Carsharing in Austin: A Service Based Approach

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December 14, 2007

Using GIS to Locate Carshare Typical User and Non Typical User Groups in Travis County

A Project for CRP 386: An Introduction to GIS
Professor Dr. Bjorn Sletto
Fall 2007
University of Texas - Austin
Carsharing in Austin, Texas: A Service Approach

Executive Summary

Carsharing is the name of a number of types of shared-use vehicle systems where a fleet of vehicles that can be rented, usually on an hourly basis, is available to persons who are members of the carshare organization. Carshare organizations can be operated in a number of different ways, as a nonprofit, as a privately held company or a cooperative, and carsharing now exists in many parts of the world (Barth et. al. 2006). Austin Carshare is a nonprofit carsharing organization that started in Austin, Texas in October 2006 and currently has a fleet of 5 vehicles (Austin Carshare). Their website says that the organization seeks to help improve the quality of life of the members and the overall livability of the city of Austin while saving money for their members and reducing pollution (Austin Carshare). These are worthy goals considering that Austin has worsening air quality and traffic congestion (CAMPO, Texas Transportation Institute 2007). My research seeks to help identify where Austin Carshare, as a growing nonprofit organization can target user groups as they increase the number of vehicles in their fleet. Demographic and other factors have been analyzed to this end and while only 4 census tracts in the Austin metro Travis County area fit the typical user of carshare, spatial analysis is performed to identify where Austin Carshare could target non-typical user groups in the city.

Introduction

Carsharing is a concept which promotes the shared use of motor vehicles. The carsharing idea was first started by a co-operative in Switzerland in 1948 (Shaheen & Cohen, 2006). Carsharing organizations were started and failed in a number of European and the United States for a number of decades (Shaheen & Cohen, 2006). The concept became popularized in the 1990s and the establishment of CarSharing Portland Inc. marked the first long-term successful commercial carsharing program in the United States (Shaheen et. Al 2006). Carsharing Portland was later aquired by the largest North American carsharing company of today, Zipcar (Flexcar).

The rationale and benefits of carshare are individual and societal based. That is, an individual member of a carsharing organization benefits from the freedom from owning, storing and maintaining a personal vehicle and less vehicles helps cut down on the negative aspects of increasing car ownership (Rodier & Shaheen 2003). The earliest carsharing organizations were motivated by economic benefits to the individual members as well as other motivated by lessening their collective and independent affect on the environment by lessening their transportation greenhouse emissions (Shaheen & Cohen 2006). Indeed, even the largest commercial carshare companies in North America today heavily tout the economic and green benefits of carsharing on their websites as well as more intangible benefits such as “simplifying your life” (Zipcar).

Research has show that the typical users of carsharing services in the United States are overwhelmingly Caucasian, make $50,000 or more annually, are in their late 30s and are highly educated (Burkhardt et. al 2006, Cervero 2006). Diametrical to this is the fact that the majority of the urban areas in the United States are increasingly less white and more diverse in age, race and economic equity than in past decades (Frey 2000). Additionally, research shows that
accessibility to the vehicles by users from means other than personal vehicle (thus cancelling any benefit) is a critical issue (Barth 2001, Kek et al. 2006). These demographic and accessibility factors are critical for a carshare operator to consider.

Ironically, these demographic factors give the carshare operator a challenging task when attempting to found and operate a successful operation in urban America today. Demographic trends suggest that urban areas in the United States are becoming diverse places in terms of race, age and income. A service such as carshare, which has a fairly limited typical user base, should be keen to note these challenges and adjust service to appeal to more people in the urban landscape. Such is the case in Austin, Texas. In Austin, a ‘majority minority’ city with a large Hispanic population, the success of carsharing may depend on replacing the typical user model by adopting a service-based, or an alternative, operating approach.

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These are worthy goals considering that Austin has worsening air quality and traffic congestion (CAMPO, Texas Transportation Institute 2007). My research seeks to help identify where Austin Carshare, as a growing nonprofit organization can target user groups as they increase the number of vehicles in their fleet. As a nonprofit with progressive goals, Austin Carshare may benefit from a service-based model closer to that of a public transit agency than a for-profit business. Meaning, Austin Carshare may look beyond the typical user to other non-typical user groups who may also benefit from carsharing. These non-typical groups can include Hispanic people, those with low income, older drivers as well as African Americans and other minority groups. The staff and board of directors of Austin Carshare have said they embrace a service and community oriented approach and the organization is on the brink of expanding their
fleet. They have also stated that residential density is the main factor employed when looking for new car locations. By keeping residential density as a constant identifying factor of new car locations but exploring alternative demographic and other factors perhaps more locations can be identified which would successfully host Austin Carshare vehicles.

