, but can bring about major cost savings through making fleet costs fully transparent. Departments are now billed individually for PhillyCarShare usage, in contrast to the previous situation where all costs were borne centrally by the Office of Fleet Management.

Trips previously made using City pool cars are expected to be made with PhillyCarShare, employees' own vehicles, and transit. To help reduce opposition and ease implementation, the City introduced a monthly stipend program for senior managers who may be on call and need access to a vehicle, although in practice, few have signed up for this benefit. It also expected to increase mileage reimbursements for employees who use their own auto.

The following chart outlines Philadelphia's five-year cost savings. Note that some savings are not included, because of the difficulty of estimating them. These include avoided liability costs from auto damage under the City's self-insurance plan and reduced labor costs due to attrition over time of administrative and maintenance staff.

FiveYear Totals – Net Cost Avoidance	
Maintenance and Fuel Costs	$4,538,334
Parking Costs	$225,000
First Year, Non-Recurring Auction Revenue	$263,200
Subtotal	$5,026,534
Acquisition Costs	$4,186,458
Automated Vehicle Sharing Costs	($106,857)
Personal Auto Program Cost Increase	TBD*
Total	$9,106,134

Source: Public Financial Management, May 2005.
*The mileage reimbursements are difficult to track through the City's automated budgeting system, but are considered negligible. Costs from the monthly stipend program are also negligible, since few managers have signed up. Therefore, the Personal Auto Program does not significantly impact savings from the overall vehicle reduction program.

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funding the first year of the program with a parking mitigation payment of $150,000 from a developer who provided 10 fewer parking spaces than required under the Zoning Ordinance. These funds can only be spent on programs or facilities that can reasonably mitigate for the lack of 10 parking spaces. The second and third year of funding will be drawn from the operating budget allocations for vehicle-related expenditures in each of the departments participating in the program. Another potential funding source is the cumulative savings from the current fleet vehicle replacement fund.

Other cities and counties have introduced similar programs, but on a smaller scale – for example, with individual departments joining as a regular corporate member (e.g. the Transportation Services department at the City of Vancouver and Clark County in Washington State). Many of these local government agencies have been able to give up one or more vehicles as a result.

Still more are planning to follow suit in switching to a car-share fleet. In a campaign policy paper, San Francisco Mayor Gavin Newsom pledged: "As mayor, I will direct all city departments to join City CarShare with the goal of retiring the city vehicle fleet and service facilities. Car share facilities should be mandated in all city-owned parking facilities and provided as a condition of use in major new private developments. By pursuing these goals, we can have a car-sharing pod available within walking distance of 90 percent of San Francisco residents by 2006."

Membership Subsidies

Another approach used by partner organizations is to subsidize memberships, whether for all members or a targeted group. An example of a local authority aiming at a more general target group is the City of Alexandria in Virginia. Its Carshare Alexandria! incentive offers a promotion to residents and businesses. The incentive reimburses up to $105 of membership and application fees for residents. For business, it funds up to $50 for membership fees plus half of each employee's application fee of up to $20.

Low-income households, who are disproportionately transit dependent, have also become a significant target group. Reduced car-sharing membership costs can make it financially possible for them to join, in turn improving mobility by providing access to a vehicle. Hence, car-sharing does not only support environmental goals, but also contributes to social equity.

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Membership subsidies have been structured in two broad ways to target low-income households:

- **Through welfare-to-work programs.** The Metropolitan Transportation Commission is subsidizing low-income residents in two San Francisco neighborhoods by waiving the deposit and membership fees and by charging half the normal hourly and mileage costs. Eligibility is limited to CalWORKs welfare-to-work participants. King County Metro and Flexcar are beginning a similar program in Seattle (see Chapter 6). Funding is through federal JARC grants.
- **Through affordable housing.** The City of Vancouver in Washington has a pilot program for residents in affordable housing, in partnership with Vancouver Housing Authority (VHA) and Flexcar. If a household signs a one-year lease with the development, the family receives a welcome package containing free daily transit passes, a bicycle map and a Flexcar introductory package. Ten pilot households will receive free Flexcar accounts (paid by VHA), and five hours free Flexcar use per month for six months (paid by the three partners). The pilot households are located in workforce housing within mixed-use developments near transit.

As discussed above, programs to bring car-sharing to low-income households can also be geographically based, through encouraging car-sharing operators to place cars in low-income neighborhoods. The City of Seattle provides a good example.

Planning, Policy and Tax Issues

Planning, policy and taxation issues encompass a range of strategies that can help to institutionalize car-sharing within local government. This section discusses the potential to incorporate the concept into planning documents, development review procedures, zoning codes and taxation laws.

In the Planning Process

Government jurisdictions are including car-sharing as a strategy in transportation and environmental planning documents, in view of the expected benefits. Car-sharing is featured in Montreal's Action Plan for Reducing Greenhouse Gases; Boston's Citywide Transportation Plan; Seattle's Transportation Strategic Plan (TSP), which was adopted in 1998 and then revised in 2004 (Exhibit 5-16); and Toronto's Official Plan and Environment Plan.

The primary benefit of incorporation in these types of planning documents is credibility; it ensures that car-sharing is perceived as a mainstream transportation option that has the support of local decision makers. According to Seattle transportation staff, inclusion of car-sharing in the Transportation

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Strategic Plan captured the attention of elected officials, and ensured that staff had the policy direction to pursue and fund car-sharing. "The TSP helped tremendously" to counter views that car-sharing was "this crazy idea," said one staffer.

Exhibit 5-16 A Sample Car-Sharing Policy: Seattle's 2004 Transportation Strategic Plan

TDM6. Encourage Car-Sharing

Continue to support Seattle's car-sharing organizations. Car-sharing helps extend the public transportation network, increases transportation choices, reduces the land devoted to parking spaces, and reduces the overall number of car trips and vehicle miles traveled (VMT). Seattle has the nation's oldest and largest car-sharing program called Flexcar, developed as a public-private partnership with King County Metro and a private firm. In previous years, the City of Seattle has provided funds for off-street parking incurred by the program and the City modified the Land Use Code to provide incentives for new development to offer car-sharing spaces in new buildings. SDOT continues to sign on-street parking spaces for car-sharing parking where consistent with SDOT policies, and promotes and increases the awareness of car-sharing. SDOT should continue to investigate, evaluate and explore methods of supporting car-sharing organizations.

Through the Development Process

As already mentioned, finding parking is one of the largest obstacles for car-sharing expansion. So far, parking for car-sharing vehicles has mainly been provided by cities on an ad hoc basis. In the longer term, however, one of the most productive ways for local governments to support continued expansion may be to provide incentives for developers to incorporate car-sharing into their projects.

Linking car-sharing to access planning and zoning decisions in this way yields two benefits. Firstly, it provides the foundation for longer-term growth. Secondly, it allows the longer-term impacts of car-sharing to be captured through a reduced level of parking or roadway infrastructure provision.

Car-sharing is being integrated in two ways in the development process. One way is to include it as a formal mitigation measure during access or site planning, in the same way as other demand management strategies. For instance, car-sharing is incorporated into Boston's Project Access Plan Agreements for new developments. Any office or residential building that will be built with a parking garage must provide car-sharing spaces, although

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these may be charged for at market rates. In Cambridge, Massachusetts, developers who want to expand or build new parking in excess of 19 spaces must comply with the Parking and Transportation Demand Management (PTDM) ordinance. The ordinance requires them to have a program that reduces parking demand; car-sharing can be one such strategy.

A third example is provided by Seattle, where car-sharing was recently added to the menu of options that developers can include in Transportation Management Plans. Staff does not wish to force car-sharing on unwilling developers, but rather sees this as a way to market the concept, since it shows up as an option on development forms. If developers do not wish to include car-sharing, they need to provide a documented reason, such as lack of demand or interest on the part of the operator.

The second way to incorporate car-sharing into the development process is through zoning decisions. Many communities offer flexible parking requirements, allowing reductions for developers that incorporate demand management measures or build projects located close to transit (see, for example, Forinash et al., 2004). Car-sharing can be an extension of this concept. So far this type of flexible parking requirement has mainly been implemented on a case-by-case basis:

- The City of Berkeley, California has a downtown parking requirement of one space per three residential units in its zoning ordinance. However, before the reduced parking requirement was adopted, the City of Berkeley, California permitted the developer of the Gaia Building, a mixed-use project in the downtown, to build only one space per three units, in part because the project offered car-sharing. The City has offered several such variances in exchange for car-sharing on a case-by-case basis, although it is looking at formalizing the process.
- In Aspen, Colorado, residential units in the new Visitor's Center will have no on-site parking. Rather than paying a parking mitigation fee, the developers will contribute $60,000 to Roaring Fork Valley Vehicles, which is enough to pay for the leasing and operation of one vehicle for 10 years.
- Arlington County, VA is another local government that offers generous reductions in parking requirements. This is negotiated as part of the overall site plan approval process and for the entire TDM package, rather than for car-sharing specifically. The County prefers encouraging car-sharing with memberships and use credits for tenants instead of dedicating a certain number of car-sharing vehicles in the site plan agreement. By doing so, car-sharing

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parking does not necessarily have to be located in the new development, but can be on-street or in other complexes instead.

- Office of Planning staff in the District of Columbia report that parking requirements in the city's zoning regulations are quite low, compared to typical requirements across the nation. Even so, when projects come in for zoning relief, the staff encourages developers to explore car-sharing as one of the tools to reduce project costs associated with parking and, by extension, to lower housing costs. Car-sharing can also mitigate the number of auto trips generated by the project.

As with any zoning provision, giving developers the right to reduced parking requirements, rather than treating each project case-by-case, provides developers and car-sharing operators with far greater certainty. However, there are few examples to date of formal incorporation of car-sharing into zoning codes, and cities have been reluctant.

Seattle modified its Land Use Code to incorporate car-sharing, but does not automatically allow a net parking reduction. Instead, the change addressed issues related to commercial use of residential spaces (see Chapter 6); the new Code allows a space to be dedicated for car-sharing space instead of general use (see Appendix D). According to planning staff, there were two main reasons for not allowing car-sharing to replace a greater number of general use spaces. Firstly, the City wanted to avoid potential abuse of the incentive; staff feared that car-sharing spaces would be provided in places where car-sharing would not be feasible. Secondly, staff had concerns over what would happen if car-sharing services were withdrawn. In addition, the City already has low parking minimums and is working to abolish them entirely in many dense, transit-accessible neighborhoods.

Two cities have provided more generous zoning incentives, although it is too soon for their effectiveness to be evaluated. In Texas, Austin approved an ordinance in September 2004 allowing reductions in parking for multi-family residential development projects that participate in car-sharing (see Appendix D). The reduction is limited to projects within the University Neighborhood Overlay, an area of medium- to high-density housing and commercial development west of The University of Texas at Austin campus. Currently, Austin does not have a car-sharing service; this parking reduction incentive was intended to stimulate interest in starting car-sharing in Austin. (An RFP was planned to be issued in 2005.)

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Another example comes from Vancouver, BC in Canada. In June 2005, City bylaws were amended to permit a car-sharing space to substitute for three regular parking spaces in multi-family buildings citywide. One car-sharing space may be provided for every 60 dwelling units; with rounding of fractions, projects of 30 units or more could take advantage of the provision. The bylaws require the provision of a vehicle as well as a dedicated space, and the filing of a satisfactory agreement between the developer and the car-sharing operator.

Other cities are still exploring zoning changes, such as Palo Alto, CA, or have passed policy resolutions that have yet to be translated into code language, such as San Francisco, CA. Here, legislation is planned to be introduced in 2005 to codify the current practice of granting parking reductions on a case-by-case basis. In Massachusetts, meanwhile, the State's Transit-Oriented Development Bond Program Guidelines support reduced parking in developments that incorporate car-sharing. They state that one car-sharing space may substitute for 7-10 private parking places. The Guidelines are backed by State regulations, which establish rules and procedures under the Transit-Oriented Development Infrastructure and Housing Support Program.

A third potential mechanism to incorporate car-sharing into development decisions relates to fee assessment and traffic analysis. Cities could waive or reduce requirements for other transportation infrastructure for developments that incorporate car-sharing, or take the provision of car-sharing into account when assessing impact fees to mitigate new vehicle trips. While this concept is similar to granting flexibility in parking requirements, it does not appear to have been used yet in North America, even though traffic impact analysis guidelines adopted by several agencies (for example, the Valley Transportation Authority in Santa Clara County, CA) allow credits for other demand management measures.

However, there are some examples from Europe. For example, the requirement to build a road was waived for the developer of Slateford Green in Edinburgh, Scotland because the 120-unit housing project is car-free. Instead of parking lots, the space is used for gardens and play areas. Residents primarily use public transit, which is close by, although car-sharing is also available on site.

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Tax-Related Solutions

Tax credits can provide a further incentive for car-sharing. Although this is rare, there are several notable examples worth highlighting. The State of Oregon passed legislation in 2001 which allows tax credits for businesses that carry out energy-saving activities, including car-sharing operators, through an expansion of the Business Energy Tax Credit program. The Oregon Department of Energy, which administers the program, includes as eligible the cost of operating the car-sharing program, including the fair market value of parking spaces used to store the cars, but does not include the cost of the vehicles.

Washington State adopted a different tax incentive program in 2003, which provides credits to businesses that join car-sharing as part of a trip reduction strategy (see Exhibit 5-17). In the Netherlands, company cars that are also used for car-sharing are exempt from the 25% tax on the value of the car.

Exhibit 5-17 Tax Incentives in Washington State

Since 2003, the State of Washington has provided commute trip reduction credits to employers and property managers who provide financial incentives to employees for using commute trip reduction (CTR) measures. Qualifying measures include ride sharing, public transportation, car-sharing, and non-motorized commuting. Employers and property managers who provide these financial incentives may claim a credit on their tax return equal to 50% of the incentive paid to or on behalf of the employee, less any employee contributions. The maximum amount of credit for each employee per fiscal year is $60. The maximum amount of credit an employer or property manager may take for a fiscal year is $200,000, and the annual statewide cap is $2.25 million.

Source: Revised Code of Washington § 82.70.010 (5).

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5.6 Transit Agencies

Transit agencies across North America are teaming up with car-sharing operators as a means to provide station access, and increase ridership and overall mobility. Most often these transit agencies provide marketing assistance or car-sharing parking at rail stations. Transit agencies that provide rail service have often proved the most logical partners for car-sharing operators. However, there are several examples of bus-based agencies as well, notably King County Metro in the Seattle region.

Goals and Benefits

Two core goals of transit agencies are often to increase ridership and revenue. Car-sharing can help achieve both of these, agencies perceive, as well as contribute to broader objectives of reducing automobile use and improving mobility.

Some transit agencies focus on car-sharing as a station access strategy, in order to help expand the market for transit, manage customer parking, and bridge the "last mile" between the rail station and a passenger's final destination. For example, Metro North in New York considers that car-sharing vehicles at remote stations allow it to tap a market formerly not served. The agency can increase the sale of tickets, because people would formerly have had to rent a car or take a cab to these locations. Instead of using a car to make a 100-mile trip, passengers take Metro North most of the way and complete the trip by car-sharing. Another means to boost ridership is through using car-sharing to increase pass sales.

Some agencies see car-sharing as a means to bring about broader changes in travel behavior. The Southeastern Pennsylvania Transportation Authority (SEPTA), for example, considers car-sharing as an adjunct to public transportation – a way for households to purchase fewer cars, rely more on public transportation, and use a car only when needed. "We believe that car-sharing puts people on transit," SEPTA staff says.

Car-sharing also fits into the broader "mobility management" function of transit agencies (Murray et al., 1997). Metro North, the Washington Metropolitan Area Transit Authority (WMATA) and Seattle's King County Metro all view car-sharing within this framework.

King County Metro has used its car-sharing partnership to attract private capital to public transportation in order to address urban mobility. As Metro

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staff states: "The amount of money we have brought to the table [for car-sharing] is small compared to the amount of private capital that we have leveraged." Transit passes also have added value since Metro included a car-sharing incentive with the purchase of a FlexPass.

Finding a Partner

Most commonly a partnership is initiated through the car-sharing operator approaching the transit agency. However, some agencies such as SEPTA and WMATA point out that car-sharing was already on the agenda, meaning that operators found a receptive audience.

Some transit agencies, such as King County Metro in the Seattle region and Metro North in New York, have been more proactive in developing the partnership. King County staff had been following car-sharing in Europe, particularly the integration with transit. The agency issued an RFP in Spring 1999, and the program was launched in January 2000.

Types of Support

Transit agencies provide types of support similar to that provided by local governments. However, the scope of their involvement is usually less, given that they have fewer functions than cities and counties. Marketing and parking are the main contributions, although some agencies provide other types of support as well.

Marketing

Transit agencies can provide operators with access to a range of marketing channels. Since transit riders are usually the core market for car-sharing operators (Chapter 3), this can be an effective means of targeting promotional efforts.

Marketing is mainly provided on transit agency websites and through advertisements and brochures on buses and trains and in stations. WMATA in Washington DC and TriMet in the Portland region are two agencies that provide information about car-sharing and links to providers on their websites. WMATA; BART and Muni in the San Francisco Bay Area; and Metro North in New York are examples of agencies that have provided advertising space (Exhibits 5-18 and 5-19). The common message delivered is that car-sharing is a great complement to transit. Website information can be an ongoing activity, while most agencies tend to focus advertising in the start-up phase of the car-sharing program.

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Exhibit 5-18 BART and City CarShare conducted extensive marketing in the initial stages of the partnership.

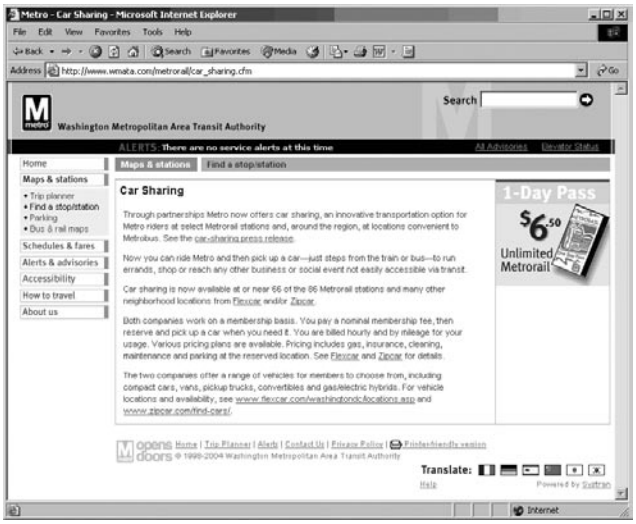

Exhibit 5-19 The Washington Metropolitan Area Transit Authority promotes car-sharing on its website

As with local governments, the most effective marketing is often integrated with broader Transportation Demand Management programs, particularly for agencies that have TDM responsibilities. For example, King County Metro views the "insertion" of car-sharing into its Commute Trip Reduction program as one of the most effective ways in which it supports car-sharing. In one effort, Metro partnered with Washington State Ferries, Kitsap Transit and Flexcar to establish 26 Commute Boards for ferry commuters on 11 of their ferries and at their terminals. The display board is complemented by brochures (Exhibit 5-20), and in the initial phases Flexcar representatives rode the ferries to advertise the availability of car-sharing at ferry terminals. Metro funded a promotion package offering free car-sharing membership and a $25 usage credit. Four hundred commuters signed up this way.

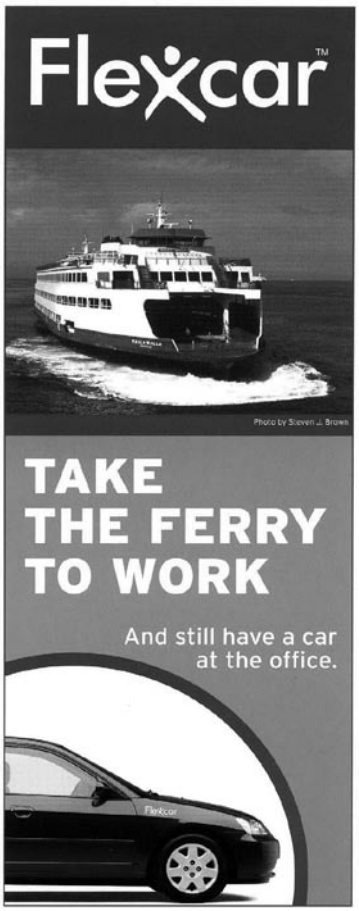

Exhibit 5-20 King County Metro and partners promote car-sharing to ferry commuters.

Several transit agencies also bring brochures and the car-sharing operator's marketing material to transportation fairs and events. Los Angeles Metro and Flexcar, for instance, conduct joint marketing at different events. Metro has also paid for the production of "take-ones" – timetable-sized brochures – about car-sharing.

Integration into employer outreach efforts can be another strategy for transit agencies. In Portland, OR TriMet provides Flexcar with access to its employer database, which can be

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used to find employers who may be interested in car-sharing. Especially small companies downtown, who cannot afford to buy their own company vehicles, have proven very interested in Flexcar when approached. Commute Trip Reduction staff at King County Metro, meanwhile, generates sales leads for Flexcar. The agency also views car-sharing as a means to further sales of its FlexPass – a discounted transit pass that employers can purchase on behalf of all their employees. It frequently offers promotional incentives to tie the two products – Flexcar and FlexPass – together.

Parking provision can also be seen as a means of marketing, in that it maximizes the visibility of the car-sharing service. This is discussed in the section below.

Administration

Most transit agencies do not provide any administrative support to their car-sharing partners. However, Los Angeles Metro provides office space for car-sharing organizations, as a form of in-kind support which may be particularly valuable in the start-up phase.

