Usability Professionals' Association 2009 International Conference
Bringing Usability to Life
Making everyday things better

GoGrocery: Community-based transportation to support a sustainable lifestyle

PAPER SUMMARY

Topic Category:	[ ] Enhancing general usability skills [ ] Usability method implementation or adaptation [ ] Building usability within the organization or product life cycle [ ] Issues and strategies for experienced usability professionals [X] "Outside the box"
Presentation Type	[ ] Business case study [ ] How-to Discussion [X] Overview of a concept, philosophy or methodology [ ] Presentation of design approach or guidelines [ ] Other: _____
Intended Audience:	[ ] Basics for People Who Are New to Usability [ ] Topics for People Who Are Experienced in Usability but New to the Topic [X] Topics for People Who Are Experienced in Usability and the Topic [ ] In-Depth, Specialized, or Research Topics [ ] Leaders and Mentors [ ] Friends and Allies [ ] Anyone

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GoGrocery: Community-based transportation to support a sustainable lifestyle

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Abstract

We propose a community owned door-to-door transport service that enables people living in the same apartment community to collectively make trips to nearby grocery stores. Our design supports sustainable use of resources and ultimately a more sustainable lifestyle by providing individuals with a convenient, reliable, efficient, and community-oriented alternative to the typical single occupancy vehicle travel to the grocery store.

Keywords

Sustainable transportation, sustainable interaction design, grocery shopping, public transportation, community

Introduction

We live in a time of environmental crisis due to global warming [5]. According to the Environmental Protection Agency, the transportation sector is responsible for approximately 25 percent of all greenhouse gas emissions produced by the United States [10]. The ubiquitous use of the passenger vehicle is the primary contributor of CO_2 emissions among the different modes of transportation [1,3]. Emissions from these vehicles have steadily grown since 1990 due to the increasing number and use of such vehicles [3]. The ubiquitous use of the passenger vehicle requires extensive infrastructure, such as highways, city streets, and parking lots [9]. This infrastructure requires land use change and the reduction of green space. According to the Intergovernmental Panel on Climate Change, land use change accounts for up to one-third of total CO_2 emissions [5]. The preservation of our public land therefore reduces CO_2 emissions. In addition, the preserved public land can serve as necessary green space which enhances the quality of life for members of the local community.

The automobile-centric nature of our culture is fundamentally not sustainable. Scientists throughout the world hold that petroleum production will decline in the near future, yet it is projected that by 2030 the global demand for oil will increase by 37%, primarily due to the increase in demand from the transportation sector [2].

Public transportation is more sustainable than private vehicle use because it reduces the use of passenger vehicles and therefore reduces emissions, fuel consumption, traffic congestion as well as the need for creation and maintenance of road infrastructure and parking.

Foehlich et al suggest that reducing the obstacles of not driving could motivate green travel [4]. The goal of our project is to provide a service that effectively meets specific and important transportation needs of residents in our local community, so they are less likely to possess or utilize a privately owned vehicle. We propose a community owned door-to-door transport service that enables people living in the same apartment community to collectively make trips to nearby grocery stores. Our design supports the sustainable use of resources, and ultimately a more sustainable lifestyle, by providing the individual with a convenient, reliable, efficient, and community-oriented alternative to the typical single occupancy vehicle travel to the grocery store.

Design Methodology

Our design was informed by extensive primary and secondary research. We engaged in several primary research activities. We conducted field observations of people waiting at a bus stop, travelling by bus, and using automobiles in our local community. We also observed people using a public train in a large city. In addition, we conducted interviews and a survey to gain greater understanding of how people perceive and utilize public transportation. We organized our extensive primary and secondary research using an affinity diagram.

Survey Regarding Use of Public Transportation and Commuting to Work or School

We conducted an online survey among 56 participants in the local community to gain a greater understanding of their experiences of commuting using public transportation. The public transportation available in the local community is bus service only. Approximately 65% of the respondents indicated that they would prefer to bike, walk, use public transportation, or other sustainable options rather than private transportation to commute. Yet, on the contrary, the majority of respondents who own a car reported that they do not use public transportation to commute daily to work or school. Some interesting qualitative data from the survey include the following: I use public transportation... "When it is close to my starting point and destination and when I am not carrying much." "If the bus times are convenient to when I need to be at work/class, and I don't need to do errands on my way home, I'll take the bus. I drive myself if I want to do errands on my way home or I'm running late and will likely miss the bus."