**Problem Statement**

Austin Carshare, like many carshare organizations in the country, are operating in urban areas that are increasingly racially and ethnically diverse and aging. Literature shows that people attracted to carsharing services fit a specific demographic profile- on that is overwhelmingly Caucasian, middle income or higher, in their thirties and highly educated. As demographics in the urban areas where carshares are operating trend away from this typical user profile data gathering becomes all the more important. Carsharing organizations seeking to survive and serve new generation of American urban dwellers should adapt their operations model based on geospatial analysis.

**Hypothesis**

Typical users of carsharing services, as described above will increasingly be found on the fringes of the urban area, often in transit unfriendly, unwalkable, suburban-style settings. Demographics of people found in the urban core will be more diverse racially and by age, will earn less income and will own less personal vehicles than the typical user groups on the urban fringe. The central urban core area will also be more accessible by transit and alternative means other than private vehicle.

**Research Questions:**

Which census tracts in Austin, Texas have the highest occurrence of typical users living at relatively high densities?
Where are these census tracts in location to transit routes and major roads?
What are the characteristics of census tracts in the urban core in relation to the typical users of carshare?
If non-typical census tracts are compared to typical user census tracts according to accessibility by transit, which ones are more accessible?
What are some implications of these relationships for Austin Carshare and carsharing in general?

**Methodology**

**Data Gathering**

Based on the information in the literature about carsharing, I knew that demographic data, such as race and age was needed. Income data, residential density and educational attainment were also needed. Additionally, I sought data about vehicle ownership even though a direct link between vehicle ownership and carsharing has not been established. In order to measure accessibility by non-auto means line and point files were needed from Capital Metro, the transit authority, and bike route data was sought. All of this data needed to be defined into a spatial relationship, in this case by census tract.
The shape files needed for the project were downloaded from the City of Austin’s GIS website. These included census blocks and census tract shape files, major and minor road line files, park shape files and aerial photos. Other demographic data was downloaded from the United States Census Bureau website. This downloaded in the form of comma delineated files, excel spreadsheet files or database files. The were eventually all converted to a database file format (.dbf) before being added to and joined to the shape files. This data includes information about race, age, educational attainment, income and access to vehicle. These were all located either in the Census SF 1 data (race, age) or in the SF3 data (educational attainment, income, access to vehicle).

Other point and line files obtained from the City of Austin GIS website were those of park shape files, bicycle route line files, major and minor road files and aerial photography. Capital Metro stop point files and line bus route files were obtained from Capital Metro staff via Elizabeth Walsh, a UT-Austin colleague.

Steps in Data Analysis and Management
All data was saved in a centralized area for ease of use and management. The steps taken to join and project the proper data were, in rough order, as follows:

- Race, age, educational attainment, income and access to vehicle data were joined to spatial data (census blocks shape file)

This task was very time consuming. When joining to the census block attribute table, the main joining field used was TRACTID, which was also found in the data downloaded from the U.S. Census website.

- Density was formulated by calculating geometry and using the field calculator

The geometry of all of the Census tracts was calculated and then the density of person/acre was calculated using the field calculator. This allowed density to be another attribute used when selecting.

- All raw number of data (for instance number of Hispanic individuals) was calculated into percentages (i.e. Hispanic person per total population)

This allowed me to give a more clear and accurate picture - by using percentages instead of raw numbers of people when selecting.

- The Select by Attributes function was performed to select Census tracts by various criteria

Once all of the demographic data was joined to the spatial files, it was possible to select by these attributes and show the selection on ArcMap. The data could be displayed categorically or in relation to other data.

- A typical user map was formulated using Select by Attribute
By using this function I was able to select out Census tracts that contain a density of 8 person per acre or greater, a white population of 50% or higher, a higher than 30% of people with bachelors degrees or higher, a population of people aged 30-39 that makes up 15% or more and a median income of $49,570 or higher for the entire Census tract. This is how I formulated the typical user Census blocks.