The most in-depth example of administrative support comes from King County Metro in the Seattle region. A large part of its initial assistance was provided in the form of a full-time staff member to provide marketing and outreach support and serve as a liaison between Metro and Flexcar. This was intended to create an in-depth partnership, rather than simply a vendor relationship. Metro also provides office space, again as a means to strengthen the partnership by having Flexcar and its Commute Trip Reduction staff together on the same floor. Flexcar staff believes that the shared space makes for a "very synergistic relationship."

Parking

Parking is considered to be the main support that transit agencies provide to car-sharing organizations. Several agencies, such as WMATA and SEPTA, offer their most visible parking spaces, such as kiss-and-ride spaces and others that are located close to the station.

As with local governments, transit agencies differ in whether they charge a car-sharing operator for parking and face several of the same conflicts. WMATA and Translink in Vancouver, BC provide spaces for free, as an in-kind contribution. Others, such as SEPTA and Metro North, charge the same rate as for other users. BART initially provided parking free of charge, but subsequently began to charge City CarShare the regular rate for reserved spaces.

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Transit agencies also face challenges when determining whether to allocate spaces at stations where parking is at a premium. WMATA avoided this problem by providing midday parking spaces in its kiss-and-ride lots, which are not fully utilized, while park-and-ride lots are filled to capacity every day. The kiss-and-ride spaces are also the most visible and closest to the station, so this is a win-win situation for the car-sharing providers and WMATA. SEPTA suggests to PhillyCarShare that they should avoid requesting parking at stations that regularly experience 100% occupancy. BART, on the other hand, has allocated scarce commuter spaces at four of its stations, including Rockridge (Exhibit 5-21), although it requested an evaluation of the overall impact on ridership (see Chapter 7).

Exhibit 5-21 Car-sharing parking at BART's Rockridge station in the San Francisco Bay Area.

Financial

Most financial support comes from local government, as described in the previous section of this chapter. Transit agencies rarely provide direct financial support for car-sharing; where they do, it usually comes from grants and external funding rather than operating budgets. Staff at Metro North feels strongly that, as a public agency, they cannot finance any of the costs of a privately owned car-sharing project from general funds. WMATA staff adds that there are too many competing uses of scarce grant funds, making financial support for car-sharing "hard to justify."

One exception is TriMet in Portland, which has received a CMAQ grant of approximately $100,000 a year to subsidize vanpooling. Flexcar is one of the

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partners for this program, through its Flexvan program (discussed further in Section 5.7).

Another is King County Metro, which tries to insert car-sharing into more general grants for demand management programs. This approach helps protect car-sharing from claims that scarce grant funding is going to a private company. Metro has also received two specific grants. The first was from the EPA, which funded the difference in purchase costs between hybrid vehicles and regular sedans. The grant also paid for outreach such as bus advertisements and radio spots that promoted the clean air value of using hybrids for car-sharing. The second was a JARC program earmark of $500,000, which is matched by the State of Washington, for low-income car-sharing (see Chapter 6). King County has recently received another $4 million in JARC funds and Washington State funds to provide mobility to job seekers in its low-income program.

Transit Integration

As noted earlier, a number of transit agencies assist in marketing and allow car-sharing vehicles to be parked in visible locations close to the station. Discounts are another method of linking the two modes of transportation. Most commonly, transit pass holders are eligible for discounted car-sharing memberships, although there are European and Canadian examples of transit discounts for car-sharing members. Smartcards and station cars are two other means of integrating car-sharing and transit. All of these strategies are discussed in turn below.

Car-Sharing Discounts

King County Metro in Seattle offers $35 worth of car-sharing use when its FlexPass employer transit pass holders join Flexcar. As well as a promotional incentive, Metro sees this program as a means to financially support car-sharing without providing direct subsidies; the incentives go to the end user, rather than directly to Flexcar. It uses the discounts as an introductory promotion to encourage members to both join and try the service out, without risking any longer-term financial incentives for driving. The discounts do not involve an additional outlay for Metro; instead of a direct subsidy, the agency purchases usage on Flexcar vehicles, which it then distributes as promotional incentives.

The Toronto Transportation Commission (TTC) offered a $100 discount on

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AutoShare's membership fee for transit riders who subscribed to the TTC's Metropass Discount Plan. Pass holders were also sent a subway map that showed the locations of transit stops and AutoShare cars.

The most extensive experience, however, comes from Europe. In Mannheim and Aachen, Germany, a pilot program offered a discounted membership to transit pass holders who also joined car-sharing. The discount, combined with publicity about the pilot program, resulted in a 136% increase in car-sharing in Aachen and a 118% increase in Mannheim, compared to the previous year.

Transit Discounts

Local bus operators offer 10% off pre-paid fares for car-share members in Bristol, England and in Quebec, Canada. The Bristol bus operator goes one step further by giving car-share members a three-month free pass if members give up their cars. This is particularly notable since the operator, First Bristol, is a private company, rather than a public agency seeking to achieve broader goals.

Fare Integration

Many transit agencies are moving towards smartcard payment technologies, which can provide further opportunities for integrating transit and car-sharing. The same card can serve as a transit pass and as an access card for car-sharing vehicles, providing a tangible symbol of integration as well as convenience benefits.

WMATA has perhaps made the most progress in North America, although there is still a long way to go. It is seeking to allow the Metro SmarTrip transit card to be used to access both Flexcar and Zipcar vehicles. Flexcar has already successfully manufactured 20 test cards with both chips, and the next step is to do the same test with the Zipcar chip. WMATA wants the same card to serve as a driver's license and is working with the District of Columbia to achieve this goal. Integrating billing systems, however, remains a longer-term goal; WMATA is still working through the many challenges of establishing a common payment mechanism for the many transit agencies in the region and is not prepared to add car-sharing agencies to the mix as of yet.

Again, the greatest experience comes from Europe. A single card in Bremen, Germany can be used to pay for both car-sharing and riding transit at a discount. Members need a smartcard and PIN. They can also order

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train tickets or take a taxi without spending cash – the bills are added to their monthly car-sharing invoice. The smartcard in Zurich, Switzerland is valid for discounted car rentals and car-sharing usage, as a ticket on the national rail system, and as a free ticket for a companion on public transit. In London, the Oyster public transportation smartcard can be used to access CityCarClub vehicles.

Station Car Program

Station cars, which were discussed in Chapter 2, provide another integration opportunity, if the vehicles form part of the wider car-sharing program. Portland, OR has the most experience with this model. TriMet, Flexcar and two vanpool providers have created a unique "pool vehicle" concept for the firm of Norm Thompson Outfitters, the Oregon Health & Science University and others, similar to a station car program. Vanpoolers participating in Flexvan pick up the van at a light rail station and drive to the office in the morning. During the day, employees and any Flexcar member can reserve the van as a company car for personal or company business. At the end of the day, vanpoolers drive back to the light rail stations. Flexcar and TriMet subsidize the monthly fee for the vanpoolers, because they consider it an economical way to serve low-density office parks and suburbs. If a person drops out of the vanpool, TriMet also helps cover the extra costs for the other vanpool members. The subsidy is offered the first two months after a person leaves the vanpool, with a cap of two drop-outs per year.

A similar concept was tested in Vancouver, BC in 2003, when Translink launched the Commuter Car Share project. However, it terminated before the end of the pilot program six months later. Only three participants had joined in that period and the feedback was that the program was not flexible enough, since the participants had to pay for the car on weekdays when they did not work. Each participant paid $225 per month for transit pass and car usage; the rest of the costs were covered by the grant. Another barrier was that since it was a pilot program, users were reluctant to sell a car in case the service did not continue.

Memberships

Transit agencies usually have non-revenue fleets, which include many pool cars that could be replaced by car-sharing. While some have expressed interest, there are no examples that are up and running yet. The most advanced in the planning process is Los Angeles Metro, which is evaluating the possibility of replacing and reducing up to half of its 392 pool cars with

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a semi-dedicated car-sharing fleet. The vehicles could be made available to other Flexcar members after working hours. The net reduction in vehicles would also yield revenue for the agency through the cost savings which would occur with a reduced pool fleet.

Planning, Policy and Tax Issues

Most transit agencies have not seen the need to incorporate car-sharing into formal planning documents. One exception is BART in the San Francisco Bay Area, which includes car-sharing in its Station Access Guidelines. These state:

> *Reserved spaces for car-sharing services should be in high-profile locations, in an area that is closer to the station faregates than the majority of the at-large parking spots. Where clearly visible locations are available, car-sharing spaces can be provided on street.*

Car-sharing is also included in BART's hierarchy of access modes, which give priority to walking, transit and bicycle access (Exhibit 5-22).

The other opportunity to include car-sharing in agency planning may come through transit-oriented development programs. King County Metro has experimented with this concept, although with limited success as most of its land holdings take the form of suburban park-and-ride lots that are not well-suited to car-sharing. At one Redmond site, for example, the car was ultimately withdrawn due to low utilization.

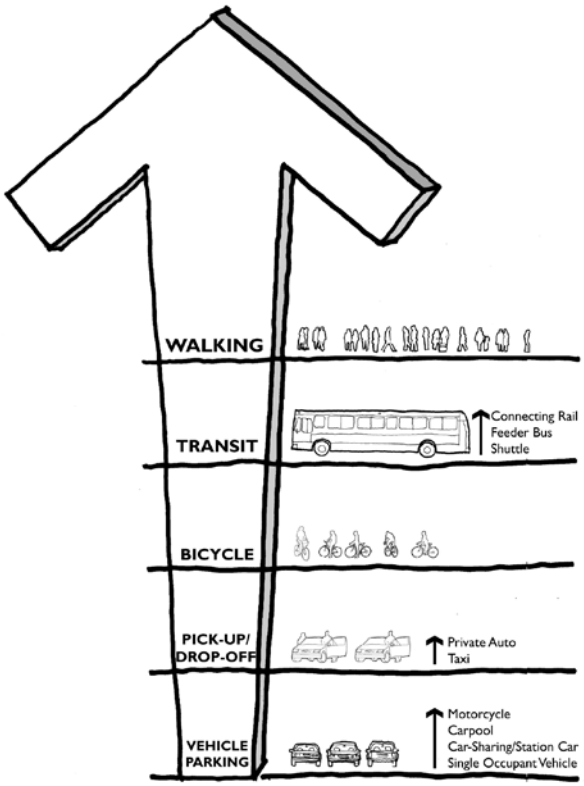

Exhibit 5-22 BART's formal hierarchy of access modes.
Source: BART Station Access Guidelines.

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5.7 Employers and Businesses

Employers and businesses are in many respects a car-sharing customer. Most business customers use the service in the same way as an individual member, and join in order to have access to a vehicle for client meetings and other business trips. Some business members, however, have greater involvement with car-sharing, and can also be considered as a partner for car-sharing operators.

Goals and Benefits

Employers who have partnered with car-sharing organizations have several goals in mind. In most cases, the aim is to gain access to another mobility option, which can be more convenient or economical than rental cars, an in-house fleet or employees' private cars. Professional businesses such as architectural and engineering firms have proven to be particular fertile ground for car-sharing operators.

Some businesses have broader goals in mind, and use car-sharing as a strategy to reduce the need for staff to bring a car to work. Car-sharing can function as a parking management tool, or as part of a larger TDM program. Employees can use car-sharing vehicles for errands and meetings during business hours, and can thus ride a bicycle or take transit to work instead of bringing the car.

The Seattle Times, for example, was facing parking management issues following the sale of some of its surface lots. Car-sharing was seen as a strategy to reduce parking demand by helping employees ride transit and boost transit pass sales. More than 15% of respondents to an employee survey stated that access to a car during the day would help them not drive to work. The company is currently piloting a car-sharing program as part of its commute trip reduction efforts.

Swedish Medical Center in Seattle also sees car-sharing as a commute trip reduction strategy, and as a way to provide transportation between its six campuses. While three of these are linked by a shuttle, others are more remote. Staff calculated that car-sharing would be cheaper than either a shuttle or paying parking and mileage expenses for employees who need to travel between campuses. This was key to gaining support from senior management. "In today's world of healthcare, it's a bottom line decision," according to the firm's parking manager.

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In addition, many companies view car-sharing as an employee benefit, as it increases the mobility of the staff who do not drive to work. At Swedish Medical Center, human resources staff advertises car-sharing as a fringe benefit when recruiting new employees. Several companies, in particular smaller ones, also state that car-sharing is much more cost-effective than having company vehicles, since they do not need to think about expenses for leasing, insurance, maintenance, and parking. There are also examples of organizations replacing larger fleets with car-sharing, such as the cities of Berkeley and Philadelphia which are discussed in Section 5.5 earlier in this chapter.

Finding a Partner

Most businesses have come in contact with car-sharing through general marketing by the car-sharing operator, or local government TDM programs. Wallis Engineering in the City of Vancouver, WA, for example, was considering buying a car for travel to business meetings since many of its employees bike or walk to work. By coincidence, the company heard about Flexcar, which made more sense than buying a car for occasional use.

The Defender Association in Seattle, in contrast, joined because of commute trip reduction incentives provided by King County Metro. The Defender Association needed to provide some bus passes for employees' work off site. It had received a discounted introductory rate from Metro. By paying a little more than the needed bus passes, it was able to provide FlexPass transit passes for all employees. The transit passes had become a valued employee benefit, but the higher cost each year was making it difficult to continue. By eliminating 10 parking spaces, which were half of its investigators' spaces, and making car-sharing available to its investigators instead, The Defender Association was able to take advantage of another Metro incentive program. Because the firm saved money on parking, it was able to retain the FlexPass benefit for all employees.

Parking management also leads to partnerships. When the landscape architectural firm Bluegreen opened its office in Aspen in 2002, there was limited parking but a need for a car for site visits and meetings. The company focuses on environmentally sensitive design and is a member of the US Green Building Council. Hence, the reason to join the local car-sharing organization Roaring Fork Valley Vehicles was a combination of a need for vehicles close-by and a desire to support the company's "green" profile.

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Transportation Management Associations (TMAs) have great potential to become good partners with car-sharing operators, since they usually have the similar goals as a transit agency or local government. Lloyd District TMA in Portland, OR became involved in car-sharing a few years back as a supplement to its alternative commute program. By introducing car-sharing the TMA could boost the mobility of the employees during business hours.

Types of Support

Employers mainly provide internal marketing for car-sharing and membership benefits for staff. Administrative support, parking and financial contributions are usually not necessary since these are provided by the car-sharing operator. Indeed, part of the attraction of car-sharing is that it is a turnkey solution that requires little administrative effort. Car-sharing operators maintain and operate the vehicles, provide training sessions, and supply marketing materials.

Exhibit 5-23 Seattle Times' poster promoting transit and car-sharing to employees.

Marketing

Car-sharing operators' marketing is usually targeted at signing up organizational members. The responsibility for recruiting individual staff members, in contrast, often rests with the employers themselves. The message is often focused on the benefits of car-sharing and how one can join. To a large extent, businesses simply distribute the car-sharing organization's own marketing material. Other types of marketing include articles in employee newsletters, memos and e-mails, and are often conducted through a broader TDM program. Seattle Times, for instance, has produced a poster with information about its annual bus pass and the integration with Flexcar (Exhibit 5-23).

At Swedish Medical Center in Seattle, WA Flexcar provides its standard marketing materials and attends the annual employee transportation fair. There are posters on every campus and articles in the internal monthly memo to staff. The hospital is currently working on a new parking department website, which will have a link to an online application.

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TMAs can also be a valuable marketing channel for employers. For example, Lloyd District TMA in Portland, OR provides its members with information about Flexcar, through the TMA Transportation Shop.

Parking

Most businesses and employers do not need to provide car-sharing parking since they can use vehicles located nearby. However, Swedish Medical Center in Seattle provides free parking for Flexcar vehicles in its garage in a prime location. This is a substantial in-kind contribution, since parking normally costs $85 per month and shift. On the other hand, employees gain the benefits of easier access to these vehicles. In addition, the cars are parked in the most visible locations, contributing to the marketing effort.

Memberships

Employers can choose from several models to make car-sharing available to their employees. One consideration is whether to have a dedicated or semi-dedicated fleet, or use the wider car-sharing network. Dedicated vehicles offer a better guarantee of availability, but can be more expensive; semi-dedicated vehicles provide a similar tradeoff, but are made available to other car-sharing members outside of business hours.

So far, the most common approach is for a business to use the open fleet, rather than pay for dedicated vehicles. This approach is used by both smaller companies, such as The Defender Association in Seattle and Wallis Engineering in Vancouver, WA, and larger employers, such as The Seattle Times.

The second consideration is the types of trips for which car-sharing may be used. Some companies, such as Bluegreen in Colorado, limit usage to business meetings and company-related errands. However, several companies encourage and pay for use for short personal errands during business hours, in order to help employees avoid driving to work. Swedish Medical Center allows all employees access to car-sharing for business purposes, but limits personal use to those who do not have a parking permit. The Seattle Times, meanwhile, does not allow the use of car-sharing vehicles for business purposes at all. Reporters, for example, need instant access to a vehicle on demand and are required to have their own cars.

TMAs can also provide car-sharing memberships for employees and integrate these programs with transit. Portland's Lloyd District TMA for example, has built on its "Passport" employer transit pass through using a $16,000

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CMAQ grant to fund the Passport+ program. This allows unlimited use of Flexcar vehicles in the TMA district during business hours, for Passport holders who sign up for car-sharing. The program has helped expand car-sharing from two to five cars in the district, and about 50 members have signed up. However, the grant money has now been used and the subsidies have been withdrawn.

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5.8 Developers

An increasing number of developers and property managers around North America are becoming interested in car-sharing. This is especially true for new housing and mixed-use developments. There are also several commercial developments, such as the Bank of America Tower in Seattle, which have incorporated car-sharing successfully.

Goals and Benefits

Car-sharing provides several benefits to developers and property managers, including the following:

- **It is an amenity to residents and tenants**, particularly for those without a car. One developer pointed to competitive pressure; in some urban markets, car-sharing may be becoming a standard amenity in new apartment buildings. It is an amenity for the developer as well, since car-sharing is a turnkey solution with little involvement from the developer. Some developers also mention that car-sharing will help marketing the development, but that it is not their main motivation.
- **It promotes sustainability and corporate citizenship.** Forest City Enterprises in Denver, CO sees car-sharing as a contribution to sustainability, which is one of the firm's eight core corporate values. In Seattle, Equity Office Properties considers promotion of car-sharing as part of its obligation as a good corporate citizen. It has a wider interest in improving transportation, in order to maintain the accessibility and attractiveness of its properties downtown. Car-sharing can also help developers gain LEED (Leadership in Energy and Environmental Design) certification. At present, car-sharing is not formally incorporated in the LEED rating system, although some projects such as Hillsdale Library in Multnomah County, Oregon have used car-sharing to gain an innovation credit. However, draft LEED proposals would formally incorporate car-sharing into the alternative transportation credits (US Green Building Council, 2004).
- **It can be used as a parking mitigation.** By introducing car-sharing, some developers have been able to reduce the number of parking spaces required by parking ordinances. For instance, the Gaia Building in Berkeley has 91 apartments and 10,000 square feet of commercial space, but only 40 parking spaces. (More details of car-sharing's relationship to the development process are provided in Section 5.5 earlier in this chapter.) There is also a financial incentive to developers who incorporate car-sharing to reduce parking requirements. A Canadian survey respondent mentions that the cost savings to developers from reduced parking – $20,000 per stall – far outweigh the cost of car-sharing. He stated that one developer received a variance to provide 100 fewer

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stalls for an investment in car-sharing of just $50,000, plus a membership purchase.

Finding a Partner

Often, partnerships have been established through the developer making contact with a local car-sharing operator to establish a partnership. Most operators, however, see the development market as an important new source of growth and have made significant outreach efforts to attract developers. City CarShare in San Francisco, for example, has placed articles in professional journals for developers and spoken at industry conferences such as one organized by the Non-Profit Housing Association of Northern California.

Non-profit organizations can also play a role in encouraging developers to adopt car-sharing. In San Francisco, the Housing Action Coalition endorses residential projects that meet its criteria, in order to help them gain planning approval. One criterion is the incorporation of City CarShare into a development.

Types of Support

Parking is the main support provided by developers and property managers. Some developers also invest financially, for example in locations where car-sharing may not be commercially viable. Administrative support, however, is usually not required, since this is handled by the car-sharing operator. As with employers, the turnkey nature of car-sharing services is a key attraction to developers and property managers.

Marketing

Most developers and property managers have a vested interest in making car-sharing work in their complexes and are therefore keen to promote the service. This is particularly true for those that provide financial support, but also for other developers who risk losing a service if it is not used enough to be commercially viable.

Marketing techniques include newsletters, promotional material posted in leasing/management offices, and website information. JSM at its Venezia Apartments complex in Santa Monica, CA, promotes car-sharing to a wider audience through signage on the exterior of the building.

Equity Office Properties manages the Bank of America Tower in Seattle, WA, and promotes Flexcar as part of its Commute Options Program (Exhibit 5-24). Equity offers each company in the building $250 to get signed up and

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driving with Flexcar. It also helped make a major marketing push when the service first began, with cleaning staff leaving material on employee desks overnight, and promotional messages on LED signs in elevators. According to Equity, property managers have a particular role in promoting car-sharing to smaller employers who may not be subject to trip reduction or similar TDM legislation.

Car-sharing in a new development can also be an indirect marketing tool in itself, in that car-sharing helps to promote the development. Bruno Wall at Wall Financial Corporation in Vancouver, BC states that bringing car-sharing into one of his new developments, the Electric Avenue Condominiums, has not needed any extra marketing. In fact, the development "is probably more well-known now because of this green and creative idea." In another Canadian example, AutoShare's website features details of condominium projects where it provides service.

