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**Flexcar Seattle Carsharing Program  
Evaluation**

by

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Transportation Northwest

**Abstract**

Flexcar Seattle Carsharing Program Evaluation

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Flexcar is a public-private partnership based in Seattle that provides short-term automobile rentals, called “carsharing.” The program began in 2000 with an agreement between King County (Washington) and Mobility, Inc. It has since expanded to many cities across the United States. This paper is an evaluation of the program in Seattle, focusing on six areas: 1) building a carsharing community, including the technology, processes and users that make up the carsharing system; 2) changing travel behavior, a study on the demographics of Flexcar users and how they have responded to the program; 3) profitability, a summary of Flexcar’s finances; 4) government support, a description of the public assistance for carsharing and the expectations placed on Flexcar; 5) environmental impact; and 6) comparison with similar programs, including other carsharing organizations and transportation modes that existed before Flexcar. The results show that Flexcar has developed an integrated system for sharing vehicles, with a high level of automation. Users were less likely to be auto owners and more likely to use transit than the general Seattle population. Better research methods are needed to understand Flexcar’s effect on travel behavior. Between January 2002 to mid-2003 Flexcar membership more than doubled and revenues increased by 67%. However, Flexcar was not yet profitable. Government support makes up about 15% of Flexcar’s revenues. Flexcar vehicles were 50% more fuel efficient than the average US vehicle. Flexcar’s main competition came from travel modes that existed before its creation.

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## **Chapter 1: Introduction**

The Flexcar program was launched in January 2000 as a public-private partnership between the City of Seattle, King County Metro (the Seattle area transit provider), and Mobility, Inc. Flexcar provides a short-term automobile rental service. Flexcar members phone (or connect through the Internet) into a centralized reservation system, select from vehicles dispersed throughout the metropolitan area, and reserve time on the vehicle of their choice. At the selected time, the member goes to the vehicle, swipes a key card, enters a PIN, drives the vehicle, and then returns it to the original location before the reservation ends. Flexcar bills the user for the time and mileage at a rate that accounts for fuel, insurance, maintenance and vehicle purchase price.

Since its inception, Flexcar has partnered with other government agencies in an effort to meet the needs of the community while expanding the business. King County saw Flexcar as a part of their travel demand management strategy. By encouraging commuters to ride transit to work and to reserve a Flexcar for errands during the day, fewer cars would be used during peak travel hours. The City of Seattle has supplied parking spaces to Flexcar in an effort to place vehicles near low-income users who otherwise would not have access to a car. The EPA has also provided funds to encourage the use of low-emission vehicles.

Researchers and carsharing organizations have, in the past decade, developed systems and technologies that allow thousands of people to access a common fleet of vehicles. Flexcar has adopted (and adapted) these technologies to provide mobility for its members. In turn, this mobility has generated revenues for the company and impacted society and the environment.

### **Purpose**

The purpose of this paper is to evaluate the effectiveness of the Flexcar program in the Seattle, Washington metropolitan area in terms of leveraging government support, the technology required to run the system, and Flexcar's effect on society. It will also offer recommendations to King County and Flexcar on areas for improvement.

### **Structure**

The remainder of this chapter is dedicated to outlining the goals of the Flexcar program, discussing the data sources used in the evaluation and providing a brief history

of Flexcar in Seattle. Each goal is discussed in its own chapter, including a summary of the conclusions that can be drawn from the research. The final section summarizes the findings and offers recommendations for King County and Flexcar.

### **Flexcar Program Goals**

This evaluation is based on the following six goals, established in October 2002 in meetings between the University of Washington, Flexcar Seattle and King County Metro<sup>1</sup>:

1. Build a carsharing community
2. Change the travel behavior of Flexcar members
3. Create a profitable company
4. Obtain appropriate government support
5. Make a positive impact on the environment
6. Be effective compared to similar programs

*Building a carsharing community* consists of the administrative arrangements and technologies that allow people to share vehicles. It is necessary to understand how the system works and to determine members' attitudes towards the service.

*Changing how people travel* is a difficult undertaking, and one that transit providers have been struggling with for decades. King County supported Flexcar as a means to reduce auto dependency and increase transit ridership. Other motivations included providing mobility in inner-city neighborhoods, reducing the need for parking and improving regional air quality.

Flexcar was conceived as a private company that would be subsidized initially by King County Metro, with the eventual goal of gaining self-sufficiency. *The primary goal for private firms is to make a profit.* The goals associated with changing travel behavior are secondary.

Building Flexcar required *resources from several government agencies*, including King County, the City of Seattle and the Environmental Protection Agency. In exchange for providing funding and support, these agencies wanted to determine whether Flexcar could be used to meet social, environmental and economic goals. If the agencies want

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<sup>1</sup> The author represented the University of Washington. William Del Valle, Flexcar Seattle's General Manager, represented Flexcar. Christine Anderson and Ref Lindmark, of Market Development, represented King County Metro.

Flexcar to achieve more than its financial goals, the company may require continued government funding.

Automobiles represent a large *environmental impact* and transit agencies have made efforts to reduce the number of cars on the road. Flexcar can benefit the environment in two ways: replacing automobile trips with alternative modes (e.g. transit, walking and biking) and replacing private automobile trips with cleaner, more fuel efficient Flexcar trips (e.g. Honda Civic Hybrid instead of Ford Explorer).

As the literature review shows (see Chapter 2), carsharing in Seattle is one of the most recent experiments in bringing carsharing to North America. Today there are several companies serving the same purpose as Flexcar. This evaluation will *compare Flexcar with other attempts at carsharing and its competition*.

### **Evaluation Data Sources**

Please note that the evaluation focuses on Flexcar's Seattle-area operation and not the company as a whole. Data for the evaluation comes from the following data sources:

1. Carsharing literature (academic research and marketing materials)
2. Flexcar Seattle baseline survey
3. King County Metro phone survey of Flexcar members, 2001 & 2003
4. Flexcar Seattle reservation data, January 2002 – March 2003
5. Flexcar reports to King County (number of members and usage) December 2001 through October 2003
6. Flexcar Seattle fleet data (number and type of vehicle)
7. EPA green vehicle guide
8. Flexcar Seattle financial data/balance sheet, January 2002 – September 2003

The *carsharing literature* will be discussed at length in the literature review. Carsharing is a relatively new research field, and large-scale carsharing organizations have existed in North America only in the past few years.

The *baseline survey* is an optional questionnaire that members submit once they have been approved as Flexcar members. It asks questions about travel behavior, automobile ownership, demographics, and household characteristics. Approximately 1200 members had completed this survey as of January 2003.

After 1-1/2 years of operation, King County Metro conducted a *telephone interview* of over 200 Flexcar members. The survey had five themes: Flexcar use, commute method, auto ownership, transit use, and household characteristics. The survey was updated and repeated in 2003 (after 3-1/2 years of operation) with 48 respondents, and the results were compared. See Appendix A for the complete report.

Each reservation was recorded and compiled into a database. The *reservation data* links each trip to a member and vehicle, with information about when the reservation was made, the trip's start time and date, and the trip's end time and date. It does not include trip purpose or distance.

Under the terms of the agreement between King County and Flexcar, Flexcar is required to report *membership data and vehicle usage*. The membership data includes the total number of members and the number of members who used a vehicle for each month. The vehicle usage data consists of the number of trips, the number of miles and the number of hours for each vehicle by month.

The *vehicle fleet data* is basically a table that tracks the type of vehicle and its maintenance history for each Flexcar location. In combination with the *EPA's Green Vehicle Guide*, it is possible to estimate the fleet's fuel economy and air emissions.

The final major data source is Flexcar's *financial statement*, which summarizes the company's monthly revenues, costs and profits for the Seattle operations. The combination of these data sources provides a basis for evaluating how successful Flexcar has been in Seattle and whether it has met its goals and objectives.

### **Flexcar Background**

The seeds for Flexcar were planted in the mid-1990s, when Conrad Wagner, a founder of Mobility CarSharing Switzerland, was in the United States promoting the carsharing concept. One of the first transportation professionals to become interested in bringing carsharing to Seattle was John Shadoff, manager of the Washington State Department of Transportation's (WSDOT) TDM Resource Center. He first met with Conrad Wagner in 1995.

In 1997, John Shadoff and Conrad Wagner presented the carsharing concept to King County Metro, represented by Rick Walsh and Bill Roach.<sup>2</sup> Shadoff and Wagner also met with a journalist, who wrote an article favorable to the concept.<sup>3</sup> The Mayor and the King County Executive<sup>4</sup> read the article and became excited by the possibility of carsharing in the Seattle area.

In response to this interest from elected officials, King County Metro and WSDOT co-sponsored a West Coast carsharing workshop in 1998, in which representatives from existing West Coast carsharing programs, academics and government officials discussed carsharing and its implementation. The result of the meeting, at least for Seattle, was an agreement to conduct market research. The research team consisted of King County Metro, the City of Seattle, and the University of Washington.

According to the 1998 Business and Marketing Plan, prepared by Q4 Associates, the project was motivated by a need to, “increase mobility in urban neighborhoods” and address the “parking problem these neighborhoods are experiencing” (Bernard 1998). The plan called for aggressive growth, with profitability reached 18 months after start-up and a fleet size of 200 vehicles. King County would guide the organization's development and offer start-up funding, and a private company would be the operator. King County released a Request for Proposal in 1999 with the hopes of attracting a large rental car company to create and operate a carsharing organization in Seattle.

King County received only one response to the RFP. It came from Neil Peterson, who had formerly been the head of Metro before its merger into King County.<sup>5</sup> He founded the company Mobility, Inc. and negotiated a contract with King County.<sup>6</sup> Operations began in January 2000, under the name Flexcar.

Flexcar based their systems on another US carsharing company, called CarSharing Portland (CSP). The founder of CSP, Dave Brook, along with Conrad

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<sup>2</sup> Rick Walsh was General Manager of King County Metro Transit since 1994 and Bill Roach was Supervisor of Market Development until 2001.

<sup>3</sup> See Whitely, Peyton. “Time-Share Cars: Idea Whose Time Has Come?” Seattle Times, November 17, 1997.

<sup>4</sup> The King County Executive was Ron Sims and the Mayor was Paul Schell.

<sup>5</sup> The organization was called the Municipality of Metropolitan Seattle. It merged with King County in 1993.

<sup>6</sup> Glenn Chin, of Transia and the Merchants Parking Association, conducted much of the background research necessary for Flexcar's creation and was one of the original members of the Flexcar team.

Wagner, advised Flexcar on the technology needed to make carsharing possible. This initially consisted of a telephone reservation system (originally developed for aviation clubs), a billing system, manual lock boxes for key storage, and four Honda Civic sedans.

Once the systems were in place, the company could begin its marketing effort. The first vehicles were placed in Capitol Hill, a dense neighborhood adjacent to downtown Seattle, where the rate of automobile ownership was relatively low and parking was scarce. Flexcar was promoted as an affordable, environmentally friendly alternative to auto ownership. The concept took off, and by the end of the first year, the fleet had expanded to over 20 vehicles shared by 1,000 members.

During 2001, Flexcar began looking for new ways to expand the business. The first successful business partnership was with Starbucks, which placed three vehicles at its corporate headquarters for employee use. In the same year, Flexcar also tested the suburban markets, with vehicles in Bellevue and Redmond (Eastern suburbs of Seattle). At the close of the year, Flexcar had 58 vehicles and over 2,800 members in the Seattle area. In addition, Flexcar established operations in Washington, D.C, Portland, Oregon and Vancouver, Washington. The Portland office was the result of Dave Brook selling CSP to Flexcar. For their contribution to smart growth, Metro, Flexcar and the University of Washington received a Puget Sound Regional Council Vision 2020 award.

The year 2002 brought many changes to Flexcar. Early that year, Flexcar and American Honda announced a partnership whereby Honda purchased a stake in the company and offered technological support. Flexcar also partnered with the University of Washington in a joint marketing campaign. Due to a grant from the Environmental Protection Agency (EPA), Flexcar introduced hybrid (gas-electric) vehicles into the fleet.

Besides organizational changes, Flexcar made technological improvements in 2002, such as replacing the lockbox system with integrated circuit keycards for vehicle entry and updating the telephone reservation system. The new system was designed to integrate with a web-based reservation system. By the end of 2002, approximately 5,800 members were sharing 78 vehicles in the Seattle area, with new branches in Los Angeles and the San Francisco Bay area.

In 2003, Flexcar continued its expansion in the Seattle area, and claimed over 7,000 members and 100 vehicles by mid-year. Flexcar provided services for over 100

businesses and made promotional arrangements with property managers, grocery stores and national rental car companies (see Chapter 3). In November 2003, Flexcar launched its web-based reservation system.

From the beginning of Flexcar, evaluating the success of the organization has been important. Metro and Flexcar held focus groups, conducted phone surveys, and collected demographic and travel information about incoming members. This report utilizes this information in evaluating Flexcar's success as a carsharing organization.



## Chapter 2: Literature Review

This chapter discusses carsharing's history, academic experiments with carsharing in North America, carsharing organizations existing before Flexcar, and recent carsharing publications. This information will aid in understanding the developments that lead to the creation of Flexcar and will be used to compare Flexcar to other carsharing organizations.

### Carsharing History

One of the first attempts to summarize the development of car sharing organizations (CSOs) was a paper entitled, "Carsharing in Europe and North America: Past, Present, and Future" by Susan Shaheen, Daniel Sperling and Conrad Wagner (1998). The paper traces early carsharing experiments to continental Europe, with commercial success beginning in the 1980s. By 1991, the European Carsharing Association had been established to support and promote the carsharing industry.

The authors identified Mobility CarSharing Switzerland and StattAuto Berlin as the two largest CSOs in Europe. As of 1998, the Swiss system had 1000 cars and 20,000 members, and the Berlin system had 200 cars and 4,000 members. At that time, the companies were moving to automated reservation systems and electronic entry to the vehicles.

Carsharing in North America was less advanced than in Europe when the paper was published. Most of the examples were small, community-based efforts. The largest North American organizations were in Canada. Also mentioned were two new CSOs being formed: one in Seattle and one in San Francisco.<sup>7</sup>

In their paper, Shaheen, Sperling and Wagner offer insight on the conditions for a successful carsharing organization:

CSOs are more likely to be economically successful when they provide a dense network and variety of vehicles, serve a diverse mix of users, create joint-marketing partnerships, design a flexible yet simple rate system, and provide for easy emergency access to taxis and long-term rentals. They are more likely to thrive when environmental consciousness is high; driving disincentives such as high parking costs and traffic congestion are pervasive; car ownership costs are rather high; and alternative modes of transportation are easily accessible.

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<sup>7</sup> The Seattle organization became Flexcar and the San Francisco organization became City CarShare.

Shaheen, et al also predicted that, in the future, carsharing would use more advanced technology in the billing and reservation systems, and CSOs would form partnerships with other organizations to provide “other mobility and non-mobility services” for their customers.

### **Station Car and CarLink I**

Around the time the above paper was published, several experiments were being conducted in the US around the carsharing concept. The largest-scale projects were conducted in the San Francisco Bay Area and investigated the use of “station cars,” a twist on the carsharing concept. Instead of distributing vehicles throughout a metropolitan area, station cars are grouped at transit stations and used primarily for commuting. In the morning, (reverse) commuters from the city travel to suburban stations via the mass transit system and drive the cars to their worksites. During the day, the cars serve as pool vehicles for the employer. At the end of the workday, the cars are returned to the station. To further utilize the cars, people who work in the city and live in the suburbs use the cars to travel back and forth between their homes and the transit station (Shaheen 2001).

The first station car project was the San Francisco Bay Area Station Car Demonstration, which took place from November 1995 – March 1998 (Bernard and Collins 1998). The project utilized electric vehicles (EVs) as station cars at four transit stations. The stated purpose of the project was, “to determine the viability of EVs for making short, everyday trips in a variety of settings.” In this sense, testing the carsharing concept was secondary to evaluating the reliability of electric vehicles. Even so, the researchers made several conclusions relevant to carsharing.

- A population exists that is willing to share vehicles. In this project, 94 participants shared 40 vehicles.
- People are willing to pay for use of a car that they do not own. The participants paid between \$95 and \$200 per month to lease a vehicle during the experiment.
- Station cars can provide environmental benefits through increasing transit use (up 56%) and reducing drive-alone, internal combustion engine automobile use (down 94%).

These results were based on monthly odometer and kWh readings, an entrance survey, 7-day trip diaries of participants before and after the demonstration, a post-project survey, usage logs for pool cars, and emission and energy data for impact analysis.

CarLink (January through November 1999) carried the station car concept further, with several differences from the previous example. The purpose of this study was, “to demonstrate, test, and evaluate a commuter-based carsharing model in the eastern portion of the San Francisco Bay Area” (Shaheen and others 2000). Instead of electric vehicles, CarLink used compressed natural gas (CNG) Honda Civics. The vehicles were outfitted with advanced technology to provide the following functions:

- Tracking the vehicles’ movements
- Key card technology to access vehicles
- Internet-based reservation system

Another difference between CarLink and the Station Car Demonstration was the price participants paid to use the vehicles: \$200 per car per month for people using the cars between home and the transit station; \$60 per car per month for people using the cars between the transit station and work; and \$1.50 per hour and \$0.10 per mile for using the cars during the workday. The program attracted 44 participants who shared 12 vehicles.

Before joining the experiment, participants completed an initial survey and a 3-day travel diary. Other data collection for CarLink included a longitudinal survey of participants; usage data, collected by an automatic vehicle location system and a manual in-vehicle trip diary; and exit survey consisting of questionnaires, a household survey and focus groups. The researchers also tracked program revenues and costs.

The results of the study showed that users were capable of using the “smart” technology needed to administer such a program. However, for those running the program, the reliability needed improvement.

At the conclusion of CarLink, the research team offered several recommendations for future research. These included expanding the size of the program, improving the in-vehicle electronics, and using conventional vehicles.

### **CarLink II**

The CarLink II project (Aug 2001 – Jul 2002), also lead by Susan Shaheen, followed up on the research recommendations from CarLink I (Shaheen and Wright

2001). CarLink II used 27 vehicles serving multiple employer locations. The vehicles were based at a Caltrain Station near Palo Alto, California.

The study “focused on understanding the commercial potential of commuter-based carsharing”, with the intent to continue the project as an “ongoing carsharing organization.” Data collection consisted of focus groups, on-line questionnaires, household interviews, and a comparison of manual travel diaries with automatically collected vehicle data.

In June 2002, the pilot program ended. The results were not yet available, but at least one goal was achieved: Flexcar took over operation of the program on July 1, 2002 and is in the process of transitioning CarLink II to a for-profit business (Car Link II 2003).

### **UC Riverside (UCR Intellishare)**

During the time that CarLink was being developed in the San Francisco Bay Area, another academic experiment was underway at the University of California-Riverside (UCR). The experiment began in 1999 as a partnership between UCR and Honda Motor Company. The purpose was to, “improve our understanding of the operating details of a multi-station shared vehicle system” (Barth, Han and Todd 2001). A “multi-station shared vehicle system” means that the user rents a vehicle at one location and drives it to another without having to return the vehicle to the original location.

The Intellishare “test bed” consisted of three stations: one on the UCR campus, one at an off-campus research center and one at a shopping center. The fleet was comprised of 25 Honda EVPlus electric vehicles shared by 350 drivers (UCR Intellishare 2003):

The experiment utilized several advanced technologies, including smartcard vehicle entry and vehicle monitoring systems. Reservations were not required. Instead, each station had a kiosk where users swiped their card, answered some questions about the upcoming trip, and were assigned a vehicle. Once the user returned the vehicle to one of the stations, the user was logged off and the vehicle was made available to other members.

One of the biggest challenges to this type of system is that vehicles could become unevenly distributed. Researchers approached this problem in two different ways. The first approach was through the use of simulation modeling. The model

predicted when the vehicles would become imbalanced. When imbalance occurred, the second approach to balancing the fleet was enacted: physically moving the vehicles between stations.

In summary, the UCR Intellishare program was a preview of the future of carsharing: clean vehicles available on-demand without the need for returning vehicles to their original location. Honda implemented a similar system in Singapore in 2002 (Honda World News 2002).

### **Carsharing Portland**

Carsharing in Portland, Oregon predates Flexcar Seattle. Richard Katzev, President of Public Policy Research Inc., prepared an evaluation after the first year of operations ended in February 1999 (1999). The report was written for the Oregon Department of Environmental Quality, which sponsored the project with funds from the EPA.

CarSharing Portland (CSP) was founded as a private enterprise and followed the classic neighborhood carsharing model. The cars were located in several neighborhoods in central Portland. No advanced technologies were employed; a phone service was used for booking reservations, the keys were stored in lockboxes at the vehicle locations, and the trip information was recorded manually on trip tickets.

The fare system was \$1.50 per hour and \$0.40 per mile with a daily maximum of \$45 for standard vehicles. Special vehicles (i.e. the pickup truck) cost \$2.00 per hour and \$0.40 per mile with a daily maximum of \$55. Members paid \$25 to join plus a \$500 deposit. After one year, enrollment was 120 members who shared nine vehicles in seven locations.

Data for the evaluation consisted of the following: pre-membership and year-end surveys, pre-membership and year-end 7-day travel diaries, and an analysis of trip ticket data. Katzev presented his results in four categories: membership, usage, satisfaction and travel behavior.

- Membership increased by 10-12 members per month. Members were typically well educated with a net income of \$3000-4000 per month. Vehicle ownership was 41% and home ownership was 39%.
- Members made an average of 2.5-3.5 trips per month, mostly for shopping and entertainment trips. The trip distance averaged 22.6 miles and lasted 3-4.5

hours. Trip frequency decreased with the length of membership. More trips were made in the winter and summer months.

- Satisfaction was high; most members indicated that the service had met their expectations and wanted to see the program expanded.
- Vehicle miles traveled (VMT) had increased among non-car owners, but VMT did not change significantly for car owners. After one year, 17 members had sold a vehicle. It is unknown how many members purchased a vehicle.

After the conclusion of the first year, CarSharing Portland continued to provide its service. Its staff also helped King County Metro to plan for its own carsharing venture. In 2001, CSP became a part of the Flexcar organization and continued its operations. CSP claimed 3,000 members sharing 59 vehicles by mid-2003.

### **Co-operative Auto Network**

Carsharing in North America also extended into Canada. The largest organization in Canada is the Co-operative Auto Network (CAN), a non-profit organization founded in Vancouver, British Columbia in 1997.

In 2001, CAN released a Social and Environmental report (Jensen 2001). The report summarizes the results of a member survey and attempts to quantify the organization's environmental impact. At the time, CAN claimed 676 members and 38 vehicles.

In terms of emissions, CAN estimated that its members, who drove an average of 1,383 km (859 miles) per year in 2000, were producing 10-36 times fewer greenhouse gas emissions than someone who owned their own car. This is based on the assumption that car owners drove between 6,000 (3,728 mi) and 24,000 km (14,913 mi) per year.

The fleet fuel economy ranged from 15.5 L/100km (15.2 mpg) and 7.9 L/100 km (29.8 mpg) in the city. The highway fuel economy was between 11.2 L/100 km (21 mpg) and 6.2 L/100 km (38 mpg).

CAN also estimated their use of paper in the office, which was approximately 10,500 sheets in the year 2000. They were looking for ways to reduce this usage, for example, making invoices available online.

The member survey revealed that the primary reason for using the service was to save money over automobile ownership. Environmental concerns were the second most common reasons, followed by avoiding the hassles of car ownership. The members

were happy with the service, with 95% reporting that they were 'satisfied' or 'very satisfied'. When asked about price increases, 78% condoned an increase of \$0.25 per hour.

As of mid-2003, CAN was still the largest carsharing organization in Canada, with 67 vehicles in the greater Vancouver area. The fees had been raised to \$1.75 per hour and \$0.17 - \$0.32 per km (\$0.27 - \$0.52 per mile), plus monthly charges of \$5 - \$35 per month (CAN 2003). The organization had not revised their environmental report to reflect these changes.

### **Recent Publications**

Carsharing is a relatively new industry in North America and has no formal organization to guide its growth. In the past few years, the annual Transportation Research Board (TRB) meeting has become an opportunity for carsharing organizations to exchange information. The New Transportation Systems and Technology Committee, A1E14, created a subcommittee for research on carsharing and station cars.

At the 2003 TRB meeting, four papers were presented on carsharing during Session 470: Carsharing Trends, Technologies and Findings. At this session, Susan Shaheen, Matthew Barth, Robert Cervero, and Tuenjai Fukuda presented papers on their carsharing research.

Shaheen was first to present. Her paper, "U.S. Shared Use Vehicle Findings: Opportunities and Obstacles for Carsharing and Station Car Growth," was a survey of 18 carsharing organizations in the United States (Shaheen, Meyn and Wipyewski 2003). She evaluated the market on rates, technology, costs, business model, size and partnerships. Shaheen outlined several trends:

- Participation in carsharing is growing, with a few organizations beginning to dominate the market. Flexcar, Zipcar, and City Carshare serve 92% of carsharing participants and own 64% of the fleet.
- Insurance has become a major obstacle for carsharing, representing 20-48% of an organization's cost.
- Four strategies for lowering insurance are developing risk rating factors; using technology to lower risks, e.g. automatic seat belts; self-insuring, possibly as a coalition of carsharing organizations; and acquiring usage-based insurance.

- Carsharing organizations perceive advanced technology as necessary for growth. Organizations with advanced operation systems control 76% of the carsharing fleet. Development of this technology has been a barrier for new carsharing organizations to enter the market.
- Developing carsharing technology cooperatively could reduce costs, help provide standardized data collection for insurance purposes, promote growth, and accelerate improvement.
- Interoperability, or the ability to access multiple services with a single membership, may help attract members. Carsharing organizations may also want to consider letting members from other services use their vehicles.

Matthew Barth from UC Riverside presented his paper, "Examining Intelligent Transportation Technology Elements and Operational Methodologies for Shared-Use Vehicle Systems" (Barth, Todd and Shaheen 2003). Barth saw an opportunity for the use of intelligent transportation systems (ITS) in carsharing, and he discussed the cost and benefit tradeoffs in using ITS for this purpose.

Barth first defined the four main systems required for carsharing: reservation, vehicle access, monitoring, and system management.

- Reservations can be in advance or on-demand. On-demand systems are easier for the user, but require the service provider to predict the demand and provide enough vehicles. Variable pricing could be used to help balance demand.
- Several different methods exist for accessing vehicles, from providing a lockbox near the vehicles to smartcard readers that require a PIN confirmation. The tradeoffs are between cost, security and user convenience.
- Vehicle monitoring requires on-board vehicle electronics and communication architecture. On-board vehicle electronics applications include 'locking out' users without a reservation, recording time and mileage while the vehicle is in operation, tracking vehicle location via GPS, and administering messages to users while they drive.
- Wireless communications, or telematics, make many of the above applications possible. Communication can take place at the docking station via dedicated short-range communication (DSRC) or during transit via cellular or radio signals.



Hybrid systems are also possible. Here, cost must be balanced with bandwidth needs and the possibility of data loss.

- System management includes reservation management, vehicle check-out processing, trip data logging, vehicle maintenance, accounting, and collecting data for analysis.

Barth suggested how to use these ITS technologies to improve carsharing. Many activities could be standardized across the industry that would make carsharing easier to use. Examples included using standardized keys and combining multiple services, such as transit use, on a single bill. To lower insurance premiums, carsharing organizations could adopt standard data collection to help establish an insurance risk class. Finally, Barth suggested that automakers could manufacture cars that are “share-ready” and allow organizations to upgrade the systems over time.

Robert Cervero also presented at the 2003 TRB conference. His paper, “City CarShare: First-Year Travel Demand Impacts,” examined carsharing in San Francisco (2003). His research shows that while users may increase vehicle travel after joining carsharing, they “are accruing substantial travel-time savings, and willingly pay market prices for these benefits.”

Subjects in his study filled out 2-day travel diaries before joining the program, three to four months after joining the program, and eight to nine months after joining the program. The control group consisted of people who had registered to join, but were not yet members. Some of the metrics included vehicle miles traveled, mode-adjusted vehicle miles traveled (to account for carpools and transit use), and mode and engine size adjusted vehicle miles traveled (to measure environmental impact). Also recorded were trip purpose, time of day, and several demographic characteristics.

The typical CityCarshare member was female (67%), 30-39 years old (64%), made \$35-50K per year (50%), owned a bike (60%), and held a transit pass (65%). About 2/3 of the members had no car, while about 20% had one car. The most common car to own was a Honda Civic.

Cervero found that members were able to decrease their travel times by using CityCarshare, which may have induced the use of automobiles (although it was not statistically significant). In low-income members, car trips replaced walking and biking trips, while higher income members replaced personal auto trips with CityCarshare.

Carsharing occurred mostly during off-peak times and the destination was seldom to congested areas like downtown. Cervero calls this “judicious automobility.” Members were paying market prices to use the cars, and they were not adding to congestion.

The final paper at the 2003 session was, “Evaluating Second Car System, an Electric Vehicle Sharing Experiment in Tama New Town District, Inagi City, Tokyo”, presented by Tuenjai Fukuda (Fukuda, Kashima and Barth 2003). This experiment involved electric vehicles intended for use by housewives in suburban Tokyo. The vehicles featured many ITS applications, including a reservation system that could be accessed by phone or internet, wireless communication between vehicles and the operation center, automated vehicle monitoring for battery charge and position, and a hands-free phone for the user to call the operation center.

The average round-trip distance was 9 km over 1.95 hours. The users predicted the distance using landmarks in the town. With this method, 94% of trips were within 5 km of the predicted distance. Users were limited to 4 hours per day. The top destinations were for shopping, picking up/dropping off children, going to lessons and going to the hospital.

For part of the experiment, the vehicles were provided free of charge, but later a fee was imposed. Membership dropped off at this phase, probably because of the high rate (94%) of auto ownership among members. Fukuda noted that women have different travel behavior from men and that carsharing linked to transit may help fulfill women’s demand for short distance travel with many stops.

Since the 2003 TRB meeting, two notable papers have been released. Martin Bernard released a review of station car programs in his paper, “A Ten-Year Retrospective on the National Station Car Association” (2003). Per Schillander, of the Swedish National Road Administration, released a report entitled, “Make space for Car-Sharing! Car-Sharing in Sweden, its definition, potential and effects, IT-solutions for administering it, and strategies to further its development” (2003).