- A map with Census tracts made up of people with lower income and lower educational attainment was formulated using Select by Attribute

Using this function I was able to select out Census tracts that contain all of the same characteristics as the typical user tracts except the median income was lowered to $35,184 or higher and the educational attainment was lowered to a threshold of only 10% of the population with a bachelors degree or higher.

- A map with Census tracts made up of a lower percentage of people in their thirties, with even lower income than the previous group, but with similar education attainment of the typical users. I generally referred to this as the “student” grouping.

This map focused on people with the same characteristics as the typical user group but in Census tracts with 10% or more of people in their thirties and a median income of $30,000 or more.

- Creation of maps focusing on the typical user tracts

For this series of maps I used the aerial photography obtained from the City of Austin to focus in on the four typical user Census tracts that were found. I also overlaid transit connections and major roads as well as other significant features such as parks. My goal was to perform a basic analysis of these tracts. These were done on a one inch to five thousand foot scale.

- Creation of a comparison map between car ownership, income and educational attainment

A layout map was formatted to compare this separate phenomenon and their spatial relation to each other. Each of these three characteristics were categorized and put into maps at the same scale and laid out together.

- Buffering of transit stops of a quarter mile, dissolving of these features together and overlaying of this onto the typical user and alternative user combined map.

This step was taken in order to move to the next step of identifying where the vehicles could most likely be placed. Furthermore, it helps to analyze the tract more closely and prove the hypothesis.
Findings

Typical User

Four Census tracts of Travis County were identified, using the Select by Attribute function, as containing a density of 8 person per acre or greater, a white population of 50% or higher, a higher than 30% of people with bachelors degrees or higher, a population of people aged 30-39 that makes up 15% or more and a median income of $49,570 or higher. These Census tracts numbers 16.05, 17.56, 17.58 & 18.53. These are identified in the map entitled Carshare Typical User Locations in Travis County.

The communities identified by this analysis area known locally as the West Lynn and Woodlawn neighborhoods (tract 16.05), the Laurel Oaks neighborhood in the Jollyville area (tracts 17.56 & 17.58) and Wells Branch Subdivision (tract 18.53). The most centrally located of these is the West Lynn area which can generally be considered in the Old West Austin neighborhood area. To a great extent the geographic locations of these Census tracts with the highest numbers of carshare typical users prove part of the hypothesis. That is:

1. Typical users will be found in higher number and most often in communities on the urban fringe

As an extension of this finding, it can also be surmised that:

2. Typical users of carshare do not generally reside in the urban core area

The second part of the analysis undertaken concerning the typical user tracts was the overlaying of transit routes and the visual analysis of the areas using aerial photography. This analysis involves a series of maps including:

- The West Lynn and Woodlawn Neighborhoods: Census Tract 16.05
- Laurel Oaks: Census Tracts 17.56 & 17.58 / Wells Branch Subdivision: Census Tract 18.53
- Laurel Oaks/Jollyville: Census Tracts 17.56 & 17.58
- Wells Branch Subdivision: Census Tract 18.53
- West Lynn: Census Tract 16.05

This analysis was performed in order to visually assess the transit connections and land use patterns of the typical user tracts. A general finding that can be understood from this analysis is:

3. Transit connections generally lie to the outer edge of these areas along major road corridors

Another finding which can be understood from examining the maps concerning the northern typical user of Wells Branch Subdivision is that this area is designed with a spatial pattern more reminiscent of typical suburban regions. That is, it contains single outlet collector roads for neighborhoods that feed into larger arterials and contains cul-de-sacs and other non-grid street patterns. This is not the case for the other two areas, Laurel Oaks and West Lynn. These are designed on a more gird pattern system. All of the areas are of principally residential use.
Carshare Typical User Locations in Travis County

Produced by Martin Thomen
Datum: NAD 1983
Projection: State Plane Central Texas NAD Feet
Lambert Conformal Conic
Data Sources: City of Austin: Census Tracts, Major Roads
U.S. Census: Census Tracts
December 12, 2007
The West Lynn and Woodlawn Neighborhoods: Census Tract 16.05

Produced by Martin Thomen
Datum: NAD 1983
Projection: NAD 83 State Plane
Texas Central Feet
Lambert Conformal Conic