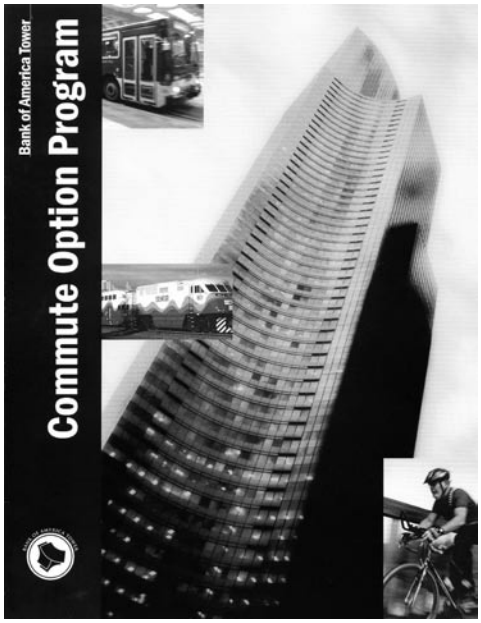

Exhibit 5-24 Equity Properties in Seattle has established a Commute Option Program for its Bank of America Tower.

Parking

Most developers and property managers provide free parking for the car-sharing vehicles that are placed in their complexes, either because it is an amenity to the residents or because it is part of a development agreement for reduced parking. The vehicles are typically located in spaces with high visibility and access, to encourage non-users and to further promote the concept. If the car-sharing operator is a non-profit organization, the value of these spaces is tax deductible.

Most often the car-sharing vehicles are used not only by tenants, but by all members of the car-sharing organization, in order to maximize utilization. A major concern for many developers is how non-tenants get access to the vehicles that are placed in secure garages. Partly for this reason, Forest City Enterprises stresses the need to consider the location of parking for car-sharing during the development phase, when issues such as garage access and

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overall parking ratios can be considered.

There are different solutions to this problem. Citizens' Housing and Panoramic Interests (Exhibit 5-25) are two developers in the San Francisco Bay Area that have incorporated car-sharing into their mixed-use developments, in exchange for more flexible parking requirements. Non-resident members can use their City CarShare fob to access the garages. Flexcar in Washington, DC and Seattle, WA uses the same technique. A manager in Los Angeles lets non-resident Flexcar members receive the access code to the building when booking the car online.

Financial

In most cases, developments that incorporate car-sharing are located in neighborhoods where the service is commercially viable. Sometimes, however, financial incentives may be necessary in order to convince a car-sharing operator to provide service in less favorable locations, or to reduce tenants' barriers to joining.

Photo: City CarShare

Exhibit 5-25 City CarShare vehicle entering Panoramic Interests' Gaia Building in Berkeley, CA.

A US example is the Buckman Heights development in Portland, OR. The developer of this 144-unit mixed-use project agreed for the first year to cover the operational costs of two CarSharing Portland vehicles available to tenants.

Another reason for financial support may be to waive or reduce the requirement for deposits, which can pose a barrier to tenants signing up. UBC Properties has given a grant to the University Neighborhoods Association in Vancouver, British Columbia. The grant will be used to subsidize 50% of the $500 membership fee for the Cooperative Auto Network (CAN). Wall Financial in Vancouver has gone one step further and offered to actually buy the first seven vehicles for CAN in order to get around the $500 membership fee. CAN would then manage these vehicles like any other CAN vehicle. By doing so, the condominium owners avoid the need to join

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the cooperative and thus only pay a $20 registration fee rather than a $500 membership share.

Some of the most extensive examples come from European developers. For example, a 250-unit car-free housing development in Vienna, Austria – Autofreie Mutersiedlung Floridsdorf – has only 25 parking spaces, which are exclusively for car-sharing vehicles. Residents have free membership in the car-sharing club for the first year, to which 57% of the households have subscribed. The complex is also situated near public transit.

Memberships

Another form of support for car-sharing involves subsidizing membership fees. This may be necessary to convince a car-sharing operator to provide service, be required as a condition of a development agreement, or simply provided voluntarily as a tenant amenity. Developers of a residential property in Victoria will provide two cars and permanent parking stalls for them, and will purchase a membership for each unit. The membership will be assigned in perpetuity to the unit, not to the current occupants. Other developers follow suit. When the Electric Avenue Condominiums, a 456-unit complex in downtown Vancouver, British Columbia, opens in summer 2005, the condo owners will be offered affiliated membership in CAN, a non-profit car-sharing organization.

Again, Europe provides some of the most far-reaching examples. Developers in Freiberg, Germany subsidize a one-year free pass on all public transit and a 50% discount on train tickets when residents join the car-sharing club.

Some property managers have corporate accounts and use the service in the same way as any other employer. For instance, Equity Office Properties in Seattle, WA is a corporate member and uses car-sharing vehicles for business.

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5.9 Universities

Universities are a fertile ground for car-sharing because, as a generalization, the student and faculty population are more attuned to environmental impacts than the population at large. In addition, universities frequently have very constrained parking. Because parking and transportation functions cannot usually draw from academic funds, universities need to explore innovative parking management strategies in order to be self-sufficient. They are more readily able to implement new parking strategies since, as self-contained organizations, they are able to control their own parking facilities. Furthermore, their marketing efforts are easier to target than most, in that communication mechanisms are usually in place and everyone has a similar destination.

Despite these similarities, universities vary in their settings. Some are urban and can be easily integrated into a car-sharing operator's regular fleet, such as the University of California in Berkeley and Massachusetts Institute of Technology near Boston. In both these instances, the car-sharing operator has vehicles placed on the campus as well as in locations around the community. In more suburban settings, car-sharing is a stand-alone project focused only on the campus. Stanford University in Palo Alto, California and the University of North Carolina in Chapel Hill are two such examples.

Goals and Benefits

A key goal of universities is to reduce parking demand. At some universities, this goal has been linked to a TDM program, where the overall goal of managing the system also encompasses an emphasis on environmental leadership.

At the University of North Carolina at Chapel Hill, the University of Wisconsin at Madison, and Portland State University in Oregon, car-sharing is one of the TDM strategies offered to campus affiliates. The programs include other alternative transportation modes as well, such as free or subsidized transit passes and vanpooling and ridesharing. Reducing parking demand is a goal of these campuses, as it is at Massachusetts Institute of Technology (MIT). MIT is further spurred to include car-sharing as a strategy, since Cambridge, its host city, limits how much parking the University can have.

Sustaining the environment was one of the goals of the University of Victoria in British Columbia when it introduced car-sharing on its campus. Similarly,

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car-sharing fits into the goal of the Tufts Climate Initiative, at Tufts University in Massachusetts. Tufts, which has a strong environmental movement, decided to do something itself to reduce climate emissions, since it judged that government action was slow or non-existent. There was a two-year discussion about the fact that car-sharing might actually increase emissions, since it might encourage non-drivers to drive. Ultimately, the decision was made to include car-sharing in the Climate Initiative, particularly since two of the vehicles are electric, given to Tufts by a donor.

The University of Washington in Seattle experiences parking problems because of its bucolic setting—a campus spread out over 750 acres and bordered by water on two sides. Maximizing parking availability, while limiting the number of peak-hour vehicle trips, is the University's primary goal. "We know that people can feel stranded on campus without having a car to use—Flexcar fills this need," said Lisa Quinn, Public Information Specialist with the University's Transportation Office.[2]

Finding a Partner

There is no definite pattern of who initiates the partnership between a university and a car-sharing operator. Sometimes the car-sharing operator recognizes the opportunity a campus provides for new business; other times the university itself seeks out car-sharing as another strategy for its parking and TDM programs.

At Stanford University in California, for example, the university issued a Request for Proposals in 2003 to obtain a car-sharing operator. One of its requirements was that the operator admit 18-20 year olds as members. Two bidders responded. Ultimately, the original operator who was chosen closed the program because of a lack of demand, but Enterprise Rent-A-Car has taken over, offering hourly rentals through its regular rental office.[3] Service is available to 18-20 year olds who can present proof of full-coverage car insurance.

The situation at University of Victoria in British Columbia was reversed. The University sought out an operator, Victoria Car Share (VCSC). However, VCSC asked that a core group of 24 members be recruited first, in order to

2. Quote from "Flexcar Broadens Options for University of Washington Students, Staff and Faculty," a case study published by Flexcar.

3. The high cost means that the service is similar to half-day rentals, rather than hourly. As of March 2005, the cost was $14 per hour, slightly less than half the $33 daily fee. City CarShare's rate was $4 per hour, or $2 per hour off-peak.

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prove that there would be a viable market. An ad hoc group at the University organized afternoon workshops and sent notices to staff, faculty and students. Today the VCSC car on the campus is the second most popular in the VCSC fleet.

Zipcar approached MIT about car-sharing as a no-cost proposal to the University. This was an incentive to partner, according to MIT's operations manager, because, "We can be a good citizen of Cambridge" without additional cost. Campus members themselves pay $25 a year, but are not assessed any application or security fee.

Types of Support

Parking and promotion of car-sharing are universally offered by the nine universities interviewed for this research. Several are considering using car-sharing to reduce departments' fleets, and several offer subsidies to car-share members. Car-sharing is also incorporated in policies on campuses that have TDM programs.

Marketing

Most of the universities hold campus events where car-sharing is featured along with other alternatives to the single-occupant automobile. Most also have an established communications network, such as e-mails to staff, employee newsletters, new student orientations, and websites. This network is utilized to promote car-sharing and other alternative modes. Materials are usually provided by the car-sharing operator. Below is a sampling of these marketing methods:

- The University of Victoria's campus calendars advertise the TDM program on the back, including information on car-sharing.
- MIT and Stanford University place signs advertising car-sharing in the campus shuttles.
- The University of Washington pays for weekly ads in the student newspaper.
- The University of Pennsylvania includes car-sharing information in the packets sent to new students, which advise them not to bring vehicles to campus.

In order to be effective, marketing needs to occur in a supportive environment and be appropriately targeted. For example, car-sharing parking that is not convenient, parking rates that make car-sharing uncompetitive, and lack of transit can all counteract the best marketing campaign. The Univer-

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Exhibit 5-26 Car-Sharing at the University of Washington

The University of Washington in Seattle spent $40,000 on marketing car-sharing in 2002-03. The marketing campaign included rate cards at nine commuter centers around campus; signs on parking stalls; direct mail to all faculty, staff and students; newspaper ads; departmental e-mails; banners and signs; informational meetings; and material on the website and in student registration packets.

Despite these efforts, staff judges the results to be "very modest" in reducing solo driving to campus. Although car-sharing is perceived very positively by members, there is little awareness among the wider campus community. Staff points out that car-sharing is a "tough sell" when 95% of staff and faculty own cars; parking is available on campus for less than $7 per day; and other TDM programs such as the Upass have already brought about substantial reductions in auto commuting. Only 23% of staff, faculty and students now drive to campus, making it difficult to achieve further gains.

Transportation staff now plans to conduct more targeted marketing, rather than broad-brushed techniques such as direct mail to all faculty, staff, and students. Efforts will focus on signing up departmental members, using Flexcar as a substitute for pool cars.

sity of Washington experienced this disappointment when, despite a comprehensive campaign, survey results showed that there were no significant changes in commute habits. (See Exhibit 5-26 for details.)

Administration

Just as with any employer, universities do not give outside businesses direct access to their employees and students. Therefore, the most common administrative help given is assistance with marketing. Usually, the car-sharing operator will supply promotional materials and the university staff will distribute it. The university staff time spent is generally minimal. For example, staff at Portland State University in Oregon estimate that the Administrator spends about five hours a month and the Alternative Transportation Coordinator spends another 10 hours a month on the car-sharing program.

There are some exceptions, however. For example, Zipcar provides service at the University of North Carolina-Chapel Hill, which is remote from the firm's major markets in Boston, New York and Washington, DC. For this reason, university staff provides operational and maintenance assistance.

Parking

Given the tight parking supply on most campuses, parking is one of the most significant types of support that a university can give. Indeed, given

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that universities generally control the entire campus parking supply, car-sharing would not even be possible without this type of support. Of the nine universities who were interviewed for this research, six provide free parking to the car-share operator, even when everyone else has to pay. Three universities discount the car-share parking fee.

MIT provides five free parking spaces to Zipcar on its campus. All but one can also be used by non-campus members of Zipcar. If MIT charged for the spaces, they would have a value of $10,000 per year, which MIT figures is its cost to provide and maintain them.

The University of Victoria has taken an intermediate approach (Exhibit 5-27). The VCSC vehicle was allowed to park free for the first two years of the program, but now pays full price. Future car-sharing vehicles will be required to pay for parking as a result of a recent agreement between the University and VCSC. The agreement covers a multi-year partnership that will result in a substantial investment into and expansion of car-sharing on campus.

Flexcar has two discounted parking spaces on Portland State University's campus. The car-share operator is permitted to pick the spaces it considers most advantageous and is charged half of the regular fee for reserved parking, or $70.50 per month per space. The City of Portland has granted Flexcar another six on-street parking spaces within the campus boundaries.

Exhibit 5-27 Dedicated parking space for car-sharing at the University of Victoria.

Memberships

Most universities have pool cars for departments' use. This fleet can be a very large expense to the university, especially for those campuses that do not charge the full cost to the departments. Recognizing the potential cost-savings, several of the universities said that they were trying to convince departments to enroll in car-share memberships and give up their pool vehicles. Such memberships could boost the car-sharing operator's revenues while saving money for the university. This concept is still in the fledgling stage on campuses, however. Barriers can be resistance to change and the perceived convenience of having a vehicle dedicated exclusively to a department (see Chapter 6 for an extended discussion).

More successful is the idea of subsidizing memberships for campus affiliates. Universities generally are not inclined to give direct funding to operators, unlike some of the other partners described in the preceding sections of this chapter. Rather, they support the car-sharing program by buying or

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Exhibit 5-28 University of Wisconsin Subsidizes Car-Sharing

The University of Wisconsin in Madison bought 200 trial memberships for campus employees at $50, equal to a $10,000 subsidy for the car-sharing operator. In exchange, Community Car placed one car on campus in a free, signed parking space on a covered ramp. The value of the free space is $1,015 a year, the cost if a campus employee purchased it. The space is in a core sector of the campus at the front of the ramp. People with trial memberships received five hours and 50 miles of free car-sharing usage. All but about 12 memberships have been distributed. Between 60-70% of those who received the trial membership then joined personally after the trial period.

Now, instead of buying memberships, the University of Wisconsin has refined its subsidy of the program. In order to sustain the program, which has been in existence about a year, the University pays Community Car quarterly by calculating the difference between what Community Car is making in usage fees and their costs to break even.

underwriting memberships, which gives the operator a predictable source of income. One such example from the University of Wisconsin is highlighted in Exhibit 5-28.

Another example is the program at Portland State University (PSU). Employees who work full time, buy a transit pass, and do not have a campus parking pass are eligible to join the Flexcar program. Members have the use of eight Flexcars located on or nearby campus between 8 AM and 6 PM with a maximum usage of four hours per day. PSU uses parking revenue to pay $2,000 per month to Flexcar for all employee members' usage of car-sharing at the university. In return, Flexcar has waived the first year membership fee of $35 for each employee who joins. According to PSU staff, those who don't join the program "think there must be a catch—it can't be all that good." However, the program is expanding through word-of-mouth promotion by members. PSU has also agreed to buy 20 Flexcar memberships distributed by lottery to the 380 residents in new student housing.

Planning, Policy and Tax Issues

As mentioned earlier, car-sharing has become part of several universities' policies, when it has been integrated into their TDM programs. For example, the Chancellor at the University of Wisconsin saw car-sharing programs in Europe and expressed interest in incorporating it into the existing campus TDM program. The University is in the process of updating its Master Plan, which will have a transportation section where car-sharing will also be included. Sustainability programs, such as those at the University of Victoria and Tufts, are other examples of linkage with university policies.

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Transit Integration

Universities who offer transit pass programs often combine them with car-sharing as an added incentive. People sometimes drive instead of taking transit because they worry about how they will do needed errands on their lunch hour or how they will get home if they have to work late. Car-sharing alleviates these worries and provides a good complement to transit pass programs.

For example, Portland State University's subsidy of car-sharing memberships, described above, goes hand-in-hand with its transit pass program. Employees receive a two-thirds subsidy on transit passes; student passes are subsidized by 30%. When employees and students buy their subsidized passes, they are given an information packet explaining the car-sharing program.

Those enrolled in the Upass transit discount program at the University of Washington also get discounts in the Flexcar car-sharing program. Upass holders receive a reduced car-sharing membership of $5 and steep hourly deductions on usage.

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5.10 Conclusion

Partnerships can be a win/win arrangement both for the car-sharing operators and their various partners. Car-sharing organizations are still in their infancy in the United States and Canada, despite the significant growth that has occurred in recent years. The level of support by partner organizations can be critical to their success or failure. Besides financial support, especially during the start-up phase, partner organizations contribute to success through very basic support, such as increasing visibility of car-sharing as an option in the community and providing parking for the vehicles. Some partners identified in this research have gone beyond this basic support through other means, such as by integrating car-sharing into their government policies, by substituting car-sharing for parking requirements in developments, and even by allowing tax breaks for car-sharing.

Partner organizations have benefited as well. Some benefits are concrete, such as reduced parking requirements and elimination of the organization's fleet vehicles. Car-sharing can also be a mitigation tool for environmental impacts and a societal tool for increasing community mobility, although these benefits have not as yet been adequately quantified. Nonetheless, the benefits cited the most by car-sharing partners are those with the potential to increase the quality of life for everyone, whether they are car-sharers or members of the community at large.

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CHAPTER 6. FACTORS FOR SUCCESS

Car-sharing is a recent phenomenon in the United States. As with any new concept, it faces challenges in getting a stronghold as an alternative transportation mode. This chapter outlines some of those challenges and gives examples of how they were mitigated by the actions of partner organizations that were consulted for this research. It concludes by describing common themes that contribute to the successful establishment of car-sharing.

The analysis in this chapter is based on the discussion at the Operators' Workshop, the interviews with partner organizations, and the literature review. (See Chapter 1 for an overview of these research methodologies.) Note that it primarily considers "external" barriers and factors for success that partner organizations can help to address. This chapter does not attempt to cover internal barriers for car-sharing operators themselves, such as operational and technology issues.

6.1 Overcoming Barriers

As with any innovation, certain issues arise that have not been confronted before. On top of these are other issues that are common to the start-up of a new idea, for which car-sharing is no exception. This section discusses the following barriers and suggests ways of overcoming them by citing the actions of others who have already implemented car-sharing in their community or business:

- Finding a partner
- Understanding car-sharing
- Lack of data
- Financial barriers
- Regulatory obstacles
- Parking issues
- Serving low-income participants
- Geographic and cultural barriers

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Finding a Partner

In many of the situations examined here, the car-sharing operator instigated the conversation about car-sharing in the selected community. The operator had done enough research to identify the community as a likely prospect for a successful car-sharing venture. However, collaborating with a partner organization smoothed the operator's entry into many of the communities.

Finding a Home

Without a department dedicated to alternative modes, car-sharing doesn't have a natural "home" within a partner organization. A city, employer or university with a TDM program is more likely to have a champion that can carry the idea forward within the organizational structure than an agency that focuses all transportation in a parking or public works department. Similarly, a transit agency that takes a broader view of its goals, and sees itself as a mobility manager, is more likely to carry the car-sharing concept forward.

The planning staff in Arlington, Massachusetts, for example, had conducted preliminary conversations among themselves about car-sharing but had never had the time to investigate it further. Car-sharing doesn't fit within their core responsibilities. The citizens' Transportation Advisory Committee never raised car-sharing as an issue, which might otherwise have given policy direction to a staff with many other demands on their time. In contrast, car-sharing is a natural complement to the University of Wisconsin's TDM program at its Madison campus.

The lack of a "home" for car-sharing even within agencies that are already partnering with operators was evident in this research. Many phone calls were made to find a person in the agency who knew about the program. Even then, researchers were sometimes unsuccessful in locating the right person. Staffs in local jurisdictions vaguely knew that their organization was involved but had no idea who was in charge. Car-sharing in these agencies is still an anomaly that doesn't quite fit within the organization's understanding of its mission.

Using Public Funds

Staff in some agencies have expressed concern about using public money for car-sharing to support a private company, such as Zipcar or Flexcar. King County Metro in Seattle, Washington was not in a position to operate car-sharing itself and chose to partner with Flexcar to provide the service. Metro staff indicated that the agency's public funds are being used to part-

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ner with Flexcar in order to demonstrate the viability of car-sharing and to test the different markets where car-sharing may prove successful. Flexcar was able to quickly get the car-sharing project up and running—a project that was strongly supported by several champions within the organization. Because of this partnership, Metro's public dollars were not the sole source for the program. Instead its funds were leveraged with Flexcar's private dollars, enhancing the overall project.

SEPTA took a different approach–viewing car-sharing as an adjunct to public transportation. As a result, SEPTA selected a non-profit, PhillyCarShare, as its partner. SEPTA staff believes that a non-profit operator is more open to promoting car-sharing when needed and not as a substitute for public transit than a for-profit operator who must be concerned with the bottom line.

Understanding Car-Sharing

Not only potential partners, but the public at large, often do not understand what car-sharing is—how it differs from ridesharing and rental car agencies as well as how and where it works. Even where car-sharing is established, it can continue to take effort to dispel confusion about the concept of car-sharing.