Bernard’s report was a review of previous efforts in establishing station car programs. The National Station Car Association (NSCA) was established in 1993 for “guiding the development, testing and commercialization of the electric station car concept.” He highlights several events in the past ten years that have affected these

efforts. For example, major automobile manufacturers have produced electric vehicles and later abandoned the projects. About 200 electric station cars were in service in 2003.

The NSCA was responsible for or involved in many of the early carsharing experiments in the US (see “Station Car and CarLink I”) and has been a resource for lessons learned in carsharing. Some of these lessons include the importance of public/private partnerships, understanding what motivates people to join carsharing, placing vehicles in the right location, and developing adequate technology.

For the future, Bernard recognized that the concepts of the station car were merging with neighborhood carsharing. The NSCA would continue to support these efforts, but he called for the industry to develop an association and to cooperate with each other. The NSCA would also be developing tools to help the industry to measure itself, particularly to show the environmental benefits of carsharing and the difference in emissions for electric vehicles, gas-electric hybrids, and conventional automobiles.

Schillander’s report on carsharing in Sweden offers a vision of what carsharing should be. His definition was as follows:

Carsharing 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.

A carsharing organization would require an administrator responsible for the program, drivers (at least six per vehicle), an accounting system to track vehicle use by driver, and vehicles. The vehicles should be owned by the organization, be less than four years old and meet a minimum safety standard (he suggested four stars on the Euro NCAP rating scale).

Schillander advocated for public support in advocating carsharing and for providing a legal framework to help it grow, but he did not believe that the government should provide economic support. Success factors for carsharing were identified as convenience (easy booking and rational placement of vehicles), economy (less expensive than owning a car) and reliability (newer, safer and less-polluting vehicles).

Zipcar, the second-largest carsharing organization in the US, has not been widely researched except for articles in the press. This is because Zipcar, unlike other major CSOs in North America, did not come about from a university research project or

government initiative. Rather, it has been a private organization from its outset. Zipcar claimed 250 vehicles and 7,000 members in Boston, New York and Washington, D.C. by mid-2003 (Zipcar 2003).

## **Summary**

Carsharing has emerged in the USA and Canada over the past decade due to efforts by universities, corporations, entrepreneurs, government at all levels, and grassroots community supporters. Carsharing has attracted several thousand users with promises of cost savings and environmental benefits. The technology has improved in the past few years, replacing manual means of reservation, billing and vehicle entry with automated systems.

Shaheen, et. al. (1998) traced the history of carsharing from Western Europe to early efforts in North America. Successful organizations offered members access to a variety of vehicles and were able to offer alternative transportation in case a vehicle was not available. The rate systems were simple and appealing to different types of users. When organizations tried to lower costs by reducing service quality, for example using older, less-reliable vehicles, the organizations failed.

Several academic experiments preceded the large-scale operations of today. These experiments consisted of the “station car” projects described by Bernard (1998) and Shaheen (2000 and 2001) and university-based carsharing programs like UCR Intellishare (Barth 2001). With these efforts, carsharing technology improved and the market potential became better understood.

Community-based carsharing began in North America in the late 1990's, including CAN in Vancouver, BC (Jensen 2001) and Portland CarShare (Katzev 1999). These organizations put the carsharing concepts into practical use and developed the administrative systems needed for large numbers of cars and users.

The hopes for carsharing were high. Supporters claimed that carsharing attracted people to public transit, reduced the need for parking in urban areas, promoted equity in transportation, and reduced air emissions. None of these effects had been proven on a large scale in North America. Furthermore, the literature did not provide evidence of a carsharing organization making a profit. (The CAN environmental report claimed that the organization was debt-free as of 2001. CAN operated as a not-for-profit organization.) The experts identified conditions for success, such as dense urban areas, high costs of

auto ownership and easy access to public transportation, but beyond showing growth, carsharing organizations had not demonstrated commercial success in the United States.

## **Chapter 3: Building a carsharing community**

Building a carsharing community requires technology to provide the service, processes to administer the service and people to use the service. This chapter describes how the Flexcar service works and presents data on customer satisfaction and membership growth up to mid-2003

### **Flexcar Process Description**

The Flexcar Member Manual claimed, “Using Flexcar is as easy as 1-2-3” and listed the basic instructions for accessing the vehicles. In fact, the process consisted of multiple steps and procedures that were not a normal part of automobile use. See Appendix C for a flow chart documenting the Flexcar reservation and use process.

#### Step 1: Call to Reserve a Vehicle

Flexcar members made reservations using the telephone or the Internet. When using the telephone, the user first determined the vehicle locations that met the transportation need. The Flexcar website contained a list of vehicles, available in a printable format. The list was organized by geographic location and indicated what type of vehicle is parked at the location

The user also needed to estimate the amount of time needed for the trip and verify the trip dates. After calling the touch-tone reservation system (877-FLEXCAR), the user followed the menu options to “reservations” and entered the trip data. The user sometimes needed to try several vehicles before successfully making a reservation. This sometimes required retuning to the web site to find additional vehicle locations.

To make reservations over the Internet, the user entered a member number and PIN at the Flexcar web site ([www.flexcar.com](http://www.flexcar.com)). After entering the reservation date and information about the origin of the trip, the site displayed reservation information for the vehicles in the specified area. The user then chose a reservation time during an available slot. If no time slots were available, the user changed the trip origin to reserve vehicles in a different location.

#### Step 2: Pick Up Your Vehicle

At the start of the reservation period, the user traveled to the vehicle location. The locations were posted on the web, with maps and descriptions of the locations. Examples of vehicle locations included parking lots, parking garages and the street. If

the vehicle was located near the user's home or work, the reservation typically began with a walking trip. Otherwise, the reservation began with a bike or bus trip.

If the vehicle was not at the location at the beginning of the reservation period, the user called the "help line" at 877-FLEXCAR. The on-call staff attempted to locate the vehicle, usually by contacting the previous user. If the wait time was unacceptable to the user, Flexcar either provided a taxi at no charge or canceled the reservation.

Once the vehicle was present, the user unlocked the vehicle, usually with a key card. Sometimes the entry system failed, for example, because of a dead battery, a cancelled account, or computer malfunction. The user then called the help line. The on-call staff unlocked the vehicle remotely, provided an alternate vehicle location, provided a taxi, or canceled the reservation.

Once inside the vehicle, the user activated the ignition by entering a PIN on a keypad (usually located inside the glove box). Any problems required a call to the help line. Possible problems were an incorrect PIN entry, the reservation period had not begun, the user was in the wrong vehicle, or a computer malfunction.

Not all vehicles had key card entry and PIN access. Some vehicles stored the key outside the vehicle in a lockbox. The reservation system provided instructions for entering the vehicle.

### Step 3: Drive Your Vehicle

Once the ignition had been activated, the user started the vehicle with the manufacturer's key, which was typically stored in the glove compartment. The user drove the vehicle as normal and returned it to its location before the end of the reservation period. The on-board computer tracked the mileage and time used during the trip.

When running late, the user was supposed to call the reservation system. It was sometimes possible to avoid late fees by extending the reservation period. If this was not possible (i.e. a reservation existed directly after the period) the user called the help line to help warn the next user.

When returning the vehicle to its location, the user sometimes found a vehicle parked in the Flexcar space. In this case, the user parked in the nearest legal space and called the help line.

Upon completion of the trip, the user locked the vehicle and removed all personal items. Users were encouraged to track their usage and to compare with Flexcar's invoice with the total charges for the month. Finally, Flexcar charged the user's credit or debit card for the total monthly usage.

### **Potential Defects**

As the process description shows, there were several opportunities for the system to break down on the user. The problems did not occur during most Flexcar trips. They are important because they show the differences between Flexcar use and the operation of a private vehicle. The following list summarizes the possible failures:

- Unable to reserve a vehicle
- Vehicle unavailable/unsuitable at beginning of reservation period
- Unable to enter the vehicle at beginning of reservation period
- Unable to start the vehicle at beginning of reservation period
- Vehicle problems during reservation period
- User running over the reservation period
- Parking space unavailable upon return

Explanations for the problems ranged from the reliability of Flexcar's technology to users being unfamiliar with the system. Almost all of the problems required the user to notify the on-call staff via the Flexcar helpline. To address the user problems, such as running over the reservation period, Flexcar developed financial incentives for its members. The technical problems were assigned to fleet manager.

### **User Incentives**

Flexcar discouraged undesirable behavior in its members by charging fees. Most of the fees were directly related to the potential defects listed above, such as the fee for returning a vehicle late. Users faced charges for the following infractions:

- Returning the vehicle late (\$20 plus costs up to \$100)
- Inconveniencing other members, e.g. low fuel level (\$75)
- Damaging the vehicle (first \$500 of deductible)
- Returning the vehicle in an unsatisfactory condition, e.g. smoking in the vehicle (\$200)



- Traffic violations and Illegal parking (member is responsible for paying tickets, or \$20 plus costs for Flexcar to handle)

Flexcar also offered incentives for members to take care of the vehicles and to help recruit new members. Users received usage credits for the following activities:

- Filling the fuel tank (\$2)
- Washing the car (\$5 plus reimbursement)
- Referring a new member (\$20 per new member)
- Signing on as a neighborhood champion (see Partnerships and Events below)
- Participating in a survey (\$5-10)

Besides keeping the vehicles fueled and cleaned, the credits gave members an opportunity to “work off” any charges they incurred.

Flexcar tracked the member charges and credits with other costs and revenues.

See Chapter 5 for more information.

### **Technology Assessment**

Flexcar relied heavily on technology to allow its members to share vehicles. Mathew Barth (2003) defined carsharing technology as having four components: reservation, vehicle access, monitoring, and system management.

#### Reservations

Flexcar used a touch-tone phone reservation system and a web-based reservation system. Members could make reservations up to one year in advance, but most people made reservations within 24 hours of start time. The time slots were 30-minute intervals. Originally scheduled for release in early 2003, the web-based reservation tool was implemented in November 2003.

**Figure 3.1: Flexcar web-based reservation system**

### Vehicle access

Each member was provided with a plastic card with an imbedded integrated circuit. The “key card” opened most Flexcar vehicles by passing the card over a sensor mounted inside the vehicle’s window.

Some of the Flexcar vehicles did not have key card entry. Instead, their keys were stored in lockboxes at the parking space. The reservation system advised the user on how to open the boxes.

### Monitoring

The Flexcar vehicles carried on-board computers to store the vehicles’ reservations. Users without reservations were not able to operate the vehicle. When the vehicle was in use, the computer tracked the vehicle mileage and time. The on-board computers exchanged information with Flexcar’s reservation and billing database via a wireless communication link.

Besides tracking reservation and trip data, the Flexcar vehicles were also equipped with a global positioning system (GPS). The GPS is used primarily for security purposes. For example, if a vehicle was stolen, Flexcar could have found it with the GPS.

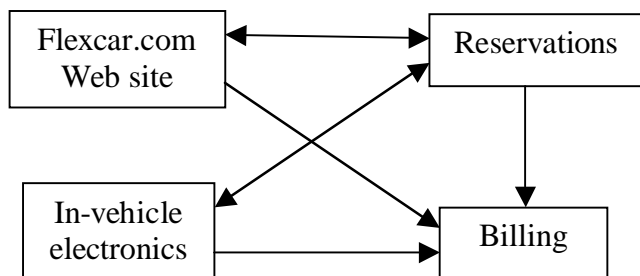
Members stayed connected to Flexcar through the telephone. No in-vehicle communication was available, but many users carried mobile phones, which they used to communicate with on-call staff. In the event of an emergency, such as a collision or being locked-out, the member assistance was available 24 hours per day. (Flexcar staff

could usually unlock a vehicle remotely.) For general information, Flexcar maintained a web site ([www.flexcar.com](http://www.flexcar.com)) and distributed a monthly newsletter.

### System management

Flexcar improved its systems from a collection of semi-connected parts to an integrated management system consisting of the web site, the reservation system, the in-vehicle electronics, and the billing system.

- The web site contained information about vehicle locations, allowed members to update billing information, and provided access to the reservation system.
- The reservation system stored information about which members had reserved which vehicles. This information was transferred to the vehicles to lock out unauthorized users. The reservation data were also transferred to the billing system. Users were charged for the reservation time even if they did not drive the vehicle during the reservation period.
- The in-vehicle electronics stored the reservation data and tracked the mileage and time duration for each trip. The trip data was sent to the billing system.
- Each month, the billing system tabulated each members' dues, based on their vehicle usage and rate plan.

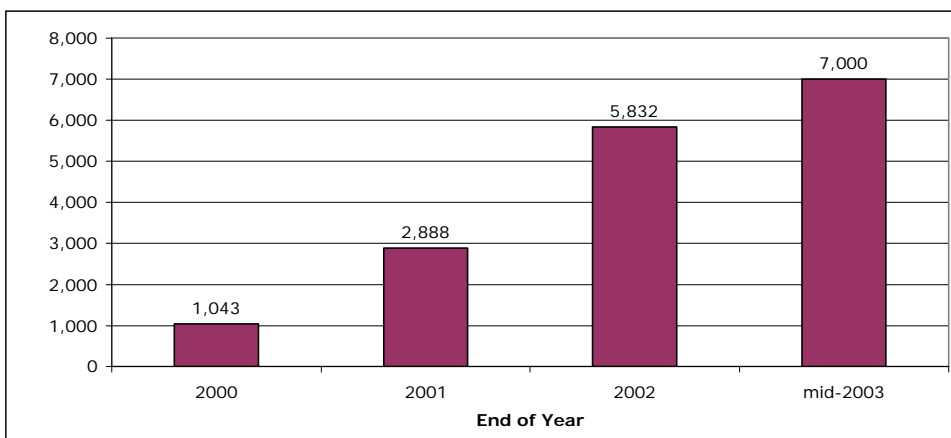


**Figure 3.2: Flexcar systems**

By mid-2003, Flexcar was using these systems to coordinate reservations for over 100 vehicles and approximately 7000 Seattle members. Flexcar also operated in several other US cities: Washington, D.C.; Portland, Oregon; Denver, Colorado; Los Angeles, San Diego, and the San Francisco Bay Area in California. Members had the option of becoming members in each of the cities for no additional cost.

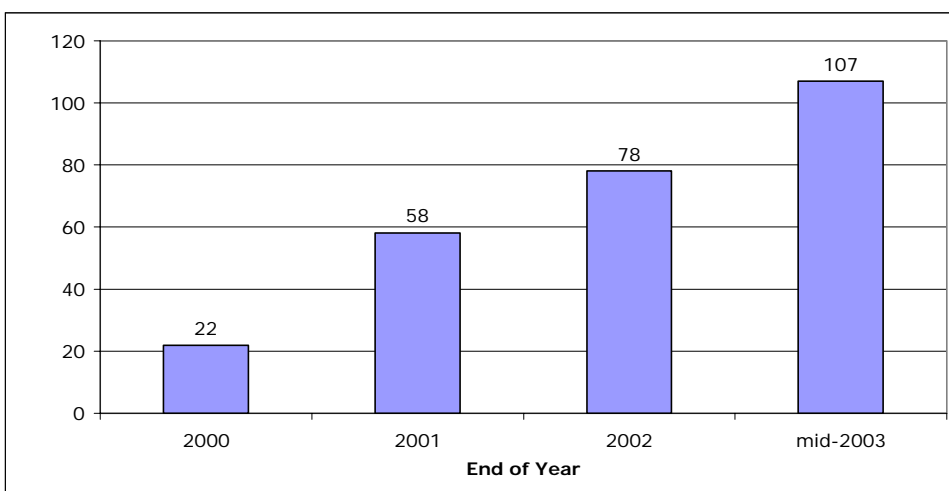
### Growth in Number of Members and Vehicle Locations

Besides having systems and a process for managing various transactions, a carsharing organization needs members. In Seattle, Flexcar increased its membership sevenfold from the end of 2000 to mid-2003 (See Figure 3.3).

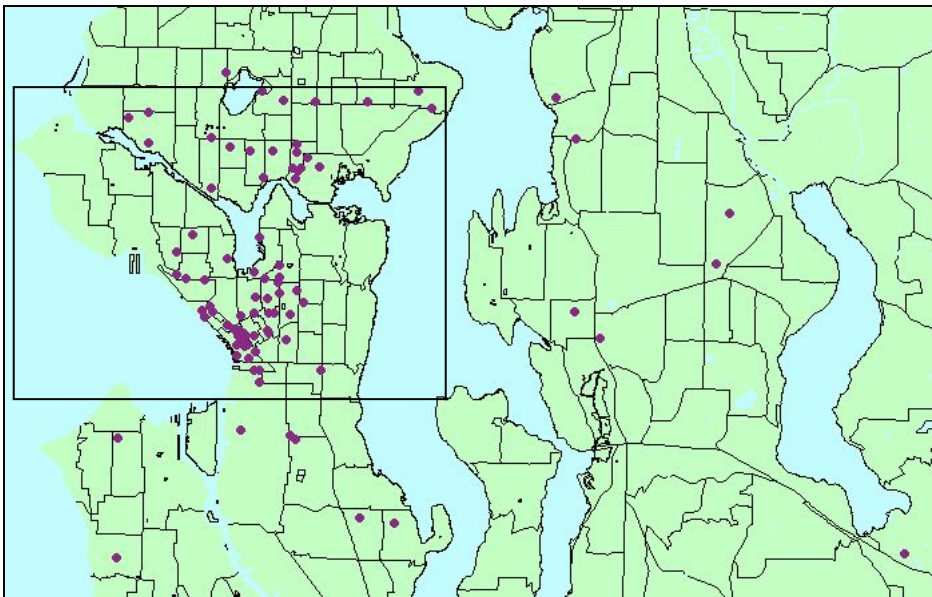


**Figure 3.3: Increase in Flexcar Seattle membership**

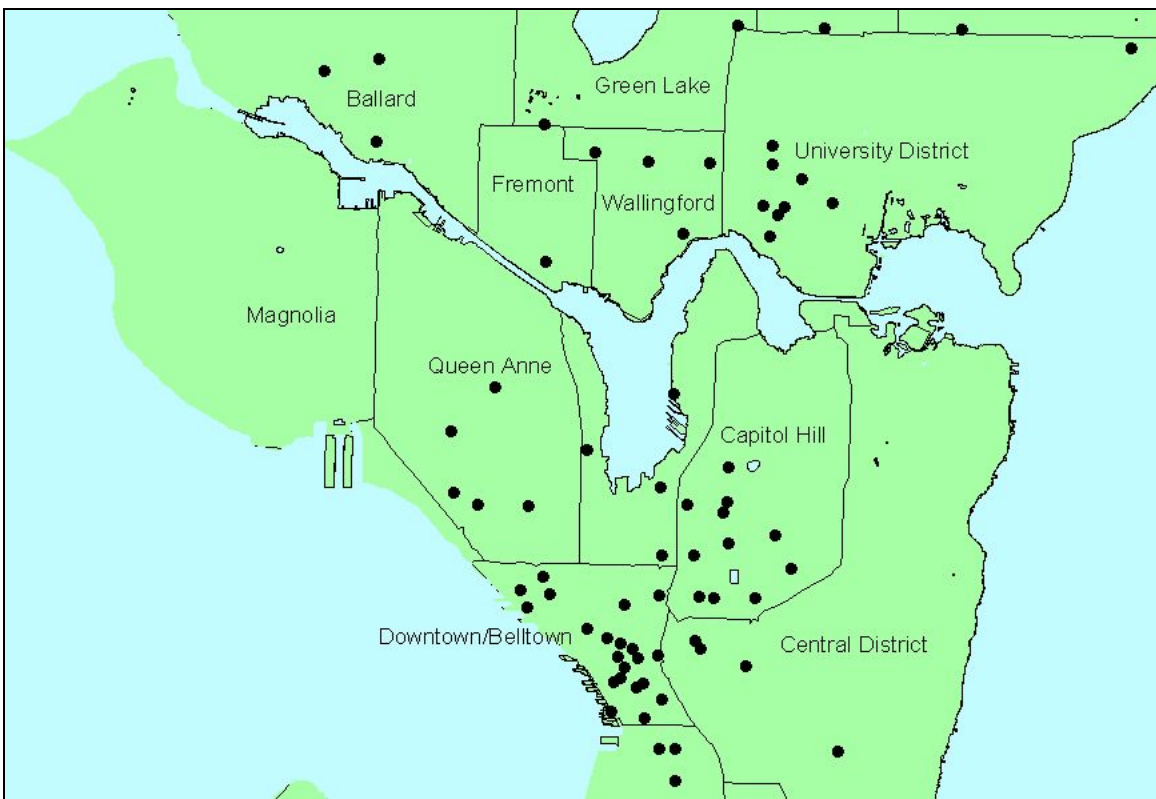
As the number of members increased, Flexcar also increased the size of its fleet. Flexcar claimed over 100 vehicles by mid-2003 (See Figure 3.4). About 50% of vehicles were located in Downtown, Capitol Hill, or the University District (See Figures 3.5 and 3.6).



**Figure 3.4: Increase in Flexcar Seattle vehicles**



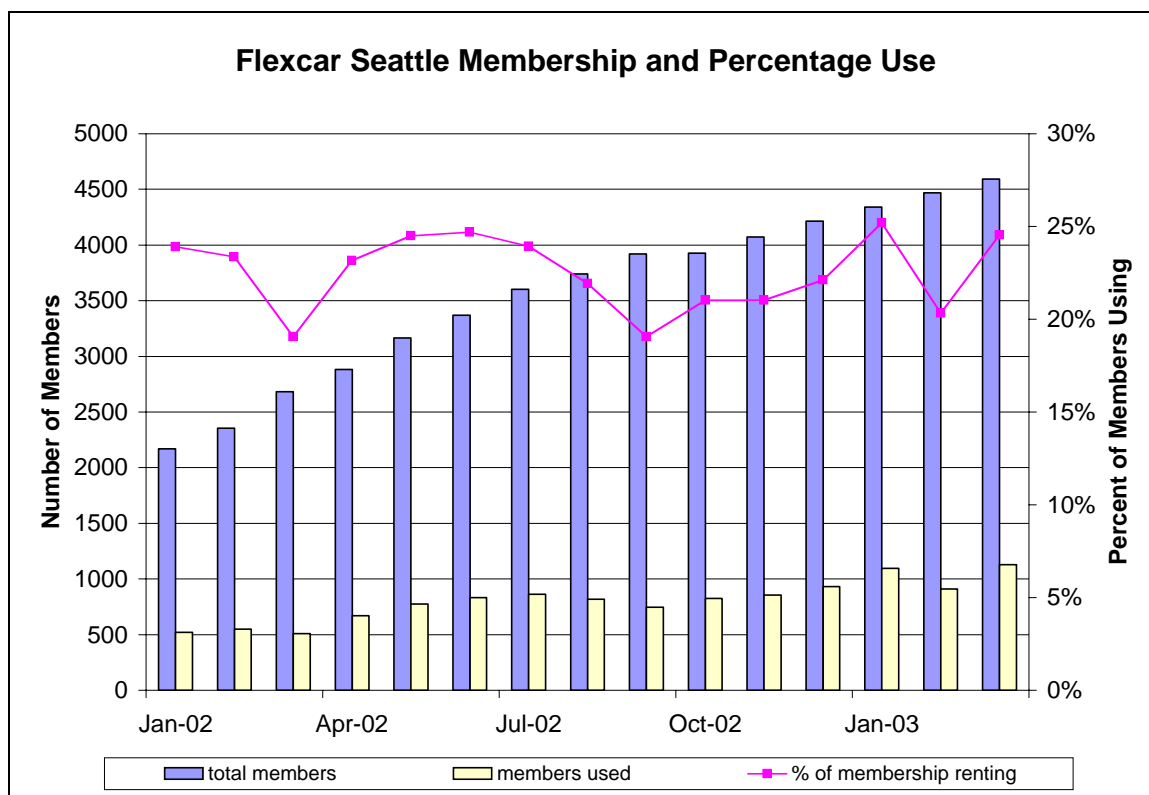
**Figure 3.5. Flexcar Locations in Seattle Metro area (approximately 250 square miles)**



**Figure 3.6: Flexcar locations in Central Seattle (approximately 55 square miles).**

## Partnerships and Events

As Figure 3.7 shows, approximately 20-25% of the membership reserved a vehicle in a given month, between January 2002 and March 2003. Flexcar maintained this average during the aggressive growth period of 2002. The number of members increased from about 2000 members and 500 users in January 2000 to over 4500 members and 1000 users by January 2003.



**Figure 3.7: Percentage of membership reserving Flexcar by month**

The membership growth was the result of aggressive marketing and the creation of partnerships with other organizations. Partnerships fell into six categories: government organizations, mobility providers, employers, property owners, other service providers and individuals.

### Government organizations

King County Metro, City of Seattle and the University of Washington supported Flexcar in a variety of ways, including funding, providing office space and marketing. See Chapter 6.

### Mobility providers

Flexcar made arrangement with other organizations that provided transportation. For example, Flexcar members receive a 10% discount when renting a vehicle through Enterprise Rent-a-Car.

#### Employers

Providing fleet management services to business was a growth area for Flexcar. Flexcar waived the membership fee for its business clients' employees.

#### Property owners

Flexcar has placed vehicles at residential and commercial properties as an amenity for people living and working there. Harbor Properties, a Seattle real estate firm, is one example. They included Flexcar vehicle locations at several of their residential and commercial properties.

#### Other service providers

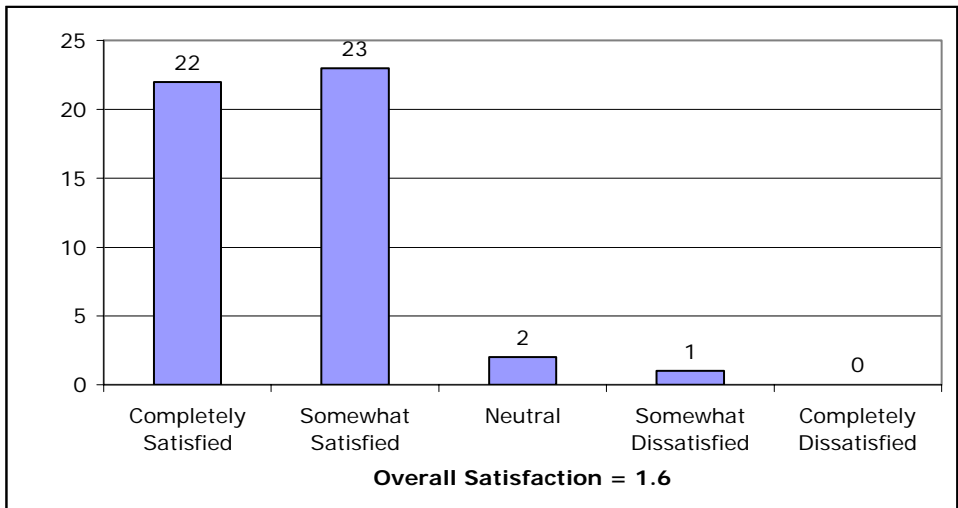
Flexcar tied its service to other non-transportation service providers. For example, Flexcar placed vehicles at each of the seven PCC Natural Markets and offered discounted memberships to PCC members. PCC, the Puget Consumers Co-op, operated grocery stores specializing in natural and locally grown foods.

#### Individuals

Flexcar also marketed directly to individuals through advertising and participating in community events. Examples of community events include the Seattle Folklife Festival, an annual music and arts festival; the Fremont Fair, a community street fair and parade; and the Seattle PRIDE parade, a lesbian, gay, bisexual and transgender celebration. Flexcar also began the "neighborhood champion" program, where individuals agreed to take care of a vehicle in their neighborhood and recruit new members in exchange for usage credits.

#### **Member satisfaction**

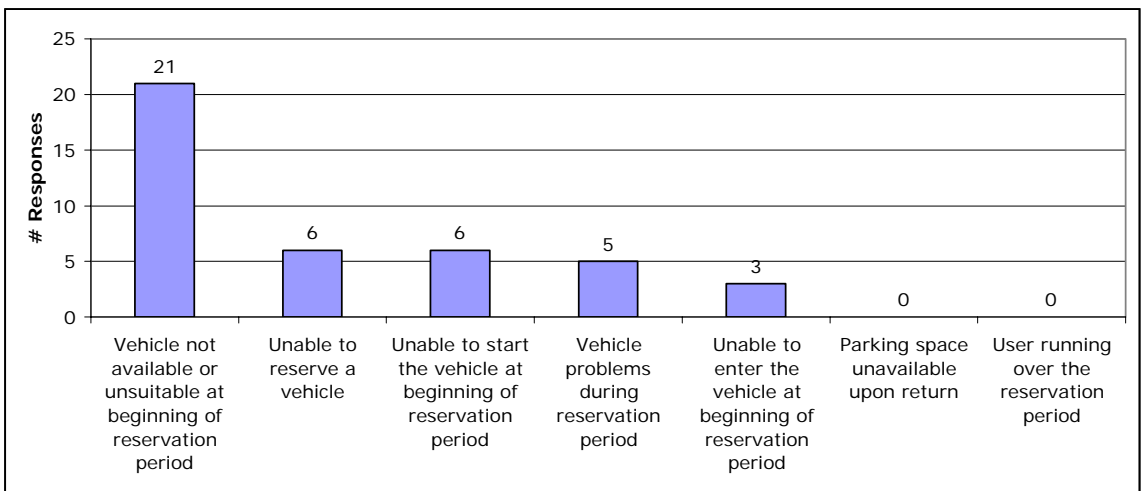
King County Metro sponsored a telephone survey in May 2003 of Flexcar members who had joined in 2000 (See Appendix A). The members reported a high level of satisfaction (see Figure 3.8.). Please note this was a small sample of active users and not representative of the entire Flexcar membership.



**Figure 3.8. Flexcar member satisfaction from 2003 phone survey**

In the same survey, members were asked to describe the problems they had encountered when using Flexcar. About two thirds had experienced problems when using Flexcar and about 80% had called the help line. The problem categories are as follows, corresponding to the “Potential Defects” identified earlier in the chapter.

Figure 3.9 shows a Pareto diagram, where the frequency of problems are ordered from left to right in decreasing frequency. According to the survey, the most common problem was the vehicle not being available or suitable at the start of the reservation period.



**Figure 3.9: Problems when using Flexcar from the 2003 phone survey.**



## **Summary**

This chapter described the systems that Flexcar used to provide mobility for its members, the Flexcar user process, the number of people that the service had attracted and their experiences while they used it.