Data Sources:
City of Austin GIS data:
Park Inventory, Major Roads.
U.S. Census: Census Tract and Block
Austin Carshare: Car Location
December 11, 2008
Laurel Oaks: Census Tracts 17.56 & 17.58

Wells Branch Subdivision: Census Tract 18.53

Capital Metro Pavillon Park and Ride
Round Rock ISD Caraway Elementary School
Oakview Park

Capital Metro Route #242
Wells Branch Subdivision
Katherine Fleischer Park
Laurel Oaks / Jollyville: Census Tracts 17.56 & 17.58
Wells Branch Subdivision: Census Tract 18.53

Produced by Martin Thomen
Datum: NAD 1983
Projection: State Plane NAD 83 feet
Lambert Conformal Conic
Data Sources: City of Austin Aerial Photos, Major Roads, Park, Capital Metro: Bus Routes & Stops
December 12, 2007
West Lynn: Census Tract 16.05

Produced by Martin Thomen
Datum: NAD 1983
Projection: State Plane NAD 83 feet
Lambert Conformal Conic
Data Sources: City of Austin Aerial Photos, Major Roads, Park, Capital Metro: Bus Routes & Stops
December 12, 2007
Findings (contd.)

Non-typical User

Because the first part of the original hypothesis was proven, then further analysis was undertaken to identify what demographics are present in Census tracts in the urban core of Austin and to understand which variables to the typical user formula should be adjusted in order to capture more potential users. The first analysis performed was to change the median income variable and educational attainment level variable from the original typical user formula. The Select by Attribute function was used to identify Census tracts containing a density of 8 person per acre or greater, a white population of 50% or higher, a higher than 10% of people with bachelors degrees or higher, a population of people aged 30-39 that makes up 15% or more with a median income of $35,184 or higher. These changes are portrayed in the map entitled Lower Income & Educational Attainment Census Tracts in Travis County. A total of 16 Census tracts, including the first four typical user tracts, are identified. Additional Census tracts captured by this analysis include a number of tracts with neighborhoods that are in the general vicinity of the North Lamar area of Austin, such as Allendale/Crestview; two tracts to the east of Interstate 35, including one off of Yager Lane and another in the Cameron Road area; one Census tract bisected by Interstate 35, south of Riverside Drive and four tracts in South Austin.

The second analysis performed further adjusted the variables of the original typical user group formula. This is one that I generally refer to as the “student tract” map. Whether or not the presence of more students in this area is a driving factor in the demographic makeup of the tracts has not been established, but because of the lowering of the age and income threshold, without changing the educational attainment variable, I thought that a number of tracts containing students would be captured. More research is needed to confirm this hypothesis. The formula for the Select by Attribute analysis for tracts these tracts is one that contains a density of 8 person per acre or greater, a white population of 50% or higher, a higher than 30% of people with bachelors degrees or higher, a population of people aged 30-39 that makes up 10% or more with a median income of $30,000 or higher. Again, from the original typical user formula this is a change in only median income and proportion of thirty year old people. The map that portrays this selection is entitled Lower Income “Student” Census Tracts in Travis County.

A total of 32 Census tracts, including the four original typical user tracts and the 16 previous lower income tracts, are identified. This hierarchy of selected tracts was not expected, but helps to make another observation. That is:

4. As the variables of income, education and age stray further from the typical user formula, more Census tracts are identified as potential users if the potential is based only on the other variables of relative residential density and race

More analysis using this method can help to identify exactly which variable is helping to identify more tracts that the typical user formula. My hypothesis for further study is that the median income factor, above all others, is the one most closely affecting the identification of these tracts and that the lower the threshold for median income, the more Census tracts are identified.
Lower Income & Educational Attainment Census Tracts in Travis County

Produced by Martin Thomen
Datum: NAD 1983
Projection: State Plane NAD 83 Lambert Conformal Conic
Data Sources: City of Austin: Major Roads, County shp, Census Tracts
December 12, 2007
Lower Income "Student" Census Tracts in Travis County

Produced by Martin Thomen
Datum: NAD 1983
Projection: State Plane NAD 83
Lambert Conformal Conic
Data Sources: City of Austin:
Major Roads, County shp,
Census Tracts
December 12, 2007
Findings (contd.)