Relating Car-Sharing to Goals

Partners do not necessarily equate car-sharing as a natural extension of their goals. For example, since King County Metro in Seattle primarily provides transit service, the connection between car-sharing and transit was not obvious to everyone at the agency. Some Metro staff questioned how getting involved with car-sharing would increase the transit agency's ridership, which is its core mission. Those who advocated that car-sharing was in alignment with the transit agency's role to promote overall mobility see a clear connection. They believe that car-sharing complements the agency's mission.

One way the car-sharing proponents in Metro have demonstrated its compatibility with transit is to use the car-sharing program to help sell FlexPass, its monthly pass purchased by employers for their employees. "We're making the FlexPass more valuable," said one staffer, by linking car-sharing and transit. Another strategy was to introduce car-sharing instead of increasing transit service on some routes during nights and weekends, which proved to be a more cost-effective method of providing mobility.

However, car-sharing operators have generally found it difficult to partner

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with transit agencies on discounted passes. One respondent wrote, "The transit agencies seem reluctant to offer it [a discount] to the car-sharing operators because they feel they'll be losing revenue by selling discounted fares to people who are now or would be willing to pay full price." The transit agencies do not view car-sharing as a natural complement to their own goals.

If the goal is to reduce parking demand, one operator has found that it is a counter-intuitive argument to tell a partner that you need to find parking spaces for car-sharing vehicles. In this case, city staff may not understand the benefits car-sharing can produce in reducing the overall need for parking.

Even when there is a receptive champion within the organization, the lack of supportive policies or conflicting internal policies can be daunting. For example, car-sharing fits into the goal of Tufts University's Climate Initiative, which is to reduce climate emissions. Nonetheless, it took years to convince the facilities staff to allow a free car-sharing parking space at its Boston, Massachusetts campus. The goal of the facilities staff to maximize revenues for the campus' premium, scarce, high-value parking spaces conflicted with the Climate Initiative's goals.

On the other hand, a potential partner may think that car-sharing will, in fact, help reach goals without a full understanding of the types of settings necessary for car-sharing to succeed. For example, some partners have required the operator to set up car-sharing in a low-income neighborhood where many residents may not have driver's licenses or money for hourly fees, or in neighborhoods where households typically have three or more cars—settings that pose difficult challenges for success. WMATA included a provision in its Request for Proposals (RFP) that the selected operator locate vehicles in the entire service area, which includes not only Washington, DC but also Maryland and Virginia. Others have tried to tie separate priorities, such as energy-efficient electric vehicles, with the car-sharing programs.

Partners may not realize the risk and start-up costs involved in establishing car-sharing in a community. They need to understand the types of support partners can provide in order to overcome these barriers and realistically align the car-sharing program with the partner's own goals.

Difficulties with True Cost Comparisons

At the same time, the public at large is not educated on the true costs of owning an automobile, and, often erroneously, perceives car-sharing to be a more expensive option. Highest in people's consciousness are what

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they pay at the gas pump and for parking. Costs that are not encountered daily—such as insurance, license fees, smog tests, and maintenance—are not as transparent, when compared to out-of-pocket hourly and mileage fees for car-sharing. In addition, the pride in ownership of an automobile is touted daily in advertising. The notion of sharing an automobile runs counter to the cultural bias toward the car as a symbol of personal freedom. In themselves, these factors make it hard to "sell" car-sharing. Unfamiliarity with the concept of car-sharing just adds to this difficulty.

The lack of understanding about car-sharing and its benefits is fueled by a natural resistance to change. One city's fleet manager was concerned about having to cut jobs in his department if car-sharing replaced vehicles. Other employees feared the loss of "perks" without access to a city vehicle. At the University of Washington, 21 departments have signed up to use Flexcar as a substitute for motor pool cars, but only one has actually given up a pool car. Even though a pool car costs a department $600 a month, "It's not usually a rational cost decision—they want their pool cars," according to the transportation staff, because of departments' perceptions of convenience and availability. At the City of Berkeley in California, staff is supportive of the overall concept of replacing fleet vehicles with car-sharing, but more resistant when their own vehicle is targeted. A car-sharing proponent on the staff in another city had to defend its benefits when other staff accused him of social engineering. They believed that it was not the city's role to subsidize car-sharing in order to move people out of single-occupant automobiles.

Need for Standardized Definition

One of the desires expressed at the Operators' Workshop conducted during this research was the need for a clear, concise definition of car-sharing. The lack of definition is not only a barrier in finding partners but also in recruiting members beyond the early adopters. This research attempts to address the issue in Chapter 2 by presenting a series of definitions used by others. Perhaps the most succinct and descriptive definition is that used by the State of Washington:

> **A membership program intended to offer an alternative to car ownership under which persons or entities that become members are permitted to use vehicles from a fleet on an hourly basis**

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Using the definitions listed in Chapter 2, operators could collaborate on adopting one of them for universal use. When one definition becomes repeated and standardized, it may mitigate some of the regulatory barriers discussed later in this chapter. And familiarity with the concept will lead to a better understanding for everyone of car-sharing and its benefits.

Lack of Data

Another benefit of this research, according to the operators, is the credibility that can be gained from an impartial examination of car-sharing. When operators present their case to potential partners, many are skeptical about its claims. Because car-sharing is relatively new, a body of data is not readily available to prove its worth to agencies that are being asked to invest in it, either financially or through resources, such as parking spaces. Some agencies worry about accepting operators' data at face value, recognizing that operators are businesses that must make a profit.

Need for Performance Data

One reason that only a slim amount of objective data on the benefits of car-sharing exists is because current partners rarely establish performance measures. As one partner said, the main criterion is whether the company is still around. "If it's profitable, it means that it's being marketed and that people are using it." Another summed up the attitude of many partners when she said, "It's one of those 'good to have' things that does make a difference, but is difficult to quantify. It just helps chip away at the barriers to transit use or carpooling." Her statement reflects the view of many partners—that car-sharing is just one of many tools to address congestion and pollution which, by itself, will not cause significant change. Therefore, some partners believe it is not important to get heavily involved in evaluation and monitoring.

Need for Cost Data

A number of public agencies that are turning to car-sharing to replace their vehicle fleets have found that they themselves do not have good data by which they can compare fleet costs to car-sharing costs. For example, the City of Berkeley started its fleet program by identifying underused department vehicles. Because data was manually collected by departments and assumptions had to be made about costs and utilization, it took a year to determine the first 15 vehicles that would be replaced by car-sharing. The University of Pennsylvania is running into the same issue, because all its

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schools have their own vehicles. Since there is no centralized fleet and costs are distributed across different budgets, the transportation staff does not have the necessary data. They will need to compile the data themselves in order to study how fleet-sharing could work in their environment.

As car-sharing grows, agencies, particularly local governments, will need to justify their investments and other public support by applying performance measures. To address this need, Chapter 7 discusses performance measures and useful data to support the measures. Collecting these data will expand the understanding of car-sharing and its benefits.

Financial Barriers

As Chapter 5 described, many partners help initiate car-sharing by providing operators with sorely needed seed money. One US operator estimates that it can cost $1 million to open up a new market. As with any new business, there are start-up costs that need to be covered before any revenue is forthcoming. For example, the operator needs to purchase vehicles, obtain insurance, set up a reservation system, hire staff, market to prospective members and find parking near them. It then takes time to build the business and break even. All of these steps require risk-taking, which a partner organization can help mitigate. The benefit will be a new mobility option for the partners' constituencies—residents, businesses, renters, employees, and transit riders.

Grant Restrictions

When the partner's funding assistance comes from grants, restrictions often impose administrative burdens on the public partner. For example, when the Center for Neighborhood Technology (CNT), a non-profit in Chicago, Illinois wanted to set up a demonstration car-sharing project, the City of Chicago agreed to apply for federal funds. (See Exhibit 6-1 for details.) However, the City believes that the FTA could better promote car-sharing if it made direct grants to the recipient, instead of requiring the operator to find an open-minded government agency to act as the pass-through.

Grant funding usually comes with restrictions placed on the recipient – i.e. the grant can only be used for specific purposes. King County Metro received a federal JARC grant, which can only be used for low-income participants in the car-sharing program. It also received an Environmental Protection Agency (EPA) grant to provide 23 hybrids in order to promote

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Exhibit 6-1 CMAQ Funds Support Chicago Car-Sharing

The City of Chicago agreed to apply as the sponsoring government agency for federal Congestion Management and Air Quality Improvement Program (CMAQ) funds after the Center for Neighborhood Technology (CNT) had been turned down by others. Like the others, Chicago had some concerns about being the pass-through agency. Not only would the City be held responsible for performance of the non-profit even though the City was only the middleman, but it would also be taking on an unfunded mandate through the preparation of all the paperwork involved.

With the CMAQ grant, the City was awarded $250,000 to start I-GO by providing CNT with the operating costs for 11 vehicles. Altogether, the City secured $600,000 over three fiscal years for start-up operations funding. In 2005, Chicago was awarded a second CMAQ grant of $419,000 to expand the program with more vehicles, totaling $1 million in federal grant funds for I-GO. The City continues to be involved in monitoring and reporting on the grant to the Federal Transit Administration.

clean air benefits. The grant was used to pay Flexcar the cost difference between supplying a combustion engine vehicle and a hybrid. Similarly, Agence Métropolitaine de Transport in Montréal plans to provide hybrids to Communauto car-sharing members with a partial grant from Transport Canada's Urban Transportation Showcase project. The original proposal was for electric vehicles. However, the project has been delayed because of the high cost and difficulty of obtaining electric vehicles, causing a shift to hybrids. These examples illustrate grants which met the agencies' goals. Nevertheless, a downside of using grant funds is that the restrictions may not always coincide with the most pressing program priorities or may divert the agency from its main mission.

Some partners worry that car-sharing cannot succeed without ongoing financial help in addition to start-up funding. For example, I-GO in Chicago asked for a second CMAQ grant and subsequently received an award through the City of Chicago for 35 vehicles to expand its fleet. The City's Department of Transportation is again a pass-through for a federal grant. The Executive Director of the Lloyd District TMA, a business district east of downtown Portland, Oregon suggests that expenses for car-sharing be built into either parking fees or transit pass charges. The TMA has used CMAQ funds to give unlimited use of car-sharing vehicles in the business district if an employee has a transit pass and also signs up for car-sharing. The Director wonders if the 50 car-share members will continue to use the service, now that the grant is depleted and the free access will be discontinued.

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Attracting competition could be a long-term goal of partner organizations to ensure against the financial difficulties any one operator may incur. For example, both Zipcar and Flexcar are now operating in the Washington, DC area. Concerns about sustainability of the car-sharing program will also be allayed if the market is established and has proven viable in a given region.

Insurance Costs

Insurance costs continue to be a major financial burden for car-sharing operators. Insurance accounts for 20-40% of an operator's total costs, according to a study published in *Transportation Research Record*. In July 2002, this amounted to $4,800-$6,000 per vehicle per year. One cause is the fact that car-sharing has not yet been assigned a risk class within the insurance industry, leading to widely variable interpretations of the risk by insurers (Shaheen, Meyn & Wipyewski, 2003). The problem of insurance costs and the development of data to support a new classification category is one that should be addressed by the car-sharing industry acting jointly (see Chapter 8 for more discussion about joint actions).

One of the biggest potential untapped markets—university students—is inhibited by insurance costs imposed on the operator. The University of Washington and the University of Victoria in British Columbia both report that this is a major obstacle for expansion of their program. Initially, the University of Washington had a waiver to allow 18-20 year olds into the program, but it was dropped later due to exorbitant insurance costs. Stanford University in California has solved this problem by requiring that the car-share operator find coverage in order to serve the campus. City CarShare qualified 18-20 year olds with a clean driving record, who had also passed a defensive driving course. When City CarShare closed the program due to lack of demand, Stanford then partnered with Enterprise Rent-A-Car, a large national company. Enterprise has made hourly rentals possible and allows student who are 18 years or older with valid proof of insurance and a major credit or debit card to participate in the car-sharing program.

Suggested Tax Code Changes

To ease financial burdens on car-sharing, Arlington County, Virginia staff would like changes in the State's tax code. Currently, vanpool vehicles do not pay state vehicle taxes. Extending this exemption to car-sharing vehicles would remove a financial barrier. Another partner in Chicago echoes this

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idea and further suggests that there be breaks in the tax code for car-sharing similar to those for solar power.

Regulatory Obstacles

Even if a partner attempts to help the car-sharing operator, they both can run into obstacles from other agencies or restrictive legislation that inhibits their progress. Because car-sharing doesn't fit neatly into an existing category, regulators sometimes want to impose taxes and higher fees on car-sharing. Zoning restrictions can limit car-share parking in both residential and commercial settings. Minimum parking standards can block developers' incentive to introduce car-sharing in order to reduce parking demand. The following examples illustrate how some partners overcame these regulatory obstacles.

Taxes and Fees

The Department of Consumer and Regulatory Affairs (DCRA) in Washington, DC wanted to regard each car-sharing space as a place of business, requiring a "certificate of occupancy" for each parking space. This example demonstrates the misunderstanding about car-sharing and the regulatory barriers it can face. Fortunately, in this particular case, a memo from DDOT explaining the characteristics of car-sharing served to absolve car-sharing companies of these barriers. In another instance, DCRA classified car-sharing vehicles as rental cars. This had a negative impact on insurance costs for the car-sharing firms. DDOT requested that, if the law provided DCRA with a choice in the matter, a classification that had a lower cost on car-sharing companies would be appropriate in light of the public benefits derived from maximizing car-sharing participation. In some jurisdictions, rental cars are subject to an additional tourist lodging and entertainment tax, so avoiding this classification for car-sharing is an important economic consideration for the operator.

Parking Regulations

Zoning regulations can be a barrier to locating parking for car-share vehicles. Staff in the City of Arlington, Massachusetts worry that allowing car-sharing parking on residential streets may be considered a violation of zoning regulations, which prohibit businesses in areas not zoned for it. Because the City of Seattle also had this concern, it amended its Land Use Code to allow car-sharing as an accessory use for residential buildings. A less formal method of addressing the problem was used in Washington, DC,

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where staff from DDOT wrote to the Zoning Commissioner in response to a resident's complaint. DDOT described the characteristics of car-sharing to justify why it is an appropriate use in a residential area. This resolved the zoning issue.

In addition, cities that want to give on-street car-sharing parking spaces in commercial areas may be accused of privatizing the street if a particular company benefits. The City of Seattle resolved this problem by signing the spaces for a class of vehicles: "Carshare vehicles only." Arlington County, Virginia installs orange poles with "No Parking" signs and attaches car-sharing brochures, both paid for by the car-sharing operator. These solutions are similar to the concept of taxi stands, which are authorized for a class of private vehicles that serve a public good.

Zoning restrictions that set minimum parking requirements for development can be an obstacle. There is no way to capture the benefits of car-sharing in reducing demand if no deviation from a parking standard is permitted. Developers are more likely to include car-sharing as a traffic and parking mitigation if they receive, as an incentive, credits allowing them to build less parking. For example, the City of Berkeley waives parking minimums on a case-by-case basis. As a result, Panoramic Interests provides two City CarShare spaces out of 40 total parking spaces in its downtown building, which houses 91 apartments and 10,000 square feet of commercial space.

However, some cities have been skeptical about reducing parking requirements. The City of Seattle's Land Use Code will only allow one car-sharing space to replace one required parking space in new residential development. In drafting the legislation, Seattle staff did not have sufficient data to determine that parking reductions for car-sharing would not cause spillover parking on adjoining streets. They also worried about providing an incentive to reduce parking unrelated to the actual demand for car-sharing. In Toronto, Canada staff determined that they lacked a mechanism to guarantee that car-sharing would always be available. Their concern was that a building with reduced parking could outlast the car-sharing operation.

In some cases, the lending institution, not the city, can be the barrier, fearing that reduced parking will decrease the project's viability. The requirements of the market also dictate supply; national retailers, for example, may actually want more parking than the city requires or will allow (Parzen & Sigal, 2004).

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Trip Reduction Ordinances

Despite the barriers mentioned above, regulations can sometimes act to promote car-sharing. The State of Washington's Commute Trip Reduction ordinance requires employers with 100 or more full-time employees at a single worksite to develop and implement a commute trip reduction program. This ordinance has spurred more success in the business market than in other parts of the country, according to a Flexcar representative. The legislation provides an opening for employers to learn about car-sharing, particularly when commute trip reduction staff promotes car-sharing alongside other TDM strategies.

Parking Provision

Car-sharing cannot succeed without conveniently located vehicles near the members. Yet, finding affordable, well-located parking for the vehicles is one of the barriers most frequently mentioned by operators. Communauto in Canada reports that it has a problem absorbing the high demand for memberships and needs help from local governments to secure parking for its cars. However, even a supportive municipality or business can have difficulty providing help, because parking is a volatile issue in areas with constrained supply. Objections about reserving parking for a particular class of users—in this case car-sharers—can come from residents, from employees, and even from other city departments with different priorities. These objections can spill over into enforcement problems, as other parkers risk tickets for a place to put their cars.

Charging for Car-Sharing Parking

Paying for parking can be a significant cost for the car-sharing operator. It is another expense that must be factored into the business plan when an operator is deciding to serve a community. For example, Zipcar pays $75 a month per vehicle for parking at some Metro North stations in New York. Metro North, a commuter rail system, considers it to be a gift of public funds if it were to give Zipcar free parking. On the other hand, the University of North Carolina at Chapel Hill provides four free parking spaces on campus for the Zipcar program, forgoing revenue of up to $4,600 a year for this car-sharing incentive.

The operator can offer lower rates to members when free car-share parking is available. One operator notes that it's particularly important to keep costs low when a new car-sharing service is initially introduced in order to attract

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membership sign-ups. Recognizing this incentive, Cambridge, Massachusetts discounted 20 spaces in lots or garages in order to get car-sharing started in the community, gradually moving to the current full market rates.

Nonetheless, the need for revenue is a barrier cities face in providing the most visible on-street spaces for car-sharing. Despite its support for car-sharing, the City of San Diego does not yet designate metered spaces for car-sharing, partly because it does not want to lose the meter revenue.

On the other hand, Arlington County, Virginia cites on-street parking as the most important support that they provide. Representatives recognize that there is some revenue loss but say, "Fifty spaces is a drop in the ocean." They state, "We like to think that the car-share use of on-street parking spaces near transit facilities is a necessary and practical piece of the transportation infrastructure that serves world-class transit-oriented development just like sidewalks, crosswalks, taxi stands, and curbside bus stops." Similarly WMATA considers that the small amount of revenue loss from meters in their kiss-and-ride spaces is outweighed by the gain in ridership.

Resolving Parking Objections

Car-sharing operators need parking that is not simply available—it must also be located where it is actually needed to serve members. However, anything that takes away a parking space in an area with a tight parking supply can provoke strong opposition. When DDOT in Washington, DC asked the car-sharing operators to identify potentially desirable curbside parking spaces for their vehicles, some residents "were up in arms." Since Residential Permit Parking spaces are so scarce, residents called it "outrageous" and "corporate welfare" to "give away" curbside parking to for-profit corporations. DDOT met with several advisory neighborhood commissions. In most cases, DDOT achieved some progress by showing that it proposed a reasonable quid pro quo for access to reserved curbside spaces. Nonetheless, most commissions passed resolutions supporting car-sharing parking, but only for newly created spaces.

In a different twist on parking angst, car-sharing came to the rescue of The Defender Association, a non-profit corporation that provides public defender services in the Seattle region. The association experienced high employee resistance when it proposed to cut its costs by reducing the number of parking spaces it rented for investigators. After lots of meetings, the organization agreed to keep half the spaces and institute car-sharing, allowing investiga-

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tors to use car-sharing vehicles to conduct field visits on days when they do not drive to work. Although the investigators are still somewhat miffed, the deputy director says that the organization now leases only 10 spaces instead of 20 and the program with the car-sharing operator has been extended.

Enforcement

Parking enforcement can also be an issue. In Cambridge, Massachusetts, drivers park in restricted car-sharing spaces while they go inside city offices to pay parking tickets for illegal parking! One Canadian operator installs signs that sport a tow truck and warn, "Don't Even Think of Parking in Our Spot." San Francisco, California is considering proposed legislation that will give hybrids and car-sharing vehicles free parking in city spaces. However, this can pose possible enforcement problems, such as whether officers can easily identify hybrids and how to determine if the vehicle has violated the time limits at metered spaces. Other cities' regulations requiring that all cars be removed for street cleaning or snow removal can complicate car-sharing operations that rely on street parking for the vehicles.

An operational issue that car-sharing operators can face is the need for member access in secured parking facilities. Venezia Apartments in downtown Santa Monica, California has one free car-share parking space. All car-sharing members, not just tenants, receive the code to the building when booking the car online. The code is changed on a regular basis to minimize the number of people with access to the building. In an apartment building in Washington, DC, car-sharing members use their Flexcar smartcard to enter the garage housing the car-share vehicle. For security, residents go into the garage by the building's elevator, which can't be accessed with the smartcard.

Serving Low-Income Participants

When public support is involved, agencies have expressed the need for equitable access to car-sharing for all its citizens. This requirement can create problems for the operator, because low-income areas are sometimes difficult to serve—both in terms of profitability and also in terms of qualifying participants.

Recognizing the operator's need for a return on investment, the City of Seattle sweetened its requirement to encourage car-sharing in diverse neighborhoods by contributing $30,000—half the costs—to place cars in four low-income areas for one year. The funding is not outright, but pays for usage on the car-sharing vehicles. Seattle, King County Metro, and Washington

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State Department of Transportation have also recently received JARC federal funds for welfare-to-work activities. (See Exhibit 6-2 for details.)