Flexcar created an integrated system that linked its web site, the reservation system, the vehicles and the billing system. Most information was tracked electronically.

Flexcar's membership increased sevenfold between the end of 2000 and mid-2003. The growth was due to aggressive marketing and the creation of partnerships with other organizations. Each month, about 1 in 4 Flexcar members used a vehicle.

The highest concentrations of vehicles were in Seattle's Central Business District, Capitol Hill (a high-density residential neighborhood) and the University of Washington. These areas accounted for 50% of the vehicle fleet, which had grown to over 100 vehicles by mid-2003.

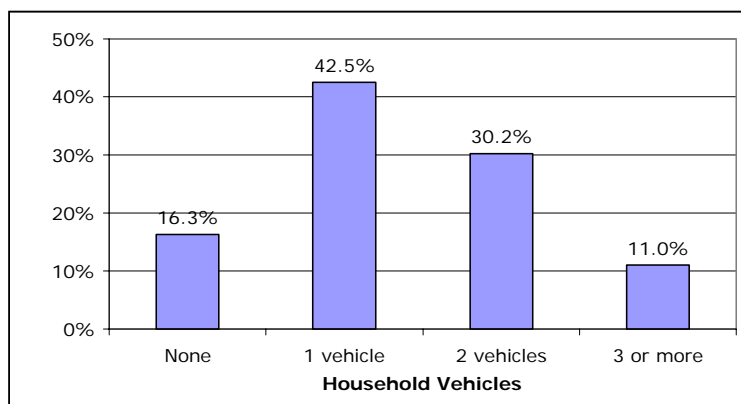
The process of using Flexcar was more complex than the "1-2-3" advertised in the member manual, and it contained several potential defects that do not occur when using a private vehicle. Members were able to reach Flexcar staff 24 hours per day if any problems arose. Tracking the defects and reducing the most frequently occurring problems would help Flexcar to improve its service.

## Chapter 4: Changing Travel of Members

When carsharing was introduced, its proponents envisioned a variety of urban problems that the new technology could address: lowering the land use impact of automobiles by reducing parking, reducing congestion through increased use of transit, improving air quality through cleaner vehicles, and providing a more equitable transportation system by increasing access to automobiles for non-owners. All of these outcomes would be a result of changing the travel behavior of carsharing members, specifically through a reduction in automobile ownership and use, and/or increased transit use.

### Travel Behavior and Income in Seattle

The Puget Sound Regional Council<sup>8</sup> compiles and publishes the US Census data for the Seattle area. The following statistics came from the 2000 Census (PSRC 2002).

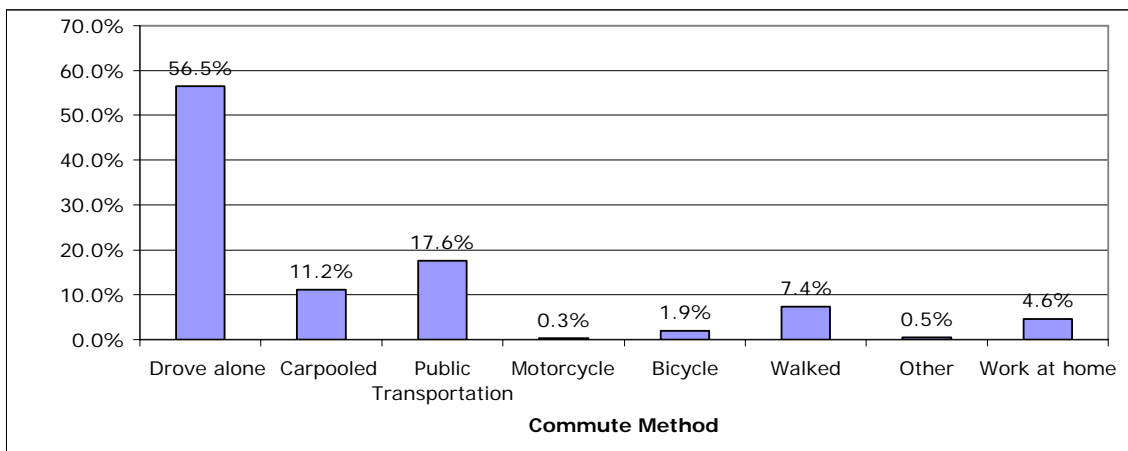


**Figure 4.1: Vehicles per household in Seattle, from 2000 Census**

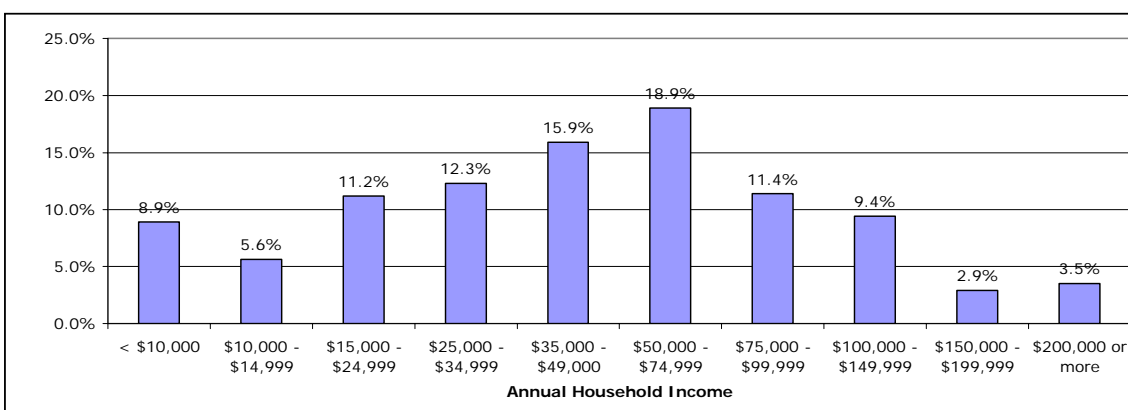
As Figure 4.1 shows, the majority of households in Seattle had at least one vehicle available. Accordingly, the majority of commuters used an automobile to travel to work, with 56.5% of workers driving alone and 11.2% traveling in a carpool (see Figure 4.2). Transit had a 17.6% share of commute travel in Seattle, including buses, taxis, ferries and trains. The mean travel time to work was 24.8 minutes.

The median household income for Seattle residents was \$45,736 per year. Over 25% of households earned more than \$75,000 per year, and about 25% of households earned less than \$25,000 per year. See Figure 4.3.

<sup>8</sup> PSRC is the Metropolitan Planning Organization for the Seattle area, consisting of King, Pierce, Snohomish and Kitsap counties. See [www.psrc.org](http://www.psrc.org) for more information.



**Figure 4.2: Commute method in Seattle, from 2000 Census. Mean travel time to work was 24.8 minutes**



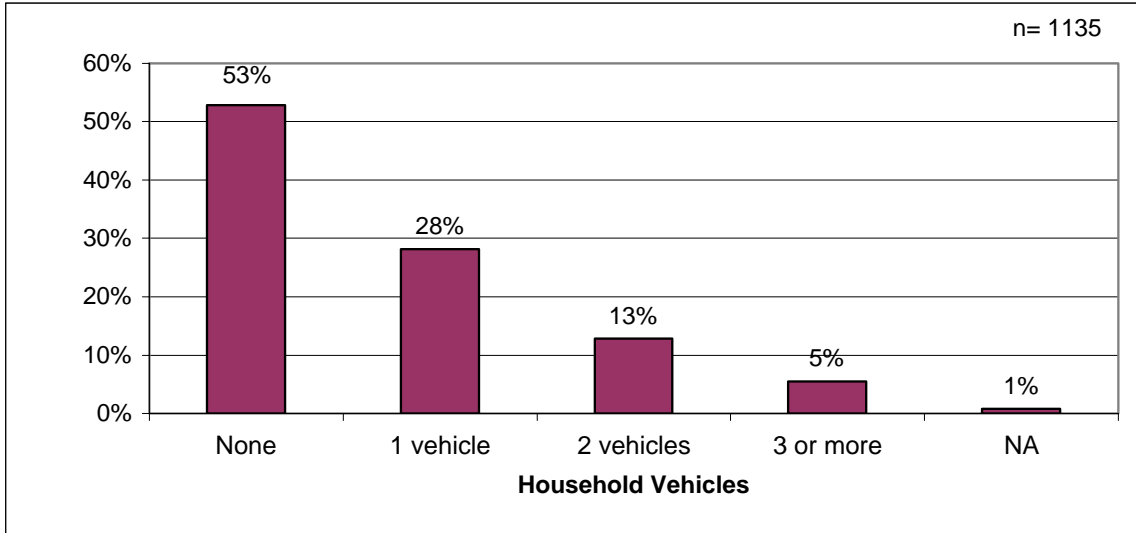
**Figure 4.3: Monthly Household Income in Seattle, from 2000 Census. Median household income was \$45,736 per year.**

### **Flexcar Customers**

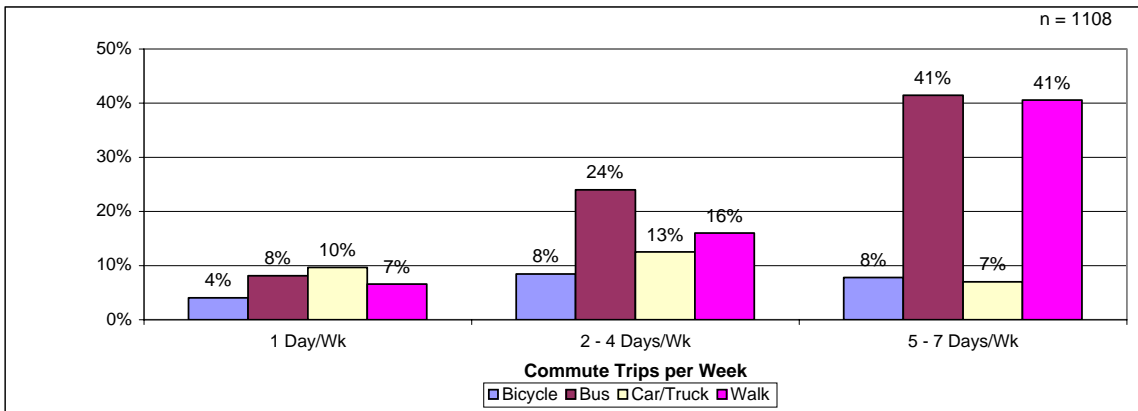
Flexcar asked each new member to complete a survey at the time they were accepted into the program. The survey contained questions about travel behavior and demographics. A sample of surveys from 2000 through 2002 showed the common characteristics of Flexcar members and how they were different from the majority of Seattle residents.

Generally, those joining Flexcar were less likely to have access to a vehicle than most Seattle residents (47% vs. 84%). In their journey to work, the most popular travel mode was transit or walking, rather than driving or carpooling. See Figure 4.5. The income of those joining Flexcar was more likely to be in the middle of the spectrum, with

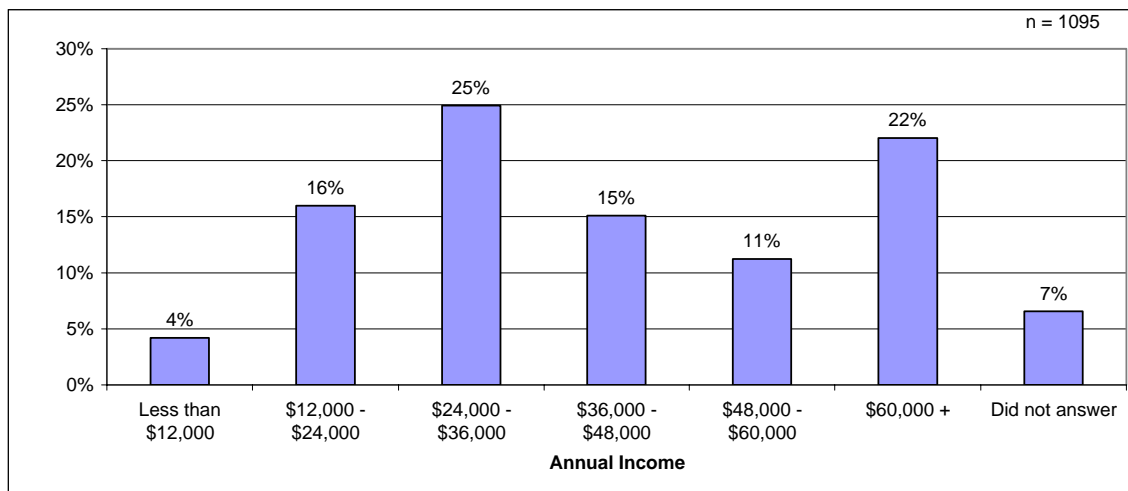
about 20% earning less than \$24,000 per year and 22% earning more than \$60,000 per year. See Figure 4.6.



**Figure 4.4: Vehicles available per household in new Flexcar Seattle members (2000-2002)**



**Figure 4.5: Commute method by new Flexcar Seattle members (2000-2002). Over 20% never commuted by car.**



**Figure 4.6: Annual Income of new Flexcar Seattle members (2000-2002)**

The new member survey also collected a variety of demographic and travel data. The following list highlights some of the main trends:

- Approximately 60% of those joining Flexcar drove less than 4,000 miles per year, and about 90% drove less than 12,000 miles per year.
- An automobile was used for shopping and other discretionary trips at least one day per week by 40% of new members. About 17% said they never used an automobile for shopping and 18% said they sometimes do.
- The largest age group was 25-34 years old (41%), followed by 35-44 (21%)
- Over 90% of new members had attended college, and nearly 75% had a bachelor degree or higher. In the 2000 Census, about 47% of people 25 or older in Seattle had a bachelor degree or higher.

In summary, people joining Flexcar tended to use transit and other alternative transportation more than the average Seattle resident. They were young and well-educated and earned professional-level wages.

### **Phone Survey**

After understanding how members behaved before joining Flexcar, the next step was to determine whether behavior changed after joining. To do this, King County Metro conducted telephone surveys in 2001 and 2003. (See Appendix B for questions and answers.)

The population for the 2001 survey included all current Flexcar members. The sample size was 221, which was about 10% of the total membership at the time. For 2003, the criteria for being selected for the survey were as follows:

- Member must have joined Flexcar prior to 2001 (903 members)
- Account must have been open and available to rent as of April 2003, the month prior to the survey (576 members)
- Member must have used Flexcar at least once between January 2002 and March 2003 (255 members)

The purpose of the screening was to allow comparison between the results of the 2001 and 2003 surveys by selecting from a similar population. Of the population of 255, a total of 48 members participated in the survey in 2003.

The telephone surveys had five themes: Flexcar use, commute method, auto ownership, transit use, and household characteristics. The responses to many of the phone questions confirm the results of the new member survey: Flexcar members had a low rate of automobile ownership and used transit often. The important question was whether their travel behavior had changed since joining Flexcar. The results were compiled by automobile use, transit use and trip replacement.

#### Automobile Use

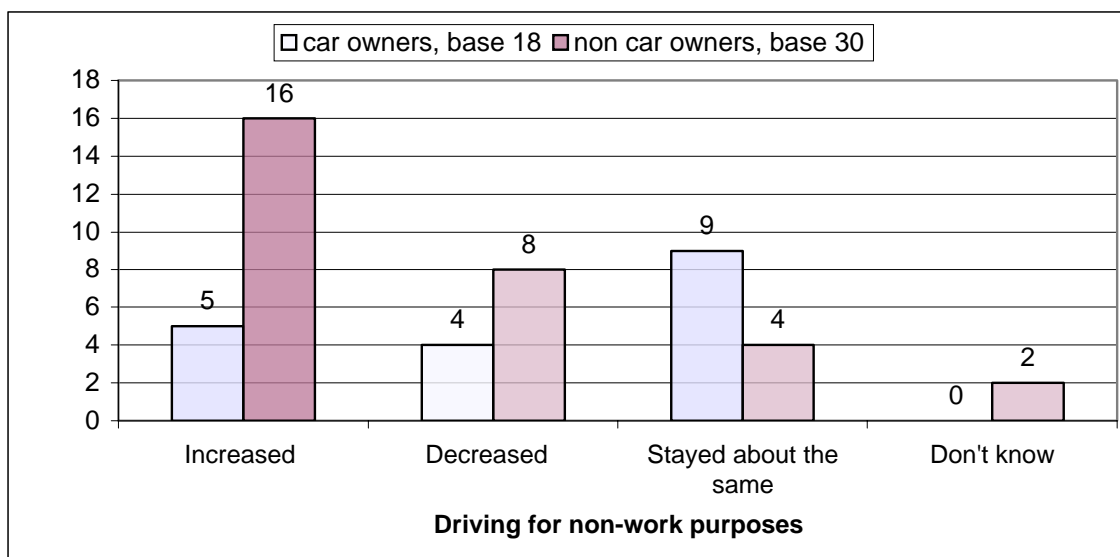
Respondents were asked to estimate whether their automobile use had increased since joining Flexcar. They were asked about their driving for non-work purposes and their overall automobile use (including being a passenger). The results are shown in Figure 4.7 and Figure 4.8, stratified by car owners and non-car owners.

Flexcar members who did not own a car tended to increase their driving, although about a quarter of non-car owners said that their driving had gone down. Of members with cars, about half said that their amount of driving was about the same since joining Flexcar. See Figure 4.7.

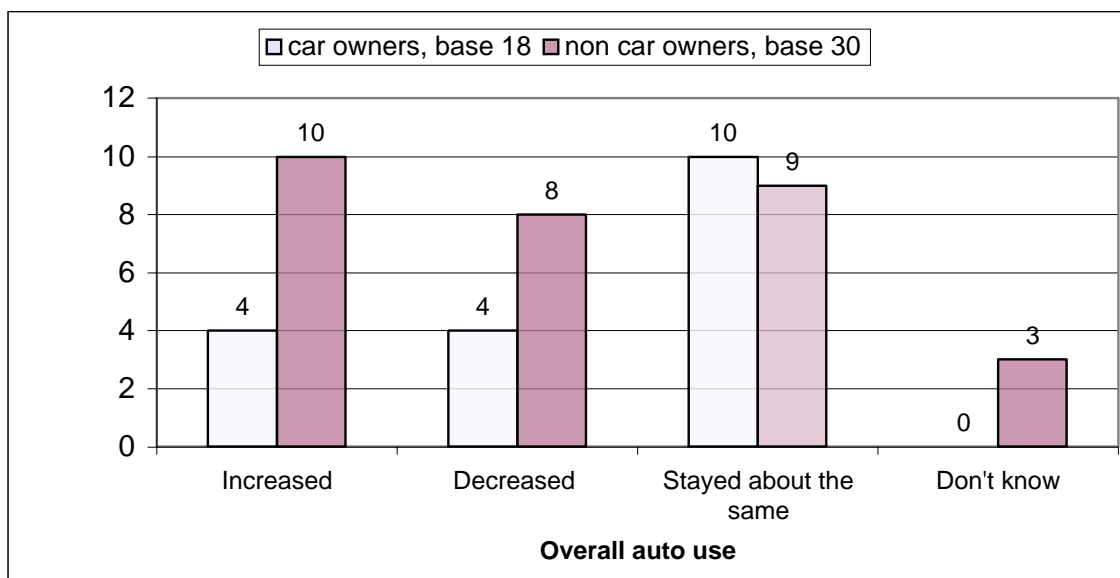
Results were not as conclusive when respondents were asked about overall automobile use. (Please note that Flexcar's pricing discourages using Flexcar vehicles for commuting, due to the hourly charges. Members could use Flexcar from work if a vehicle were located close to the workplace.) Again, car owners did not change their behavior much. For respondents without cars, about one-third said their auto use had

increased, about one third said it had decreased, and about one third reported no change. See Figure 4.8.

Auto ownership did not change significantly. Of the 48 respondents in 2003, ten had sold a vehicle and eight had purchased a new vehicle since joining Flexcar. In 2001 and 2003, about 60% of respondents said Flexcar had helped them to avoid purchasing a vehicle.



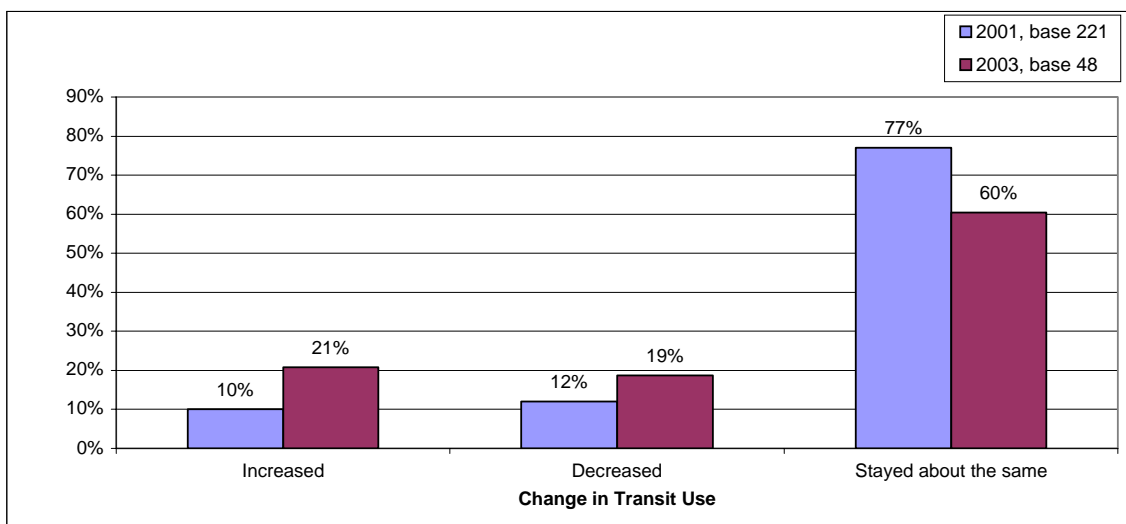
**Figure 4.7 Change in automobile driving since joining Flexcar, from 2003 phone survey.**



**Figure 4.8: Change in overall automobile use since joining Flexcar, from 2003 phone survey.**

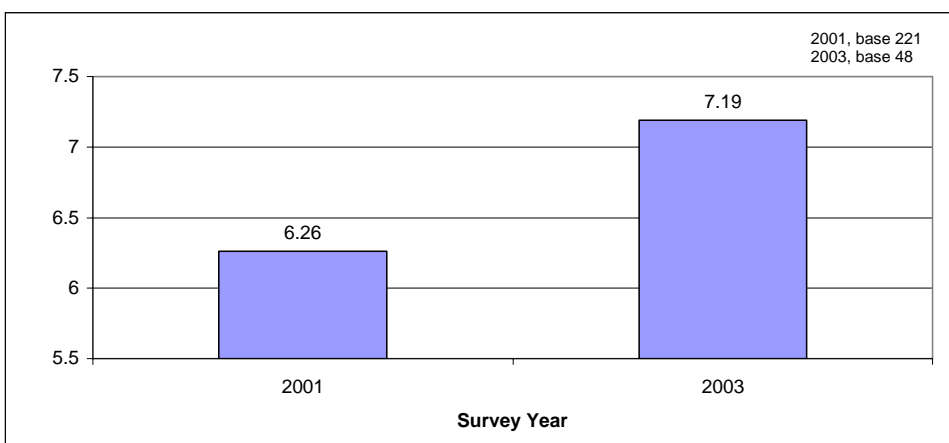
### Transit use

Approximately 60% of respondents had some type of bus pass, and nearly 90% of the passes were paid, at least in part, by schools or employers. Most people did not think that their transit use had changed since joining Flexcar, but a larger portion of respondents reported change in 2003 than in 2001. In 2003, 21% said their transit use had increased, compared with 10% in 2001 and 19% said their transit use had decreased, compared with 12% in 2001. See Figure 4.9.



**Figure 4.9: Changes in transit use, from 2001 & 2003 phone surveys.**

The respondents used the bus about once per day, an average of 6.3 trips in the past 7 days in 2001 and 7.2 trips in 2003. See Figure 4.10. Please note that respondents estimated these values. They did not actually track the number of trips.

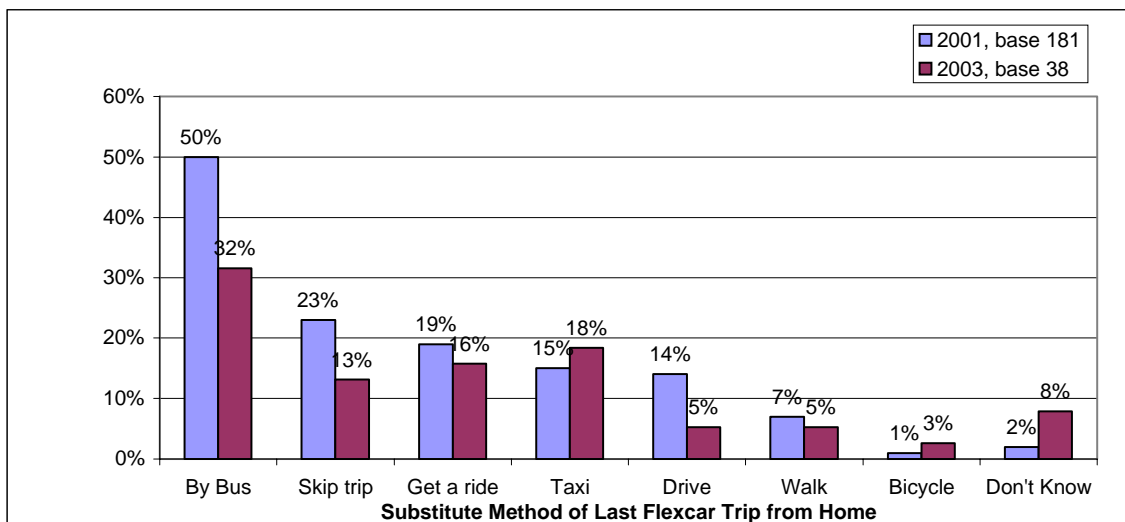


**Figure 4.10: One-way bus rides in past 7 days, from 2001 & 2003 phone surveys.**

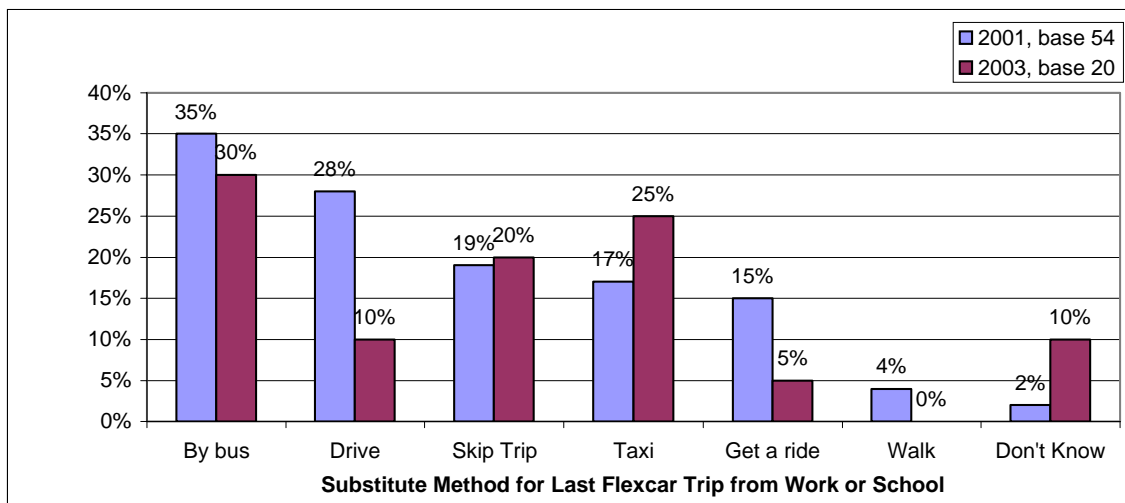


### Trip Replacement

The survey asked Flexcar members how they would have taken their previous Flexcar trip if Flexcar were not an option. Figures 4.11 and 4.12 show the substitute travel mode from home and from work. Flexcar most commonly replaced bus trips, followed by skipping the trip or using another motorized mode, such as using a taxi, driving or getting a ride from someone else. Fewer than 10% said they would have walked or biked if Flexcar was not an option.



**Figure 4.11: Trip replacement from home, from 2001 & 2003 phone surveys.**



**Figure 4.12: Trip replacement from work or school, from 2001 & 2003 phone surveys.**

### Survey Comments

The small sample size (221 in 2001 and 48 in 2003) made it difficult to draw significant conclusions about changes in travel behavior. A team of consulting statisticians from the University of Washington<sup>9</sup> reviewed the survey results, performed sample size calculations and made recommendations for future data collection.

### Paired t-test

The simplest calculation would be a paired t-test, which is commonly used to detect statistically significant differences in means. An example would be the number of bus trips per week before and after joining Flexcar. Before joining Flexcar, a sample of members would be asked to estimate the number of bus trips taken during the past week. At a later time, the same members would be asked the same question again. The t-test would be used to detect whether the difference in mean trips per week was statistically significant.

### Other tests

The alternatives to the paired t-test are more complex. For example, in the 2003 survey, members were asked whether their transit use had increased, decreased or stayed about the same. The 2003 survey results are shown in Table 4.1.

The consultants suggested using a Pearson Chi-square test or a Conditional Sign test to determine whether car owners had increased or decreased their transit use. Using the 2003 data as a guide, they calculated a “car owner” sample size of 200 to achieve statistically significant results (confidence level 0.05 and power of 80). This means Flexcar would need to conduct a much larger survey to answer questions about changes in travel behavior.

**Table 4.1: Sample data for statistical tests**

	No Change	Increase	Decrease
Car Owner	12	4	2
Non-car Owner	17	6	7

### **Metro Flexpass/Flexcar Promotion**

The telephone survey yielded interesting information about Flexcar members, but it did not provide conclusive evidence that Flexcar has brought about changes in its

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<sup>9</sup> The team consisted of Statistics Research Professor Judy Zeh and two students: Vaishali Kukreja and Ying Huang.

members' travel behavior. To test whether Flexcar members would increase use of the bus and Flexcar, King County Metro conducted an experiment in 2003.