The key insight that we derived from the survey is that there are significant barriers that prevent people from using public transportation on a regular basis. We inferred that convenience is of prime importance to commuters. We conducted further research to better understand these barriers to public transportation use.

Field Observation of People Waiting at Public Bus Stop

We observed approximately 40 people waiting at a local bus stop during peak hours of use. Secondary research revealed that a principle deterrent to use of public transportation is the uncertainly an individual feels in regard to how long s/he will have to wait [6]. This secondary research was supported by our observation that the majority of people continually looked in the direction from which the bus would arrive. An additional observation that informed our design is that the people we observed were prepared to wait for a significant period of time. Individuals were appropriately dressed for the cold weather. We concluded that the act of waiting for a bus is a barrier to regular use due to weather conditions and the uncertainty of the bus arrival time.

Field Observation of People Riding the Public Bus

We travelled with and observed approximately 30 people on a bus in our local community during peak hours of use. We observed that people did not appear to speak to those they didn't know, yet many people who appeared to know one another engaged in conversation. Our key conclusion from this observation is that the close quarters of the bus encouraged social activity among friends and acquaintances. We concluded that facilitating use of public transportation among friends and acquaintances can make its utilization more desirable and fun.

Field Observation of People Using Automobiles at a Busy Street Intersection

The purpose of this observation was to gain a better understanding of the driving culture in our local community. Team members recorded the number of single occupant vehicles that travelled a busy street on a week day morning. The busy street was observed for 30 minutes. Only 16% of vehicles (61 out of 387) had more than one occupant. This observed predominance

of single occupancy vehicle usage is consistent with national statistics [12]. We concluded from this observation that the true capacity of an automobile is not well utilized (approx 3 seats go unused for every single occupant vehicle). The single occupant use of the automobile is ubiquitous and wasteful.

Ethnographic Participant Observation of Chicago Public Elevated Train

Secondary research reveals that more than two thirds of the passengers of the public train in Chicago choose this service over other available means of transportation, including private transportation [7]. The purpose of this observation was to better understand the elements that make up a successful public transportation experience. One of the team members experienced the elevated train in Chicago. A key observation is that the train was well utilized by people from all economic backgrounds, including those well dressed in business suits. The team member's experience of using the train revealed that it is an efficient, reliable, safe, affordable and convenient mode of transportation. The presence of these factors appears to be critical in explaining the train's popularity across a diverse population.

User Interviews Regarding Use of Public Transportation

We conducted 16 semi-structured interviews with open-ended questions among people who live in different areas of the United States regarding their experience using public transportation. Bus travel was noted as unreliable by several participants. They reported that waiting for public transportation is unpleasant particularly if the weather is bad or if the user is uncertain as to whether or not the bus is on schedule. Many participants expressed that the schedule of the bus did not accommodate their schedule and that the limited schedule, particularly on the weekends, was a barrier to use. Some of our participants reported that even though they use public transportation for their commute, they rely on a private vehicle for grocery shopping. Participants also reported that the use of public transportation for making a trip to the grocery store is inconvenient due to the taxing experience of physically carrying the groceries to and from the bus. The key insights derived from the interviews include the following: reliability of transportation is very important; providing participants with greater control over the bus schedule will encourage use of public transportation; and the current public transportation does not effectively allow people to comfortably complete the regular errand of grocery shopping.

Throughout our design process, we had five separate brainstorming sessions during which the team explored over 50 design concepts. The brainstorming sessions were followed by additional primary and secondary research. We evaluated our design concepts based on a success matrix with the following parameters: efficient use of resources, carbon footprint, quality of life for user, community building, affordability and long term benefits. After zeroing in on a final concept, we created multiple iterations of our prototype.

Our Design Concept

Our major research insights led us to the design of a sustainable, reliable, efficient and convenient community transportation system for making regular grocery shopping trips.