Similarly, the Metropolitan Transportation Commission (MTC) in the San Francisco Bay Area uses JARC funds to underwrite the costs of deposits and fees for welfare-to-work participants in the City CarShare program. Half of the usage charges are also discounted by MTC.

Even when the public agency contributes funds to ensure car-sharing is available to low-income residents, the program may face barriers caused by potential participants' own circumstances. For example, the City of Vancouver, Washington partnered with the Vancouver Housing Authority and Flexcar in a pilot program for residents in affordable housing. Ten pilot households in two different developments were to receive free Flexcar accounts, paid by the Housing Authority, and five free car-share hours a month, paid by the three partners. So far only five households have been found eligible. Other potential participants did not have a driver's license, had a poor credit history, or did not have a checking account. This problem is echoed by the developer of a downtown Berkeley, California apartment building, who said that his low-income tenants are not car-sharing members because of poor credit ratings.

A further obstacle is that many low-income residents do not have English as their native language. Car-sharing information on usage is generally exclusively in English, creating a barrier to the potential low-income par-

Exhibit 6-2 Low-Income Car-Sharing in Seattle

"Transportation is often the biggest obstacle facing job-seekers, especially those in lower income households," said Patrice Davis, partnership coordinator at WorkSource Washington, a program of the Washington State Employment Security Department in Seattle. "Our programs help prepare people for the job search and interview process. But sometimes they can't get to an interview or access additional training with public transit, which hinders our efforts. By giving these people access to a car, more people can get better jobs faster."

The funding for this program comes under the federally funded Job Access Reverse Commute (JARC) program and enables clients of employment programs (such as WorkSource Washington) and other qualified individuals to use Flexcar for free on all trips that are related to job search or job training. The program also enables participants to access Flexcar at a significant discount for trips, such as child care, doctor's appointments or others that are related to mobility from the workplace.

Excerpt from "Flexcar Extends Car-Sharing Program; Innovative Program to Help Qualified People Access Employment, Training and Other Services," http://home.businesswire.com, March 28, 2005.

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ticipant.

WMATA is one agency that is cognizant of these barriers, and its RFP included specific criteria to ensure that car-sharing would be available to as many sectors of the community as possible. For example, it wanted an operator that did not impose a credit check or security deposit as a condition for joining. "We didn't want them to only be available to the higher income segments of the population," said a WMATA representative. It also has been working to promote access for people with disabilities, by requiring that operators install hand controls on request. If a vehicle is under-utilized, WMATA will allow it to be moved to another station in the same jurisdiction, but tries to avoid a shift from a low-income to high-income neighborhood.

Geographic and Cultural Barriers

The preceding discussion illustrates barriers faced by car-sharing operators that have been creatively addressed in various ways by partner organizations. However, there are additional barriers over which partners have no control or which will take changes lasting years or decades to overcome. These include land use issues and cultural attitudes.

Appropriate Markets

Chapter 3 outlines the market settings where car-sharing is likely to succeed, to date. Urban neighborhoods that are dense, with mixed-use development, scarce parking, and good transit offer the best potential for car-sharing. Without these elements, car-sharing is much more difficult to establish. Auto-oriented land uses featuring low-density development, big box stores, and free, large parking lots are not particularly conducive to car-sharing. These same areas are not likely to have convenient transit service to serve as a complementary mode of transportation.

At the Stapleton development in Denver, Colorado, for example, car-sharing was tried and discontinued. According to the Director of Sustainability for Forest City Enterprises, the failure resulted primarily because it was too early in the project, before density had maximized. Neither did car-sharing programs in suburban Bellevue, Bremerton, and Kitsap, Washington prove to be wholly successful, according to Flexcar. However, as Chapter 3 notes, car-sharing has been successful in some non-urban circumstances, such as at suburban university campuses, apartment buildings, and rural areas with characteristics such as a high degree of personal involvement, good transit, and the availability of local services.

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Chapter 2 discusses new market development not reliant on the neighborhood residential model, which is the current key market. The models below are not as dependent on favorable geographic attributes, which partners may not have the power to easily change. Instead, partners can help the viability of car-sharing even in non-urban areas by assisting operators with:

- Business sharing, which combines residential evening and weekend use with use by business during the day in order to create a sustainable revenue stream
- Fleet sharing, which provides an organization with exclusive use of car-sharing vehicles at particular times, guaranteeing a revenue source
- Lease sharing, whereby an individual leases a vehicle, but makes it available to other car-sharing members when not needed, or where only a small group has access to a single vehicle

Car Culture

Cultural obstacles are also primarily beyond partners' immediate control and will take longer-term strategies to address. America is a car culture, as evidenced (i) by the preponderance of automobile ads appealing to individual freedom linked to car ownership and (ii) the corresponding low percentage of people who travel by an alternative mode. Further, as discussed earlier, people do not have a true understanding of the cost of auto ownership and tend to consider only the variable costs, such as fuel, when comparing the cost with another travel mode.

However, the cost of the auto ownership may become more apparent as fuel prices increase and congestion makes the personal cost of travel time unbearable. Partner organizations can help by making the cost more apparent in relation to parking. Many suburban locations have an abundance of parking that is free to the user. Of course, the parking isn't really free—it is bundled into the cost of the construction and the rent or lease. Donald Shoup, an urban economist at the University of California at Los Angeles, argues that land is wasted and goods cost more because businesses have to compensate for losses from building and maintaining vast, empty spaces for parking (Shoup, 2005). If parkers had to pay the true costs of parking—which can cost $20,000 or more per space to build in a structure—they would be able to make more rational comparisons between owning a car and joining car-sharing. (See Chapter 4 for more on parking costs.)

Therefore, there are some short-term strategies that partners can employ to overcome cultural biases toward the single-occupant automobile:

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- Make parking costs transparent by charging for parking instead of making it free.
- Lower the parking requirement for commercial and residential land uses near transit.
- Allow multiple-use parking that serves customers by day and residents by night.

The District of Columbia Office of Planning, for example, notes that many of the wider policy changes that it is pursuing to encourage alternative modes will help to create a more attractive environment for car-sharing.

Changing Current Conditions

Longer-range strategies include increased densities around transit hubs. "Residents living near transit stations are around five times more likely to commute by transit as the average resident worker in the same city," according to a report issued by the California DOT (Lund, Cervero & Willson, 2004). And when residents can rely on transit for their commute, they are also more able to rely on car-sharing for the rest of their trips. The community benefits are reduced congestion and parking demand.

A corollary requirement is better funding for transit. By increasing the frequency and coverage, transit can fulfill its role as an essential and complementary mode to car-sharing.

In addition, partners can improve walkability in neighborhoods. Lack of sidewalks, cul-de-sacs with no pathways to the main street, and obstacles such as open drainage ditches discourage people from walking and push them into their personal automobile. If these barriers are present, car-sharing members will be unable to easily access car-sharing vehicles and may give up on the idea.

Many affluent communities are also environmentally sensitive and may consider car-sharing as a beneficial response to pollution and overdevelopment of land for freeways and parking. For example, Brookline, Massachusetts is a "green," affluent city very well-served by transit, which has also embraced car-sharing. Zipcar is a perfect complement to the community's environmental bent, according to city staff, making Brookline a more desirable place to live. Like Brookline, partners in other communities can offer car-sharing as one tool to address the larger societal issues of land uses and fuel consumption.

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In other words, car-sharing can't "paper over the cracks" – that is, it isn't a panacea for fundamental, underlying transportation problems. Car-sharing only makes sense as part of a wider package; it is not a solution to the lack of mobility in a community in and of itself. Neither can it exist in isolation. It can be a tool to address community concerns about the environment—reduced air pollution, fuel consumption, and sprawl. But to work it must be combined with other strategies, such as good transit and pedestrian alternatives, and land development that doesn't always require the use of an automobile for everyday living.

6.2 Factors for Success

The previous section outlines barriers to car-sharing and offers examples of how partner organizations have successfully addressed these barriers. The common themes that run through these examples of success are:

- Identifying a champion for car-sharing
- Adopting supportive policies and regulations
- Providing funds
- Implementing supportive actions
- Selecting the right neighborhoods

Identifying a Champion

In many cases, the need for a champion is critical to success—someone who recognizes the benefits of car-sharing and works to promote it. The champion may be a well-placed staff member who can influence others in the organization. The champion may come directly from a political voice in the community. Or the champion may actually consist of a group of people who discuss its benefits through word-of-mouth to others in the community and, perhaps, organize a grassroots effort to initiate car-sharing. The following are examples of car-sharing champions from communities across the country:

Minneapolis-St.Paul. County Commissioner Peter McLaughlin in Hennepin County, Minnesota, is a long-time transit and light rail advocate who views car-sharing as a great complement to these modes. It's tied to his larger vision, because "It allows people to use transit and avoid the need for a car." When hOurCar approached him for start-up funds to get the operation off the ground, he was able to secure a $50,000 grant from the County's general fund. He

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regarded the grant as a small catalyst to leverage other funds to reduce car dependence, especially compared to the millions spent on transit highways.

Seattle. A high-placed staff member in the Market Development group at King County Metro had been following car-sharing in Europe and its integration with transit. The Market Development group had a history of innovation with the political leaders at the County. A prior record of success with transit passes for businesses and the university was helpful when this staff member began to promote car-sharing. He commissioned a feasibility study to look at several models of car-sharing and analyze which would best fit Seattle's profile. Before the launch of the project, he created an advisory group of various agencies, which helped establish key support.

Chicago. The City of Chicago has 50 aldermen, each similar to the mayor of a small town. Those in congested neighborhoods promote car-sharing as a means to address the parking issues caused by gentrification. I-GO works with the aldermen to get spaces in these neighborhoods. For example, Alderman Tom Tunney provided a space at his restaurant in the Lakeview district.

Minneapolis-St. Paul. Mayor Randy Kelly included car-sharing in a speech about sustainable development in the City of St. Paul, Minnesota. After this first public declaration of support, there have been few internal barriers in the city. "When you have it at the Mayor's level, and he gives direction to directors of departments, it happens pretty quickly," noted a staff member. (See Exhibit 6-3 for excerpt of speech.)

Massachusetts. Governor Mitt Romney of Massachusetts is promoting smart growth and sustainable development. One action supporting these policies is a capital grant program for transit-oriented development, which prioritizes funding for projects that incorporate reduced parking requirements. The program promotes car-sharing as one means of reducing the amount of required parking. (See next section, Adopting Supportive Policies, for details.) The new program is strongly endorsed by the Governor and is administered by the Office of Commonwealth Development, an overarching agency which reports directly to the Governor.

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Exhibit 6-3 Car-Sharing and Sustainable Development in St. Paul

"What Saint Paul and Minneapolis have done to promote sustainable development has been recognized nationally and internationally, and what we can do in the future is even more exciting!.... We are taking the lead in metro air quality by supporting **hOurCar** – the Neighborhood Energy Consortium's new car-sharing program – the first such program **in the world** that will have an exclusively ultra-low emission hybrid vehicle fleet. This program will reduce ozone-forming emissions across the metro area while improving transportation options for Saint Paul residents and businesses.... Both Mayors want city government that is smarter and wastes less energy, wastes less water and creates less solid waste – at the same time improves performance and saves taxpayer dollars."

Excerpts from a speech by Mayor Randy Kelly of St Paul, Minnesota, January, 2004.

San Francisco. A policy resolution introduced by San Francisco Mayor Gavin Newsom will allow reduced parking requirements for developers who incorporate car-sharing into their projects. Aaron Peskin, a member of the San Francisco Board of Supervisors, is planning to introduce legislation that would require large new developments to identify car-sharing spaces. Car-sharing vehicles outside City Hall are also a tangible sign of support (Exhibit 6-4).

Exhibit 6-4 City Carshare Vehicles in Front of City Hall, San Francisco

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Adopting Supportive Policies

A policy climate that reinforces the benefits that can be obtained through car-sharing will help it flourish. These policies often begin with issues such as energy conservation, environmental protection, and parking relief. Car-sharing becomes one strategy to serve the larger purpose. Often, the policies are backed with specific grant programs to help with implementation.

Minneapolis-St. Paul. As cited above, the City of St. Paul's focus on sustainability policies led to the mention of car-sharing as one tool to address the issue in its Sustainable Development Plan.

Seattle. Similarly, the City of Seattle's staff inserted discussion of car-sharing in its Transportation Strategic Plan as a strategy to reduce auto ownership and related parking impacts in neighborhoods. "The Mayor really loved it," said a planner, and she was directed to pursue a pilot project and make money available to support it. She said putting car-sharing into the Plan raised its profile and gave it credibility, "instead of being this crazy idea."

Toronto. Toronto, Canada, which calls itself the Greenest City, cited car-sharing in its 2002 Environmental Plan. The Plan is pro-transit and pro-intensification, according to the program manager, and "AutoShare really fits in with that perspective." Toronto's Atmospheric Fund backs the Plan's policies with implementation dollars.

Aspen. The City of Aspen and Pitkin County, Colorado launched the Renewable Energy Mitigation Program (REMP) in 2000. The long-term goals are to reduce air pollution and greenhouse gas emissions in order to attain a sustainable energy future. The car-sharing operator, Roaring Fork Valley Vehicles, has received grants from Aspen funded by REMP, which imposes a mitigation fee on new homes that use more energy than the local code permits.

Boston. The Citywide Transportation Plan in Boston, Massachusetts encourages car-sharing by mentioning the need to provide parking for car-sharing vehicles. Car-sharing is incorporated into Transportation Access Plan Agreements for new developments with garages. Through this zoning provision, any office or residential building that will be built with a parking garage must provide the car-share company with parking spaces in the garage at market rates.

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Massachusetts. Similarly, the Commonwealth of Massachusetts is drafting program guidelines for a transit-oriented development bond, which will include incentives to reduce parking spaces by providing car-sharing. See Exhibit 6-5 for details. Excerpts from the full document are included in Appendix D.

Some businesses have their own policies that support car-sharing. The following three examples illustrate how businesses have dovetailed their company policies with supportive external policies or programs.

Vancouver. Wallis Engineering, in the City of Vancouver, Washington, decided to buy about 25 hours of car-sharing per month instead of purchasing a company car. The City's Green Fleet program, which is based on a policy goal of reducing commutes by single-occupant automobiles, offers free memberships to those who do not drive alone to work. Eight of Wallis Engineering's staff now are car-sharing members who use the service in lieu of a company car.

Aspen. Bluegreen, a landscape architectural firm, is a member of the U.S. Green Building Council, a coalition of 4,000 organizations from across the building industry. The Council works to promote buildings that reduce solid waste, conserve natural resources, and minimize strain on the local infrastructure. In keeping with these principles, Bluegreen does not provide parking for its six employees. All are car-sharing members, who bill clients by specifying the hourly and mileage costs for the car-share vehicle, instead of the traditional mileage charges for site visits.

Exhibit 6-5 Car-Sharing in TOD Guidelines

A total of $30 million is being proposed to promote Transit-Oriented Development (TOD) in the Commonwealth of Massachusetts. Guidelines are being drafted under the Office for Commonwealth Development, which reports to the Governor. As stated in the guidelines, "The purpose of the TOD Bond Program is to provide financial assistance for key components of Transit Oriented Development: parking facilities, pedestrian and bicycle facilities, and housing." Grants up to $500,000 will be available for qualified parking facilities; low-interest loans can be obtained for higher amounts. Municipalities must provide 20% in matching funds. The policy underlying the guidelines is "developing in ways that are consistent with the Commonwealth's Sustainable Development Principles." Under the guidelines, up to a 25% reduction over the standard parking ratios can be granted. One car-sharing space may substitute for 7-10 private parking places.

Office for Commonwealth Development (MA), 3rd Draft Transit-Oriented Development (TOD) Bond Program Guidelines, December 2004.

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Providing Funds

Car-sharing needs time to establish itself. One study in the United Kingdom estimated that the lead time can be between 9-18 months to develop a critical mass of initial users (Parker, 2004). However, the operator must have the financing to purchase the vehicles and set up the system before the car-sharing program can ever begin, and must have enough in the bank to sustain the operation while membership is being built. Therefore, partners can play an extremely valuable role by assisting with start-up funds. In fact, 80% of organizations receive some form of financial support from public or private sources (Shaheen, Schwartz & Wipyewski, 2004). Partners interviewed for this research give a variety of assistance, including direct funding, applying for grants on behalf of the operator, subsidizing memberships, offering in-kind services and materials, and supplying a line of credit. Examples of these types of assistance are explained in detail in Chapter 5.

The following example shows the risks that can be faced in the start-up of a program, and how a partner's financial assistance contributed to a redesign.

> The Federation of Canadian Municipalities allocated to Translink in British Columbia a grant of $50,000, which Translink matched to market "Commuter Car Share." The Commuter Car Share program was terminated before the end of the pilot period because only three participants signed up to use a CAN car to travel to and from work. Participants had to pay for the car even if they did not go to work on a particular day. They were also reluctant to give up their own cars, since the program was only a pilot, not permanent. The grant is now being used for a redesigned program marketed to corporations. Businesses will have exclusive use of a car-sharing vehicle during the workday if 12 employees are signed up. Public members will have access to the car on evenings and weekends. With seed money from the grant program, Translink and the car-sharing operator were able to try out a program, recover from the failure, and learn from the experience to develop a more targeted approach.

When partners share the risk with the car-sharing operator, both have a vested interest in making the program work. The preferred arrangement from the operator's view is a revenue guarantee. The operator will be more inclined to venture into less secure markets if all the risk doesn't fall on his

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business. And with its revenue on the line, the partner is more likely to promote the car-sharing program and help get it established.

For example, the University of Wisconsin at Madison was interested in including car-sharing in its TDM program, a market Community Car had not included in its business plan. Therefore, to assist with start-up, the University bought 200 trial memberships for campus employees at $50 each, equal to a $10,000 subsidy. Similarly, Arlington County, Virginia gave six months of cash subsidies to Flexcar and Zipcar during the Pilot Carshare program for new car-sharing vehicles that were introduced into the community. Subsidies begin at $1,500 per month and decline to $500 per month, with revenue subtracted from the subsidy amount. The subsidy is discontinued if the vehicle becomes profitable before the end of the six-month period.

These case studies of Translink, the University of Wisconsin, and Arlington County illustrate how a financial partnership can be critical in starting a new venture. Without funding assistance from a partner, experimentation and development of new markets for car-sharing is less likely to occur.

Implementing Supportive Actions

Communities and organizations may consider car-sharing a tool to meet their own goals, such as reduced parking demand or decreased pollution caused by the single-occupant automobile. However, car-sharing will become much more viable as a tool if it can operate in a supportive environment in collaboration with partner organizations.

"If your community wants people to get around without a car, you need to realize it is a challenge (and) find creative solutions," said the TDM program director at the University of Wisconsin in Madison. The University includes car-sharing in its TDM program and subsidizes the cost of the vehicles. In addition, it provides marketing and parking support, two of the five supportive actions discussed below.

Other specific examples of the supportive actions that partners have provided to enable car-sharing to succeed can be found in Chapter 5, which gives a comprehensive account of the strategies that partners have employed. This section briefly summarizes those strategies.

Marketing

Partners can assist car-sharing operators by giving them access to customers. For example, an employer can send e-mails and provide mailing lists as a communication channel for the operator. If the partner has a TDM program,

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car-sharing can be inserted into the overall marketing activities—outreach, promotions and transportation fairs. This direct access also gives the operator credibility, because the employer is, in effect, sanctioning the operator's message.

Administration

Including car-sharing in a TDM program gives it a "home" in an organization. This increases the probability that car-sharing will be considered in policy decisions and will have dedicated staff to promote it. Regardless of whether an organization has a TDM program, partners can commit administrative resources toward car-sharing, such as processing grants, lending office space, and providing an interface with other departments or agencies.

Parking

Making convenient and visible parking spaces available for the car-sharing vehicles is one of the most useful actions a partner can take. The operation cannot grow without adequate parking availability where members have easy access to the vehicles. Without parking in advantageous locations, the vehicles will be under-utilized and revenues will not be maximized. Spaces should be clearly signed and enforced in order to ensure that the space is available when the car is returned after use.

Transit Integration

Car-sharing is a complementary mode to transit. It helps the rider travel between the train station or major bus stop and an origin or final destination when transit is unavailable for this vital link. In turn, the transit partner does not have to bear the cost of unproductive "end of the line" routes, while still fulfilling transit's mission of providing mobility. Besides permitting car-share operators to use parking at their stations, transit operators can take a more proactive approach by integrating car-sharing with their fare systems. When transit agencies link with car-sharing operators, the two can give discounts on both car-sharing and transit passes. In Europe, the fares have been integrated into one smartcard for use on both systems.

Memberships

Partners can indirectly provide funding to car-sharing operators by becoming members. In this way, they help sustain the car-sharing program while also demonstrating leadership in promoting car-sharing and lending credibility to the idea. Some partners have gone a step further by replacing fleet vehicles

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with a car-sharing program. The vehicles can either be exclusive to the organization or they can be shared with other public members. Fleet-sharing memberships give the car-sharing operator a secure source of funding to supplement residential car-sharing, which has more spontaneous usage.

Selecting the Right Neighborhoods

Findings of this research, which included a survey of current car-share members, conclude that the communities most conducive to successful car-sharing programs include the following characteristics:

- Good transit
- Walkability
- Lower than average vehicle ownership
- Higher than average density and mix of uses

This is not to say that neighborhoods without these characteristics cannot support ridesharing. As has been discussed, car-sharing can succeed, for example, in rural neighborhoods where there is a great deal of personal involvement, at suburban universities, and in "closed" communities or businesses where a small group shares one vehicle. Nonetheless, it is much more difficult to introduce car-sharing in a non-urban setting without the list of attributes bulleted above. A partner organization should be aware of the most fertile ground for car-sharing and develop its expectations for success accordingly. Chapter 3 of this report describes in detail the market niches where car-sharing is most likely to succeed.