King County offered a 3-month PugetPass (a regional transit pass) for \$50 (regularly \$216) for members who upgraded their Flexcar membership by one level and paid in advance. For example, a member in the Advantage 5 plan (5 hours of Flexcar use per month) would upgrade to the Advantage 10 plan (10 hours per month). Thirty Flexcar members participated in the promotion.

According to a survey at the completion of the promotion, 59% of the participants had previously held a PugetPass, and 88% would purchase a PugetPass in the future. If the results were accurate, the promotion would pay for the reduced cost of passes in less than three months:

$$\begin{aligned} \text{Cost of passes} &= \$216 \times 30 = \$6480 \\ \text{Flexcar member payment} &= \$50 \times 30 = \$1500 \\ \text{King County Net Cost} &= \$6480 - \$1500 = \$4950 \end{aligned}$$

$$\begin{aligned} \text{Number of new PugetPass customers} &= 30 \times (0.88 - 0.59) = 8.7 \\ \text{King County revenue increase} &= \$216 \times 8 = \$1728 \text{ per month} \end{aligned}$$

$$\text{Payback period} = \$4950 / \$1728 \text{ per month} = 2.9 \text{ months}$$

The promotion was a win-win for Flexcar and Metro. Metro attracted new transit pass customers and Flexcar increased revenue by attracting more members to plans with a monthly fee.<sup>10</sup>

### **City CarShare First-Year Evaluation**

Robert Cervero studied how travel behavior changed after joining City CarShare in San Francisco during its first year of operation (Cervero 2003). Members filled out 2-day travel diaries before joining the program, three months after joining and nine months after joining. The test group consisted of 105-143 people who joined City CarShare. The control group was made up of 89-155 people who expressed interest in, but did not actually join, the program.

The results show that, over time, City CarShare made up a larger proportion of the trips made by carsharing members and a larger proportion of their Vehicle Miles Travelled. (Trips increased from 2.2% to 8.1% and VMT increased from 7.0% to 21.6%.)

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<sup>10</sup> Of the 30 Flexcar members, 23 were previously in a plan with no monthly fee.

City CarShare was found to induce automobile travel, that is, members drove more after joining. Cervero explained that this was because most people came from households without a car and that they were replacing trips formerly taken by walking or biking.

The Flexcar/King County telephone survey, discussed above, also showed evidence of trip replacement and travel inducement. According to the surveys, between 30 and 50% said that they would have taken their last Flexcar trip by bus, if Flexcar were not an option. Another 10 to 23% said they would have skipped the trip if Flexcar were not an option.

Cervero's study revealed that most of the San Francisco City CarShare trips occurred during off-peak hours and the destinations were away from the congested downtown. Users were gaining travel time benefits by replacing transit, walking or bike trips with auto trips, and they were willing to pay market prices in exchange.

If the situation was the same in Seattle, then Flexcar was compatible with the goals of reducing congestion and air pollution, when members used transit for peak period travel and used Flexcar only when it was worth the expense (between \$6.00 and \$9.00 per hour). If members reduced their number of household vehicles, or avoided the purchase of an additional vehicle, Flexcar achieved further environmental benefits. The evidence is inconclusive as to whether these changes in travel behavior occurred on a large scale.

### **Summary**

In contrast to City CarShare, Flexcar has not used travel diaries to collect information on how people travel. Instead, the data presented above are based on Flexcar members' perceptions of how they have changed their habits. Unfortunately, this method has not yielded conclusive evidence of changes in Flexcar members' automobile use, automobile ownership or transit use. The general conclusions on travel behavior are as follows:

- Flexcar was used mostly for personal errands, shopping and social occasions, even from work. In the survey, the individual, rather than the employer, paid for the most recent Flexcar trip from work about 90% of the time.
- Flexcar members were frequent transit users, with nearly half commuting to work by bus every day.

- Flexcar members were less likely to own a car than most Seattle residents (47% vs. 84%).

Flexcar members did not overwhelmingly sell their cars or begin riding transit because they joined a carsharing organization. Flexcar offered its members an alternative to a long bus ride or an expensive taxi trip. Members could take advantage of quick and convenient travel when their car was not available, for example, when they were at work. Cervero referred to this as “judicious automobility,” meaning that users paid market prices to gain travel-time savings.

## **Chapter 5: Profitability**

Flexcar was in business to make money. Original marketing plans called for an initial large investment from King County and other government sources, with self-sufficiency and a fleet size of 200 vehicles achieved within 18 months of start-up (Bernard 1998). The plans also counted on commercialization through a large auto rental company. Instead, the company started from scratch and grew at a less aggressive pace. By mid-2003, the fleet size was over 100 vehicles, and Flexcar was still taking utilizing public funding.

### **Rate Structure**

Flexcar earned revenue in a few different ways: application fees, usage fees, charges, annual fees, and government subsidy.

#### Application Fee

The \$25 application fee covered the expense of checking the driving record of applicants. Flexcar offered many opportunities for reduced application fees. For example, University of Washington students and employees received a \$20 discount if they held a U-Pass (a type of transit pass). Another offer waived the application fee for employees of a company that signed a business contract with Flexcar.

#### Usage Fees

Usage fees included hourly rental charges and per-mile rental charges. Flexcar offered monthly packages, called Advantage Plans, in which members purchased a certain number of hours per month for a flat fee. The rates were structured so that the more a member used Flexcar, the less expensive it became per hour. (See Table 5.1.) Flexcar charged a \$2.00 per hour premium on certain vehicles, like trucks, sports cars and vans.

Flexcar did not charge for the hours used between 11 pm and 7 am and offered special rates on certain vehicles. The specials were called Freedom 5 and Freedom 10 vehicles, whereby a member could reserve the vehicle for 24 hours and only pay for 5 or 10 hours. The mileage charge still applied.

**Table 5.1: Flexcar Advantage Plans, effective October 1, 2003**

<b>Plan</b>	<b>Standard</b>	<b>Advantage 5</b>	<b>Advantage 10</b>	<b>Advantage 25</b>
Base (\$/mo)	\$0.00	\$40.00	\$75.00	\$175.00
Base (hr/mo)	0	5	10	25
Base (mi/mo)	0	50	100	250
Excess rate (\$/hr)	\$9.00	\$8.50	\$8.00	\$7.50
Excess rate (\$/mi)	\$0.35	\$0.35	\$0.35	\$0.35
<b>Plan</b>	<b>Advantage 50</b>	<b>Advantage 100</b>	<b>Advantage 200</b>	<b>Advantage 300</b>
Base (\$/mo)	\$325.00	\$625.00	\$1,200.00	\$1,800.00
Base (hr/mo)	50	100	200	300
Base (mi/mo)	500	1000	2000	3000
Excess rate (\$/hr)	\$7.00	\$6.75	\$6.50	\$6.00
Excess rate (\$/mi)	\$0.35	\$0.35	\$0.35	\$0.35

### Charges

Charges were penalties on members who do not follow the rules of the organization (see Flexcar Process Description). For example, a member who returned a vehicle late could be charged a \$20 fee plus the price of the taxi for the next reservation holder. Charges were offset with usage credits that members earned for maintaining vehicles. For example, members earned \$2 in usage credits for fueling a vehicle.

### Annual Fees

Annual fees of \$25 were instituted for members joining after October 1, 2003. Members who joined prior to this date did not pay an annual fee. Businesses signing a one-year contract with Flexcar avoided the annual fee.

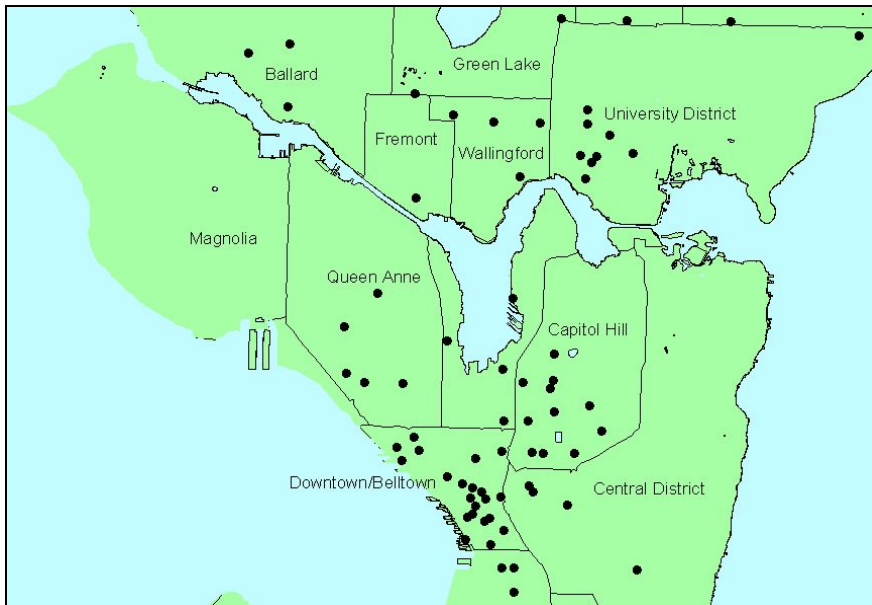
### Government Subsidy

Flexcar received a government subsidy as the result of its contract with King County Metro. For more information, see Chapter 6.

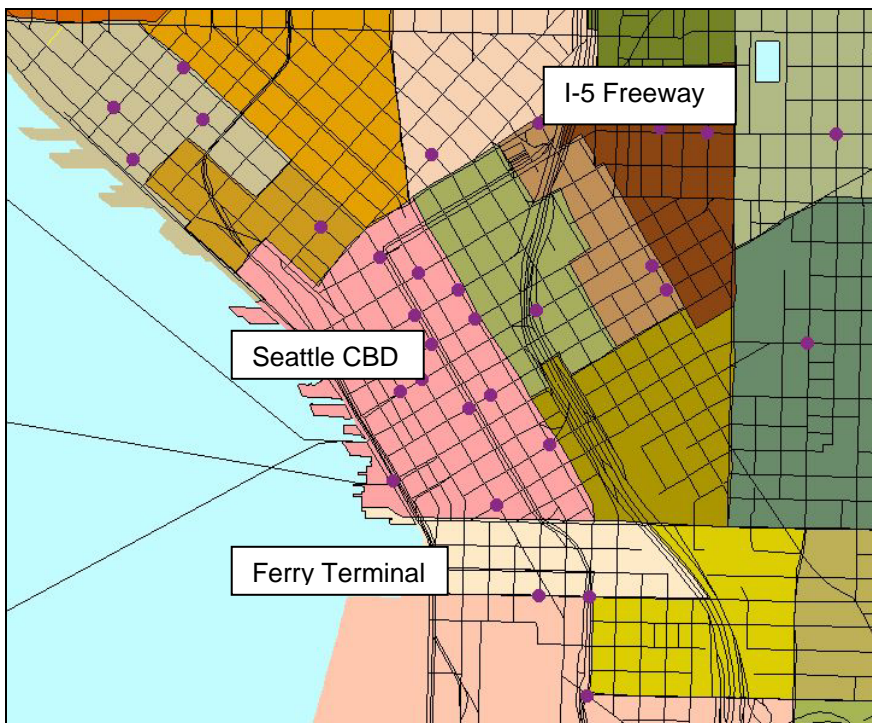
Flexcar has also received private investment, most notably from American Honda (Flexcar 2002). The details of these arrangements have not been made available and the private investment is not shown as revenue, so it will not be discussed further.

### **Business Strategy**

Flexcar has two main markets: individuals and businesses. For individuals, Flexcar placed vehicles where its members lived and shopped. Examples include apartment complexes, grocery stores, college campuses and coffee shops. The “neighborhood vehicles” were typically located in a parking lot, although some cars were kept on the street. Unlike the station car experiments discussed in Chapter 2, it was unusual for several vehicles to be located together.



**Figure 5.1: Flexcar locations in central Seattle neighborhoods.**



**Figure 5.2: Flexcar locations near the Seattle Central Business District (CBD).**

For businesses, Flexcar provided a fleet management service. The vehicles were located at or near employment centers. The highest concentration of vehicles was in the Seattle Central Business District. See Figure 5.2. Flexcar also placed vehicles in



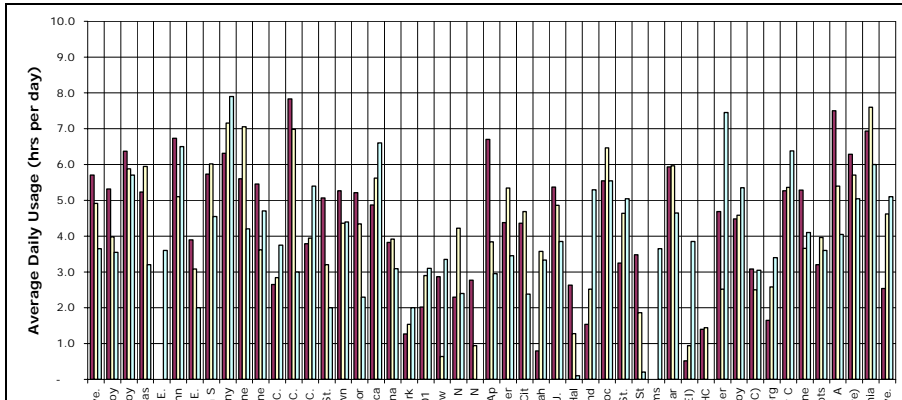
suburban employment centers. Examples include CH2MHill, an engineering consulting firm located in Bellevue, Washington and at a park-and-ride lot near the Microsoft headquarters in Redmond, Washington.

The same rate plans applied to businesses, except the Advantage 25 was the lowest possible level of membership. Businesses were also able to contract for an exclusive or semi-exclusive vehicle. Exclusive vehicles were available seven days per week only to the business client and included unlimited hours. The cost was \$1450 per month, plus \$0.35 per mile over 1500 miles per month. A semi-exclusive vehicle was available only to the business client Monday through Friday from 8 am to 6 pm. Outside of these hours, the vehicle was available to other Flexcar customers. The cost was \$1150 per month, plus \$0.35 per mile over 1500 miles per month.

Flexcar also had several vehicles located at the University of Washington, Seattle campus. These vehicles were a cross between individual and business vehicles. Flexcar contracted directly with various departments within the University, so when a staff member used Flexcar for official business, his or her department was billed. At the same time, the vehicles were available for use by students, faculty and staff (and other Flexcar members).

### **Vehicle Utilization**

Vehicle use was one of the primary measures of success that Flexcar had established for itself. Each month, the corporate office produces a bar chart with the monthly average number of hours per day for each vehicle location. The chart also includes the two previous months. (See example in Figure 5.3.) The charts allow quick comparison between vehicles and show which vehicles are consistently high- or low-usage.

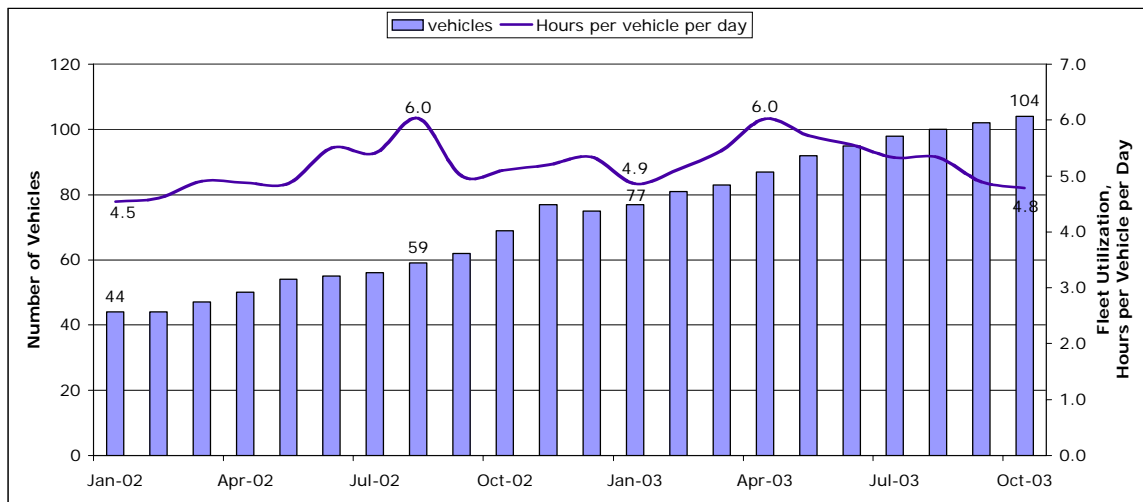


**Figure 5.3: Example of Flexcar's monthly usage metrics.**

The utilization can also be calculated for the fleet by using the following formula:

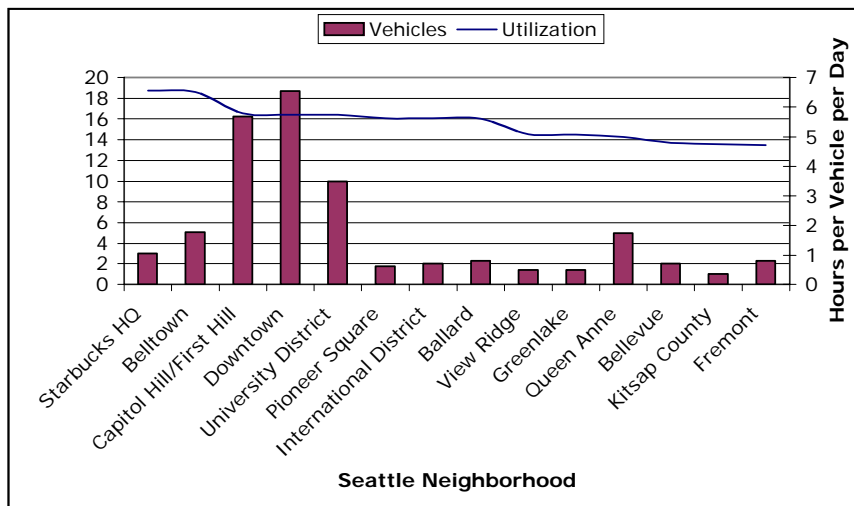
$$\text{Fleet Utilization} = \text{Total vehicle hours in month} / (\text{number of vehicles} \times \text{days in month})$$

Figure 5.4 shows the monthly Flexcar fleet utilization from January 2002 through October 2003. The highest utilization occurred in August 2002 (6.0 hours per vehicle per day for 59 vehicles) and in April 2003 (6.0 hours per vehicle per day for 87 vehicles). The lowest utilization occurred in January 2002 (4.5 hours per vehicle per day for 44 vehicles), January 2003 (4.9 hours per vehicle per day for 77 vehicles) and October 2003 (4.8 hours per vehicle per day for 104 vehicles).

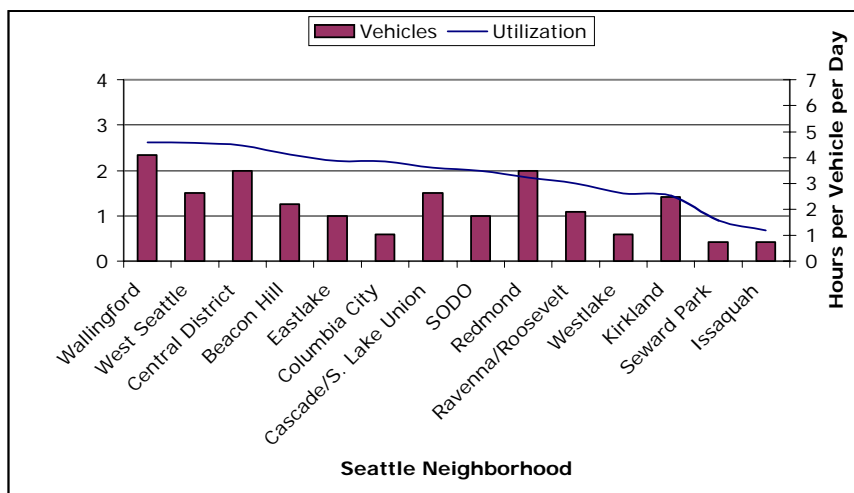


**Figure 5.4: Monthly fleet utilization and number of vehicles January 2002 through October 2003**

Utilization can also be calculated for groups of vehicles. This type of analysis would help Flexcar to identify trends in vehicle use and to determine placement areas under-performing vehicles. For example, Figures 5.5 and 5.6 show vehicle usage by neighborhood.<sup>11</sup> In general, the vehicles located in neighborhoods closest to the downtown core were used more than vehicles located away from downtown.



**Figure 5.5 Vehicle usage by neighborhood, top locations. November 2002 through October 2003**



**Figure 5.6 Vehicle usage by neighborhood, bottom locations. November 2002 through October 2003**

<sup>11</sup> The neighborhood groupings correspond to the location of vehicles on the Flexcar.com web site.

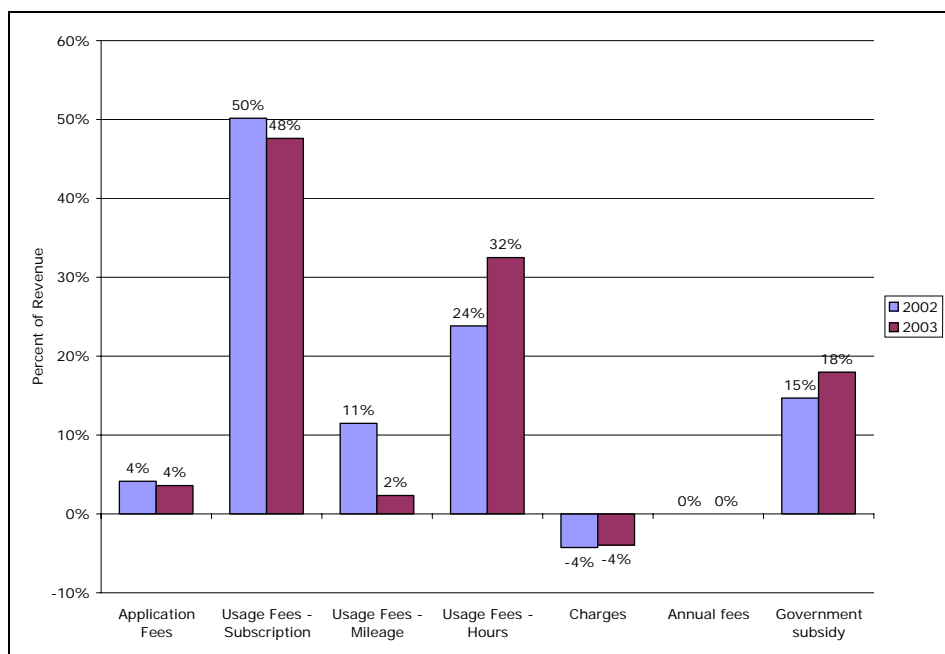
## Financial Data

Flexcar provided revenues and costs figures for the period of January 2002 through September 2003 in the Seattle area. Flexcar Seattle was not profitable over this time period and the single profitable month was July 2002. Revenues (for the first nine months of the year) increased by 67% from 2002 to 2003. The following analysis breaks down the revenues and costs by category.

### Revenue

The revenue categories were application fees, user fees (separated into subscription, mileage and hourly fees), charges, annual fees and government subsidy. The largest source of revenue (about 50%) was the subscription fee paid by members enrolled in an Advantage Plan. The most popular subscription plans were the Advantage 5 and Advantage 10, which respectively comprised 6.5% and 11.6% of the revenue. The Advantage 25 plan contributed another 11.2% of revenue.

The second-highest revenue source (about 30%) came from hourly fees. The Standard Plan and the U-Pass program, which charge only for the time and mileage used with no monthly fee, were the largest contributors to this category (9.6% and 6.8% of revenue, respectively).



**Figure 5.7: Flexcar Seattle revenues January 2002 – September 2003.**

Government subsidies made up 15 to 18 percent of revenue. More will be discussed in the next chapter about sources of public funding for Flexcar.

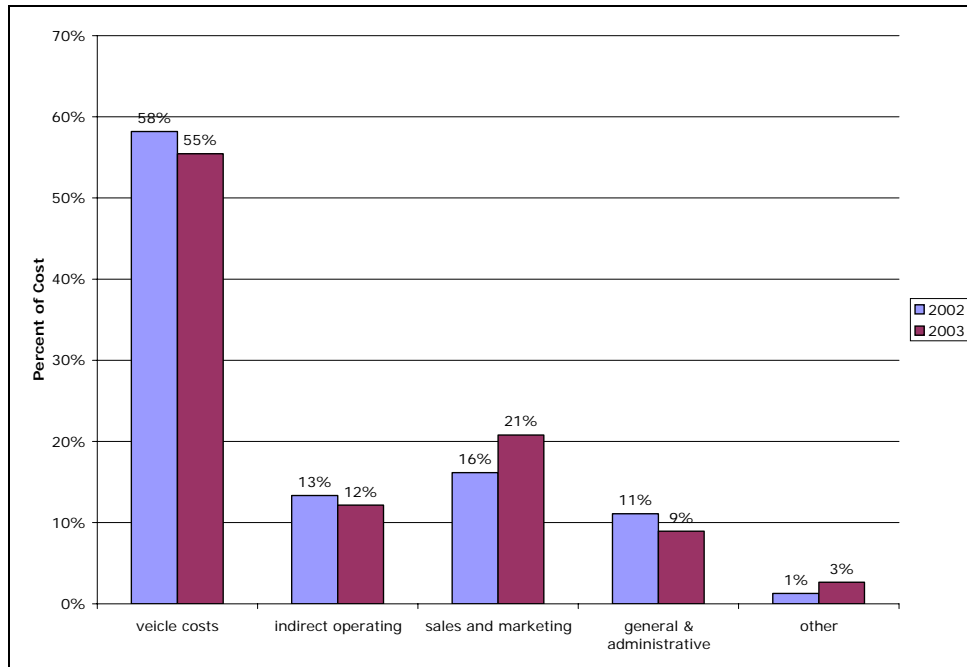
Mileage fees were the fourth-largest revenue category and decreased from 11% of revenues in 2002 to 2% of revenue in 2003. This can be attributed to a 93% decline in revenue from Standard Plan mileage.

Application fees were about four percent of revenue in both 2002 and 2003. Annual fees went into effect October 1, 2003. The application fee covers the annual fee for the first year, so revenue from this should be expected until October 2004.

Finally, Flexcar lost four percent of revenue on customer credits and penalties. This indicates that Flexcar was giving out more in credits (such as washing cars) than in penalties (such as late fees). It should be noted that penalties were cash for Flexcar while the credits went toward Flexcar usage.

### Costs

Flexcar categorized its costs into vehicle costs, indirect operating, sales and marketing, general and administrative, and other (See Figure 5.7)



**Figure 5.8: Flexcar Seattle costs January 2002 – September 2003.**

Vehicle costs represented over half of Flexcar's costs. This included financing the vehicles, insurance, fuel, parking, maintenance and repairs. Vehicle financing was

the largest expense at 24% of cost, and insurance was the second largest expense at 14% of cost. Maintenance and repairs made up 5% of cost. Fuel and parking were about 4% each.

Other cost categories represented the supporting activities that made Flexcar function as a business, such as labor, supplies, advertising, communications and taxes. Labor made up about 20% of costs, and the other activities made up about 25% of costs.

The sales and marketing costs increased from 2002 to 2003. This was due to a general increase in marketing efforts, with more advertising and business-to-business sales.

### **Summary**

Flexcar developed a rate system to make its service attractive and placed its vehicles close to where its members live and work. The Seattle fleet utilization from January 2002 through October 2003 varied from a low of 4.5 hours per vehicle per day to a high of 6.0 hours per vehicle per day. During the same time period, the fleet size more than doubled from 44 vehicles to 104 vehicles.

Flexcar had not turned a profit in Seattle as of September 2003. The largest revenue source was monthly subscription fees (about 50%), which included hours and miles. Hourly fees were the second-highest revenue source (24-32%), followed by government subsidies (15-18%). Revenues (for the first nine months of the year) increased by 67% from 2002 to 2003.

Flexcar Seattle's costs consisted of direct and indirect operating expenses. Direct operating costs made up over half of the costs, including vehicle financing, insurance, fuel, parking, maintenance and repairs. Labor expenses made up 20% of costs. Marketing efforts increased from 2002 to 2003.

The cost data showed that Flexcar was capital-intensive, in contrast to labor-intensive bus transit and taxi operations. In terms of revenue, Flexcar Seattle's income was largely from selling time on the vehicles, rather than distance. Also, Flexcar Seattle depended on government funding for start-up and continued to make use of public money to achieve its goals. Finally, the most popular points-of-departure were in the urban core, not the auto-dependent suburban areas.

## Chapter 6: Obtaining Appropriate Government Support

Flexcar has been supported by every level of government: the City of Seattle, King County, the State of Washington and the US Federal Government. King County was Flexcar's main supporter, with whom they are under contractual agreement to provide carsharing services. As noted in the previous chapter, government funding represented 15-18% of Flexcar's annual revenue in 2002 and 2003.

### King County

Flexcar entered into two contracts with King County. The first contract was a two-year agreement signed on September 1, 1999. Some of the reasons listed in the contract to support carsharing were as follows:

- Carsharing would support transit-oriented development and other "smart growth" initiatives
- Carsharing had been shown in studies to reduce auto trips by up to 50% among members<sup>12</sup>
- Carsharing would reduce parking demand in neighborhoods
- Carsharing would help employers meet their Commute Trip Reduction goals
- Public support is necessary to begin a carsharing program

The first contract also specified what Flexcar was supposed to accomplish, such as forming a management team, developing the systems needed for starting the program, testing the system, and implementation. Full implementation was to be reached by December 31, 2000, including a minimum of ten vehicles, a 24-hour reservation system, and a vehicle usage and billing system. Flexcar was to have a plan for adding an Internet reservation system within nine months of signing the contract.

The second contract was a three-year agreement beginning January 15, 2002. The contract repeated the original reasons for supporting carsharing. At this point, the program had been fully implemented, and Flexcar's role was to continue operating the service with input from King County. Other tasks for Flexcar included the following:

- Provide monthly, quarterly and annual reports to King County for the purpose of evaluation

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<sup>12</sup> Examples cited included Portland, Oregon; Vancouver, British Columbia; Victoria, British Columbia; and "various cities in Europe."

- Demonstrate technologically advanced infrastructure
- Provide service to certain types of neighborhoods
- Provide service outside of Seattle
- Provide service at Washington State Ferry terminals
- Demonstrate a station car/van share service
- Acquire hybrid-fuel or alternative fuel vehicles for the carsharing fleet

These requirements, and their outcomes, are discussed below. For its part, King County supported Flexcar in two ways: financially and with in-kind support.