Further Analysis

Two other maps were formulated to further extend the analysis. The first, entitled *Relationship Between Car Ownership, Income, Educational Attainment and Location?* was formulated in order to explore a trend which seemed to suggest income and educational attainment, which have already been proven to be related to each other, are spatially mapped with another map showing incidences of household vehicle accessibility rates. In general it can be said that:

5. Census tracts with lower educational attainment and lower median income also tend to have lower vehicle accessibility rates

This is an important factor to consider when considering the socio-economic impact and attractiveness of car share. Specifically, it begs some questions:

*Should carshare target people who already have access to personal vehicles or those who don’t?*

*If the typical user of carshare already has the financial capabilities to purchase a vehicle or already owns one, can carsharing reduce private vehicle ownership?*

*If a carsharing operation were to target people without access to vehicles, would it help improve those people’s personal mobility while at the same time decreasing the possibility that they will buy a vehicle in the future?*

The second map formulated in this section is also the last map of the project thus far. It is entitled *Locating Shared Vehicles* and it is a first step into further analysis that will allow Austin Carshare to identify areas within typical user and non-typical user Census tracts to place future carsharing vehicles. It was formulated by creating a ¼ area around Capital Metro transit (bus) stops where vehicles could be located. This was because a user of the carshare vehicle must have a means to arrive to and depart from the vehicle location other than private auto. These could include walking, taking transit or biking. This map focuses only on taking transit and helps to establish another finding related to the hypothesis:

6. The areas in which typical users are more numerous are more often less connected to the transit network than areas of non-typical users in the core urban area

The map helps to identify low transit connected areas as the ones that show bright red through the overlay. While the West Lynn typical user area is as highly connected as other non-typical user tracts, the northern tracts of Laurel Oaks and Wells Branch are obviously not very well connected to transit.
Relationship Between Car Ownership, Income, Educational Attainment & Location?

Car Ownership

Ownership Rates
- 0 - 4%
- 4 - 8%
- 8 - 16%
- 16 - 26%
- 26 - 45%

Education

Higher Education Rates
- 0 - 13
- 14 - 26
- 27 - 38
- 39 - 51
- 52 - 64

Median Income

Median Income
- 0 - 33022
- 33023 - 66045
- 66046 - 99067
- 99068 - 132090
- 132091 - 165112

Produced by Martin Thomen
Datum: NAD 1983
Projection: NAD 83 State Plane Feet Lambert Conformal Conic
Data Sources: U.S. Census: Educational Attainment, Income, Vehicle Available. City of Austin: Census Tract shp file
December 12, 2007
Locating Shared Vehicles

- Interstate 35
- Major Roads
- Walkshed of Bus Stops
- Potential Users
- Travis County

Produced by Martin Thomen
Datum: NAD 1983
Projection: NAD 83 State Plane
Central Texas Feet Lambert Conformal Conic
Data Sources: City of Austin: Major Roads, Census Tracts
U.S. Census: Vehicle Availability
December 12, 2007
Analysis

Overall the original hypothesis seems to be supported. That is, the typical user of carshare lives on the urban fringe in areas not as well connected to transit as other areas of the city, particularly the urban core. The extension of the hypothesis that non-typical users of carsharing live in urban core areas more greatly connected to transit also seems proved. The most unclear relationship that currently exists is that between the different variables in the typical user formula and the identification of non-typical user tracts that have similar densities or other qualities of the typical user tracts. My hypothesis steaming from this is that income is the most important factor to identify the best non-typical user tracts for carsharing services.

Of the six findings listed above, some seem more solidly supported and others are less stable and should be tested further. Particularly, finding number four should be refined to include exactly which variables are more elastic in regards to identifying non-typical carshare tracts most suited for carsharing. Furthermore, if carsharing is to be extended to non-typical users, it cannot simply be done by locating a car in a non-typical user area. This is because location and distance is likely not the sole or even the major factor determining use of carsharing. Rather, to capture users beyond the typical users a carsharing organization would have to start by examining the operations, marketing and management as well. Many of the non-typical users could simply be being “priced out” of these services. Others may feel disenfranchised by the marketing or technology-based nature of the services. Others still may simply be unaware of the advantages and existence of carsharing services.