6.3 Conclusion

Car-sharing is one of the tools in a "toolbox" of strategies partner organizations can use to address their transportation and land use goals, particularly those goals related to decreasing parking demand, reducing environmental impacts, and promoting transit-oriented development. Although barriers to implementation exist, this chapter has described how other existing car-sharing partners have met and overcome the barriers and has outlined the key factors for success.

If partner organizations wish to be proactive in attracting operators to their community or business, they need to demonstrate their willingness to participate actively in establishing a car-sharing program. During the Operators' Workshop conducted for this research, the car-sharing operators suggested

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three important questions that partners should answer:

1. "Are they serious?" Do they have a business plan and something tangible to offer or in-kind assistance?
2. Do they have commitments up front that make the venture less risky?
3. Do transit agencies and local government in the community embrace car-sharing with a willingness to provide institutional support?

Adopting the factors for success discussed here and coupling them with a positive community attitude should lead to a successful car-sharing program.

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CHAPTER 7. PROCUREMENT AND MONITORING

7.1 Introduction

This chapter discusses different approaches for partner organizations seeking to procure car-sharing services or formalize their support. It also describes ways in which partners can evaluate the contribution of car-sharing towards their goals for the program, and introduce appropriate performance monitoring systems. The discussion is primarily based on the partner interviews and Operators' Workshop described in Chapters 5 and 6.

This material will be most relevant to partners who provide substantial amounts of financial and in-kind support. The greater the partner contribution, the greater the need for formal procurement, contractual and monitoring procedures. In contrast, most partners require little more than an informal understanding with the car-sharing operator. While they may wish to monitor the program, these needs can often be satisfied with readily available membership and fleet growth data.

7.2 Procuring Car-Sharing

In many cases, partner organizations do not need to be concerned with "procuring" car-sharing. As discussed in Chapter 5, most partnerships are informal in nature and are set up through the operator's initiative in approaching potential partners.

The City of Boston, for example, has not issued a Request for Proposals (RFP), since it does not wish to be in the business of regulating car-sharing, according to City staff. At the City of Chicago, staff feels that such a step is unnecessary; even if future competition arises following the entry of additional operators into the local market, they plan to work with any or all of the competing firms. Metro North staff considers that an RFP was not needed because its partnership with Zipcar was a demonstration project, and because they could not find any competing operators in the New York region.

In other instances, however, a procurement process – whether formal or informal – does make sense or is required by an agency's procedures. Alternatively, the procurement process allows the partner to

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take the initiative and establish the partnership, either in an existing car-sharing community or through bringing the concept to a new region.

The following sections summarize several of the procurement approaches that have been used by car-sharing partners in North America, including RFPs, Memoranda of Understanding (MOUs), contracts and informal bidding. In general, RFPs or similarly formal processes are important if there is a large amount of support offered by the partner. Normally, however, a more informal process is appropriate. In most communities with car-sharing, there is only a single operator, meaning that the issue of procurement is never raised. The partner simply works with the incumbent operator.

Requests for Proposals

Requests for Proposals for car-sharing services have been issued in several main contexts:

- Where the partner organization is offering financial support, parking or similar assistance. Examples include Cambridge, MA, and the Washington Area Metropolitan Transit Authority (WMATA). The University of Wisconsin did not issue an RFP for the first car on its campus, but decided that one was necessary for the second car due to the amount of subsidy being considered. Note, however, that this practice is the exception rather than the rule; most partners do not issue an RFP prior to granting support.
- To bring car-sharing to a new community. This can be a more peripheral location within a region that already has car-sharing, such as Stanford University in the San Francisco Bay Area. In Seattle and San Diego, meanwhile, the RFP was the original impetus to start car-sharing in the region.
- For large-scale memberships or fleet management services. The City of Philadelphia, for example, issued an RFP as part of its fleet reduction program, discussed in Chapter 5. Even though the city already had an incumbent operator – PhillyCarShare, which was ultimately selected – it decided to use a competitive process.

With less success, RFPs have also been used in attempt to broaden competition. For example, King County Metro was eager to receive bids from the rental car industry when it began its procurement process in 1999. To date, rental firms have either declined to submit proposals (as in the case of King County Metro), or have not been selected. In Europe, however, rental firms such as Avis are active providers of car-sharing.

Operators suggest that RFPs be as specific as possible regarding the overall goals of the issuing agency, and the types of support that are on offer. In this

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way, the RFP can help set out the partner's expectations for the program. For example, is serving low-income populations a priority for the partner, or does the partner want to see the most rapid growth possible? What outside funding sources may be available? In turn, this will shape which organizations respond to the RFP, and help frame their proposals.

Appendix D provides excerpts from sample RFPs from selected agencies. Note that WMATA and King County Metro have released two RFPs, with the second issued after the first contract expired.

Exclusivity

Some partners such as King County Metro and Stanford University have opted to select a single operator, while others will grant support to all qualifying operators. With WMATA's first RFP, a single operator, Flexcar, was selected, and staff suggests that this was the right decision given that only one responder was willing to abide by the agency's strict criteria. Following WMATA's second RFP, a second car-sharing company, Zipcar, was also selected. While the current contracting arrangements with Flexcar and Zipcar entitle each company to parking spaces at particular stations that do not overlap, staff report that WMATA would be amenable to permitting more than one operator in a station parking facility in the future.

Note that in many cases, exclusivity is a moot issue as only one bid is received. This was the experience of the San Diego Association of Governments (SANDAG) and with the 1999 RFP from King County Metro.

Scope of Services

The scope of services in an RFP is often extensive, specifying detailed requirements on vehicles, maintenance, technology and administration. Others, such as Stanford University's (Exhibit 7-1), are much simpler. The overall intent, however, is to make it clear that the vendor will provide a full, turnkey service, taking responsibility for all vehicle and customer service issues. The following are some items often included:

- **Locations.** The RFP might specify locations where services are required (e.g. King County Metro) or describe places where the partner is willing to provide parking (e.g. WMATA).
- **Technology.** Most RFPs simply describe the type of systems required, such as 24-hour reservations by Internet and phone, and secure vehicle access, rather than mandating a particular technology.

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- **Vehicles.** Requirements might include the type of vehicles (such as hybrids), age, amenities, and accessibility. For example, WMATA's RFP specified the provision of hand controls for users with disabilities, and the contract requires these to be fitted following a request from a member. (In practice, none have been forthcoming.)
- **Maintenance and cleaning.** This might include the provision of roadside assistance, and adherence to maintenance and cleaning schedules.
- **Reporting and evaluation.** The scope may specify the types of information required by the partner, and the frequency of reporting.
- **Administration.** This might include meetings, presentations, and points of contact.

Exhibit 7-1 Stanford University RFP

Stanford's RFP provides one of the most concise descriptions of the services requested.

Objective

The objective of the program is to provide vehicles at a reasonable per-hour and/or mileage cost to students, staff, faculty, and campus departments for personal and business related purposes. This program will support the university's effort to reduce the number of commute vehicle trips to Stanford University, reduce the demand for parking spaces, and encourage use of transportation alternatives such as mass transit, biking, car and van pooling, etc.

Program Description

The vendor shall establish and manage a car sharing program serving the campus community consisting of students, staff, and faculty as well as campus departments.

Services to be Provided

The vendor shall be responsible for a full turnkey car-sharing program for the Stanford University community including the day-to-day operations of the program. This will include, but not be limited to:

1. Providing an on-line 24/7 reservation system that can be accessed by the campus community, maintenance of the vehicles, billing, membership reservations, and the coordination of all aspects of the program to assure the communication and collaboration necessary for a successful program
2. Providing service representatives to deal with questions and/or customer needs
3. Managing appropriate staff persons and consultants, including engineers and IT personnel, who maintain and upgrade the technology
4. Maintaining a database of member and reservation information for billing and reporting purposes
5. Providing a variety of vehicle types
6. Providing a quarterly report to the university to include utilization information

Services Desired

Stanford University would like to see this program made available to all members of its community, including students 18 years of age and older.

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Evaluation Criteria

Evaluation criteria are in most respects similar to those that agencies use for other projects, and focus on the proposers' experience and qualifications, costs, the approach to the scope of services, and participation by Disadvantaged Business Enterprises. Some important issues for evaluating car-sharing proposals specifically, which may or may not form part of the formal evaluation criteria, include:

- **Business plan.** The partner will want to judge the realism of the business plan, and the understanding of the local market.
- **Cost.** In the context of car-sharing, this generally applies to the fees that operators propose to charge members, and the realism of the budget.
- **Locations.** WMATA, for example, wanted to see operators serve a variety of neighborhoods in the District of Columbia, Virginia and Maryland, rather than cherry picking the most favorable locations. The agency's evaluation criteria also considered the methodology for selecting locations.
- **Innovation.** SANDAG, for example, asked to see technologically advanced infrastructure and innovative programs, particularly those that integrated with transit.
- **Barriers to specific user groups.** For example, Stanford University wanted to ensure access for 18 year olds, while WMATA was keen that credit checks or deposits did not pose a barrier for low-income users.

In Philadelphia, flexibility is cited as one reason for selecting PhillyCarShare to partially replace the City's vehicle fleet. The RFP was not a typical one, as the type of service was known but could not be quantified – for example, the number of trips and vehicles needed was highly uncertain. Moreover, the City did not want to replace vehicles on a one-for-one basis, but rather engineer a shift to transit and use of employees' private cars, as well as car-sharing.

King County Metro, meanwhile, was keen to negotiate a partnership, rather than a standard vendor agreement. While the selected firm would be responsible for operations, Metro wanted to solicit a firm that would welcome input, and treat the growth and development of car-sharing as a partnership.

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Contracts

While few partner organizations have issued RFPs, a greater number have signed contracts with the operator. In most cases, the main purpose is simply to formalize an understanding. For example, the contract might specify:

- The number and location of parking spaces that an operator may occupy, and arrangements should the parking be temporarily unavailable
- The amount of financial support or parking charges
- Rates charged by an operator, including any discounted rates offered to specific user groups (e.g. university affiliates)
- Vehicle condition
- Requirements for liability insurance, and for the operator to indemnify the partner (see text below)
- Operational issues, such as prohibitions on cleaning or maintaining vehicles on the partner organization's property
- Reporting and evaluation requirements (discussed in the second part of this chapter)

Insurance requirements vary considerably between different partners. For example, in addition to its general liability requirements that apply to all contractors, WMATA requires operators to add the agency as an additional insured, hold it harmless, and provide coverage of $2 million for bodily injury and property damage (combined single limit). The Town of Brookline requires $1 million in automobile and general liability insurance. Seattle, on the other hand, simply requires that "Flexcar will not hold the City responsible for any loss, theft or injury to Flexcar or its customers that may result from the use of an on-street car-share parking space provided by the City."

For business members that purchase memberships, the contract will specify the rates, times and conditions of usage. Dedicated vehicles will usually warrant more complex contracts. For example, the City of Berkeley's contract with City CarShare covers many specific issues, including criteria for adding vehicles, marketing activities, customer service and costs.

Where an RFP has been issued, the contract will generally incorporate the scope of services. Contracts may also be necessary where a partner organization passes through funding received from federal or other external grants, such as the Congestion Mitigation Air Quality and Job Access Reverse Commute grants, respectively administered by the City of Chicago and King County Metro.

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Examples of partner organizations that have formal contracts with car-sharing operators include the City of Berkeley, University of Pennsylvania, Equity Office, WMATA and City of Chicago. Many operators have boilerplate contracts that are used for parking and other simple agreements. Some sample contracts are provided in Appendix D.

Other Approaches

Several other approaches have also been used to procure car-sharing, such as:

- **Informal bidding.** Operators might be asked to submit a proposal and/or attend an interview, but without the issuance of a formal RFP. This approach has been used by developers where they have a choice of operators – for example, by JBG in Washington, DC where Flexcar and Zipcar compete, and by Forest City in Denver, where there was no incumbent operator.
- **Exchange of letters.** This can serve to formalize an understanding in cases where no binding commitment is required. This approach was used by the Philadelphia Parking Authority, which has its own umbrella coverage and does not need a contract to address liability issues.
- **Memorandum of Understanding.** A good example is provided by San Francisco developers, who often sign an MOU with City CarShare regarding the incorporation of car-sharing into a project. In turn, this provides evidence to the Planning Commission regarding the developer's intent.

It is important to stress, however, that perhaps the majority of partnerships are highly informal. Partners such as Arlington County, VA; Brookline, MA; and the Massachusetts Institute of Technology have no formal contract or procurement process at all. Staff at Arlington, for example, did not believe that this was needed, and the informal nature of the process helped the program get started extremely quickly – within four months. The Town of Brookline, which provides free on-street parking for Zipcar, wanted to avoid the administrative effort and retain the flexibility to cease support at any time. The Town considers Zipcar a "tenant at will." However, staff suggests that a contract will probably be necessary should they begin to charge Zipcar for the parking.

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7.3 Performance Measures and Evaluation

Until the present, car-sharing programs have been the subject of relatively little evaluation and monitoring. Certainly, there has been a host of small-scale surveys, and a small number of larger, more academic projects (see Chapter 4). However, the main performance measure from the point of view of operators and their partners has been the "breath test" – in other words, whether the program is still alive and breathing.

In some instances, this may be appropriate. If an operator retains a vehicle location without the need for subsidy, it generally means it is being used and that the program is in this respect successful. As the industry matures, though, many partners will face a growing need for more sophisticated performance measures and evaluation techniques. These are important for several reasons:

- **To keep partners on board.** Staff at a partner organization will often need to make the case for car-sharing to senior management and/or Board members. Initially, the program may be viewed as experimental, but continued support will often require data. For example, Arlington County is completing its initial evaluation in Spring 2005, in order to support the case for continuing the program beyond the first year. In other cases, data may be needed before the program even begins. At Tufts University, the decision to support Zipcar was the subject of a two-year debate, amid fears that it could increase emissions.
- **To obtain performance-based funding.** Car-sharing qualifies for several sources of transportation funding, but only if the impacts on program goals can be clearly demonstrated and reported. The federal CMAQ program, from which I-GO in Chicago has received funding, is one of the most significant; CMAQ-funded projects are required to include an assessment of the emissions reduction impact. Other examples include the federal JARC program, which has granted funding to Flexcar in Seattle and City CarShare in San Francisco; and the EPA-administered Clean Air Transportation Communities program, which has benefited Flexcar's programs in Vancouver, WA and Seattle, WA. There are also various local programs using performance-based funding, such as the San Francisco Bay Area's Transportation Fund for Clean Air.
- **To enforce development mitigations.** Seattle and Boston, for example, permit car-sharing to be included as a trip reduction strategy in a developer's Transportation Management Plan or Transportation Access Plan Agreement (see Chapter 5).

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- **To determine cost effectiveness.** For example, TriMet in Portland, OR has standards for a minimum number of riders (e.g. 15 roundtrips per day) before it will subsidize vanpools or a Flexcar van shuttle to specific employers. The City of Berkeley conducted a cost comparison when determining whether to outsource a portion of its vehicle fleet to City CarShare.
- **To ensure responsible use of public money.** If car-sharing is supported by a public agency, whether through cash, in-kind or policy support, it needs to be justified, regardless of the legal or practical reasons for doing so. In other words, evaluations can help to validate the public policy premise for granting support, and assess the extent to which car-sharing is achieving the promised results.

Car-sharing is an extremely data-rich environment, particularly when compared to transit. The computerized reservations, billing and fleet management systems used by most large operators allow the automatic reporting of metrics such as vehicle utilization, trip length and revenue. These data also help operators to better understand their customers and different market segments, through examining utilization patterns. In contrast, transit agencies are often forced to perform manual counts in order to gain accurate information on basic statistics such as ridership and passenger loads on particular routes.

However, quantification of outcomes, such as changes in vehicle ownership and travel, still pose difficult challenges for car-sharing operators, as discussed below. Many partner organizations interviewed for this study believe that car-sharing is a "soft measure," the impact of which will never be comprehensively quantified.

Evaluations to Date

Most partner organizations contacted for this study – both through the online survey and interviews – consider, on balance, that car-sharing has been successful in helping to achieve their most important goal. Of online respondents who answered this question, nearly 25% said it has been very successful, and a further 45% said it has been fairly successful (Exhibit 7-2). Just one respondent said car-sharing was fairly or very unsuccessful.

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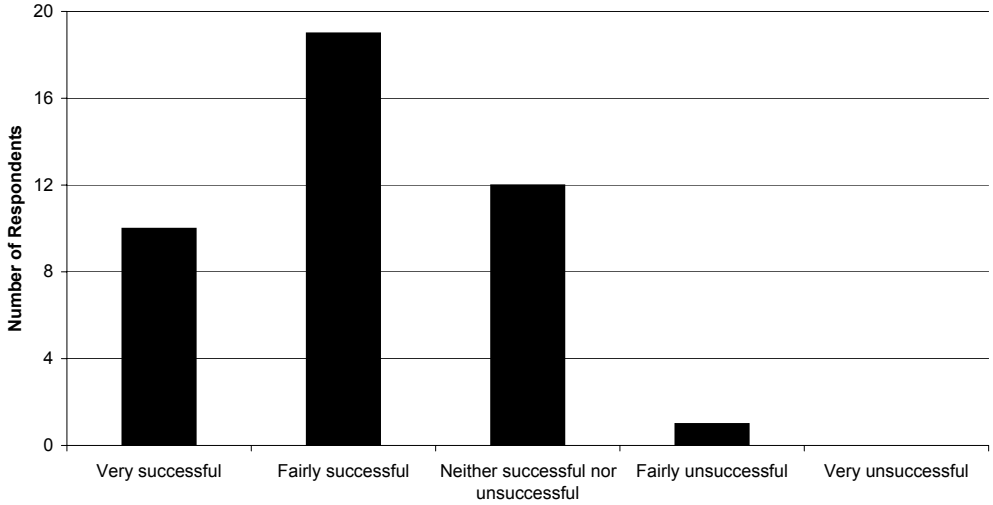
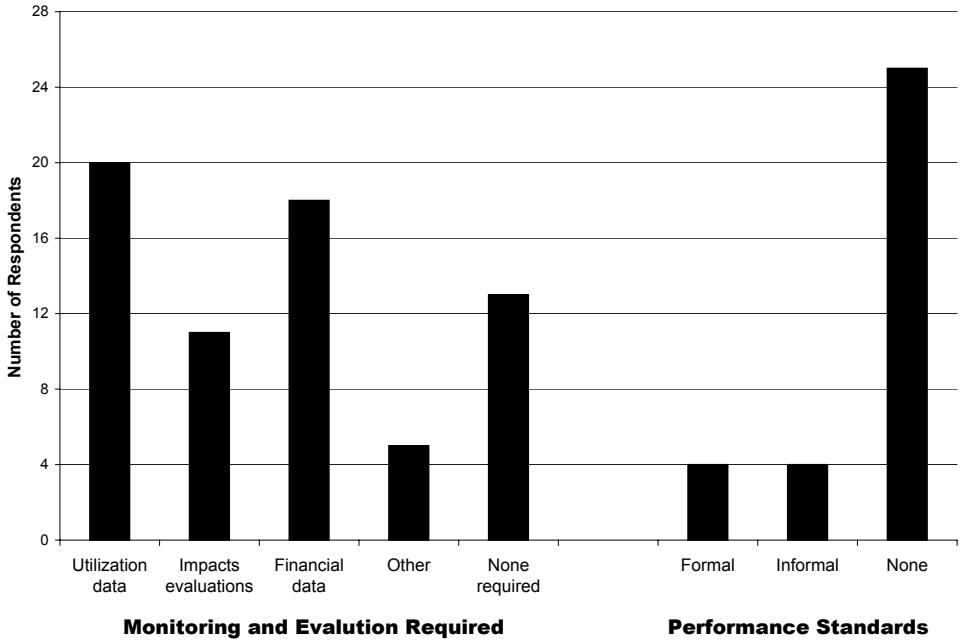
Exhibit 7-2 Evaluation of Success



This picture of success, however, may be influenced by the nature of the survey respondents; many are "champions" for car-sharing within their organizations. The conclusions also appear to be largely based on qualitative impressions. More than 25% of respondents do not require any monitoring or evaluation as a condition of providing support, while many of the remainder request multiple types of reporting (Exhibit 7-3). Reporting was most often done quarterly. Only eight respondents stated they have performance standards for their partner car-sharing organization – four with formal standards and four with informal standards.

Exhibit 7-3 Techniques to Evaluate Success



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Judging from the interviews, a formal monitoring program is even less common than the survey results imply. The majority of car-sharing partner organizations interviewed do not monitor or evaluate programs in any way, or require data from operators. Examples of partners that do not require monitoring or evaluation from their partner car-sharing organization include TriMet in Portland, OR; the Los Angeles Metropolitan Transportation Authority; the City of Boston; and developers such as JBG Properties. The City of Cambridge, meanwhile, ceased to require data once Zipcar began to pay market rate for parking. Several planning departments find it difficult to track the number of developments that incorporate car-sharing as a transportation mitigation measure. Boston, for example, has a system in place but has not had the staffing to keep the monitoring up-to-date. The City is now setting up a simplified system, where developers will submit their reports on mitigation measures electronically.

Other partners rely on more qualitative evaluations as to whether car-sharing is meeting their goals. For example, the prime measure of success for The Defender Association in Seattle is the halving in the number of parking spaces leased for employees, from 20 to 10, and the associated ability to continue the transit pass benefit for employees.