#### Financial Support

The 1999 contract provided \$280,000 for start-up and implementation, and funding was distributed each time Flexcar reached certain milestones. The first phase was program planning (\$70,000), which consisted of creating a management team. The management team would work together with the county to set the goals, objectives and marketing strategy for the program.

Phase II was program development (\$70,000), consisting of accounting practices, a 24-hour reservation system, a customer service program, and a process for collecting new member applications. The customer service program included office procedures, telephone coverage and a training program for Flexcar members.

Phase III was the beta-test implementation (\$35,000). Flexcar needed to develop a handbook for members containing the procedures for using Flexcar, conduct preliminary marketing activities, develop logbooks and a billing system to track usage and charge users, set the pricing, and develop a vehicle-parking plan. Finally, Flexcar was to provide at least four vehicles for the beta test period, which was to be complete by February 1, 2000. After submitting a report on the beta test (Phase IV), Flexcar was to receive \$80,000.

The final phase was full program implementation, to be completed by December 31, 2000. This consisted of providing at least 10 vehicles and establishing procedures for administering the program. Within nine months of signing the contract, Flexcar was to have a plan for an Internet reservation system. Completion of this phase was worth \$25,000.

The 2001 contract funded Flexcar up to \$200,000 per year for the three-year contract period. The requirements of Flexcar are discussed below.



### In-Kind Support

Besides financial support, King County also provided in-kind support, consisting mainly of office space and marketing. King County assigned a full time employee to help with marketing activities and helped develop and print marketing materials. The printed materials were available alongside bus schedules at Metro customer service outlets. King County also provided contacts for people interested in carsharing and businesses affected by the Commute Trip Reduction Law.<sup>13</sup>

King County provided up to 1000 square feet of office space under the 2001 contract. The space included furniture, a conference room, computer equipment and a photocopier.

### King County's Requirements of Flexcar

The requirements for start-up under the 1999 contract were listed in the Financial Support section. The requirements for the 2001 contract consisted of the following tasks:

1. Provide reports to King County for the purpose of evaluation

King County requested very specific information of Flexcar. The main categories were membership, vehicle usage, marketing activities and financial information.

2. Demonstrate technologically advanced infrastructure

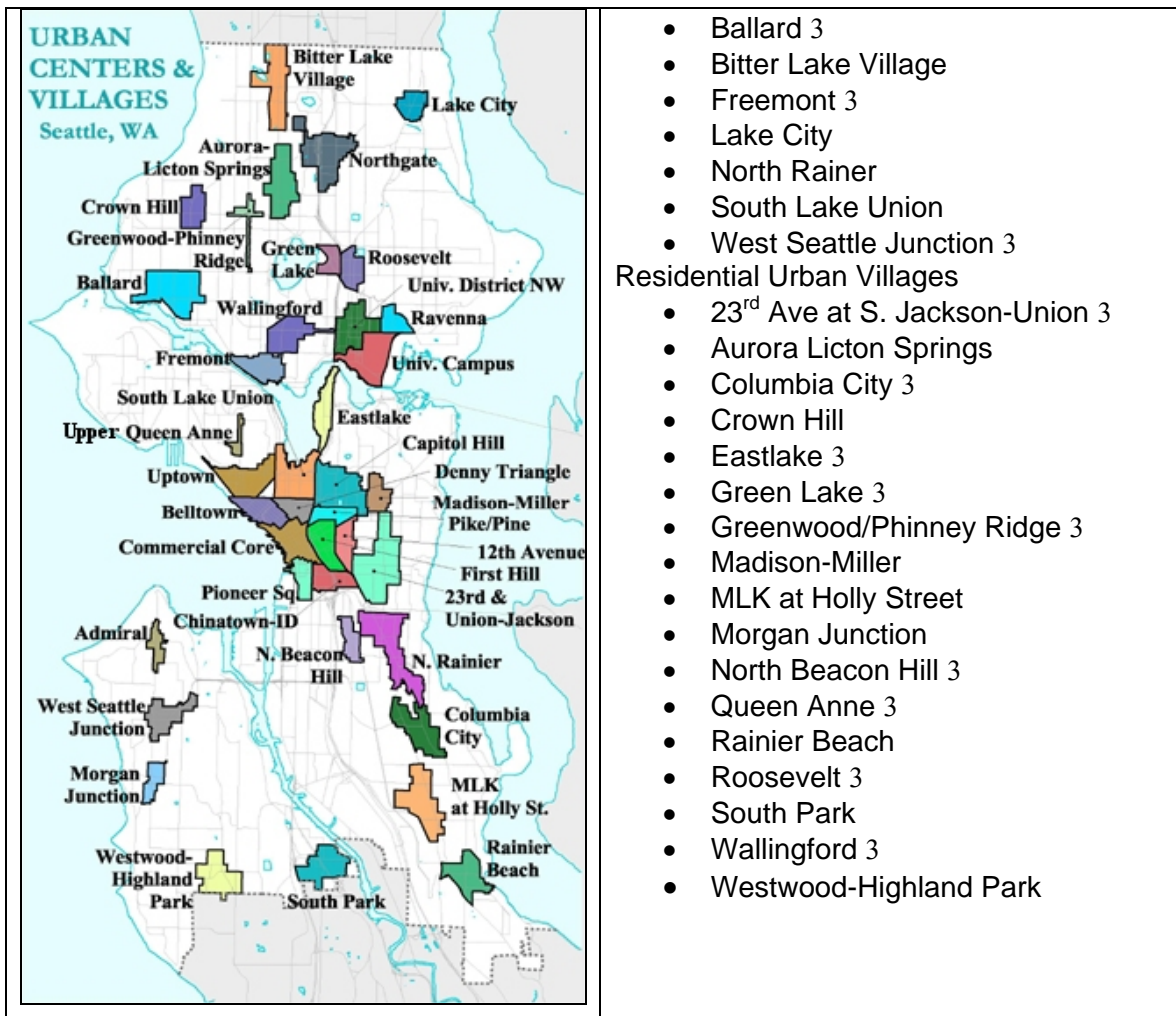
Within one year of signing the contract, Flexcar was to have implemented "secure vehicle access, automated data collection, telephone and Internet access for reservations, and automated back office support systems."

3. Provide service to certain types of neighborhoods

Flexcar was to provide service and recruit members at each of the King County-designated "urban centers", "hub urban villages" and "residential urban villages" (City of Seattle 2001). See Figure 6.1.

	<p>Urban Centers</p> <ul style="list-style-type: none"> <li>• Downtown 3</li> <li>• First Hill/Capitol Hill 3</li> <li>• Northgate</li> <li>• University District 3</li> <li>• Uptown Queen Anne 3</li> </ul> <p>Hub Urban Villages</p>
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<sup>13</sup> The Commute Trip Reduction Law required employers with more than 100 employees starting work between 6 and 9 am to have a plan to reduce their single occupant vehicle traffic.



**Figure 6.1: City of Seattle urban centers, urban hub villages and residential urban villages (Seattle 2001). Check marks (3) indicate areas where Flexcar had placed a vehicle by September 2003.**

4. Provide service outside of Seattle

Flexcar was to provide service and recruit members in the City of Bellevue, the City of Kirkland, and the City of Renton.

5. Provide service at Washington State Ferry terminals

Flexcar was to provide service at passenger ferry terminals

6. Demonstrate a station car/van share service

Flexcar was to coordinate with the County VanShare Demonstration Program to provide a station car program (see Chapter 2) at a minimum of three commuter rail stations or park-and-ride lots for at least two years.

7. Acquire hybrid-fuel or alternative fuel vehicles for the carsharing fleet

Flexcar was to provide a minimum of ten hybrid-fuel vehicles in the carsharing fleet. Alternative-fuel vehicles would also be acceptable with equivalent energy and air emission characteristics.

To help meet these requirements, King County and Flexcar were to meet regularly. King County was given input on major decisions, such as fee increases.

Completion of Requirements

Flexcar met the requirements for implementation under the 1999 contract, and by the end of the first year, the Flexcar fleet consisted of over 20 vehicles. A system had been established for making reservations, collecting fees, maintaining the vehicles and marketing the service.

Flexcar had met many of the requirements of the 2001 contract by October 2003, such as introducing hybrid-fuel vehicles and providing carsharing in some of the required areas (See Figure 6.1). For the advanced technologies, key card entry was introduced in October 2002 and the automated data collection and back office support systems were implemented in May 2003. The telephone reservation system was updated in April 2003 and the Internet reservation system was activated in October 2003.

With more than a year remaining on the contract, expiring in January 2005, the remaining contractual requirements included submitting reports for evaluation, vehicle placement at all of the locations specified by the contract, and implementation of a station car demonstration.

As shown in Figure 6.1, Flexcar did not place vehicles in all the Urban Centers, Hub Urban Villages and Residential Villages. Vehicles were also missing from the City of Renton. King County relaxed some of the placement requirements to allow Flexcar to concentrate on the successful areas near the downtown core.

To meet the requirement of a station car demonstration, Flexcar placed two vehicles at a transit center near the Microsoft headquarters in Redmond, Washington. The vehicles did not, however, function as station cars as described by Bernard (1998)

and Shaheen (2000, 2001), and they were two of the least-used vehicles in the fleet. See Chapter 8 for a description of how to better meet this requirement and possibly increase utilization of these vehicles.

### **City of Seattle**

The City of Seattle's involvement with Flexcar began in 1998, during the planning stage. In supporting Flexcar, the City of Seattle replaced some metered on-street parking with spaces reserved for "carsharing vehicles." Another contribution was including Flexcar in the City of Seattle's "One Less Car Challenge" (City of Seattle 2003). This program encouraged citizens to reduce their private automobile use with the goal of eliminating one million miles of automobile travel. The first level of the program was to stop using one vehicle for one month. Participants reported their odometer readings, then filled out weekly questionnaires to report their reduction in driving. In return, the City supplied information on alternative transportation, \$75 worth of Flexcar use, \$10 off a Bikestation membership and \$5 off a purchase of \$40 or more.

The next level of the One Less Car Challenge was to sell or donate a vehicle and agree not to replace it for one year. Participants had to submit one month of driving information before joining and after six months in the Challenge. In return, participants received \$75 worth of Flexcar use per month for 12 months and a one-year bus pass. According to the City's website, over 80 Seattle households had participated in the One Less Car Challenge as of November 2003.

### **State of Washington**

The State of Washington aided Flexcar by providing input during the initial planning stages (see Chapter 1), analytical support (such as this report), and with vehicle placement at the University of Washington.

According to the Assistant Director of Transportation Services at the University of Washington, the University provided the following aid:

- April 2001 to September 2002: free parking for three vehicles and marketing assistance

- September 2002 through September 2003: free parking for eight vehicles, purchase of \$34,000 in vouchers for distribution to U-Pass<sup>14</sup> holders and marketing time and materials (Dewey 2003).

The University also allowed departments to contract with Flexcar to provide transportation for business use.

### **Environmental Protection Agency**

In 2001, King County received a \$150,000 grant from the EPA through its Clean Air Transportation Communities Grants Program (USEPA 2003). The grant was to cover the additional cost of acquiring Honda Civic Hybrid sedans rather than the standard Honda Civic sedans. The grant also paid for marketing the vehicles and attracting new Flexcar members. Flexcar was able to acquire 20 hybrid vehicles with this grant.

### **Summary**

Flexcar received public funds to accomplish many objectives, from start-up to adding hybrid vehicles to its fleet. As stated in the previous chapter, about 15-18% of Flexcar's revenues came from government sources in 2002 and 2003.

Flexcar met most of its contractual requirements with King County by October 2003. These included implementation of advanced carsharing technology, such as automatic data collection and Internet reservations; providing service to certain locations; and adding hybrid vehicles to the fleet.

With over one year remaining on the contract (expiring January 2005), the remaining contractual requirements included submitting reports for evaluation, vehicle placement at all of the locations specified by the contract, and implementation of a station car demonstration.

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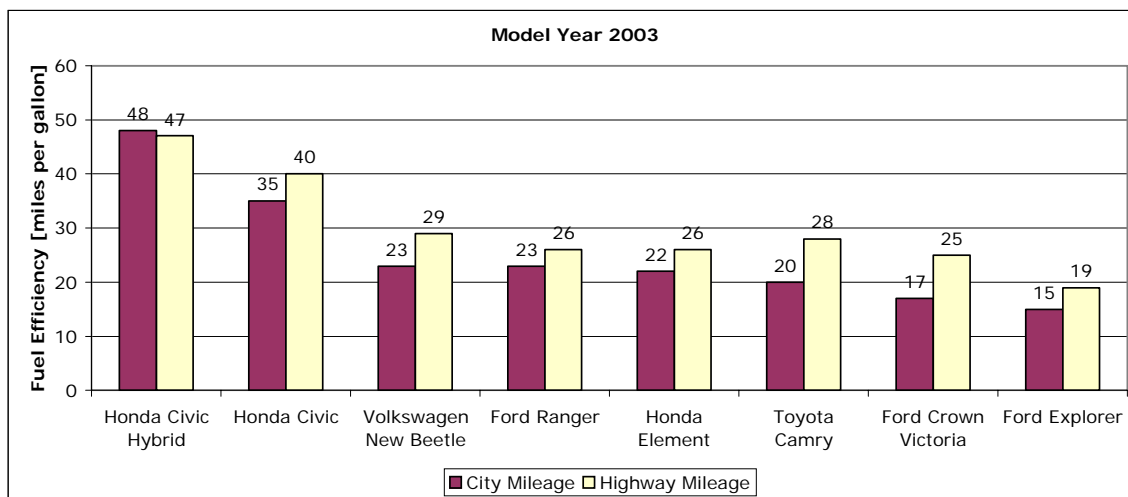
<sup>14</sup> U-Pass is transportation package, including transit use for University of Washington students and employees. See <http://www.washington.edu/upass> for more information.

## Chapter 7: Environmental Impact

Flexcar could reduce the environmental impact of transportation in two ways: by reducing the number of automobile trips and by replacing normal automobile trips with less-polluting automobile trips. Flexcar did not significantly reduce the number of automobile trips among its Seattle members, as noted in Chapter 4. Therefore, this chapter focuses on the environmental aspects of Flexcar vehicles.

### Air Emissions

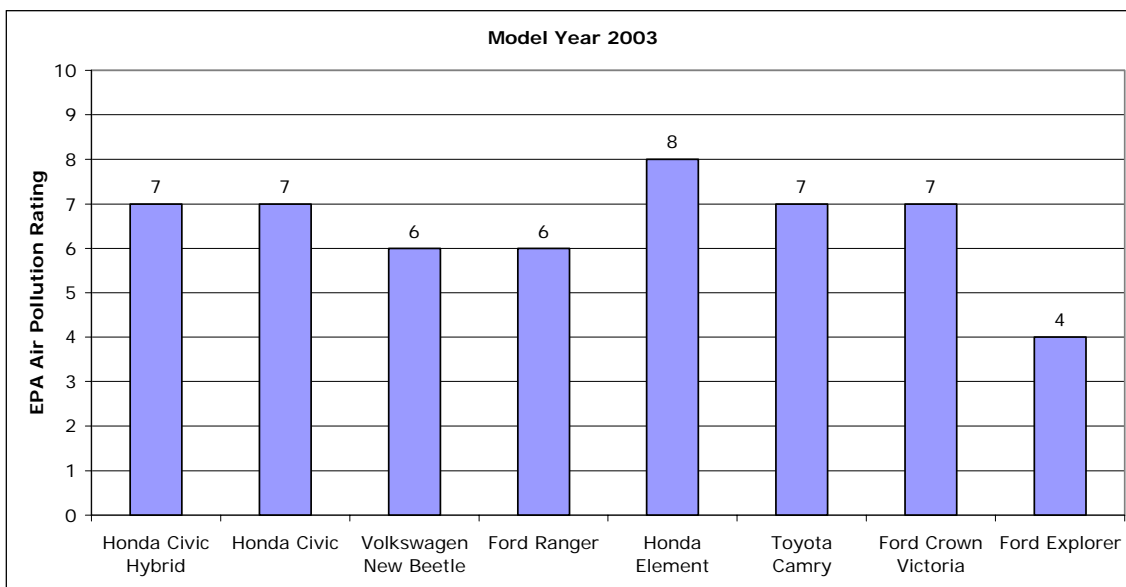
The EPA Green Vehicle Guide rates the environmental impact of automobiles in terms of fuel efficiency and air pollution (USEPA 2003). According to the web site, carbon dioxide emissions are directly related to fuel efficiency, i.e. the more fuel consumed, the more carbon dioxide is produced. Carbon dioxide is the main “greenhouse gas” causing global warming. Each gallon of gasoline burned produces about 20 pounds of carbon dioxide (USEPA 2003). Figure 7.1 compares the fuel efficiency for common vehicles (model year 2003) in miles per gallon as listed on the EPA web site.



**Figure 7.1: In-city and highway fuel efficiency for common vehicles, model year 2003.**

The air pollution rating is a 10-point scale corresponding to the amount of smog-forming pollutants a vehicle produces. Smog-forming pollutants, such as sulfur dioxide and nitrogen dioxide, have more localized, human health impacts than carbon dioxide. The emissions ratings correspond to the pounds of smog-forming pollutants per mile are not related to fuel efficiency. Rather, they are dependant on how “cleanly” the vehicle

burns its fuel. Vehicles scoring a 10 are the cleanest. Figure 7.2 compares the air pollution rating for common vehicles, model year 2003.



**Figure 7.2: EPA air pollution ratings on 10-point scale (10 = cleanest) for common vehicles, model year 2003.**

The EPA estimated the average fuel efficiency of US vehicles as 22 miles per gallon, or 0.91 pounds of CO<sub>2</sub> per mile (USEPA 2001). The Civic Hybrid, at 48 miles per gallon, or 0.42 pounds of CO<sub>2</sub> per mile, is 118% more fuel-efficient and emits 54% less CO<sub>2</sub> than the average vehicle. Table 7.1 compares other vehicles with the average.

**Table 7.1: Comparison of vehicles by fuel efficiency and CO<sub>2</sub> production.**

	mpg	mpg improvement	lbs CO <sub>2</sub> per mi	CO <sub>2</sub> reduction
Average	22	0%	0.91	0%
Hybrid	48	118%	0.42	-54%
Civic	35	59%	0.57	-37%
Explorer	15	-32%	1.33	47%

In comparing air pollution ratings, it should be noted that the rating is a single number meant to represent several chemicals emitted by the burning of gasoline. In general, Figure 7.2 shows that small passenger cars burn fuel more cleanly than sport utility vehicles.

### **Flexcar Fleet**

As of October 2003, the Flexcar fleet consisted mainly of Honda Civic sedans and included as many as 20 Civic Hybrid vehicles. The fleet also contained Ford Ranger

trucks, Honda Element SUVs, Honda Odyssey vans, and two sports cars. The fleet fuel efficiency varied as the composition changed. The following examples show how hybrid vehicles and trucks affect the fleet's fuel efficiency.

#### Assumptions

- Fleet size = 100 vehicles
- Hybrid fuel efficiency = 50 mpg
- Sedan fuel efficiency = 35 mpg
- Truck/van/suv/sport car fuel efficiency = 20 mpg
- Vehicle types are used in the same proportions

#### Fleet 1: 90% sedan, 10% truck

Fuel efficiency =  $(35 \times 0.9) + (20 \times 0.1) = 33.5$  mpg

- Trucks reduce fleet fuel efficiency

#### Fleet 2: 10% hybrid, 80% sedan, 10% truck

Fuel efficiency =  $(50 \times 0.1) + (35 \times 0.8) + (20 \times 0.1) = 35$  mpg

- Hybrid vehicles offset truck fuel consumption

#### Fleet 3: 20% hybrid, 70% sedan, 10% truck

Fuel efficiency =  $(50 \times 0.2) + (35 \times 0.7) + (20 \times 0.1) = 36.5$  mpg

- Hybrid vehicles increase fleet fuel efficiency

Overall, Flexcar's fleet of vehicles maintained an average fuel efficiency much higher than the US average. It was also higher than the current Corporate Average Fuel Efficiency (CAFE) standards<sup>15</sup> for US automakers.

### **Flexcar's Actions and Other Impacts**

Air emissions from automobile use was Flexcar's largest environmental impact. Flexcar committed in September 2003 to offsetting its carbon dioxide emissions by planting trees. According to a September 22, 2003 Flexcar press release:

Flexcar will ensure that enough trees are planted every year in areas where the company operates to completely negate the effect of greenhouse gasses attributed to automobile exhaust from the company's fleet of shared vehicles.

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<sup>15</sup> The 2003 standard for passenger cars was 27.5 mpg, and the light truck standard was 20.7 mpg (US DOT 2003).



To accomplish this, Flexcar partnered with American Forests, a nonprofit organization. The initiative did not address the smog-forming pollutants that affect the local environment.

Flexcar's other environmental impacts included paper use for invoices and promotional material, energy use from Flexcar's facilities and computer equipment, and land use needed for parking the vehicles.

### **Summary**

Flexcar's main environmental impact was air emissions. The fleet of vehicles was approximately 50% more fuel efficient than the US average of 22 miles per gallon. Thus, Flexcar made a positive impact on the environment when replacing trips that would have been made by private automobiles.

Furthermore, Flexcar partnered with a non-profit organization to plant enough trees to offset its greenhouse gas emissions. The initiative did not address the smog-producing pollutants that Flexcar vehicles emit, although passenger cars produce less smog than trucks and SUVs. Flexcar's other environmental impacts include paper use, non-transportation energy use and land use for parking.

Flexcar could produce much larger environmental benefits by reducing the number of automobile trips in the Seattle area. In 2003, the program was still new and growing, and its impact on travel behavior was not completely understood. By participating in programs targeted at the reduction in automobile trips, such as U-Pass at the University of Washington, Flexcar supported regional environmental goals.

## **Chapter 8: Effectiveness Compared to Similar Programs**

In 2003, Flexcar was the largest carsharing organization in the United States, and Flexcar Seattle was its largest branch of the company. In growing the business, Flexcar learned from past carsharing experiments and had to keep up with its competition. The competition included other carsharing organizations, private automobiles and taxis.

### **Past Carsharing Experiments**

As discussed in the literature review, there were several North American carsharing experiments conducted in the late 1990s. Most of the examples (The San Francisco Bay Area Station Car Demonstration, CarLink I and CarLink II) were station car experiments. Because they linked use of clean vehicles directly to transit use, they were able to attract participants to mass transit. Flexcar did not have a direct link to transit because the vehicles were located near members' homes or work sites. The vehicles could be used independently of transit.

#### Station Cars

In 2003, Flexcar placed two vehicles at a park-and-ride lot near the Microsoft headquarters in Redmond, Washington. The vehicles filled the "station car" requirement in its contract with King County (see Chapter 6). However, to function as station cars, the vehicles would need to be used in a scenario similar to the following:

- In the morning, a Microsoft employee living in Seattle would take a bus to the park-and-ride lot in Redmond, then drive the vehicle to work.
- During the workday, the vehicle would be used as a Microsoft pool vehicle.
- After work, the Microsoft employee would drive the vehicle back to the park-and-ride lot and take a bus home to Seattle.
- Another Flexcar member, who works in Seattle and lives in Redmond, would arrive at the park-and-ride lot and take the vehicle home for the evening.

As of October 2003, the "station car" vehicles were some of the least used in the Flexcar fleet. Following the scenario above could increase utilization and provide a direct link between Flexcar and transit.

### CarSharing Portland

In 1998, when planning for Flexcar was beginning, a carsharing organization was operating in Portland, Oregon under the name “CarSharing Portland.” As discussed in the literature review, Richard Katzev conducted an evaluation after the first year of operation for the Oregon Department of Environmental Quality. CarSharing Portland operated similarly to Flexcar by placing vehicles in neighborhoods near the downtown core. Although the program was much smaller (120 members and nine vehicles), the usage statistics were very similar to 2002 Flexcar levels. According to Katzev’s report, members made 2.5 – 3.5 trips per month. Each trip averaged 22.6 miles and 3 - 4.5 hours. Table 8.1 compares Katzev’s results with 2002 Flexcar data.

**Table 8.1: Flexcar compared with CarSharing Portland. The Flexcar data is an average of monthly usage totals for 2002.**

	Monthly Trips per Member Renting	Miles per Trip	Hours per Trip
Katzev 1999	2.5 - 3.5	22.6	3 - 4.5
Flexcar 2002	4.2	17.8	3.5

Flexcar’s trips were shorter than CarSharing Portland, but more frequent. This was probably due to the difference in pricing. CarSharing Portland charged \$1.50 per hour and had a daily price cap of \$55. In 2002, Flexcar charged as much as \$8.00 per hour and had no price cap.

### **Flexcar’s Peers**

In 2003, European carsharing organizations operated under much different conditions, e.g. higher auto tax, lower auto ownership rates, more public transportation, so they could not be considered peers to Flexcar. Between 2000 and 2003, casharing operations began in several cities in the United States and Canada. The largest of these are Zipcar (Boston, New York, and Washington DC), City CarShare (San Francisco), CAN (Vancouver, Canada), and CommAuto (Québec Province, Canada). Flexcar operated in Seattle, Portland, Los Angeles, Washington DC, and the San Francisco Bay Area, and Denver.

Susan Shaheen’s 2003 paper presented to the Transportation Research Board compared 18 carsharing organizations in the United States. At the time, Flexcar, Zipcar and City CarShare served 92% of all US carsharing participants and owned 64% of the

fleet. These companies all used advanced technology like key card entry and automated reservation systems.

The differences between the largest companies were subtle. City CarShare operated as a non-profit organization, while Zipcar and Flexcar were for-profit. Flexcar did not charge a damage deposit, but Zipcar and City CarShare did. (Zipcar did not charge a deposit in Washington, DC where Flexcar also operated.) All the organizations had different rate structures and different types of vehicles. City CarShare used mainly Volkswagens, Flexcar used mainly Hondas and Zipcar used a wide variety of small cars (each individually named).

As discussed in Chapter 2, Cervero's evaluation of City CarShare's first year found demographics similar to Flexcar's. See Table 8.2.

**Table 8.2: Demographic comparison of City CarShare (San Francisco) with Flexcar (Seattle).**

	City CarShare	Flexcar
<b>Age</b>	64% were 30-39 years old	60% were 25-44 years old
<b>Income</b>	50% made \$35,000-50,000 per year	15% made \$36,000-48,000 per year
<b>Transit Pass</b>	65% held a transit pass	60% held a transit pass
<b>Household vehicles</b>	2/3 lived in households without cars	53% lived in households without cars

During 2003, all three companies were able to operate and grow. Washington, DC was the only market where Flexcar was in direct competition with another carsharing organization. The 2004 Transportation Research Board Annual Meeting will feature new evaluations of carsharing in the US, and a better basis for comparison.

### **Other Forms of Transportation**

Flexcar's main competition came not from other carsharing organizations, but from other forms of transportation that existed before Flexcar. Chapter 5 discussed Flexcar's pricing and its business strategy of appealing to individuals and businesses as an alternative to automobile ownership. Chapter 7 discussed the environmental impacts of Flexcar vehicles and other automobiles. Following is a method for comparing different transportation options based on cost, environmental impact, convenience and image. The analysis was based on business users, but the assumptions applied to individuals as well. Alisa Bieber, a University of Washington graduate student in the School of

Aquatic and Fishery Sciences, developed the following comparison methodology with the author.<sup>16</sup>

### Travel Modes

Each option for providing automobile access during the business day had its strengths and weaknesses. The differences were categorized into financial costs, environmental impact, convenience and company image.

#### 1. Employee-owned Cars

Employers could choose to reimburse employees to use their own cars for company business. An employee needing a car drove to work, parked the car (either the company's lot or a commercial lot), used the car for business, possibly returned to work, then returned the car to home. The employee later reported the mileage for the trip and was compensated for the business trip only, not the commute.

Owner compensation was attractive because it required little investment from the company, and the program could be easily administered. One drawback was that the employee had to own a private vehicle and parking had to be available at the worksite. In addition, companies sometimes needed to purchase liability insurance in case an employee caused an accident. Finally, the owner-compensation option did not reduce drive-alone traffic.

#### 2. Taxi

Hiring a taxi was another way to provide mobility without an up-front investment. Taxis required no parking, insurance or maintenance from the company. They were compatible with reducing drive-alone traffic to work. Billing could have been simplified by setting up a business account with the service provider. Taxis, however, might not have provided the desired company image and, as we shall see, they became expensive very quickly.

#### 3. Fleet Vehicles

Owning or leasing a company fleet was a significant investment for a company. Besides paying the cost of the vehicles, employers had to pay for registration, insurance, fuel, maintenance and parking. On the other hand, the convenience and prestige of

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<sup>16</sup> See also Cervero and Tsai (2004) for a similar economic comparison of San Francisco City CarShare with taxi and rental car modes.

having cars on-site might have been worthwhile. Fleet vehicles were also compatible with reducing drive-alone traffic to work.

#### 4. Flexcar

With Flexcar, a company paid a monthly fee that entitled the company to a certain number of miles and hours per month. Beyond that, Flexcar charged a per-mile fee and per-hour fee. The cars could be reserved for the exclusive use of the company at all times, only on weekdays, or the company could choose to share the cars with other carshare members at any time. In 2003, Flexcar Seattle offered a fleet of about 100 vehicles distributed throughout the Seattle metropolitan area. Membership was open to individuals and employers. Insurance, fuel, maintenance and parking were all included in the price. Companies might have purchased additional liability insurance in case an employee caused an accident. Carsharing was compatible with reducing drive-alone traffic to work, and might have conveyed an environmentally responsible image.

#### Method of Comparison

Comparison was based on a series of assumptions developed with the Flexcar sales team. Costs were calculated based on 8, 32, and 60 trips per month. The trip length varied between 10 and 100 miles per trip. The overall assumptions were as follows:

- Personnel costs averaged \$20 an hour, including benefits.
- Driving was primarily in-city
- For 8 trips/month, one fleet car would be needed
- For 32 trips/month, two fleet cars would be needed
- For 60 trips/month, four fleet cars would be needed
- Environmental impacts include air emissions of carbon dioxide and smog-forming pollutants

Specific assumptions for each option are listed below.

The analysis considered only the usage phase of each product. A more thorough environmental analysis, such as a life cycle assessment, would consider the differences between the options based on their complete life cycle: including their materials, manufacturing process, distribution, use and disposal (Schenck 2000).