The final analysis performed raises some sticky questions for carshare operators, but ones that if answered, will ultimately improve, enhance and expand carsharing services. These involve questions of operations in areas of low car ownership, lower income and ones that are more racially diverse. A few of those, repeated from above are here as well:

*Should carshare target people who already have access to personal vehicles or those who don’t?*

*If the typical user of carshare already has the financial capabilities to purchase a vehicle or already owns one, can carsharing reduce private vehicle ownership?*

*If a carsharing operation were to target people without access to vehicles, would it help improve those people’s personal mobility while at the same time decreasing the possibility that they will buy a vehicle in the future?*

If carsharing did operate in areas of the urban core that had lower vehicle access, higher racial diversity and lower income this would certainly have implication on its operations and management. Again, if these questions and others can be raise, confronted in a thoughtful manner and answered successfully then that would improve carsharing tremendously. It could be the fact that carsharing organizations only want to target the typical user of today, but I feel that this is a lose-lose situation for the future.

Conclusion

Carsharing is an innovative and promising program that can do a lot to relieve persistent urban problems such as traffic congestion, worsening air quality and decreased mobility. Unfortunately the typical user of this service is a falling share of the urban population.
Carsharing organizations, like the one in Austin, Texas, must make decisions as they seek to expand services and serve a larger community. Should they chase typical users to the urban fringe, places that are perhaps not as friendly to the carsharing model, or should they refocus efforts in the urban core and seek to expand the user base? Better yet, can they do both and maintain success?

This study is one that uses geospatial data to help in these efforts to focus on the future of carsharing services. It is one that will require further research and analysis, but that has so far promised to be an insightful resource for carsharing organizations.

**Further Research**

As stated above, each of the variables in the typical user formula should be explored in more detail to find which one is most telling in determining which Census tracts are have a high typical user population and which ones don’t, but have similar characteristics. These are possibilities for further exploring this:

- Extend the analysis to the block or block group level
- Weight the variables of the typical user formula

Also, further exploration of the connections between non-auto transportation and the typical user and non typical user tracts is necessary. This would involve bring in data about sidewalks, bike lanes and other alternative transportation data. The background research should be expanded to understand other phenomena at work in respect to carsharing. Lastly, further exploration of vehicle access and lower income and education groups can be performed.

Much of this research will be performed in the Spring of 2008 as a part of my professional report in the University of Texas – Austin School of Architecture, Department of Community and Regional Development. The initial proposal and timeline for this research is attached in Appendix 3.
APPENDIX 1: DATA SOURCES AND INFORMATION

Data sources:
United States Census: www.census.gov
SF 3 - Tabular source: Residential Vehicle Access, Educational Attainment, Median Income (by Census Tract)
SF 1 - Tabular source: Race, Population (by Census Tract)
Capital Metro: Shape/line file of Bus Routes and Bus Stops (from Elizabeth Walsh)
City of Austin GIS ftp site ftp://ftp.ci.austin.tx.us/GIS-Data/Regional/coa_gis.html
Shape File: Census Tract shape files, Major Roads and Arterial shape/line files, Parks shape files, Bike route line file, Census Block shape file
Aerial Photography: Aerial photography jpeg files

Summary of Analysis:
- Race, age, educational attainment, income and access to vehicle data were joined to spatial data (census blocks shape file)
- Density was formulated by calculating geometry and using the field calculator
- All raw number of data (for instance number of Hispanic individuals) was calculated into percentages (i.e. Hispanic person per total population)
- The Select by Attributes function was performed to select Census tracts by various criteria
- A typical user map was formulated using Select by Attribute

By using this function I was able to select out Census tracts that contain a density of 8 person per acre or greater, a white population of 50% or higher, a higher than 30% of people with bachelors degrees or higher, a population of people aged 30-39 that makes up 15% or more and a median income of $49,570 or higher for the entire Census tract. This is how I formulated the typical user Census blocks.
- A map with Census tracts made up of people with lower income and lower educational attainment was formulated using Select by Attribute

Using this function I was able to select out Census tracts that contain all of the same characteristics as the typical user tracts except the median income was lowered to $35,184 or higher and the educational attainment was lowered to a threshold of only 10% of the population with a bachelors degree or higher.
- A map with Census tracts made up of a lower percentage of people in their thirties, with even lower income than the previous group, but with similar education attainment of the typical users. I generally referred to this as the “student” grouping.