When information is collected by partners, the material falls into four broad groups: financial and utilization data; trip information; surveys; and independent evaluations. Each of these is discussed in turn in the following sections. Exhibit 7-4 provides some specific examples of partner organizations that require each type of data. These are not mutually exclusive; several partners ask for information in more than one category.

In general, the depth of evaluation depends on the level of support from the partner organization. Partners that do not conduct any evaluation tend to be those that provide lesser degrees of support, such as promotion or a small number of parking spaces, although there are several exceptions to this rule. Partners that provide direct financial support generally ask for more data, particularly financial and utilization information.

Financial and Utilization Data

Financial and utilization data generally consist of information that is routinely collected and analyzed by car-sharing operators for internal use, and do not impose a new data collection burden. However, such information is often proprietary, particularly in the case of for-profit operators. The degree

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to which it will be disclosed by operators depends on the amount of support that a partner is willing to provide. Non-disclosure agreements or similar undertakings are often required.

Utilization and revenue data, such as the number of hours per day each vehicle is used, can be used to assess the financial stability of an operator and to evaluate operator requests to move under-utilized vehicles. This type of data tends to be the most closely guarded, as it would be extremely useful to potential competitors. In contrast, operators are usually more than willing to publicize membership numbers.

Trip Information

Trip information is primarily of interest to business members, who use the information to track utilization and prevent abuse. Most operators provide monthly, itemized invoices indicating the individual user, trip length, distance and time.

For example, Swedish Medical Center in Seattle reviews the invoices to see if employees appear to be using the service during non-business hours. The organization's monitoring also led to a policy change; any trip of more than three hours now requires advance permission from the transportation coordinator. The Seattle Defender Association, meanwhile, is interested in using the information to assess productivity and employee work habits – for example, the extent to which investigators are in the field.

Surveys

A small number of partners have asked operators to conduct surveys of their members, in order to gain information on the impacts of car-sharing on travel behavior, vehicle ownership and transit ridership.

In most cases, the operator conducts the surveys, generally through e-mailing members. The survey instrument is designed collaboratively between the partner and the operator. However, the City of Alexandria, VA, issues its own surveys. These are linked to the City's financial support; in order to receive a free membership, participants must return the surveys.

Independent Evaluations

In some cases, funding may be available for an independent evaluation, often by a local university. This has the advantage of perceived rigor and objectivity; however, the cost means that it is not normally an option. For example, the City of Chicago found that an independent evaluation to support its CMAQ grant proposal could cost more than the entire grant itself.

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Exhibit 7-4 Partner Evaluation Techniques

Partner Organization	Evaluation
Financial and Utilization Data	
University of Victoria, BC	Receives annual report on vehicle utilization, seasonal trends and other data.
Arlington County, VA	Zipcar and Flexcar report revenue per vehicle on a monthly basis, in order to receive the subsidy (which provides a revenue guarantee – see Chapter 5). Arlington also collects survey data (Price & Hamilton, 2005).
Massachusetts Institute of Technology	Receives quarterly report on number of vehicles.
City of Chicago	Quarterly reports are passed through to Federal Transit Administration as a condition of CMAQ grant funding. The report outlines the demographics of members, car usage, trip destinations, member usage, and emission reductions estimated from car ownership changes. Data are based on (1) baseline data collected at the time of membership enrollment; (2) follow-up surveys; (3) travel diaries from members after 6 and 9 months; and (4) monthly mileage reports.
City of Kitchener, ON	Receives semiannual report on member numbers, new members and costs. Reviews financial statements.
University of Wisconsin	Subsidy is based on the quarterly utilization report, which is used to calculate the difference between usage fees and Community Car's costs to break even.
University of North Carolina	Zipcar provides monthly utilization data.
Trip Information	
Portland State University	Monthly itemized bill indicating miles and hours used, time of trip, and name of user.
Seattle Times	
Defenders Association, Seattle	
Surveys	
City of Alexandria, VA	Survey questions include commute mode, vehicle ownership, reason for joining, and plans to switch commute mode or sell a car. Paper survey administered by the City.
WMATA, Washington, DC	Questions asked about frequency of riding transit, member satisfaction, and change in transit usage and vehicle ownership since joining the car-sharing program. E-mail survey to all DC-region members administered by the operator.
University of Washington	Questions probed reasons for joining, member satisfaction, and impact on travel to campus. Online survey to all UW-affiliated Flexcar members, administered by the operator. Responses were tied to date of joining and utilization information held in Flexcar's database.

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Exhibit 7-4 Partner Evaluation Techniques (cont'd)

Partner Organization	Evaluation
City of Chicago	Members are screened when they enroll in the I-GO program by asking questions about their demographics, travel mode and travel pattern baseline data, including car ownership (make, model and mileage and type of usage). Follow-up surveys, distributed after 6 and 18 months of membership, request information about members' travel mode choices, travel patterns, and their perceptions of I-GO and its impact, if any, on travel mode choices and travel patterns. Follow-up surveys have parallel questions to the initial survey to easily detect changes over time. After 12 months of membership, travel diaries are also distributed to members.
BART, San Francisco Bay Area	Questions asked about mode of access to car-sharing, frequency of riding BART, and how members would have made the last trip had City CarShare not been available. E-mail survey to users of car-sharing vehicles at BART stations, administered by the operator and analyzed by a consultant.
University of Wisconsin	The University asks for results of surveys Community Car conducts of its members. Questions on car-sharing will also be added in the campus' biennial survey.
Independent Evaluations	
King County Metro	University of Washington conducted initial evaluation. Metro is currently seeking to fund a second independent study that will focus on changes in transit ridership, pass sales and achievement against other goals.
SANDAG	San Diego State University received a separate grant to evaluate the Compass Plus program, which includes Flexcar.
City CarShare	University of California-Berkeley conducting multi-year study, including travel diaries, funding by the Federal Highway Administration.

Principles of Performance Measurement

Recent years have seen a growing trend towards the use of increasingly sophisticated performance measures in the transportation fields. For example, pedestrian, bicycle and transit quality of service measures are now available to complete the traditional focus on vehicular level of service. Agencies such as the San Francisco County Transportation Authority, Florida Department of Transportation and City of Seattle are integrating performance measurement into their decision-making processes. At the federal level, changes to transportation and clean air legislation during the 1990s helped encourage

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local jurisdictions and Metropolitan Planning Organizations to develop more innovative performance-based methodologies (Ewing, 1995).

TCRP has already published two comprehensive references on developing performance measures for transit systems – *TCRP Report 88: A Guidebook for Developing a Transit Performance-Measurement System* (Kittelson & Associates et al., 2003a), and *TCRP Report 100: Transit Capacity and Quality of Service Manual, 2nd edition* (Kittelson & Associates et al., 2003b). As *TCRP Report 88* points out, agencies use performance measurement for three main reasons:

- Because they are required to do so (e.g. for National Transit Database reporting)
- Because it is useful for the agency to do so
- Because others outside the agency need to know what is going on

The same reasoning also applies to car-sharing operators. Although there are fewer required measures when compared to transit, some funding sources have reporting requirements. Measures can be useful internally as a management tool, and in convincing potential partners that car-sharing is a program worth supporting.

TCRP Report 88 identifies 11 characteristics of a successful performance measurement system. The following discussion tailors these findings to the field of car-sharing. The characteristics are (Kittelson & Associates et al., 2003a):

- **Stakeholder acceptance.** The measures should have broad input and support from a range of stakeholders, including the operator, partners and customers.
- **Linkage to goals.** The primary purpose of performance measures is to track progress against goals and objectives.
- **Clarity.** Measures should be intuitive for stakeholders to understand.
- **Reliability and credibility.** Some kinds of data, such as financial information, tend to be more reliable than others. Objectivity is also important: "Measures selected merely to make an agency look good are of little help in identifying areas for improvements," the TCRP guidebook says.
- **Variety of measures.** Measures should cover a broad range of areas, such as financial performance and customer satisfaction.
- **Number of measures.** Variety must be balanced with the need to avoid overwhelming the end user.

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- **Level of detail.** Measures need to be as simple as possible, while allowing the accurate identification of areas where goals are not being achieved.
- **Flexibility.** Measures need to respond to changing goals and external factors, while also allowing for historical comparisons.
- **Realism of goals and targets.** "Targets should be realistic, but slightly out of reach," in order to spur improvements, the report recommends.
- **Timeliness.** This allows quick identification of problem areas, and an appropriate reaction.
- **Integration into agency decision-making.** Measures can flag under- or over-achieving segments, and allow an appropriate course of action to be determined.

Car-Sharing Performance Measures

Specific performance measures can be divided into three categories:

- **Internal.** These measures are primarily a management issue for individual operators. In most cases, they will not be reported to partners – partly for proprietary reasons, and partly because they are of limited relevance. For this reason, only a small selection of possible indicators is described here; for more details, see City CarShare (2005). As discussed above, however, there are sometimes exceptions – for example, operators may need to report utilization or revenue per vehicle when a partner is providing cash subsidy or parking. In these instances, however, the information is usually treated as confidential.
- **Output.** These include measures such as member numbers, vehicle numbers and coverage, which help measure growth and success but are not necessarily tied to wider goals. Output measures are also normally proprietary, but are less closely guarded than internal measures.
- **Outcome.** These measures are the most important from a partner's perspective, but usually the most difficult to measure. They indicate progress in achieving goals, such as impacts on vehicle ownership, parking availability, transit ridership and mobility for low-income households. (See also Shaheen, Schwartz & Wipyewski, 2004.)

Exhibit 7-5 summarizes a range of performance indicators. The focus is on quantitative measures that can yield measurable results. However, it should be noted that more qualitative measures can also be extremely useful. For ex-

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ample, King County Metro has qualitative goals for the car-sharing program, such as political support and success in leveraging private-sector capital.

In addition, there is considerable interest in measures of outcomes at a broader scale – such as changes in parking availability, traffic congestion or overall vehicle travel at a neighborhood or citywide level. The Philadelphia Parking Authority, for example, plans to use its regular surveys of parking availability to assess whether a portion of any impact can be attributed to the PhillyCarShare program.

Most partners, however, are skeptical that car-sharing is a large enough phenomenon for any changes at this scale to be measurable, and there are no examples as yet of success with measures at such a broad scale. WMATA, for example, believes that the ridership gain from car-sharing will be too small to measure directly. Swedish Medical Center in Seattle suggests that while car-sharing helps to reduce barriers to transit use and carpooling, it is difficult to quantify the effect.

Exhibit 7-5 Car-Sharing Performance Measures

Measure	Definition	Significance	How Measured
Internal Measures (normally proprietary)			
Utilization	Revenue hours per vehicle per month.	Core measure of demand and effectiveness, which helps to assess performance of individual vehicle locations.	Reservations and vehicle logs
Revenue per vehicle	Revenue (usage charges) per vehicle per month.	Similar measure to utilization, but helps control for reduced-rate nighttime trips.	Reservations and vehicle logs
Vehicle availability	% reservations denied.	Helps assess whether new capacity is needed. Can be separated into members whose first choice was denied, and those who could not reserve an acceptable time or vehicle location for that trip at all. Difficult to measure with modern web-based reservations, since members can choose another vehicle or time.	Manual reservations logs; difficult to measure with web-based systems
Employee overhead	Full-time employees per vehicle.	Measures the efficiency of staffing; ratio should fall as an organization grows.	From staffing and vehicle numbers
Member satisfaction	% "very satisfied" or "satisfied" with car-sharing service.	Simple satisfaction measure. A range of more sophisticated measures are available; see *TCRP Report 88* (Kittelson & Associates, 2003a).	Member surveys
Member retention	% of members leaving each year.	Customer satisfaction measure. Exit surveys can probe reasons for leaving.	Member database
Farebox recovery	Ratio of member fees to total expenses.	Progress towards financial self-sufficiency or profitability. Similar to standard transit industry measure.	Financial statements

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Exhibit 7-5 Car-Sharing Performance Measures (cont'd)

Measure	Definition	Significance	How Measured
Output Measures (usually proprietary)			
Number of members	Number of members.	Simple measure of size and penetration.	Member database
Active members	% members using service in a month.	Assesses whether members are active users, dormant or have signed up for "mobility insurance."	Reservations logs
Number of vehicles	Number of car-sharing vehicles in service.	Simple measure of size and penetration.	Fleet database
Low-emission vehicles	% vehicles that are hybrid, CNG or electric.	Assesses uptake of clean-fuel technology.	Fleet database
Car-sharing developments	Number of (i) approved and (ii) occupied developments that incorporate car-sharing.	Assesses uptake of car-sharing by developers.	Fleet database
Outcome Measures			
Vehicle travel	Net change in annual Vehicle Miles Traveled (VMT) in private vehicles.	Assesses impacts of car-sharing.	Member surveys or travel diaries
Vehicle ownership	Net change in number of vehicles owned. Where members report having avoided vehicle purchases, this should be reported separately.	Assesses impacts of car-sharing.	Member surveys
Emissions	Net change in CO_2, CO, NOx or other pollutants. Based on change in VMT and fleet composition.	Assesses impacts of car-sharing.	Fleet database and VMT change calculation, using factors adopted by local air quality regulators
Transit ridership	Number of new transit trips generated each year.	Assesses impacts of car-sharing. Includes ridership from transit access trips to car-sharing, as well as wider changes in travel behavior.	Member surveys
Parking spaces saved	Net reduction in parking provision in developments that incorporate car-sharing.	Assesses extent to which car-sharing changes the form and auto-orientation of new development.	Planning Department data. Difficult to quantify as parking variances are often granted for multiple reasons.
Mobility	Perception of increased mobility among members (e.g. ability to reach new destinations).	Assesses impacts of car-sharing.	Member surveys
Fleet savings	Annual change in cost of corporate vehicles (rental cars, car-sharing, vehicle fleet, and mileage reimbursements).	Assesses cost savings from car-sharing.	Requires "before" and "after" data on fleet costs plus costs of car-sharing

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7.4 Recommended Approach

Performance evaluation brings a range of benefits to car-sharing operators and their partners. To date, however, many efforts have been limited or ad hoc in approach. The following principles might usefully guide future evaluation efforts by partner organizations:

- **Build into programs.** Any specific program can benefit from having monitoring and evaluation activities built in. For example, an evaluation component might be part of a grant funding application, as with Flexcar's program to bring car-sharing to low-income households in Seattle, using JARC funds. Similarly, a program to incorporate car-sharing into new development as a mitigation measure can be subject to follow-up monitoring and enforcement, in the same way as other mitigations. Seattle and Arlington are beginning to collect comprehensive data on the impacts of development mitigations, although there is a long lead time. Requirements to survey building occupants are typically included in the development agreement, which may be signed several years before occupancy.
- **Relate to amount of support.** The more generous a partner in providing support, the more evaluation and monitoring is warranted. Minimal evaluation that could be requested by all partners would include data on member and vehicle growth, and any existing survey data. Partners that provide substantial assistance may request an annual survey of car-sharing members; to avoid duplication, this could be a standard survey designed to meet the needs of all partners in a given region. Utilization and financial data may be justifiably requested, in confidence, by partners providing financial support.
- **Relate to alternatives.** As an innovative program, car-sharing is naturally subject to particular scrutiny. However, the danger of "over-evaluation" compared to other modes of transportation must be borne in mind. For example, a common measure of the effectiveness of proposed transit investments is "cost per new rider." While useful, this indicator does not directly relate the benefits of transit to reductions in vehicle travel, parking demand or emissions – data which many partners wish to see for car-sharing. Similarly, parking garages, intersection widenings or vehicle fleet expansion may be approved with little or no analysis of the potential for demand management alternatives. The costs and benefits of a car-sharing program might usefully be compared to alternatives, such as parking garage expansion. Such analyses have typically been conducted when comparing the costs of car-sharing to an in-house vehicle fleet, as in Philadelphia, but may be warranted in other instances.

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- **Recognize methodological challenges.** As discussed in Chapter 4, the impacts of car-sharing on vehicle travel and transit ridership are difficult to quantify, while vehicle ownership data tends to be more reliable. Monitoring programs need to acknowledge these challenges; it may be preferable to focus on simpler indicators, at least initially, even though a partner may have broader goals. For example, changes in vehicle ownership may serve as a proxy for vehicle travel impacts, in that more vehicles taken off the road are likely to equate to greater reductions in vehicle travel.
- **Standardize evaluations.** At present, partner organizations find it difficult to benchmark success against similar organizations in other parts of North America. Partners could require operators to use a standard methodology, discussed in detail in Chapter 4, that would both enable national comparisons and avoid partner and operators having to "reinvent the wheel." A small set of standard questions could be supplemented with those of specific interest to the partners and operators. In addition, by asking the same questions at the time of joining and annually thereafter, a longitudinal picture can be developed. This is similar to the approach adopted by I-GO in Chicago. The questions would include:
    - How many vehicles are owned by you and members of your household?
    - On average, how many days a week do you drive alone to work or school?
    - Do you purchase a monthly or annual transit pass?
    - Approximately how many miles do you drive per year? (Include miles in your own vehicle, plus those in borrowed, shared and rental cars.)

7.5 Conclusion

Chapter 6 showed that one of the main barriers to car-sharing is a lack of understanding about how and where it works, and skepticism over the extent to which it can help partner organizations reach their goals. Evaluation and monitoring programs are therefore an important complement to the support offered by partner organizations. While evaluation can understandably be a neglected component in the initial stages, when the prime focus is on keeping the car-sharing service alive, in the longer term this approach is unhelpful to both partners and the industry as a whole. Well-designed evaluation programs not only can ensure that public and private resources are properly spent, but also can build support for car-sharing within a partner organization and help promote its long-term success.

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CHAPTER 8. CONCLUSION

This report has covered some of the most important topics regarding car-sharing in North America. It has demonstrated that car-sharing brings substantial benefits in terms of reduced vehicle ownership and travel, and improved mobility. It can help partners such as developers, employers, universities, local governments and transit agencies achieve their goals. However, car-sharing is a niche product; it is likely to succeed only in a narrow range of primarily urban settings.

This chapter discusses some of the ways in which car-sharing can be promoted at a national level, particularly through examining the potential role of a national car-sharing association. It also analyzes the eligibility of car-sharing for various federal transportation funding programs. Finally, this concluding chapter discusses how to bring car-sharing to a new community. It describes the different ways in which programs have been established in North America, and explains how partner organizations can provide the impetus to launch a program in their own cities.

National Action

Car-sharing is in most respects a local program, guided by local priorities and dependent on local factors for success. Certainly, the vast majority of barriers identified in Chapter 6 can only be addressed at a local level; they are the prerogatives of cities, transit agencies and other local organizations.

Nonetheless, there are several common issues that make sense to address at a national level. They may require concerted action by car-sharing operators, or fall within the responsibilities of federal agencies and other partners. These common issues include funding, promotion, regulations, insurance and interoperability, which are discussed in the following section.

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Car-Sharing Association

Many operators have expressed considerable interest in forming a national car-sharing association, in order to address these common issues. This might involve separate organizations in the United States and Canada, or a single North American body. Possible functions of the association, as suggested by operators at the Transportation Research Board workshop and in follow-up interviews, include the following.

1. Promote understanding. As discussed in Chapter 6, a lack of understanding of the car-sharing concept, from both potential partners and potential members, is the most significant barrier to the growth of car-sharing. For the most part, this is a local task for each car-sharing organization and their partners in their respective geographic markets. However, there is a wider function that could be served by a national association helping to promote greater understanding within federal and possibly state and provincial agencies; reaching out to partners such as national developers, the American Public Transportation Association and automobile manufacturers; and promoting car-sharing through the national media.

The association could also serve as the natural point of contact for partners wishing to bring car-sharing to their communities. It could provide technical advice, and a forum to disseminate RFPs and similar opportunities.

2. Advocate for regulatory reform. Again, most regulatory reforms that can promote car-sharing are local or state or provincial responsibilities. However, there are several areas of federal law where there are opportunities to support car-sharing. Chief among them in the United States, according to one car-sharing operator, are Internal Revenue Service rules. Allowing car-sharing to be offered as part of pre-tax commuter benefit programs, in the same way as transit passes, would provide a significant incentive and help recruit new members. The other obvious issue where regulatory reform might promote car-sharing relates to federal transportation funding programs, which are discussed in more detail below.

3. Provide a networking forum. Small operators in particular have much to gain from sharing experience with their peers, on issues such as operations, marketing and pricing strategies. Larger, more established operators tend to have overcome most obstacles already, however, and may not be willing to discuss many of their solutions.

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4. Share data. Most of the data held by car-sharing operators is proprietary. However, there are two areas where data sharing may yield mutual benefits: environmental impacts and insurance risk-rating factors.

Many car-sharing operators or their partners collect data on the environmental and social benefits of programs, such as the impacts on vehicle ownership. Introduction of the standard methodology recommended in Chapter 4 provides the opportunity to take a wider view of these impacts, through compiling and aggregating data from across North America. A national car-sharing association would be the logical organization to undertake this task.

The development of insurance risk-rating factors for car-sharing has the potential to significantly lower insurance premiums, through providing insurers with a means to more accurately assess their exposure. This requires the aggregation of data on accident histories, vehicle and driver profiles and fleet usage patterns from across the industry (Shaheen, Meyn & Wipyewski, 2003). A national association would be well placed to serve as a clearing house for data on both insurance and environmental impacts. The association could also purchase a group insurance policy for all its members, or negotiate "affinity group" rates.