#### Environmental and Cost Assumptions

The following cost assumptions were developed with the assistance of the Flexcar business-to-business sales team. The costs were estimated for the minimum cost, maximum cost and the expected (mid) cost.

#### 1. Flexcar costs

Most of the costs for using Flexcar were included in the monthly charges and the additional hourly and mileage charges. The amount of usage was determined by the following formula:

- Miles per month = Miles per trip x Trips per month
- Drive time = Miles per month / 35 miles per hour
- Meet time = 2 hours per trip x trips per month (Flexcar-2), or  
Meet time = 4 hours per trip x trips per month (Flexcar-4)
- Hours per month = Drive time + meet time

The monthly charge for Flexcar corresponded to the Business Rate Calculator (available at the Flexcar.com web site). Additional monthly costs included additional liability insurance, the employee time to make a reservation, and parking charges at the destination. See Table 8.3.

**Table 8.3: Additional monthly costs for Flexcar beyond the monthly usage charge.**

<b>Flexcar Costs</b>	Min	Mid	Max
Liability Insurance (\$/month)	0	12	25
Minutes to make reservation	3	6	9
Parking at destination (\$/trip)	0	5	10

#### 2. Leased vehicle

When a company chose to lease and maintain its own fleet of vehicles, it incurred many costs, which could vary with the location and the type of vehicle. Table 8.4 lists the cost assumptions for this option, based on estimates by the Flexcar sales team.

**Table 8.4: Costs for leasing a fleet of vehicles for employee use, based on estimates from Flexcar sales team.**

<b>Leased Fleet Car Costs</b>	Min	Mid	Max
Monthly parking (\$/month/car)	0	150	360
Parking at destination (\$/trip)	0	5	10
Lease (\$/month/car)	200	280	400
Insurance/car (\$/month/car)	70	100	200
Registration/Tax (\$/month/car)	0	20	50
Fuel Price (\$/gallon)	1.75	2	2.25
Fuel Efficiency (mpg)	35	35	35
Miles between service	3000	3000	3000
Maintenance charge (\$/occurrence)	20	30	40
Maintenance administration (hrs/occurrence)	0.5	1.5	3
Minutes to reserve (min/trip)	0	2	5

### 3. Taxi

Taxi rates were set by King County and were standard for all companies. The variances in the amount of time employees spent reserving a taxi and waiting for its arrival changed its cost to the company. See Table 8.5.

**Table 8.5: Standard King County taxi rates and time variables.**

<b>Taxi Costs</b>	Min	Mid	Max
Meter drop (\$/trip)	1.8	1.8	1.8
Price per mile (\$/mi)	1.8	1.8	1.8
Time per reservation (min/trip)	2	3	5
Employee wait time (min/trip)	0	5	10

### 4. Employee reimbursement

In 2003, the IRS allows businesses to deduct employee travel costs from company taxes at a rate of \$0.365 per mile. The analysis assumed that companies reimbursed employees at the same rate when using their private automobiles on company business. In addition, companies may have purchased insurance, and paid for parking costs. See Table 8.6.



**Table 8.6: Company costs for reimbursing employee travel**

<b>Employee Reimbursement Costs</b>	Min	Mid	Max
Mileage reimbursement (\$/mi)	0.365	0.365	0.365
Car Insurance (\$/driver/year)	0	50	100
Liability insurance (\$/month)	0	12	25
Reimbursement administration (min/trip)	5	15	20
Parking at destination (\$/trip)	0	5	10
Parking at office (\$/trip)	0	7	16

#### 5. Environmental impact

Chapter 7 discussed the differences in gas mileage for various vehicles. The vehicles assumed for each scenario are as follows:

- Carsharing: 2003 Honda Civic, 35 mpg, EPA smog rating “7”
- Leased vehicle: 2003 Honda Civic, 35 mpg, EPA smog rating “7”
- Taxi: 2003 Ford Crown Victoria, 17 mpg, EPA smog rating “7”
- Employee vehicles: US average, 22 mpg, EPA smog rating “5”

In addition, employee vehicles had the added environmental burden of the commute to work, assumed to be 20 miles round trip. Taxis also drove more than the length of the trip itself as they travel between drop-off and pick-up points, assumed to be 5 miles per trip.

#### Cost Comparison

Using the assumptions above, the company’s costs were calculated based on several scenarios: 8 trips per month, 32 trips per month and 60 trips per month. Trip length varied between 10-100 miles per trip. Figures 8.1, 8.2 and 8.3 show the results of 32 trips per month using the minimum, medium and maximum cost assumptions. Charts for the other scenarios are included in Appendix D.

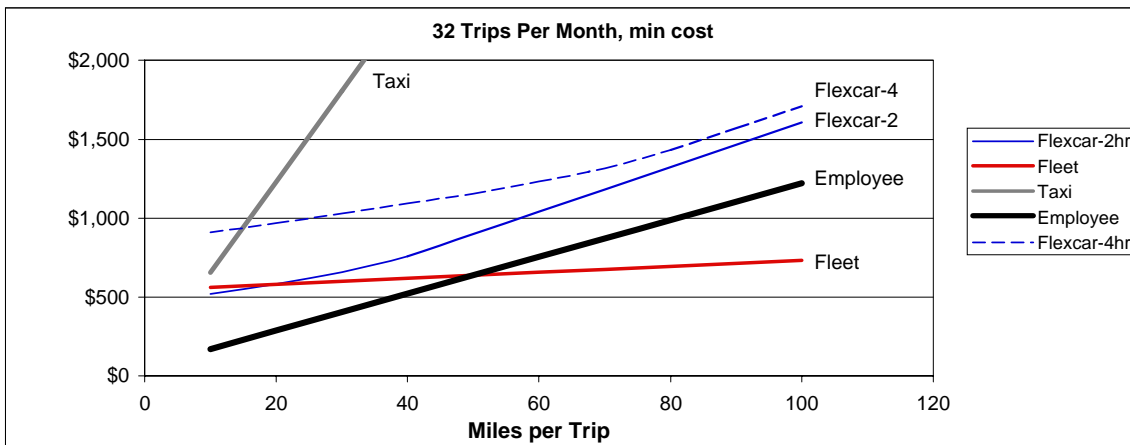


Figure 8.1: Cost comparison, assuming 32 trips per month and minimum costs.

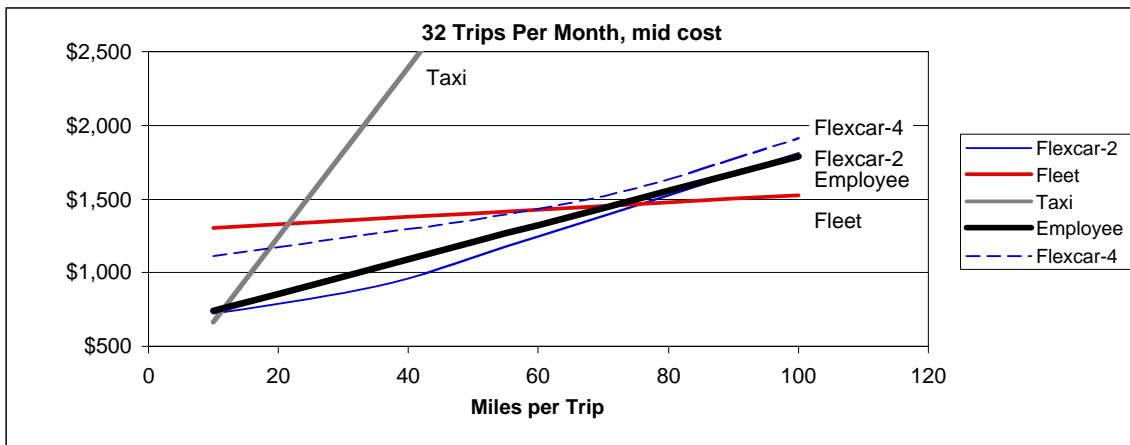


Figure 8.2: Cost comparison, assuming 32 trips per month and medium costs.

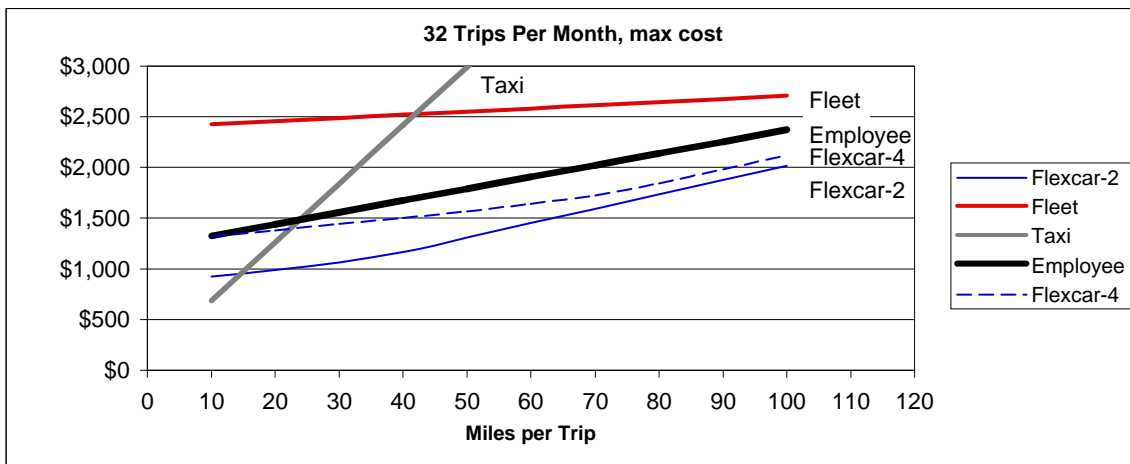


Figure 8.3: Cost comparison, assuming 32 trips per month and maximum costs.

In general, reimbursing employees was the least expensive option when costs were low and average trip length was less than 50 miles. For longer trips, it became cost effective to lease vehicles. In the medium cost scenario, Flexcar was competitive with employee reimbursement when the “meet time” was two hours. When trip length reached 80 miles, leasing company vehicles became more attractive. When costs became high, as in the maximum cost scenario, Flexcar was the least expensive option, for trips 15 miles or longer, even when the “meet time” was extended to four hours.

#### Environment, Convenience and Image

The environmental data presented above showed that Flexcar and the leased vehicles had lower environmental impact than the other options. Employee vehicles had better fuel efficiency than taxis, but this was offset by the commute to work and their high smog emissions.

Convenience and image were subjective. Using employee cars was the most convenient because the individual, rather than the company, maintained them. Company fleet vehicles were available on-site, but required maintenance. Flexcar and taxis required advanced planning, but did not require maintenance. Similar trade-offs existed for the company’s image. A decision matrix was used to balance these factors.

#### Decision Matrix

The decision matrix weighed each of the four factors: cost, environmental considerations, comfort/convenience, and image. It scored each travel option on a scale of 0-5. A score of “5” represented excellence, and “0” represented an undesirable option. (Scores and weights were determined by the author.) Cost represented 80% of the decision, environmental impact was worth 15%, comfort/convenience was worth 10% and image 5%. The score was multiplied by the weight, and the scores were added to produce a final score for each option, ranging from 0-5 (see Table 8.7).

**Table 8.7: Weighted decision matrix comparing company transportation alternatives, highest total score indicates the best option.**

	Weight	Flexcar		Leased Vehicle		Taxi		Employee Vehicle	
		Score	Wt. Score	Score	Wt. Score	Score	Wt. Score	Score	Wt. Score
Cost	80%	4	3.2	3.5	2.8	1	0.8	4.5	3.6
Environmental Impact	15%	5	0.75	5	0.75	3	0.45	1	0.15
Comfort/Convenience	10%	3.5	0.35	3	0.3	3	0.3	4	0.4
Image	5%	4	0.2	5	0.25	2	0.1	3	0.15
Total Score:			<b>4.5</b>		<b>4.1</b>		<b>1.65</b>		<b>4.3</b>

## Results

If the decision were based on only one of these categories, carsharing would not have been the top choice. The decision matrix demonstrated the advantage of carsharing over other transportation options when many factors were considered. It should be up to the individual decision-maker to determine how much importance to place on each of the criteria. Under these weights, carsharing was the best option for employee travel.

## **Summary**

In 2003, Flexcar was more technologically advanced than the carsharing experiments conducted in the late 1990s. Compared with other large carsharing organizations, Flexcar offered comparable services, such as key-card entry and Internet reservations. Flexcar's real competition came from transportation choices that existed before carsharing, such as taxis and privately owned automobiles. For companies and consumers, Flexcar offered a transportation alternative that was superior to automobile ownership or taxis when many factors were considered, including cost and environmental impact.

## **Chapter 9: Findings and Summary**

This report discussed the foundations of Flexcar, beginning with European companies in the 1980s, North American experiments during the 1990s and the implementation of carsharing in Seattle by 2000. It also evaluated Flexcar Seattle on several different aspects of the program, such as technology, influence on travel behavior, business growth, environmental impact and government relations. A summary of the findings, through September 2003, is listed below, followed by recommendations for Flexcar and future research.

### **Building a carsharing community**

- Flexcar created an integrated system that linked its web site, the reservation system, the vehicles and the billing system. Most information was tracked electronically.
- Flexcar's membership increased sevenfold between the end of 2000 and mid-2003. Each month, about 1 in 4 Flexcar members used the service.
- The highest concentrations of vehicles were in Seattle's Central Business District, Capitol Hill (a high-density residential neighborhood) and the University of Washington. These areas accounted for nearly 50% of the vehicles.
- The process for using Flexcar contained several potential defects, such as cars not being returned on time. Tracking the defects and reducing the most frequently occurring problems could help Flexcar improve its service.

### **Changing Travel of Members**

- The research methods used in the evaluation did not yield conclusive evidence of changes in Flexcar members' automobile use, automobile ownership or transit use. More detailed surveys and larger samples sizes are needed to measure behavioral changes.
- Flexcar was used mostly for personal errands, shopping and social occasions, both from home and work.
- Flexcar members were frequent transit users, with nearly half commuting to work by bus every day.
- Flexcar members were less likely to own a car than most Seattle residents (47% vs. 84%).

- Flexcar offered an alternative to a long bus ride or an expensive taxi trip. Members could take advantage of quick and convenient travel when their cars were not available.

### **Profitability**

- The fleet utilization from January 2002 through October 2003 varied from a low of 4.5 hours per vehicle per day to a high of 6 hours per vehicle per day. During the same time period, the fleet size more than doubled from 44 vehicles to 104 vehicles.
- The most highly utilized vehicles were located near the urban core.
- Flexcar Seattle had not turned a profit as of September 2003. The largest revenue source was monthly subscription fees (about 50%). Hourly fees were the second-highest revenue source (24-32%), followed by government subsidies (15-18%).
- Revenues (for the first nine months of the year) increased by 67% from 2002 to 2003.
- Flexcar was a relatively capital-intensive operation. Direct operating costs made up about 55% of Flexcar's costs, including vehicle financing, insurance, fuel, parking, maintenance and repairs. Labor expenses made up about 20% of costs.

### **Obtaining Appropriate Government Support**

- Flexcar received financial and in-kind support from the City of Seattle, King County, the State of Washington and the Environmental Protection Agency.
- Flexcar met most of its contractual requirements with King County by September 2003, including implementation of advanced carsharing technology, such as automatic data collection and Internet reservations; providing service to certain locations; and adding hybrid vehicles to the fleet.
- Over one year remained on Flexcar's contract with King County (expiring January 2005). The remaining contractual requirements included submitting reports for evaluation, vehicle placement at all of the locations specified by the contract, and implementation of a station car demonstration.

## **Environmental Impact**

- Air emissions were Flexcar's main environmental impact. Other environmental impacts included paper use, non-transportation energy use and land use for parking.
- Flexcar had a positive impact on the environment when replacing trips that would have been made by a private automobile. The fleet of vehicles was approximately 50% more fuel efficient than the US average of 22 miles per gallon.

## **Effectiveness Compared to Similar Programs**

- In 2003, Flexcar was more technologically advanced than the carsharing experiments conducted in the late 1990s.
- Compared with other large carsharing organizations, Flexcar offered comparable services, such as key card entry and Internet reservations.
- Flexcar's main competition came from transportation choices that existed before carsharing. Flexcar offered a transportation alternative that was superior to automobile ownership or taxis when many factors were considered, including cost and environmental impact.

## **Recommendations and Future Research**

Flexcar used information technology to replace many of the business functions formerly performed manually. Besides making the business run more smoothly, this data could be used to make improvements to Flexcar's service. Examples include the following:

- Tracking late vehicles  
Each time a vehicle was late, it created problems for Flexcar members and staff. Flexcar should know how often vehicles are late, how often members are being charged, and which vehicles are the most frequently returned late. Other problems that members encounter should be tracked by the on-call staff, and addressed in order of importance.

- Market segmentation

The general demographics of Flexcar members were known. It was unknown how specific demographics affected the likelihood of using a vehicle. Linking survey data to vehicle use could help provide this information.

To help with the data analysis, King County should shift some of its support for Flexcar away from marketing and promotion in general to assisting Flexcar with data-driven decision-making. MITT, the Management Information and Transit Technology Section of King County, provides similar services for King County Transit. Efforts like large-scale travel surveys, activity-based costing, and GIS analysis of vehicle placement could take Flexcar to the next level of organizational effectiveness.

Public subsidies should also be used to support programs that link Flexcar directly to transit use, such as the Flexpass promotion mentioned in Chapter 4, and promoting the reduction of automobile use, as with the One Less Car Challenge and the U-Pass programs mentioned in Chapter 6.

Finally, Flexcar must provide service in the remaining areas specified in its contract with King County. These areas tend to be further from the downtown core and less affluent than the early neighborhoods. By 2010, many of the areas will be connected to the rest of the city through investments in public transportation: the Seattle Monorail, Sound Transit's Link Light Rail, and Bus Rapid Transit on Aurora Avenue. Flexcar has a business opportunity (and a contractual obligation) to meet current transportation needs while new means of transportation are developed.



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## **Appendix A: Flexcar Member Phone Survey**

## **Flexcar Seattle Member Attitude and Usage Survey**

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### **Abstract**

Flexcar, a for-profit carsharing organization, was launched in Seattle in 2000 in partnership with King County Metro, the local transit agency. Flexcar conducted telephone surveys in 2001 and 2003 to examine how Flexcar members in Seattle had used the service and how their transportation choices had changed. Flexcar has an important link with transit because most respondents reported not owning a vehicle and using the bus for their commute to work. The majority did not perceive a change in their transit use after joining Flexcar. The results do not show whether Flexcar members had increased or decreased automobile use or ownership since joining. Less than 10% of respondents said

that they would have walked or used a bicycle as a replacement for their most recent Flexcar trip.

## **INTRODUCTION**

The Flexcar program was launched in January 2000 as a public-private partnership between the City of Seattle, King County Metro (the Seattle area transit provider), and Mobility, Inc. Flexcar provides a short-term automobile rental service, known as carsharing. Flexcar members contact a centralized reservation system through the phone or Internet, select from vehicles dispersed throughout the metropolitan area, and reserve time on the vehicle of their choice. At the selected time, the member goes to the vehicle, swipes a key card, enters a PIN, drives the vehicle, and then returns it to the original location before the reservation ends. Flexcar bills the user for the time and mileage at a rate that accounts for fuel, insurance, maintenance and vehicle purchase price.

When carsharing was introduced, its proponents envisioned that the new technology could address a variety of urban problems: lowering the land use impact of automobiles by reducing parking, reducing congestion through increased use of transit, improving air quality through cleaner vehicles, and providing a more equitable transportation system by increasing access to automobiles for non-owners. All of these outcomes would be a result of changing the travel behavior of carsharing members, specifically through a reduction in automobile ownership and use and increased transit use.

Previous carsharing experiments in the US have studied the change in peoples' travel behavior before and after joining a carsharing program. The San Francisco Bay Area Station Car Demonstration found that transit passenger miles traveled by participants increased by 56% during the demonstration [1]. The CarLink I experiment found, in a sample of 12 participants, that vehicle miles traveled decreased by an average of 18.5 miles per day per person [2].

Research has also been conducted on non-experimental carsharing organizations. City CarShare found, using a sample size of at least 89, that carsharing became a larger portion of the trips taken by members. Because so many members came from households without access to a car, travel by automobile also increased [3].

The results of previous research used travel diaries to document how participants traveled before and after joining a carsharing program and surveys to collect demographic information, such as auto ownership. Flexcar has not used travel diaries in its research, but it has conducted periodic member surveys. This paper presents findings from two surveys, including Flexcar members' perceptions of how their travel behavior has changed.

## **SURVEY PURPOSE**

The purpose of the survey was to gauge the attitudes and changes in behavior of Seattle Flexcar members who had been in the program for at least three years. The survey had 5 themes: Flexcar use, commute method, auto ownership, transit use, and household characteristics.

## **SELECTING CANDIDATES FOR THE SURVEY**

The criteria for being selected for the survey were as follows:

- Member must have joined Flexcar prior to 2001 (903 members)
- Account must have been open and able to rent as of April 2003 (576 members)
- Member must have used Flexcar at least once between January 2002 and March 2003 (255 members)

The purpose of the screening was to allow comparison between the results of this survey and a similar survey conducted in September 2001.

### **Sample Size**

The first two criteria limited the list to fewer than 600 candidates. The third criterion, after Flexcar employees were removed, reduced the list to 255 candidates. The members on the list were randomly ordered, and the first 150 people were mailed a postcard. Each of the 150 postcard recipients were contacted a minimum of 3 times by phone. The overall response rate was 32%, for a total of 48 responses.

### **Geographic Distribution**

Figure 1 and Figure 2 show the distribution of the 255 candidates and 48 respondents by neighborhood. The neighborhoods with the most number of candidates and respondents were Capitol Hill, Seattle Central Business District, Central District and Queen Anne. See Table 1 for a complete list.

The location of respondents was highly correlated with location of candidates. This means that the 48 members who responded to the survey lived in the same neighborhoods, and in similar proportions, as the 255 candidates for the survey. Candidates and respondents also used Flexcar about the same amount, with candidates averaging 2 rentals per month for a total of 8 hours, and respondents averaging 2 rentals per month for a total of 9 hours.

It is reasonable to assume that the respondent sample of 48 members is a good representation of the 255 survey candidates. However, the results should not be applied to the entire population of current, or former, Flexcar members.

## **SURVEY FORMAT AND QUESTIONS**

The survey was conducted over the phone, between the hours of 9 am and 7 pm. The first interview occurred May 1, 2003 and the final survey was completed May 22, 2003. Members were asked about 60 questions during the interview, which lasted 10-15 minutes. Contact the authors for a copy of the survey questions.

## **RESULTS**

The following results were compiled and compared with a similar survey conducted in September 2001. The data is broken down by the five themes of the survey: Flexcar use, commute method, auto ownership, transit use, and household characteristics. The 2003 survey also included questions that were not in the 2001 survey. These results are presented last.

When making comparisons between the surveys, please note the large difference in sample size. In 2001, 221 members responded to the questions, while the 2003 sample size was 48.

### **Flexcar use**

Nearly all respondents (94%) had used Flexcar from home, compared with 82% in the 2001 survey. Reasons for trips from home included recreation or social occasions, work or school related business, personal errands or shopping, medical appointments, and other. The most common type of trip was for errands or shopping (51%), followed by recreation (30%).

Most respondents (85%) indicated that they worked or attended school outside the home. About half (54%) of this group from the 2003 survey had used Flexcar from work or school, compared with 36% in 2001. This was usually a different vehicle than the one accessed from home. Again, reasons for trips from work or school included recreation or social occasions, work or school related business, personal errands or shopping, medical appointments and other. No activity stood out as the most popular, but in 2003, only 19% said that work or school related trips were the most frequent uses of Flexcar from their work or school location. The individual, rather than the school or employer, paid for the most recent trip from work or school about 90% of the time.

### **Trip Replacement**

The survey asked Flexcar members how they would have taken their previous Flexcar trip if Flexcar was not an option. Figures 3 and 4 show the substitute travel mode from home and from work. Flexcar most commonly replaced bus trips, followed by skipping the trip or using another motorized mode, such as using a taxi, driving or getting a ride from someone else. Fewer than 10% of respondents indicated that Flexcar trips replaced walking or bicycle trips.

### **Commute method**

The majority of respondents used transit to commute to work, 53% in 2001 and 70% in 2003. See Figure 5. Other popular methods included walking and carpooling, and about 8% of the 2003 respondents indicated that they telecommute most of the time. About 20% of the 2003 respondents had changed the way they commuted since joining Flexcar. Half indicated that this was due to Flexcar.

In comparison, the 2000 census data shows that the average transit use for work trips was 27% in the Capitol Hill neighborhood, the most common neighborhood for respondents [4]. In Seattle overall, transit use had a 17.6% share of work trips in the 2000 census [5].

### **Auto ownership**

Of the 2003 respondents, about 38% of households had vehicles. This translates to 0.42 vehicles per respondent, compared with 0.57 in 2001. See Figure 6. The 2000 census data shows that average vehicle ownership in Capitol Hill is 1.0 vehicles per household [4] and 1.4 vehicles per household in Seattle overall [5].



While 21% of 2003 respondents said they had sold a vehicle since joining Flexcar, 17% had purchased a vehicle. Figure 7 shows the reasons for purchasing a new vehicle. Over 60% indicated that participating in Flexcar had helped them to avoid purchasing a vehicle that they otherwise would have purchased.

### **Transit use**

Approximately 60% of the respondents had some type of a bus pass, and nearly 90% of the passes were paid, at least in part, by schools or employers. Figure 8 shows common types of passes. The Puget Pass is a monthly regional transit pass, FlexPass is an employer-provided discount transit pass and U-Pass is a discount transit pass through the University of Washington.

Most people did not think that their transit use had changed since joining Flexcar, but a larger portion of respondents indicated change in 2003 than in 2001. In 2003, 21% said their transit use had increased, compared with 10% in 2001, and 19% said their transit use had decreased, compared with 12% in 2001. See Figure 9.

The survey asked participants to estimate the number of bus trips they took in the past 7 days. The respondents used the bus about once per day, an average of 6.3 trips per week in 2001 and 7.2 trips per week in 2003. The number of bus trips per week before joining Flexcar is unknown.

### **Household characteristics**

Household size averaged 1.5 adults per household and 0.13 children in 2003, compared with 1.6 adults and 0.18 children in 2001. The gender representation of respondents was approximately even between males and females in both surveys.

### **Questions not in the 2001 survey**

To increase depth of understanding about how members' behavior has changed since joining Flexcar, several questions were added to the 2003 survey.

#### *Level of satisfaction*

The respondents rated their level of satisfaction with Flexcar from 1-5, "one" being completely satisfied and "five" being completely dissatisfied. The average was 1.6, indicating a high level of satisfaction. See Figure 10. Rate increases appeared to be the most common reason for being dissatisfied.

#### *Vehicle ownership*

In addition to the number of vehicles per household, respondents reported the types of vehicles they owned. Cars were the most common at 80%, followed by SUVs at 15% and trucks at 5%. The overall ownership rate was 37.5%. The 2000 census data show that 84% of Seattle households own at least one vehicle [5].

#### *Automobile Use*

Respondents were asked to estimate whether their automobile use had increased since joining Flexcar. They were asked about their driving for non-work purposes and their

overall automobile use (including being a passenger). The results are shown in Figure 11 and Figure 12, stratified by car owners and non-car owners.

Flexcar members who did not own a car tended to increase their driving, although about a quarter of non-car owners said that their driving had gone down. Of members with cars, approximately half said that their amount of driving was about the same since joining Flexcar. See Figure 11.

Results were not as conclusive when respondents were asked about overall automobile use. Again, car owners did not change their behavior much. For respondents without cars, about one third said their auto use had increased, about one third said it had decreased, and about one third reported no change. See Figure 12.

#### *Transit use*

Changes in transit use were also stratified by automobile ownership. Car owners and non-car owners mostly reported no change in their transit use. See Figure 13. Non-car owners tended to take more bus trips overall, however. See Figure 14. About 40% of 2003 respondents had used transit to get to a Flexcar location.

## **CONCLUSION**

The sample presented as the “2003 survey respondents” is not intended to represent everyone in Seattle who has used Flexcar, and the results should not be applied to the entire population of current, or former, Flexcar members. The respondents have all stayed in the program for several years and have used it recently. If Flexcar did not fit their needs or expectations, the respondents would not be willing to pay for it. Compared with average Flexcar usage in 2002, the sample used Flexcar about three times as much (9 hours per month vs. 3 hours per month). The sample should be considered a best-case scenario for Flexcar members.

Comparing the 2003 results to 2001 shows the consistency at which the survey questions can be answered. For example, approximately the same proportion of respondents work outside the home. Public transportation is the most popular commute mode, and most respondents carry a bus pass. Personal errands and shopping are the most frequent uses of Flexcar, both from work and home. Flexcar has made several service changes since the 2001 survey, such as increasing the number of vehicles at employment sites. This may account for the increase in Flexcar trips from work (36% of members in 2001 vs. 54% of members in 2003).

For further comparisons, the sample size should be taken into account. Although 21% of the 2003 respondents indicated that their transit use had increased, this represents only 10 people. Having said that, some generalizations can be made.

First, the respondents were very happy with Flexcar as a service. The open-ended comments were very positive and the criticism was constructive. Even so, the service was not flawless. Flexcar can improve its systems and processes to provide more convenient and trouble-free experiences for its customers.

In addition, Flexcar has an important link with transit. The majority of the sample did not own a car, and nearly everyone used the bus at some point during the week. In contrast, the 2000 census data showed that in Seattle, 18% of workers took transit and

84% of households had at least one vehicle [5]. For those without cars, Flexcar helps provide mobility and it is an alternative to a long bus ride or a taxi trip.

To address some of the shortcomings of this survey, the data collection should be extended to the entire Flexcar membership. Flexcar is now conducting an online survey. Compiling the data and creating tables is automated, thus reducing the overall effort in producing results. Members can also update their billing addresses online, making it easier for Flexcar to keep track of members who move frequently.

A larger sample size and comparisons across groups would increase Flexcar's understanding of its members' travel behavior and provide information on how to better meet the members' needs. Examples include comparing across demographic groups, old members vs. new members and across different levels of use. Linking the survey with members' work or home addresses would allow geographic comparisons as well. Collecting numeric data, such as the number of transit trips in the past 7 days, is the easiest way to make statistical comparisons, and this should be taken into account when updating the survey questions.