This map focused on people with the same characteristics as the typical user group but in Census tracts with 10% or more of people in their thirties and a median income of $30,000 or more.
- Creation of maps focusing on the typical user tracts

For this series of maps I used the aerial photography obtained from the City of Austin to focus in on the four typical user Census tracts that were found. I also overlaid transit connections and major roads as well as other significant features such as parks. My goal was to perform a basic analysis of these tracts. These were done on a one inch to five thousand foot scale.
- Creation of a comparison map between car ownership, income and educational attainment

A layout map was formatted to compare this separate phenomenon and their spatial relation to each other. Each of these three characteristics were categorized and put into maps at the same scale and laid out together.
- Buffering of transit stops of a quarter mile, dissolving of these features together and overlaying of this onto the typical user and alternative user combined map.

Summary of Metadata:
Datum: NAD 1983, Projection: NAD 83 State Plane Texas Central Feet Lambert Conformal Conic
Carsharing in Austin: A Service Based Approach

Study Area Map

*Travis County, Texas*
APPENDIX 3:

Martin Thomen
Spring 2008 Professional Report Initial Proposal and Timeline

Demographics, Demand Characteristics and Social Implications of Carsharing

Summary
The typical user of carsharing services in the United States is white, middle class and highly educated. This fact presents a conundrum for carsharing organizations that are based in urban areas of the country, which are increasingly majority-minority and home to a large percentage of low income persons. This report seeks to investigate how demand characteristics and demographics of urban areas in the United States affect carshare organizations through a case study of Austin, Texas and Austin Carshare. Findings will be shown using GIS technology and the social and environmental aspects and implications of this geography will be discussed.

Introduction
Carsharing is the name of a number of types of shared-use vehicle systems where a fleet of vehicles that can be rented, usually on an hourly basis, is available to persons who are members of the organization. Carshare organizations can be operated in a number of different ways, as a nonprofit, as a privately held company or a cooperative, and carsharing now exists in many parts of the world (Barth et. al. 2006). The concept of carsharing has its origins in Europe and started from movements organized on collective and environmentally friendly principles. It is one part of a larger ‘green movement’ that is moving into the mainstream of the United States culture.

Carshare is an increasing mode within the urban transportation mix (Seattle Post-Intelligencer). Furthermore, the demographics of cities in the United States are diversifying. While carshare is currently a growing mode, its current typical user base is decreasing across urban areas of the country. If carshare is to maintain growth to become a major player in urban transportation, it must consider the demographic realities that it is facing. Facing that reality may have major consequences on its operations model and how it targets in which locations to place vehicles in its fleet. This report will use Austin, Texas as an example of the choices that growing carshare organizations will increasingly face as they expand.

Research Questions
Where is the carshare “typical user group” spatially located in Austin, Texas?
How does this spatial location affect the demand for and location of carshare fleet vehicles?
What are the social and environmental benefits of carsharing; how can these be marketed to and captured by a larger number of users?
With consideration that Austin is a majority-minority community, and that the typical carshare user is a small and decreasing percentage of the population in the Austin carshare market, what other user groups would Austin Carshare be keen to reach out to and what criteria could define these groups?
What are the current constraints to expanding carshare to others outside of the typical user group?

Relevancy
Research has show that the typical users of carsharing services in this country are overwhelmingly Caucasian, make $50,000 or more annually, are in their late 30s and are highly educated (Burkhardt et. al 2006, Cervero 2006). Austin, Texas is a ‘majority minority’ city with a large Hispanic population in which the success of carsharing may depend on replacing the typical user model by adopting a service-based approach. The way in which Austin Carshare can locate vehicles in non-typical user areas and perhaps change its service model will be discussed.

Austin Carshare is a nonprofit carsharing organization that started in Austin in October 2006 and currently has a fleet of 5 vehicles (Austin Carshare). Their website says that the organization seeks to help improve the quality of life of the members and the overall livability of the city of Austin while saving money for their members and reducing pollution (Austin Carshare). These are worthy goals considering that Austin has worsening air quality and traffic congestion (CAMPO, Texas Transportation Institute 2007). As a part of my research I hope to help identify where Austin Carshare, as a growing nonprofit organization can target user groups as they increase the number of vehicles in their fleet.