5. Negotiate interoperability agreements. These would allow members to use car-sharing programs in other cities when traveling. Some operators have already developed bilateral agreements; one example is the agreement between City CarShare (San Francisco) and PhillyCarShare (Philadelphia). Another is the agreement between Communauto (Quebec) and Vrtucar (Ottawa). Meanwhile, several operators such as Communauto, Zipcar and Flexcar operate in multiple cities and allow members to use their services in any part of the country where they have a presence.

Barriers to further interoperability include differing access technologies and billing systems, insurance coverage, and the lack of a sufficiently compelling business case – most operators agree that members will take advantage of the ability to use cars in multiple cities only sparingly, if at all. However, interoperability is seen as an attractive benefit when marketing car-sharing to potential members. One operator draws a parallel with gym memberships; customers like to have the option to use facilities across the city or country, but in practice will almost exclusively use one close to home or work.

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Obstacles to an Association

Car-sharing operators and other interested parties have had several discussions in recent years regarding the establishment of a national association. Most recently, a Vrtucar co-owner agreed to coordinate organizing efforts to start a Canadian industry association, following a meeting in November 2004. The most significant barrier appears to be prioritization of resources. With no external source of funding, a national association would be dependent on staff or funding from the operators themselves, both of which are in short supply. As one operator put it, there is little "spare bandwidth" to devote to this effort. There is also a lack of history in working together on cooperative efforts, and some operators perceive others as competitors, rather than partners.

Other issues raised by operators relate to governance and priorities for an association's work plan, both of which pose potential conflicts between the needs of organizations at different stages of development. In the United States, Zipcar, Flexcar and City CarShare account for the majority of the car-sharing fleet, and a similar situation arises in Canada, where more than half of shared vehicles belong to Communauto. As noted above, larger operators might give greater weight to an association's lobbying role, while smaller organizations' priorities relate to information sharing and networking.

If funding contributions were proportional to fleet size, larger operators might press for decision-making authority to be weighted a similar way, which would effectively exclude small organizations. One proposed arrangement would require a "double majority" for major decisions – in other words, agreement from at least half the member operators representing at least half of the car-sharing fleet.

While these obstacles have stymied the development of an association to date, two strategies could help to overcome them. Firstly, the discrete nature of the possible functions means that progress could be incremental; for example, a car-sharing organization can develop a website or hire a part-time staff member without the need to undertake the full range of activities described above. Secondly, there may be potential for outside funding to catalyze the process. This has been the experience in Europe, as discussed in the following section. A private foundation, APTA, or agencies such as FTA, FHWA or Transport Canada may be able to play a similar role in North America.

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Experience in Europe

It is instructive to examine the role of car-sharing associations in other countries. Here, national governments have played a key role in establishing or funding these organizations. In Italy, for example, the Ministry of Environment helped establish Iniziativa Car Sharing (ICS), in partnership with municipalities. In the Netherlands, the national government funded the Foundation for Shared Car Use (*Stichting van Gedeeld Autogebruik*), which, among other activities, helps lobby local authorities to support local programs (Enoch, 2002).

In the UK, the CarPlus non-profit is a national association that promotes the car-sharing concept, through developing marketing materials, providing a networking forum, and technical assistance for starting up programs. It also has a trading arm which provides leasing and insurance services. The organization is funded by a range of public and private organizations, including the national government through the Department for Transport and the Countryside Agency; the European Commission; and Vauxhall Motors (Department for Transport, 2004). Rather than funding programs in specific locations, the UK government has generally preferred to direct its support to CarPlus instead.

Federal Funding

Car-sharing has benefited from several federal transportation funding sources that have contributed towards start-up costs or specific programs such as hybrid vehicles or car-sharing for low-income communities. Exhibit 8-1 shows some of the sources that have been used in the United States. However, federal funding for car-sharing is constrained in several respects:

- **Lack of data.** Applications for CMAQ program funding, for example, must demonstrate the anticipated benefits in terms of reduced vehicle travel. As discussed in Chapter 4, there is relatively little supporting information at this stage, although several new studies provide important data.
- **Eligibility.** Many US federal funding programs have specific criteria, meaning that car-sharing does not explicitly qualify. For example, FHWA's Transportation Enhancements program is restricted to 12 qualifying activities, which do not include car-sharing. There is a similar picture for FTA's Transit Enhancements program, which has nine qualifying activities. Many other funding sources are mode-specific; the Federal Transit Act has sections that specifically fund bicycle facilities, clean-fuel buses, or rail and bus rapid transit. Other programs, in contrast, focus more on desired

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outcomes rather than specific activities, and thus enable car-sharing to qualify. These include the Transportation and Community and System Preservation Pilot Program (which is not currently funded).

- **Qualifying recipient**. Another eligibility question relates to the recipient. As discussed in Chapter 5, a public agency often has to serve as a pass-through organization, increasing administration costs and program complexity, although some funding sources do allow non-profit organizations to qualify.
- **Evaluation criteria**. Car-sharing is fundamentally different from other modes, in that more usage does not necessarily equate to greater success. Rather, from an environmental perspective, it often achieves greatest results when the shared cars are used less and serve primarily as a "safety net," allowing most trips to be shifted to transit, walking and cycling. This does not mesh well with some evaluation criteria for some funding programs. For example, King County Metro staff points out that a key indicator for the JARC program is "cost per trip," making it difficult for car-sharing to perform well.

This analysis should not necessarily be interpreted as recommendations for specific changes to federal funding programs. Rather, the discussion aims to highlight some of the current constraints, without drawing conclusions as to which changes might be usefully pursued.

In Canada, financial support from all levels of government has been more limited, compared to the United States. However, in 2004, Transport Canada awarded funding to two projects through the Transportation Planning and Modal Integration Initiatives program. Agence Métropolitaine de Transport of Montreal was awarded CN$182,280 to provide car-sharing spaces in the agency's park-and-ride lots, while Communauto and Vrtucar were to receive a total of CN$44,000 to promote the integration of transit and car-sharing in Quebec City, Gatineau and Ottawa.

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Exhibit 8-1 Select US Federal Funding Programs for Car-Sharing

Program	Administrator	Recipient Operator
Congestion Mitigation Air Quality Improvement (CMAQ)	FHWA/FTA	I-GO (Chicago), plus many other operators through more general CMAQ grants for trip reduction programs
Value Pricing	FHWA	City CarShare (San Francisco)
National Planning and Research	FTA	hOurCar (Minneapolis-St Paul)
Job Access Reverse Commute	FTA	City CarShare (San Francisco) Flexcar (Seattle)
Clean Air Transportation Communities	EPA	Flexcar (Seattle) Flexcar (Vancouver, WA)
Surface Transportation Program	FHWA	City CarShare (San Francisco) – pending

Establishing Car-Sharing

The greatest part of this report has been devoted to examining the impacts of car-sharing, and how partners can provide support. This, however, assumes that there is already an incumbent operator for partners to work with. For the vast majority of communities in North America, the first step is more basic – how to establish car-sharing in the first place. This final section reviews how existing programs have been initiated, and provides some guidelines for partner organizations wishing to catalyze the introduction of car-sharing to their own communities.

Models for Start-Up

Car-sharing programs in different parts of North America have been established in a range of different ways, as summarized in Exhibit 8-2. Each is discussed in turn below.

While all of these scenarios are based on experience in North America, some are hybrids of the outcome in several communities. For example, the grassroots effort scenario is drawn from experience in a range of places, including Philadelphia, Vancouver and Madison. Conversely, car-sharing in many communities is a mixture, drawing elements from a number of scenarios. San Francisco is a good example; it combines elements of the strong public-private partnership and grassroots effort.

In other instances (notably Washington, DC), there may be competing operators, with each program having a different genesis and characteristics.

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Note that operators under any scenario may be franchises (see Chapter 2 for a discussion).

For this reason, the scenarios are not necessarily case studies of a particular program, but instead focus on key attributes of each operation. In reality, there is a spectrum of car-sharing operations, rather than a discrete number of scenarios, with elements such as business ventures, grassroots support and public-private partnerships taking on different weights. For example, some programs may be halfway between a public-private partnership and a business venture, where a public agency provides the catalyst for car-sharing but does not have the resources to provide substantial funding.

Exhibit 8-2 Scenarios for Car-Sharing Development

Scenario	Who initiates car-sharing?	Who operates car-sharing? (1)	What are the key partners involved? (2)	Initial Markets (3)
1. Business venture	For-profit operator, potentially car rental firm	For-profit operator, potentially car rental firm	Not that dependent on partners, particularly public sector	Higher income, well-educated people, dense neighborhoods
2. Strong public-private partnership	May be public agency or for-profit operator	Most likely to be a for-profit operator, could be non-profit or coop	Local government support critical, probably strong transit agency backing too. Proactive in seeking out partners	Same as (1), but more emphasis on transit riders, wider range of incomes
3. Municipal lead	City takes the initiative	May be non-profit sponsored by city, or partnership with for-profit	Local government critical	Same as (2), but more emphasis on city staff
4. Grassroots, community-based effort	Community group	Most likely to be non-profit or coop, some will eventually transition to for-profit but keep similar ethos	Community groups, local government, foundations, transit agencies, other non-profits, etc. Any and all partners!	Likely to start with people with strong environmental awareness and diversify/become more mainstream as the organization matures
5. Special purpose/ research	University or research institution	University	Auto manufacturers, research staff	Students, staff and faculty, may diversify as the organization matures
6. Stand-alone development or campus	Community group, developer, university	Non-profit, for-profit	Developer, campus manager, community group	Residents/staff/faculty of the development/ campus

(1) See Chapter 2 for more details of the different types of operator.
(2) See Chapter 5 for a discussion of the role of partner organizations.
(3) Chapter 3 focuses on the market settings for car-sharing.

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Business Venture

Under the business venture scenario, car-sharing is seen by both the operator and by partner organizations as a profit-making business venture. The opening of a new market is a purely commercial decision by the operator, who initiates the move and runs the program. Venture capital is likely to be the main source of funding.

Zipcar, particularly in the New York region, perhaps comes the closest to this scenario as it places the least reliance for its growth on partner organizations, especially those from the public sector. However, even Zipcar does receive considerable support in some markets, such as cash subsidies in Arlington County, VA and free or discounted parking in the Boston region (Chapter 5). It also has numerous partnerships with developers and universities.

Note, however, that many of the most attractive opportunities for pure business ventures have already been taken – most obviously because most of the largest, most transit-supportive metropolitan regions already have an incumbent operator. The exception would be if a car-sharing firm moves to compete with an established operator, or if a car rental company offers hourly rentals through existing outlets. Exhibit 8-3 shows the 15 agencies with the largest ridership, which can be taken as a proxy for car-sharing market size; it demonstrates that the largest opportunities have already been taken.

The market-driven nature of these programs mean that operators will naturally focus on the most profitable markets. Car-sharing will be found in the most dense, transit-supportive neighborhoods, and its primary clientele will be among well-educated professionals.

Strong Public-Private Partnership

The strong public-private partnership scenario is characterized by a strong public sector role in promoting car-sharing. The program may be initiated by the operator itself, or by a local government or transit agency issuing an RFP. Regardless, considerable public support, often including start-up funding and free parking, is an important factor for success, as discussed in Chapter 6. The operator is also likely to be proactive in seeking support from an expanded group of partner organizations.

There are many examples of car-sharing as a public-private partnership. Flexcar, for example, opened for business in Seattle after King County Metro issued an RFP and provided start-up funding. Arlington County and San Diego are two other examples where a public agency has taken the initiative and provided support.

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Exhibit 8-3 Largest US Transit Agencies

Agency (1)	Region	Passenger Miles (1000s), FY 2002	Car-Sharing Operator (2)
Metropolitan Transportation Authority	New York, NY	14,162,257	Zipcar
Regional Transportation Authority	Chicago, IL	3,593,756	I-GO
New Jersey Transit Corporation	Newark, NJ	2,473,943	Zipcar
Washington Metropolitan Area Transit Authority	Washington, DC	1,897,127	Zipcar, Flexcar
Los Angeles County Metropolitan Transportation Authority	Los Angeles, CA	1,875,627	Flexcar
Massachusetts Bay Transportation Authority	Boston, MA	1,823,180	Zipcar
Southeastern Pennsylvania Transportation Authority	Philadelphia, PA	1,333,881	Philly Car-Share
San Francisco Bay Area Rapid Transit District	Oakland, CA	1,176,306	City CarShare
Metropolitan Atlanta Rapid Transit Authority	Atlanta, GA	816,748	-
Maryland Transit Administration	Baltimore, MD	629,710	-
Metropolitan Transit Authority of Harris County	Houston, TX	580,507	-
King County Department of Transportation	Seattle, WA	523,282	Flexcar
New York City Department of Transportation	New York, NY	472,076	Zipcar
San Francisco Municipal Railway	San Francisco, CA	461,147	City CarShare
Tri-County Metropolitan Transportation District of Oregon	Portland, OR	413,844	Flexcar

(1) Some regions (e.g. New York, San Francisco) may have more than one transit operator.

(2) Not necessarily involving a partnership with the transit operator.

Source: Federal Transit Administration National Transit Database, cited by American Public Transportation Association.

The market settings for car-sharing are likely to be similar to a car-sharing business venture. However, there may be a wider range of locations, including a greater focus on transit – either at the behest of partner organizations, or because of incentives such as free parking to locate there.

A wide variety of organizational forms are possible under this scenario. A for-profit operator is perhaps the most common incarnation. However, non-profits or cooperatives could operate such a program equally well.

Municipal Lead

Public agencies that want to establish car-sharing in their community will tend to do so through a third-party operator. They may issue an RFP, provide funding or other assistance to encourage an existing firm to start service in a new city, or provide the necessary resources for a community group.

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In some cases, however, a local government may prefer to be involved more directly in the provision of car-sharing, through actually operating the program itself. The closest North American example is provided by Roaring Fork Valley Vehicles in Aspen, CO. Here, the municipality has provided staffing and office space for the car-sharing operator, even though it is formally incorporated as a separate non-profit.

This approach may be useful in communities that have tried, but so far failed, to establish car-sharing through other means. It may also be valuable if the municipality itself intends to be an "anchor" car-sharing member, by replacing its fleet.

Grassroots Effort

In many cases, car-sharing has come to fruition as a result of the work of community activists and grassroots supporters. Initial efforts will usually be undertaken on a volunteer basis, such as in Philadelphia, or under the auspices of a local environmental non-profit. Examples of the latter are found in San Francisco, Madison, Chicago and Minneapolis-St Paul, where car-sharing was established through the respective efforts of the San Francisco Planning and Urban Research Association, the Madison Environmental Group, the Center for Neighborhood Technology, and the Neighborhood Energy Consortium.

Support from partner organizations – including private foundations as well as public agencies – will often provide important start-up capital, and sometimes technical assistance. However, some smaller car-sharing operators may stay as small, all-volunteer organizations without this assistance, or, in the case of cooperatives, use members' shares as the source of capital.

Examples of small, grassroots organizations with just one or a handful of vehicles include Boulder CarShare, CO and the Car-Sharing Co-op of Edmonton, AB. However, several have grown to be much larger, professionally staffed organizations, notably City CarShare in the San Francisco Bay Area, and the Cooperative Auto Network in Vancouver, BC.

Operators under this scenario are almost always non-profit or cooperatives. However, some may later transition to for-profit status, as did Communauto in Quebec (Robert, 1999).

In many instances, the market settings will be similar to a car-sharing business venture, since these will represent the most economically viable loca-

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tions. However, a grassroots program will usually mean greater emphasis on environmental and social objectives. This may lead to a conscious effort to link car-sharing with transit, through placing cars at rail stations and other transit nodes, and to serve a wider section of the community through placing cars in lower-income areas and affordable housing developments.

Special Purpose/Research

Some car-sharing operations have been established primarily as a research laboratory. For example, Barth & Todd (2001, p. 145) describe the Intelli-Share program at the University of California-Riverside as a "test bed," with which "researchers can develop and implement new operating techniques, perform experiments in travel demand management, collect data for supporting models, and quantify the energy and emissions savings associated with the system." At the same time, such systems provide mobility for campus faculty and staff.

Over time, research pilots may transition to a self-sustaining car-sharing program. In many cases, however, they appear to fold once research funding ends. For example, the CarLink II station car program in the San Francisco Bay Area was transitioned to Flexcar and incorporated into the operator's regular car-sharing program, but could not be made commercially viable (Shaheen et al., 2004).

Stand Alone

Some car-sharing programs can be considered stand-alone, in that they serve a single campus or development, rather than being integrated into a wider local network. The Dancing Rabbit Vehicle Cooperative, part of an ecovillage in Missouri, is one example. Others are found on university campuses, such as Zipcar's programs at Princeton, NJ and the University of North Carolina-Chapel Hill.

Bringing Car-Sharing to a New Community

In several instances, car-sharing will expand to a new community with relatively little effort on the part of partner organizations. This may happen through any of the scenarios discussed above. For example, hOurCar is planning to launch in Minneapolis-St Paul in 2005 as a grassroots effort, with the for-profit start-up Viacar doing the same in Detroit. Flexcar and Zipcar have publicly stated their desire to expand in the coming years, having broken even in their core markets.

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Most communities, however, will need to be more proactive if they are to achieve a desire to have car-sharing as a local transportation option. Using the typology developed in the preceding section, Exhibit 8-4 shows the potential of each model. Franchising and replication programs now make the grassroots effort and municipal lead options much simpler, since back office functions can be outsourced. City CarShare (2005) provides detailed information on starting up a car-sharing organization from a more operational perspective.

Exhibit 8-4 Options for Starting Car-Sharing

Model	Considerations
1. Business venture	Will primarily depend on operators' business and expansion plans, and their perceptions of the strength of the market. However, partners may be able to influence operators' priorities through provision of support.
2. Strong public-private partnership	Operators' interest will depend on the depth of support that is offered, coupled with the inherent desirability of the market.
3. Municipal lead	Requires strong, ongoing commitment from local government, and full operational responsibilities.
4. Grassroots, community-based effort	Feasibility depends on interest and organizational capacity of local groups, and the amount of support that can be offered by partners.
5. Special purpose/research	Limited wider applicability; conditioned by availability of demonstration/research funds.
6. Stand alone development or campus	Special niche; can be combined with any of the above scenarios.

In many ways, there is a continuum between the business venture and strong public-private partnership scenarios because support from partner organizations can help compensate for less favorable market conditions and neighborhood and demographic characteristics. In other words, the less inherently desirable a market, the more incentives that partners will need to provide in order to entice operators. This is especially true given the high costs of opening a market, and the limited amount of available capital and management resources. Flexcar, for example, puts the cost of opening a market and bringing it to profitability at $1 million.

In some instances, it may be appropriate to issue an RFP, particularly if it is tied to a significant amount of support from partner organizations. In other cases, it may be preferable to work directly with an operator or community group. Chapter 7 discusses some of the considerations related to RFPs.

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The choice of model will often be dictated by practical concerns. The amount of support that can be offered, interest from private operators, and the capacity of local community organizations may determine whether car-sharing becomes a public-private partnership or a grassroots effort. However, some partners make a conscious choice in this regard. King County Metro wanted a for-profit provider to bring private capital to the table. SEPTA in Philadelphia, in contrast, was keen to see a non-profit operator that would be more likely to pursue goals directly aligned with those of the transit agency.

According to operators, one of the most important ways a partner can help catalyze car-sharing, regardless of the preferred organizational arrangement, is through doing the groundwork. Specific actions might include:

- Documenting the characteristics of neighborhoods that could support car-sharing, in line with the geographic market analysis discussed in Chapter 3
- Conducting preliminary market research or a feasibility study
- Providing outreach to other partner organizations to obtain institutional buy-in, and also to the wider community
- Providing commitments for financial and/or in-kind support
- Considering how car-sharing can integrate with wider neighborhood and transportation plans
- Addressing the other key barriers discussed in Chapter 6, such as licensing and zoning

This study has sought to explore the current state of the practice in North America, and the markets in which it succeeds. Certainly, car-sharing is a niche product and has only been proven viable in a limited range of urban settings. The aspirations of partner organizations need to be tempered by realism, and Exhibit 8-5 provides a simple checklist that can help in assessing the viability of a program.

The potential extent of car-sharing has yet to be fully explored. At the time of writing, car-sharing in the United States has been around for less than seven years, and programs are still expanding at a rapid pace. Car-sharing is here to stay, but little can be said with any confidence about its ultimate reach. Much learning will take place through experimentation by car-sharing operators and their partners, and through trial and error. This collective experience, in turn, will provide the only definitive answer to how and where car-sharing succeeds, and how it can help achieve a community's environmental, social and economic goals.

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Exhibit 8-5 Establishing Car-Sharing – A Checklist

☑	Does the community have neighborhoods with the **right characteristics** to make car-sharing viable? Are there neighborhoods with low auto ownership and use, where walking and transit are viable options?
☑	Are there established **Transportation Demand Management programs** in which car-sharing can be inserted? Are there other commute trip reduction strategies that can recruit business members?
☑	What is the **depth of interest** in car-sharing from different types of partners?
☑	Is there a **high-level champion** with a strong commitment to car-sharing?
☑	Are there **community groups** that have shown interest in starting a car-sharing program and have the capacity to get a project off the ground?
☑	What **incentives** can partners provide for a commercial operator, such as start-up funding, marketing, zoning changes and parking provision?
☑	Is there an **anchor member,** such as a city or business that wishes to replace its vehicle fleet with car-sharing, and can provide guaranteed baseline usage?

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Abbreviations used without definitions in TRB publications:

AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
NASA	National Aeronautics and Space Administration
NCHRP	National Cooperative Highway Research Program
NCTRP	National Cooperative Transit Research and Development Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation

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