#### **ACKNOWLEDGMENT**

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Neighborhood	Candidates		Respondents	
	Number	Percent	Number	Percent
Capitol Hill	82	32%	16	33%
CBD	30	12%	10	21%
Central District	33	13%	6	13%
Queen Anne	27	11%	4	8%
University District	6	2%	3	6%
Ballard	8	3%	2	4%
Beacon Hill	3	1%	1	2%
Green Lake	5	2%	1	2%
Lake City	2	1%	1	2%
Magnolia	3	1%	1	2%
Wedgewood	1	0%	1	2%
Bitter Lake	1	0%	0	0%
Fremont	4	2%	0	0%
Greenwood	1	0%	0	0%
Maple Leaf	2	1%	0	0%
Mount Baker	2	1%	0	0%
North Beach	1	0%	0	0%
Wallingford	3	1%	0	0%
West Seattle	7	3%	0	0%
White Center	1	0%	0	0%
Unidentified	33	13%	2	4%
Total	255	100%	48	100%

TABLE 1: Survey Candidates and Respondents by Neighborhood

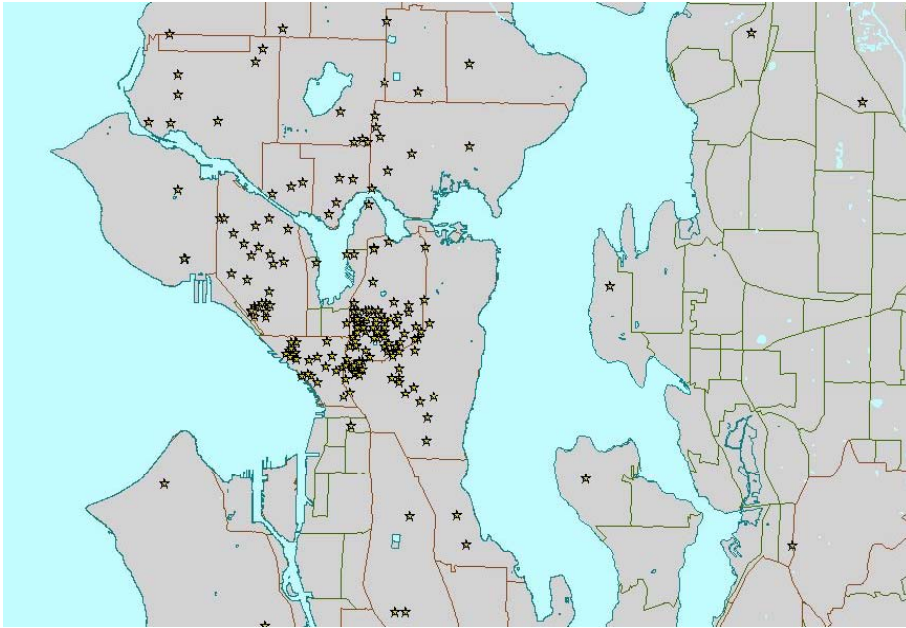


Figure 1: Location of Survey Candidates (255) by Neighborhood

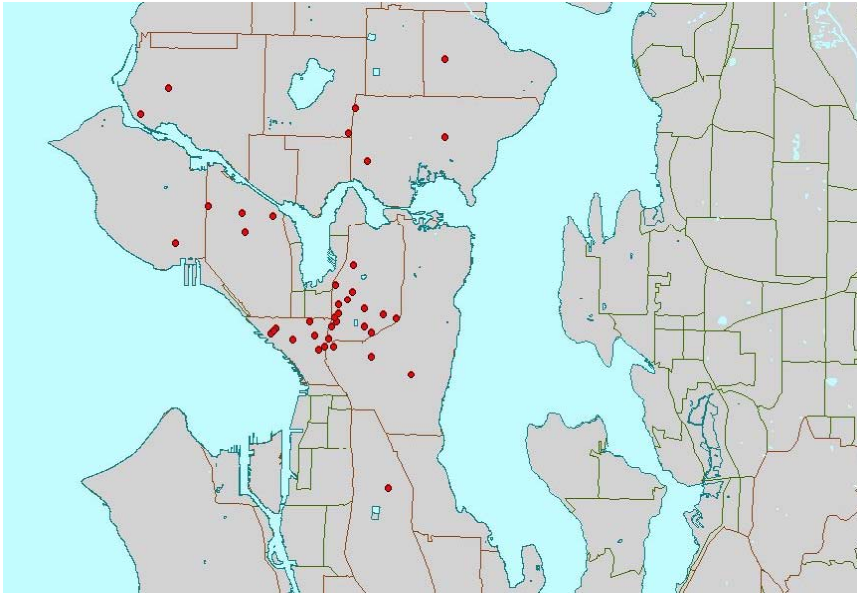


Figure 2: Location of Survey Respondents (48) by Neighborhood

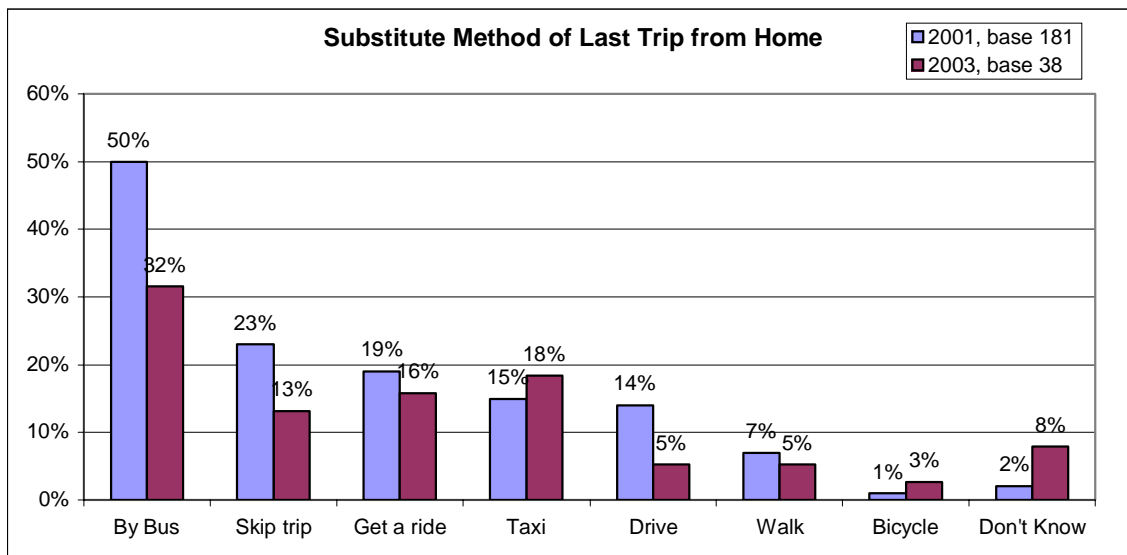


Figure 3: Types of Trips Flexcar Replaced from Home



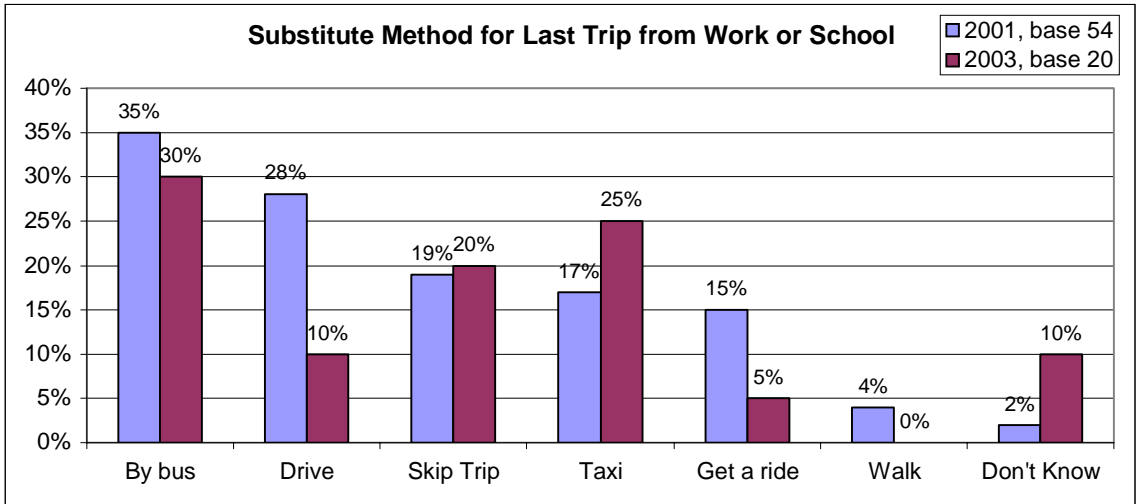


Figure 4: Types of Trips Flexcar Replaced from Work

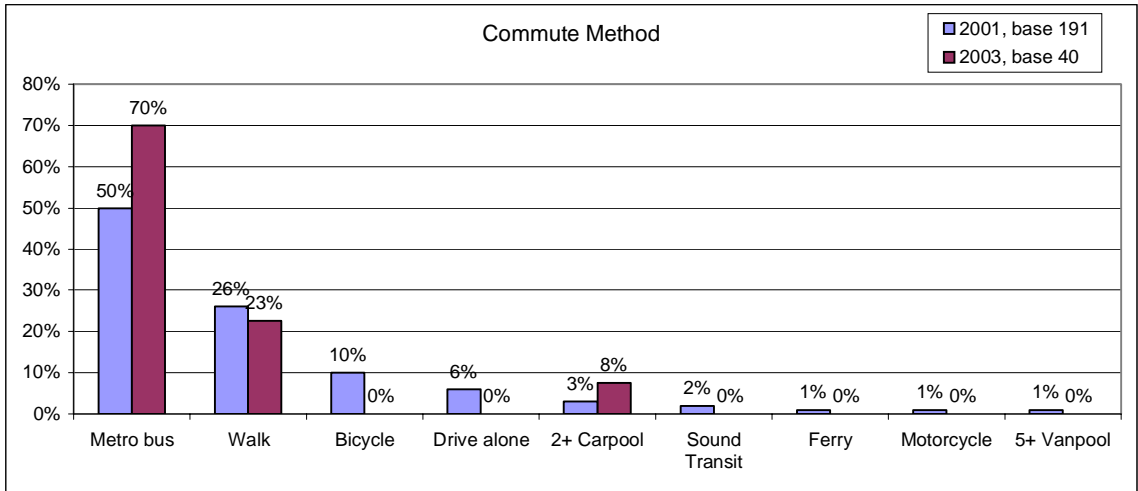


Figure 5: Methods for Commuting to Work

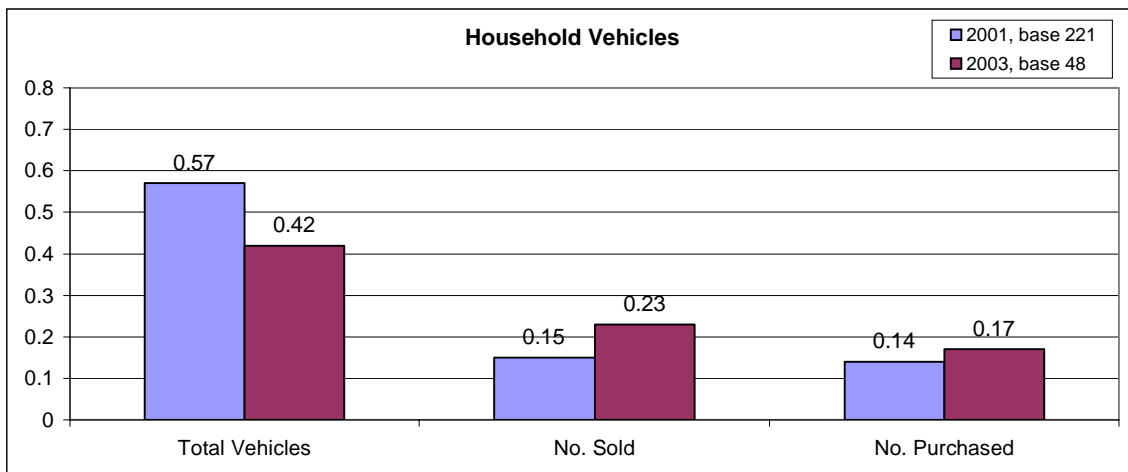


Figure 6: Average Vehicles per Household Owned, Sold and Purchased

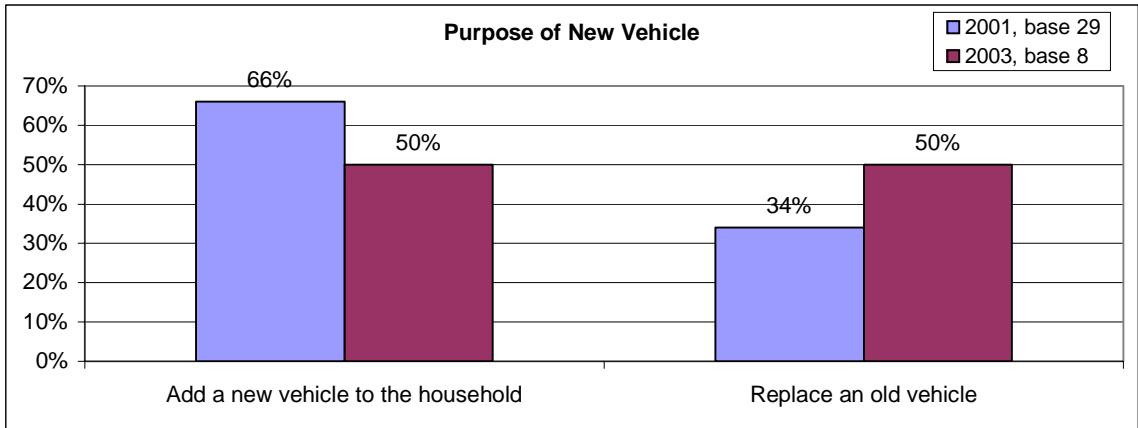


Figure 7: Reasons for Purchasing a New Vehicle

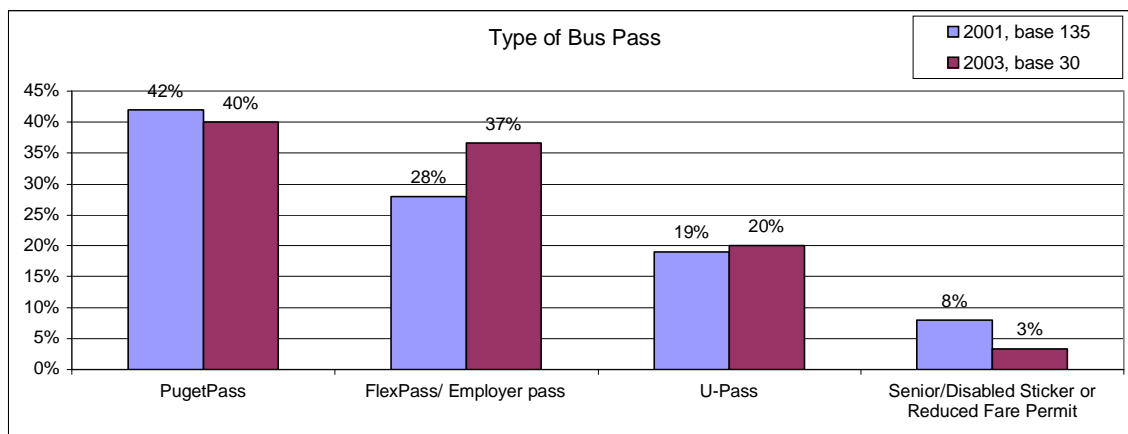


Figure 8: Bus Passes Held by Flexcar Members

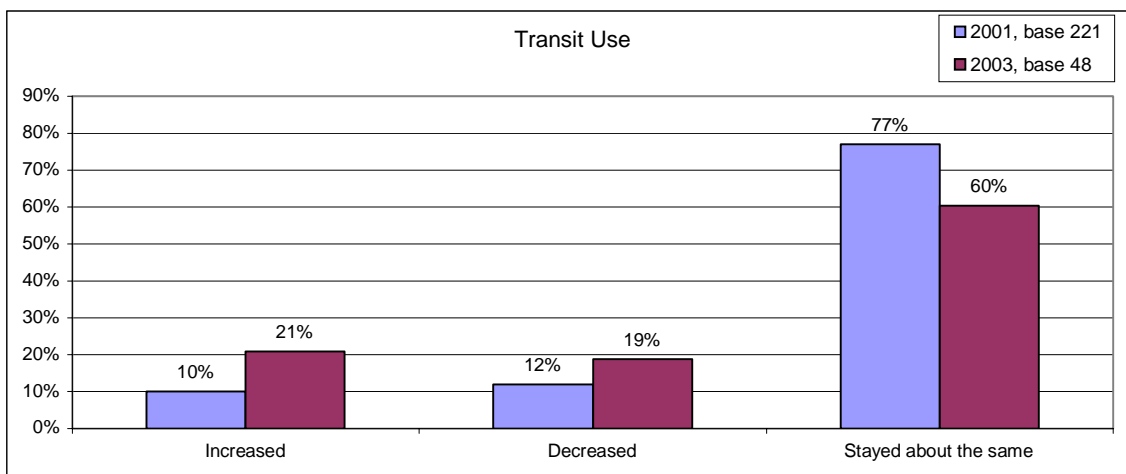


Figure 9: Changes in Transit Use



Figure 10: Satisfaction among 2003 Respondents

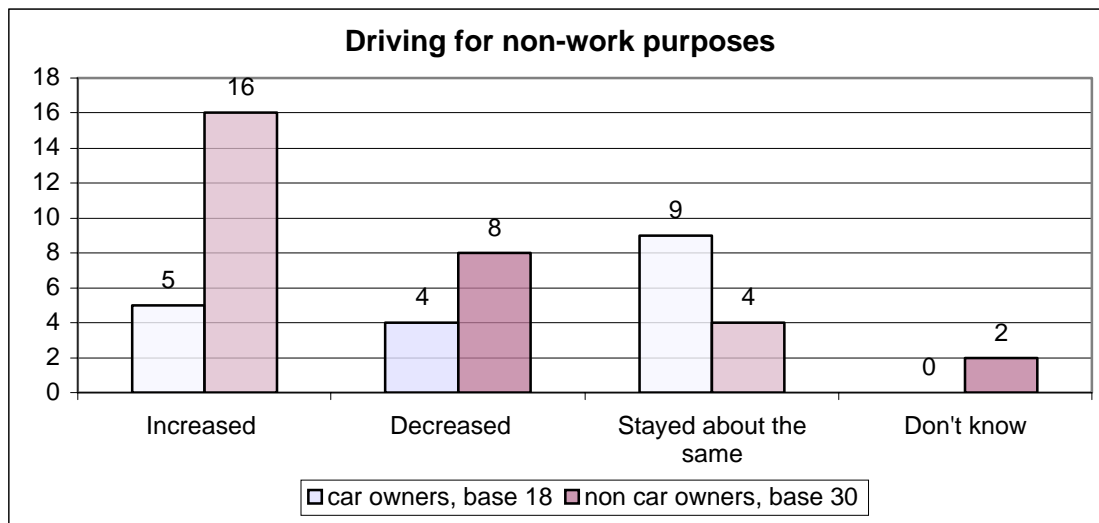


Figure 11: Changes in Automobile Driving among 2003 Respondents



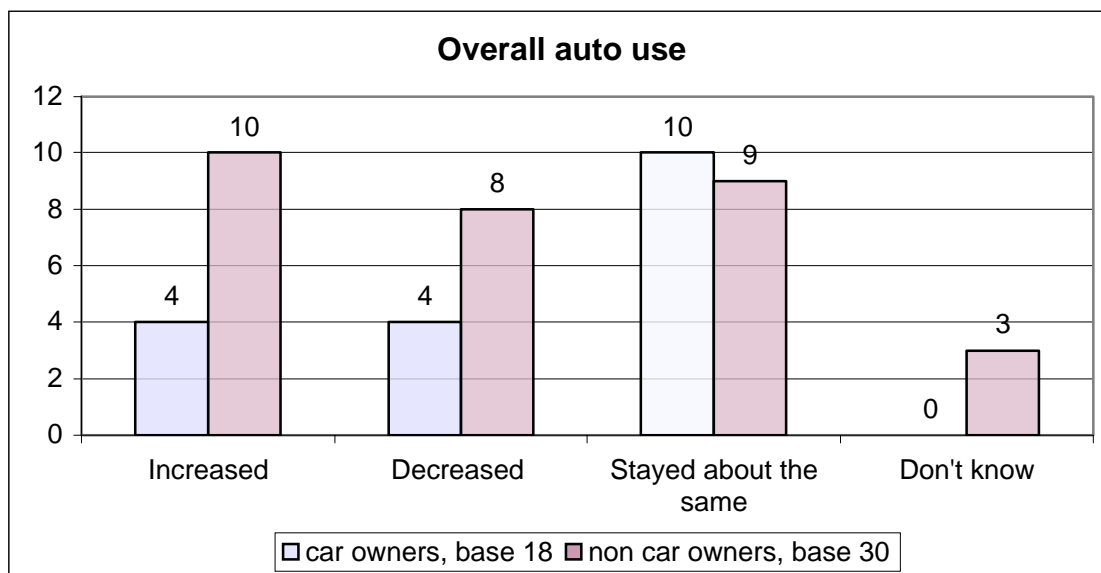


Figure 12: Changes in Automobile Use, Including Passenger Trips, among 2003 Respondents

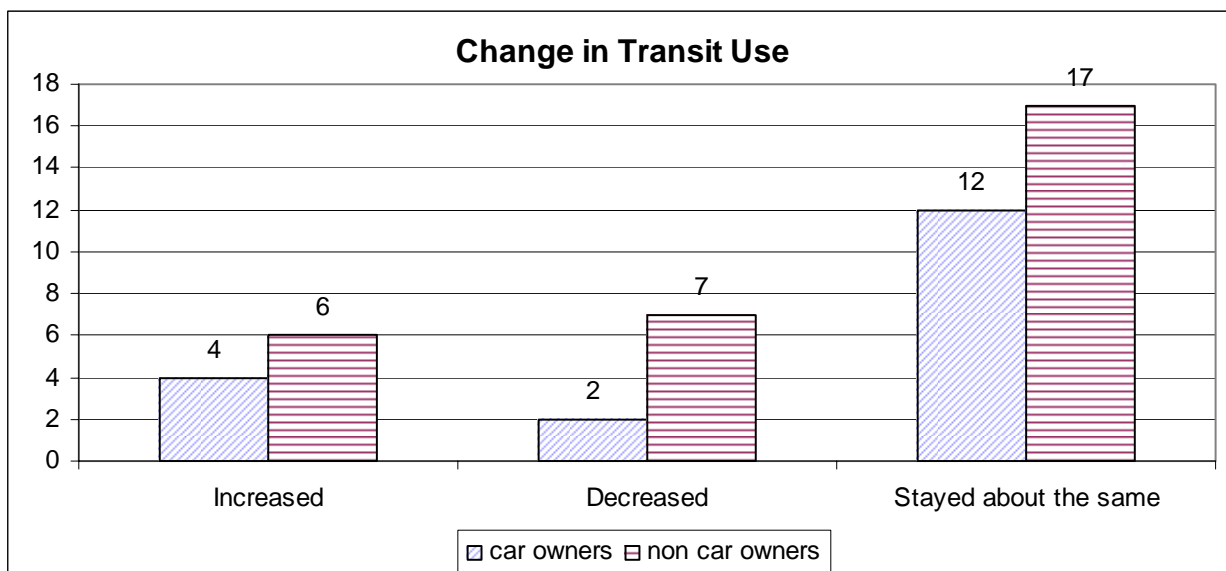


Figure 13: Changes in Transit Use by Automobile Ownership among 2003 Respondents

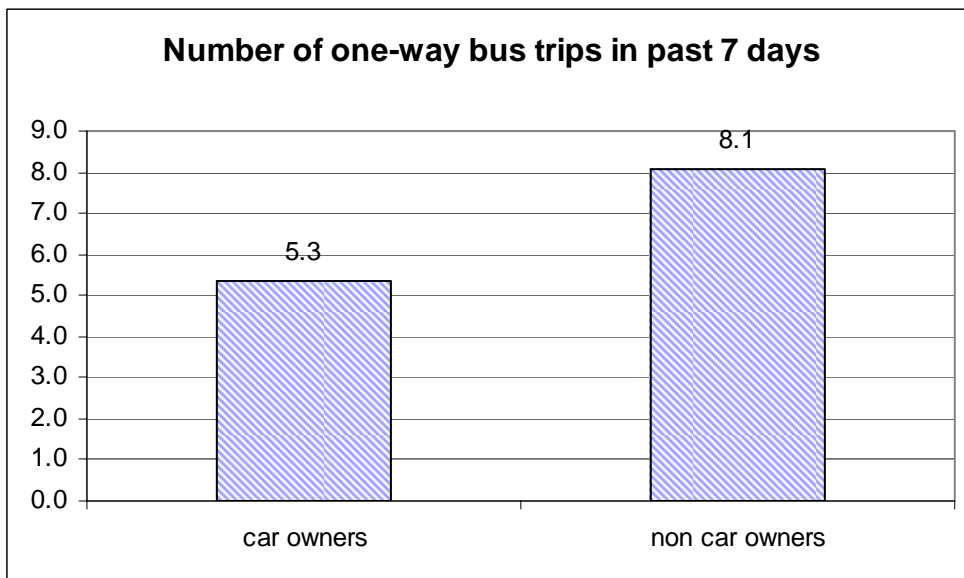


Figure 14: Frequency of Bus Rides by Automobile Ownership among 2003 Respondents

## **Appendix B: Phone Survey Questions and Answers**

## 2003 King County Metro/Flexcar Survey

Q.1 Hello, may I please speak with (READ NAME FROM SAMPLE)?

My name is \_\_\_\_\_. I am calling on behalf of King County Metro regarding the Flexcar program. I believe you received a postcard explaining that we were conducting an evaluation of vehicle usage. Would you be willing to take a few minutes to provide us with some feedback for this evaluation?

Q.2 Our records indicate that you have used a Flexcar (since January 2002). Is this correct?

	Base	221		Base	48	
Yes		221	100%	Yes	48	100%
No		0	0%	No	0	0%

Q.3 We appreciate your membership in the Flexcar program, but at this time do not need to ask you any questions. (SCREEN OUT)

Q.4 2. First I will ask you about Flexcar trips that originate from home, meaning that you use an available vehicle that is parked close to your home. Have you made any Flexcar trips that originated from home?

	Base	221		Base	48	
Yes		181	82%	Yes	45	94%
No		40	18%	No	3	6%
DON'T KNOW		0	0%	DON'T KNOW	0	0%

Q.5 3a. Thinking of all the times that you have accessed a Flexcar from home, have you ever used it for recreational or social purposes? [IF NECESSARY: **Not shopping**, but visiting friends, going to dinner or a movie, going hiking...]

	Base	181		Base	45	
Yes		141	78%	Yes	34	76%
No		40	22%	No	11	24%
DON'T KNOW		0	0%	DON'T KNOW	0	0%
No Response		40		No Response	3	

Q.6 3b. Thinking of all the times that you have accessed a Flexcar from home, have you ever used it for work or school related purposes?

	Base	181		Base	45	
Yes		62	34%	Yes	20	44%
No		119	66%	No	25	56%
DON'T KNOW		0	0%	DON'T KNOW	0	0%
No Response		40		No Response	3	

Q.7 3c. Thinking of all the times that you have accessed a Flexcar from home, have you ever used it for personal errands or shopping?

	Base			Base	
Yes	165	91%	Yes	42	93%
No	16	9%	No	3	7%
DON'T KNOW	0	0%	DON'T KNOW	0	0%
No Response	40		No Response	3	

Q.8 3d. Thinking of all the times that you have accessed a Flexcar from home, have you ever used it for medical appointments?

	Base			Base	
Yes	46	25%	Yes	16	36%
No	135	75%	No	29	64%
DON'T KNOW	0	0%	DON'T KNOW	0	0%
No Response	40		No Response	3	

Q.9 3e. Have you used that Flexcar for any other purpose?

	Base			Base	
Yes	26	14%	Yes	8	18%
No	154	85%	No	37	82%
DON'T KNOW	1	1%	DON'T KNOW	0	0%
No Response	40		No Response	3	

Q.10 3e. What have you used it for?

	Base			Base	
Moving	11	37%	Moving	1	13%
Travel to/from airport	6	20%	Travel to/from airport	1	13%
Appointments	4	13%	Appointments	3	38%
Road trips out of tow	3	10%	Road trips out of tow	0	0%
Social events	3	10%	Social events	1	13%
Job interview	2	7%	Job interview	0	0%
Community service	1	3%	Community service	1	13%
Transport refuse to b	0	0%	Transport refuse to b	1	13%
No Response	191		No Response	40	

Q.11 4. Which have you used it for most often? (READ LIST IF NECESSARY - ONLY YES RESPONSES ON Q3A-E)

	Base			Base	
Personal errands or :	93	62%	Personal errands or :	22	51%
Recreation	35	23%	Recreation	13	30%
Work or school relate	13	9%	Work or school relate	5	12%
A medical appointme	5	3%	A medical appointme	3	7%
DON'T KNOW	5	3%	DON'T KNOW	0	0%
No Response	70		No Response	5	
Other	30		Other	2	

Q.13 5. Please recall the most recent time you used a Flexcar for a trip that originated from home. How would you have made the trip if you did not have Flexcar as an option? (PROBE RESPONSES TO FIT) (DO NOT READ LIST)

Base	181		Base	38	
By Bus	90	50%	By Bus	12	32%
Skip trip	41	23%	Would not have mad	5	13%
Get a ride	35	19%	Get a ride from some	6	16%
Taxi	27	15%	Taxi	7	18%
Drive	26	14%	Drive	2	5%
Walk	12	7%	Walk	2	5%
Bicycle	2	1%	Bicycle	1	3%
Don't Know	3	2%	DON'T KNOW	3	8%
No Response	40		No Response	4	
			other	6	

Q.14 (WITHOUT FLEXCAR, HOW WOULD YOU HAVE MADE THE TRIP?)  
SPECIFY OTHER

Q.15 6. Do you work outside your home or go to school?