As a nonprofit with progressive goals, Austin Carshare may benefit from a service-based model much like that of a public transit agency. Meaning, Austin Carshare may look beyond the typical user to other non-typical user
groups who may also benefit from carsharing. These non-typical groups can include Hispanic people, those with low income, older drivers as well as African Americans and other minority groups. The staff and board of directors of Austin Carshare have said they embrace a service and community oriented approach and the organization is on the brink of expanding their fleet. Hopefully my project will provide some guidance as they expand.

The same social conundrum that carshare faces is one that is faced by a number of facets of the green movement throughout the nation. How are green urban initiatives to move forward when the base of their operations are middle class white people? How can these organizations and movements change their operations in order to appeal to lower income or more racially diverse populations than they are currently? The discussion about carshare will act as a window into this values choice that is being made by a number of urban green organizations.

Topics for Literature Review
Carshare Demand Characteristics, User Groups, Case Studies
Carsharing Travel Behavior Impacts, Environmental and Social Impacts
Environmental Justice, Green Critique, Urban Demographics

Implications of the Research
The most elemental implication of this report will be to allow Austin Carshare to better understand the market they are working within in relation to the typical user group. The spatial analysis performed will help the organization to identify which areas of the city (census blocks) are the best ones to locate their growing fleet. The report will also suggest that because the typical user is in the minority in the city population that a more comprehensive view of the city population, those who could be attracted to carsharing with some operational changes, is important. While it is beyond the scope of this report to suggest exactly what changes will attract other groups to carshare, it will serve as a platform for the discussion of the inclusion of other segments of the population into carsharing. Spatial data will also be provided about the location of the non-typical user groups.

Methodology
A literature review about carsharing will be performed. A wider body of literature that discusses transportation, access and demographics will also be performed. The first part of the report will be a discussion of these elements and how carsharing organizations are affected by urban demographics and how they can respond to maintain financial solvency and effective service levels. Case studies and operating models from a variety of North American cities will be analyzed and discussed.

In the second part of the report spatial analysis using GIS will be performed. The city of Austin will be analyzed in relation to the first part of the report and the demographic implications. This will be an initial demand analysis scheme for the city based on where the “typical user” group is found and how many typical users reside in Austin in order to make carsharing viable. It will also work to help identify where other, non-typical users reside who may be the target of a The final part of the report will focus on the Austin case study and the implications on the operations and vehicle locations for the Austin Carshare organization.

Spatial Analysis Methodology
I will first formulate a map in GIS, based on census blocks, of areas where the most concentrated number of ‘typical users’ of carsharing reside. That is, white people who earn a $50,000 or more annual salary, who are highly educated and are in their late 30s. I may also take a residential density measurement into account. I will try to identify, based on these criteria, in which census blocks Austin Carshare should locate future automobiles for member usage. This will serve as the typical user model for target areas for locating cars.

Secondly, I will create a GIS map that will locate where Austin Carshare may choose to put automobiles if it adopted a service-based model of future expansion. The criteria that will define these areas are where there is a low rate of car ownership, a lower mean income and a high minority population. This will also be on the census block scale. I will also take residential density into account for this model.

I will then compare these two maps to analyze where Austin Carshare would like to locate cars based on the typical user model and then on the service-based model. I will include bicycle route and bus route data in each map and create a buffer around them to further help identify areas where cars can be located. Research has shown that carshare works best when located in areas accessible to walking and other alternative transportation means.
Initial PR Schedule

November - December 2007
- Finalize Initial Proposal with readers (Dr. Ming Zhang, Dr. Bjorn Sletto) and with academic advisor (Dr. Michael Oden)

December 7, 2007
- Turn in ‘purple form’ to Rosemin Gopaul and register for PR class for Spring 2008 semester

December 14, 2007
- Finish GIS case study/spatial analysis as a part of Fall 2007 Intro to GIS class with Dr. Sletto

December 19, 2007
- Begin literature review for carshare, demographic/access of urban transportation, and green movement/sustainability vs. environmental justice.

Spring 2008 Semester (proposed)
- Regular meetings with Dr. Zhang and Dr. Sletto
- February 15, 2008 finalization of literature review/analysis
- March 15, 2008 complete first draft turned in to readers.
- April 15, 2008 revised PR turned in to readers.
- Late April/early May, preparation of final copy, final edits
- May 2008 final copy of PR brought to tower
BIBLIOGRAPHY

Austin Carshare, Website. http://www.austincarshare.com