Base	221		Base	48	
Yes	191	86%	Yes	41	85%
No	30	14%	No	7	15%
DON'T KNOW	0	0%	DON'T KNOW	0	0%

Q.16 7. Have you ever used a Flexcar when you are at work or school? [NOTE: THIS COULD INCLUDE TRIPS MADE FROM WORK AT THE END OF THE WORKDAY.]

Base	191		Base	41	
Yes	68	36%	Yes	22	54%
No	123	64%	No	19	46%
DON'T KNOW	0	0%	DON'T KNOW	0	0%
No Response	30		No Response	7	

Q.17 8. Is this a different vehicle location than the one you access from home?

Base	42		Base	20	
Yes	28	67%	Yes	16	80%
No	14	33%	No	3	15%
DON'T KNOW	0	0%	DON'T KNOW	1	5%
No Response	179		No Response	28	

Q.18 9. Thinking about all the times that you have accessed a Flexcar from work or school, have you ever used it for recreational or social purposes? [IF NECESSARY: Such as visiting friends, going to dinner or a movie, going hiking...]

Base	54		Base	21	
Yes	21	39%	Yes	8	38%
No	33	61%	No	13	62%
DON'T KNOW	0	0%	DON'T KNOW	0	0%
No Response	167		No Response	27	

Q.19 9b. Thinking of all the times that you have accessed a Flexcar from work or school, have you ever used it for work or school related purposes?

Base	54		Base	21	
Yes	28	52%	Yes	14	67%
No	26	48%	No	7	33%
DON'T KNOW	0	0%	DON'T KNOW	0	0%
No Response	167		No Response	27	

Q.20 9c. Thinking of all the times that you have accessed a Flexcar from work or school, have you ever used it for personal errands or shopping?

Base	54		Base	21	
Yes	36	67%	Yes	11	52%
No	18	33%	No	10	48%
DON'T KNOW	0	0%	DON'T KNOW	0	0%
No Response	167		No Response	27	

Q.21 9d. Thinking of all the times that you have accessed a Flexcar from work or school, have you ever used it for medical appointments?

Base	54		Base	21	
Yes	18	33%	Yes	9	43%
No	36	67%	No	12	57%
DON'T KNOW	0	0%	DON'T KNOW	0	0%
No Response	167		No Response	27	

Q.22 9e. Have you ever used that Flexcar for any other purpose?

Base	54		Base	20	
Yes	3	6%	Yes	5	25%
No	51	94%	No	15	75%
DON'T KNOW	0	0%	DON'T KNOW	0	0%
No Response	167		No Response	28	



### Q.23 What have you used it for?

	Base			Base	
Moving	1	33%	Moving	0	0%
Community service	1	33%	Community service	1	20%
Transport refuse to b	1	33%	Transport refuse to b	0	0%
Appointments	0	0%	Appointments	3	60%
Travel to/from airport	0	0%	Travel to/from airport	1	20%
No Response	218		No Response	43	

### Q.24 10. Which purpose have you used it for most often? (READ LIST IF NECESSARY - ONLY YES RESPONSES ON Q10A-E)

	Base			Base	
Personal errands or :	17	57%	Personal errands or :	5	31%
Work or school relate	8	27%	Work or school relate	3	19%
Recreation	3	10%	Recreation	4	25%
A medical appointme	1	3%	A medical appointme	4	25%
Don't know	1	3%	DON'T KNOW	0	0%
No Response	191		No Response	32	
			Other	1	

### Q.25 (WHICH HAVE YOU USED IT FOR MOST OFTEN?) SPECIFY OTHER

### Q.26 11. Please recall the most recent time you used a Flexcar for a trip that originated from work or school. How would you have made the trip if you did not have Flexcar as an option? (PROBE RESPONSES TO FIT (DO NOT READ LIST))

	Base			Base	
By bus	19	35%	By bus	6	30%
Drive	15	28%	Drive	2	10%
Skip Trip	10	19%	Would not have mad	4	20%
Taxi	9	17%	Taxi	5	25%
Get a ride	8	15%	Get ride form someo	1	5%
Walk	2	4%	Walk	0	0%
Don't Know	1	2%	DON'T KNOW	2	10%
No Response	167		No Response	28	
			Other	1	

### Q.27 (WITHOUT FLEXCAR, HOW WOULD YOU HAVE MADE THE TRIP?) SPECIFY OTHER

Q.28 12. Who was billed for the most recent Flexcar trip you made from work or school? Was it you, or your employer or school?

	Base			Base	
You	49	91%		19	90%
Your employer or scl	5	9%		2	10%
DON'T KNOW/DON'	0	0%		0	0%
No Response	167			27	

Q.29 13. The next questions are about commuting. How do you usually commute to and from work and school? (PROBE FOR WHAT THEY USE MOST OFTEN)

	Base			Base	
Metro bus	95	50%		28	70%
Walk	50	26%		9	23%
Bicycle	19	10%		0	0%
Drive alone	12	6%		0	0%
2+ Carpool	6	3%		3	8%
Sound Transit	4	2%		0	0%
Ferry	2	1%		0	0%
Motorcycle	2	1%		0	0%
5+ Vanpool	1	1%		0	0%
No Response	30			8	
				4	
				1	

Q.30 (HOW DO YOU USUALLY COMMUTE TO AND FROM WORK OR SCHOOL?) SPECIFY COMBINATION OF TRANSPORTATION

Q.31 (HOW DO YOU USUALLY COMMUTE TO AND FROM WORK OR SCHOOL?) SPECIFY OTHER

Q.32 14. Is the way that you commute to and from work or school any different than the way you commuted before you joined Flexcar?

	Base			Base	
Yes	24	13%		9	21%
No	163	85%		34	79%
DON'T KNOW	4	2%		0	0%
No Response	30			5	

Q.33 How is it different?

	Base			Base	
Have more transportation options	9	38%		1	11%
I used to have to drive to work	8	33%		3	33%
No longer need a car	2	8%		1	11%
I use the bus more often	1	4%		0	0%
No difference	4	17%		4	44%
No Response	197			39	

2003

Drove before  
 Not related, moved  
 Drove before  
 Would use husband's car sometimes  
 Flexcar allows him to work from home  
 Not related to FC, got new job  
 Moved since joining  
 Moved, would walk before, now takes the bus  
 Used to only use FC for daughter then walk

Q.34 15. Next, I want to ask you about the vehicles in your household. By vehicles, I mean cars, trucks, vans, SUVs and motorcycles. How many total vehicles does your household have?

Base	221	Base	48
# OF VEHICLES	0.57	# OF VEHICLES	0.42

How many vehicles of each type? (2003)

Base	20	
Car	16	80%
Truck	1	5%
Van	0	0%
SUV	3	15%
Motorcycle	0	0%
% auto ownership	37.5%	

Q.X1. Since joining Flexcar, has your amount of automobile driving for non-work purposes increased, decreased, or stayed about the same? [Do not count driving as part of your job]

Car owners = 18

Base	18	
Increased	5	28%
Decreased	4	22%
Stayed about the sar	9	50%
Don't know	0	0%

Non car owners = 30

Base	30	
Increased	16	53%
Decreased	8	27%
Stayed about the sar	4	13%
Don't know	2	7%

### Combined

Base	48	
Increased	21	44%
Decreased	12	25%
Stayed about the sar	13	27%
Don't know	2	4%

Q.X2. Since joining Flexcar, has your overall amount of automobile use increased, decreased, or stayed about the same? [Includes work trips and being a passenger]

### Car Owners = 18

Base	18	
Increased	4	22%
Decreased	4	22%
Stayed about the sar	10	56%
Don't know	0	0%

### Non car owners = 30

Base	30	
Increased	10	33%
Decreased	8	27%
Stayed about the sar	9	30%
Don't know	3	10%

### Combined

Base	48	
Increased	14	29%
Decreased	12	25%
Stayed about the sar	19	40%
DON'T KNOW	3	6%

Q.35 16. Since joining Flexcar, have you or your household sold, donated or disposed of a vehicle that you did not replace?

Base	221		Base	48	
Yes	33	15%	Yes	10	21%
No	187	85%	No	38	79%
DON'T KNOW	1	0%	DON'T KNOW	0	0%

**Q.36 How many vehicles did you sell, donate or dispose of?**

Base	33	221	Base	10	48
# OF VEHICLES	1	0.15	# OF VEHICLES	1.1	0.23

**Q.37 17. Where did you usually park the vehicle(s), prior to selling, donating or disposing of it(them)? (READ LIST, ACCEPT MULTIPLE RESPONSES)**

Base	33		Base	10	
In a garage, driveway	16	48%	In a garage, driveway	4	40%
On the street	15	45%	On the street	6	60%
In a garage or parkin	4	12%	In a garage or parkin	0	0%
No Response	188		No Response	38	

**Q.38 (WHERE DID YOU USUALLY PARK THE VEHICLE(S), PRIOR TO selling, donating or disposing of IT(THEM)?) SPECIFY OTHER**

**Q.39 18. Since joining Flexcar, have you or your household purchased or leased any new vehicles? [NOTE: LEASED VEHICLES ARE CONSIDERED THE SAME AS PURCHASED FOR THESE PURPOSES]**

Base	91		Base	46	
Yes	29	32%	Yes	8	17%
No	62	68%	No	37	80%
DON'T RECALL	0	0%	DON'T RECALL	1	2%
No Response	130		No Response	2	

**Q.40 How many vehicles have you purchased or leased?**

Base	29	221	Base	8	48
# OF VEHICLES	1.03	0.14	# OF VEHICLES	1	0.17

**Q.41 19. Did the new vehicle(s)...? (READ LIST - ACCEPT MULTIPLE ANSWERS)**

Base	29		Base	8	
Add a new vehicle to	19	66%	Add a new vehicle to	4	50%
Replace an old vehic	10	34%	Replace an old vehic	4	50%
No Response	192		No Response	40	

**Q.42 (DID THE NEW VEHICLE(S) ... ?) SPECIFY OTHER**

Q.43 20. Would you say that your membership in Flexcar has helped enable you to avoid purchasing a vehicle that you otherwise would have purchased?  
[NOTE: LEASED VEHICLES ARE CONSIDERED THE SAME AS PURCHASED FOR THESE PURPOSES.]

Base	192		Base	47	
Yes	120	63%	Yes	31	66%
No	67	35%	No	14	30%
Don't Know	5	3%	DON'T KNOW	2	4%
No Response	29		No Response	1	

Q.44 21. Next, I would like to ask you about your use of transit. Do you have a bus pass?

Base	221		Base	48	
Yes	135	61%	Yes	30	63%
No	86	39%	No	18	38%
DON'T KNOW	0	0%	DON'T KNOW	0	0%

Q.45 22. What kind of pass do you have? (READ LIST IF NECESSARY)

Base	135		Base	30	
PugetPass	57	42%	PugetPass	12	40%
FlexPass/ Employer	38	28%	FlexPass/Employer	11	37%
U-Pass	26	19%	U-Pass	6	20%
Senior/Disabled Sticl	11	8%	Senior/Disabled stick	1	3%
GoPass (SCC pass)	1	1%	GoPass (SCC pass)	0	0%
Don't Know	2	1%	DON'T KNOW	0	0%
No Response	86		No Response		

Q.46 (WHAT KIND OF PASS DO YOU HAVE?) SPECIFY OTHER

Q.47 23. Does your employer or school pay for part or all of your pass?

Base	91		Base	30	
Employer/school pay	37	41%	Yes, employer/schoc	9	30%
Employer/school pay	37	41%	Yes, employer/schoc	17	57%
Employer/school pay	17	19%	No, none of the pass	4	13%
DON'T KNOW	0	0%	DON'T KNOW	0	0%
No Response	130		No Response	18	

Q.48 24. In the past seven days, how many one-way rides have you taken on a bus? A round trip counts as two rides, and count a trip where you transferred buses as one ride.

Base	221	Base	47
# RIDES	6.26	# RIDES	7.19
		min	0
		mac	15
		<b>Standard deviation</b>	4.34

### 2003

car owners, base 18	5.3
non car owners, base 30	8.1

Q.49 25. Since joining Flexcar, has your transit use increased, decreased, or stayed about the same?

Base	221		Base	48	
Increased	23	10%	Increased	10	21%
Decreased	27	12%	Decreased	9	19%
Stayed about the same	171	77%	Stayed about the same	29	60%
DON'T KNOW	0	0%	DON'T KNOW	0	0%

### 2003, car owners = 18

Base	18	
Increased	4	22%
Decreased	2	11%
Stayed about the same	12	67%
Don't know	0	0%

### 2003, non car owners = 30

Base	30	
Increased	6	20%
Decreased	7	23%
Stayed about the same	17	57%
Don't know	0	0%

QX3. Would you say that Flexcar has influenced your transit use?

Base	47	
Yes	20	43%
No	26	55%
DON'T KNOW	1	2%

Q.X4. How has Flexcar affected your transit use?

More personal trips by bus  
 Would drive otherwise, free parking permit  
 Replace some bus trips with FC, think about combo trips  
 Offers an option: faster than bus, cheaper than taxi or owning a car  
 Use as substitute to bus for long trips, or when it would be a hassle  
 Replace 2-3 buses with FC  
 FC has replaced some bus trips, and replaced some drive trips with bus because she realized there was bus service  
 Don't take bus late at night  
 Use Flexcar instead of cab or rental  
 Takes less lengthy bus trips  
 Sold car  
 Allows him not to have a car, use transit for short trips, FC for longer trips  
 Use bus more often  
 Use for certain types of trips  
 Bus or cab were the only options  
 Discovered how easy it was to get around using transit and Flexcar, so a car was unnecessary  
 No longer takes long bus rides  
 Was FC first, then bus; now car, bus, FC  
 More aware of car costs and how to use the bus  
 Use public transportation better

QX5. Have you ever used transit to get to a Flexcar location at which you had a reservation?

Base	48	
Yes	20	42%
No	27	56%
DON'T KNOW	1	2%

Q.X6 What is your overall level of satisfaction with Flexcar? [Read choices]

Base	48
Satisfaction 1-5	1.6
1	Completely Satisfied 22
2	Somewhat Satisfied 23
3	Neutral 2
4	Somewhat Dissatisfied 1
5	Completely Dissatisfied 0



Q.X7 Have you ever had a problem when using Flexcar? [e.g. dead battery, car was not there...?]

Base	48	
Yes	30	63%
No	18	38%
DON'T KNOW	0	0%

Q. X8. What was the problem?

“Not problems”

Reported damage on car  
How cars work  
Someone took spot once  
Didn't get back in time, couldn't find key box  
Locked out

“Problems”

Did not get reimbursed for gas, no CC envelope, dead battery  
Car was not there  
Car was not there  
Flat tire  
Car was late, no reservation available  
New system was confusing, brake noise in car  
No key in car  
Account administrative problems with new password  
Car not there  
3 dead batteries, missing key, missing gas card, late car, no gas, engine light on  
Dead battery, car not there  
Vehicle not there, not returned, got taxi  
Card did not work  
Key card didn't work, called from pay phone, spent 5-6 minutes on hold  
Car wasn't there and when unemployed he was on way to interview and discovered his account had been cut off (without his knowledge) because of NSF  
Wanted to extend reservation, someone else had car booked; Had to wait for car return; Not able to find vehicle; code did not work  
Car moved but location not updated  
No luck using gas card  
The key was missing  
Car not there  
Late car, new system is harder to use, use it less now

Car not there

Car not there, arrive 10 minutes late with no gas, Tracey responded well;  
forgot lockbox combo once

User did not bring car back

Car was not there

Could not start car; gas odor

Two cars on Minor are too close, took the wrong car; Also someone took  
her car Opening garage with reomote--no instructions

Code not working, system down, missing car

Q.X9 Have you ever called the "help line" to report a problem?

Base	48	
Yes	38	79%
No	10	21%
DON'T KNOW	0	0%

Q.50 26. These final questions are for classification purposes only. How many adults 18 and older reside in your household?

Base	221	Base	48
# OF ADULTS	1.6	# OF ADULTS	1.5

Q.51 27. And how many children under 18 are there?

Base	221	Base	48
# OF CHILDREN	0.18	# OF CHILDREN	0.13

Q.52 28. And finally, including yourself, how many licensed drivers reside in your household?

Base	221	Base	48
# OF LICENSED DRIVEI	1.5	# OF LICENSED DRI	1.4

Q.53 29. Do you have any comments you'd like to add regarding Flexcar?  
(2003)

Praise:

Loves it

It's a benefit to have Flexcar

Keep up the good work

Very happy with Flexcar, it works

Good program, good for grad students with limited resources

Good customer service-had a hit and run 3 weeks ago and FC was nice about it, FC easier than renting  
 Good service, happy to use for special trips, fits a niche  
 Very convenient, important when they need it  
 Loves it, great idea, friendly staff, could not live the way she does without it, it has improved her quality of life and serves environmental purposes  
 It has been great  
 It's great  
 Happy, will continue to use, likes the cars, couldn't afford one otherwise, no vehicle problems, no worries  
 Keep up the good work  
 Very pleased, has had friends sign up, would volunteer for FC  
 Best invention since sliced bread  
 No, good ride  
 One of the first to sign up  
 Glad it worked, amazed at growth, glad to see new car at Beacon Hill  
 Loves Flexcar  
 Very satisfied, likes key cards  
 Great idea, appreciate it, will use the truck  
 Interested in car sponsorship program and how to go about getting a car in one's neighborhood  
 Great program, glad to see more locations; talk about it and proud to be a member  
 Enjoy the service and like the truck  
 Thinks it is great  
 Thank county for helping the program; activist for #8 bus, thinks FC is helping with mobility options; likes the electronic bookkeeping  
 Useful service, has encouraged others  
 Good, necessary alternative given parking in city, good variety of vehicles, immediate response to problems

Criticism:

Wants gas money, would like more standardization  
 Would like the ability to do one way trips, goes A to B, stops at B, then goes on to C  
 Would use it more if it were cheaper; prices are fair but may be out of reach for some  
 Would like Flexcar parking place in dense areas, lower per-mile fee  
 Use less now since rate change, hard to reach person he wanted on phone  
 Would like to use older cars as animal-friendly vehicles  
  
 Wants more hybrid cars and truck back in neighborhood

Won't use FC for longer trips because of new rates, misses CD player in 120

Once found car in FC spot, had it towed, only recently received new card  
Ready for online reservations

Will results of study be available?

Wants more advanced notice of rate plan changes

Would use more, but not competitive with car rental, convenience is similar, but it is cheaper to rent for all day than for more than 3 hours

Once used a \$10 coupon, but did not get credit, complained but did not get email back; fine print-more expensive than he thought; believes in it, but not a frequent user

Would like more ease of use, online reservation, inter-city reservation instructions on web

Flexcar reserved 24/7 by Neil Peterson, outside his door, reflects badly on company

The lowest plan is too expensive; most recent raise too much; would be willing to pay \$5-6

#### Q.54 RECORD RESPONDENT GENDER

Base	221		Base	48	
Male	102	46%	Male	24	50%
Female	119	54%	Female	24	50%

Q.55 On occasion, my supervisor calls to verify that I asked all of the questions correctly. For this purpose only, may I please record your first name? (IF HESITANT) Your initials?

Q.56 And the phone number I reached you at was \_\_\_\_\_ ? READ THE PHONE NUMBER ENTERED TO RESPONDENT TO VERIFY ACCURACY. INCLUDE AREA CODE.

Q.57 Thank you for your time and cooperation. That concludes our survey. RECORD ID NUMBER FROM SAMPLE

#### Q.58 RECORD ATTEMPT UPON WHICH THIS COMPLETE WAS MADE

Base	221		Base	45
# OF ATTEMPTS	2.68		# OF ATTEMPTS	1.7

#### Q.59 RECORD INTERVIEWER CODE

## Q.60 RECORD CALL DISPOSITION

Call Back - Appointment .....	01
Call Back - No Appointment .....	02
Respondent Not Available .....	03
Initial Refusal .....	04
Screen Out: Under 18 .....	05
Communication Barrier .....	06
Complete .....	07
Terminate Midway .....	08
Screen Out: Has Not Used Flexcar ..	09

Q.61 DATE OF INTERVIEW .....(113-114)

## Q.62 LENGTH OF INTERVIEW IN MINUTES

Q.63 3e. Have you used that Flexcar for any other purpose? (IF YES) What have you used it for? (CODED RESPONSES)

(119-128)

Appointments .....	01
Road trips out of town .....	02
Social events .....	03
Moving .....	04
Travel to/from airport .....	05
Job interview .....	06
Community service .....	07
Transport refuse to be disposed ..	08

Q.64 9e. Have you used that Flexcar for any other purpose? (IF YES) What have you used it for? (CODED RESPONSES)

(129-138)

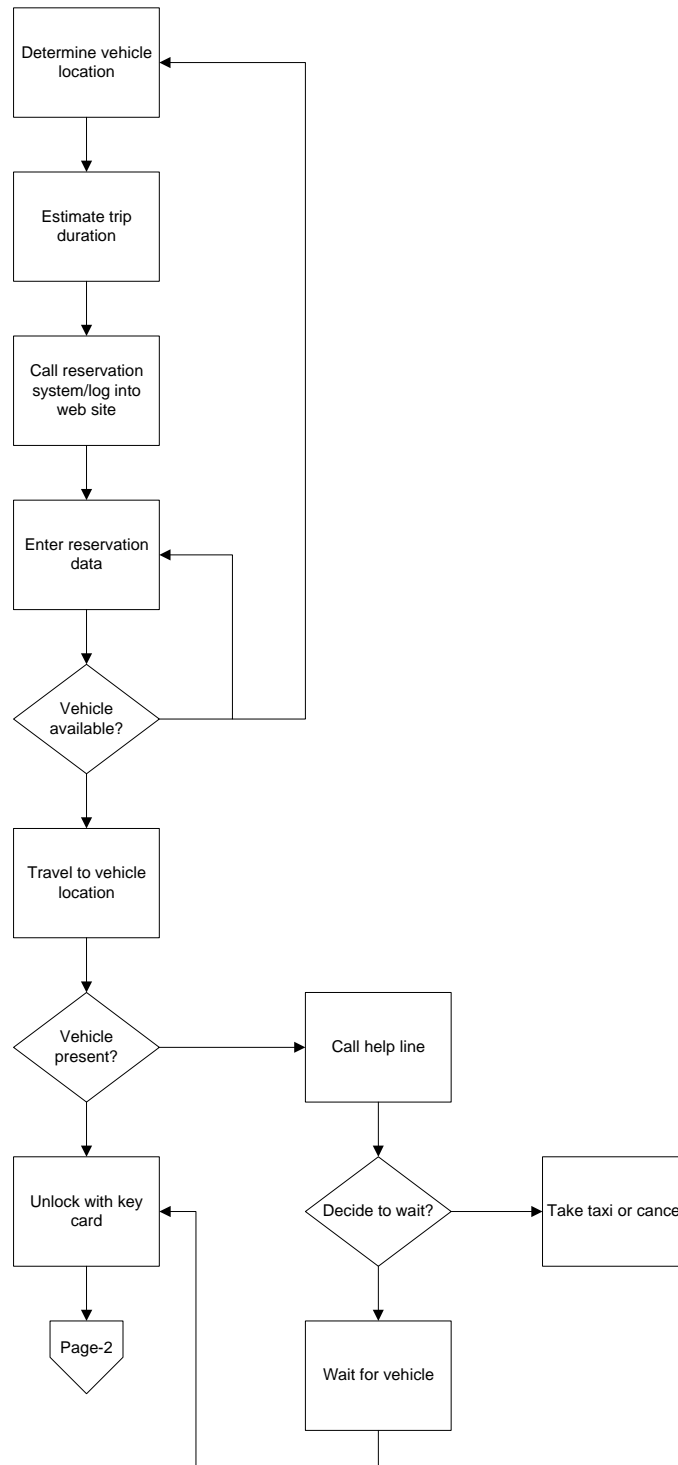
Appointments .....	01
Road trips out of town .....	02
Social events .....	03
Moving .....	04
Travel to/from airport .....	05
Job interview .....	06
Community service .....	07
Transport refuse to be disposed ..	08

Q.65 14. Is the way that you commute to and from work or school any different than the way you commuted before you joined Flexcar? (IF YES) How is it different? (CODED RESPONSES)

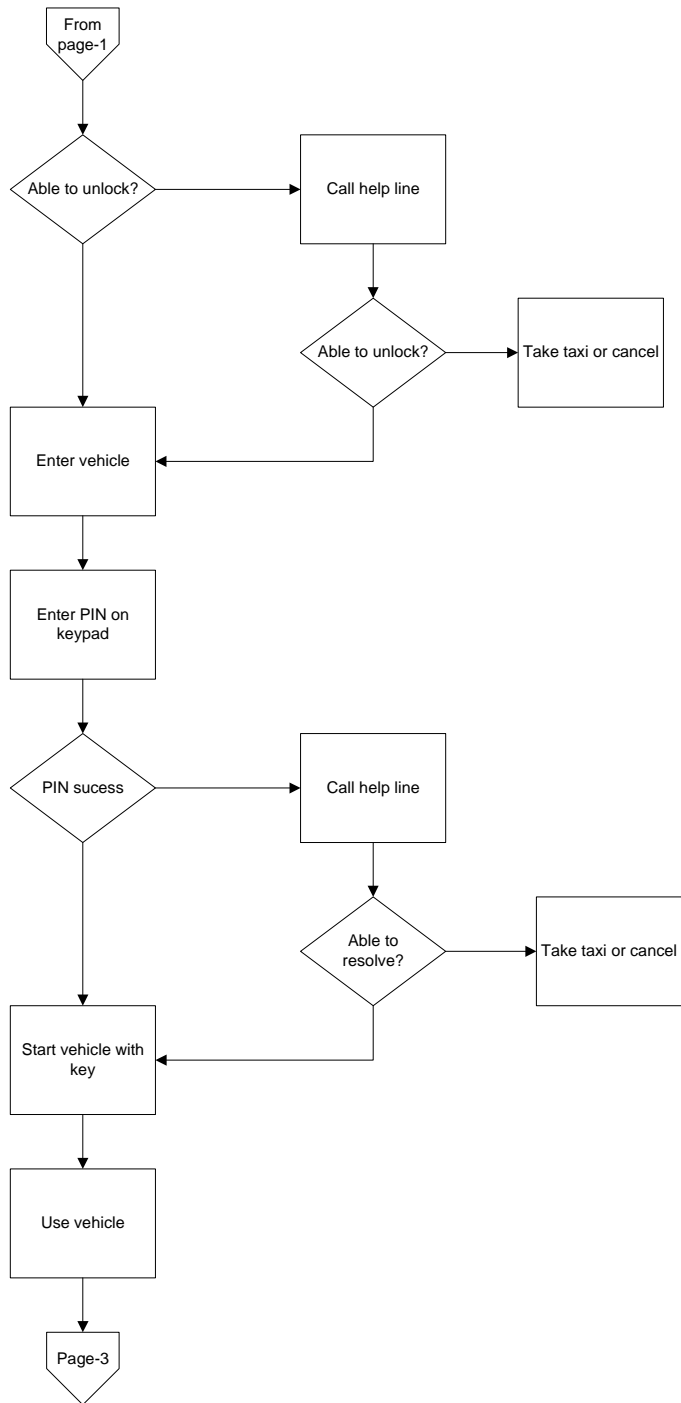
(139-148)

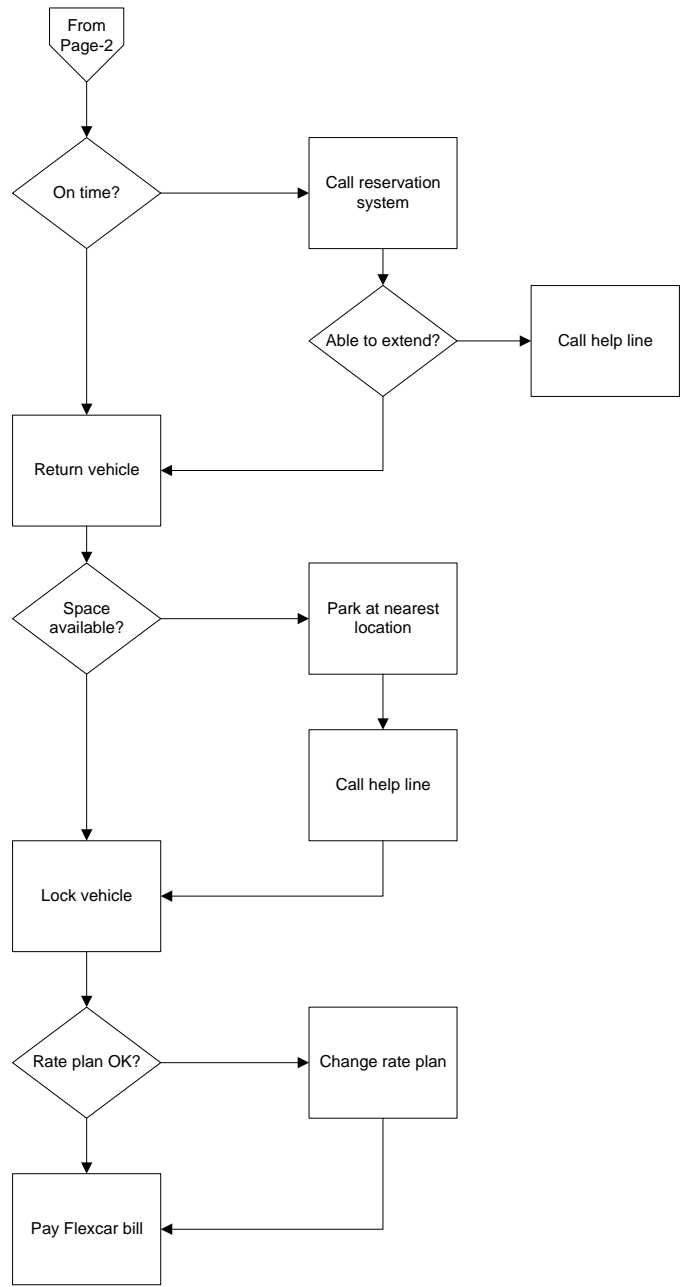
I used to have to drive to work .....	01
No longer need a car .....	02
Have more transportation options ..	03
I use the bus more often .....	04
No difference .....	05

## **Appendix C: Flexcar User Process**









## **Appendix D: Cost Charts**