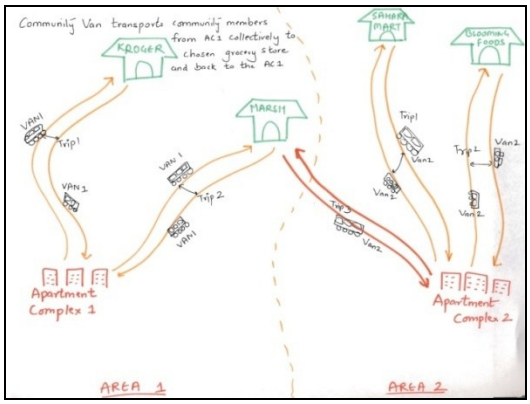

Figure 1. Our Design Concept

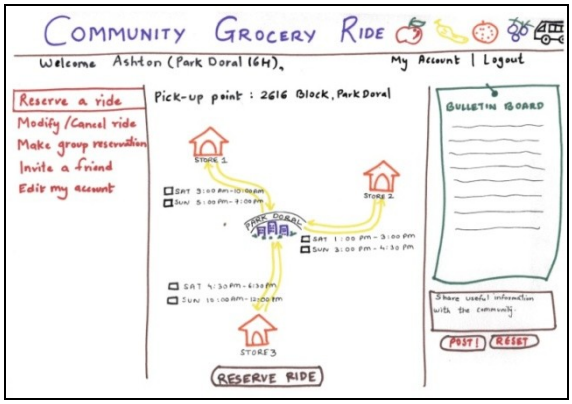

Figure 2. Ride Reservation Website

Figure 1 illustrates our design concept. In this model, grocery stores and apartment communities are well connected through a sustainable transportation system. A community van owned by each apartment community (or shared across nearby apartment communities) transports the residents to their chosen grocery store at their preferred time.

The system will be implemented as an additional free service provided by an apartment community to its residents. Each apartment community conducts an online survey prior to introducing this service to gather information about the grocery shopping habits of its residents. The survey requests information regarding the grocery stores they frequent, their preferred grocery shopping days and times, and the average amount of time spent grocery shopping. Also, each apartment community repeats this process of survey circulation and analysis each year during the lease renewal season, so as to incorporate the grocery shopping habits of new residents and changing habits of the existing residents. The service is then implemented in a way so that it meets the popular demands of most of the apartment residents. For instance, trips are scheduled 3-4 times each week to each of the three grocery stores that most residents in that apartment community frequent. It also provides access to the farmers' market and community owned cooperative grocery stores, which are generally away from the bus line, to make sustainable food more accessible.

We acknowledge that there are differences in peoples' grocery shopping habits and behaviors and that the system cannot be customized to suit each individual's preferences, but there are patterns and commonalities in our grocery shopping habits. For instance, most people prefer grocery stores closer to their home, do grocery shopping on weekends, and on an average spend 45 minutes in a grocery store. These generalizations emerged out of our user interviews and were also validated through our concept testing. Our design leverages these common grocery shopping habits and patterns of people living in the same community.

The system provides a convenient transportation option through a door-to-door drop off service. It provides the users with flexibility to personalize their trip schedule by selecting their preferred travel time. Unlike most public transportation systems which are very time consuming, our design also minimizes the travel time for the trip by providing direct access to and from the grocery store without any intermediate stops. The interior of the van is thoughtfully designed to provide enough space for each passenger to separately store their groceries.

When a new resident signs a lease with the apartment community, an online profile is created with his/her basic demographic information (e.g. name, apartment community and apartment number) that can be accessed via a website. Once the profile has been created, the apartment resident can log in and select a preferred pick-up point inside the apartment community. The user is provided with a visualization of the available grocery stores and trip schedule options. The user can use the website to reserve new ride(s), delete or modify the chosen ride(s), inform and invite friends living in the same apartment community to join him/her for the grocery shopping trip, and share information about ongoing discounts in grocery stores with other community members (Figure 2).

It should be noted that to ensure a sustainable service, the community van only makes a trip if the number of passenger reservations is more than a threshold value (approximately 60%) of the total seating capacity of the van. The residents can also make group reservations to use the community van for a trip to a grocery store at times when the van is not already scheduled. Here again, the minimum number of passengers should be greater than that threshold value.

User testing

Our user testing session involved both concept testing and usability testing. We first conducted concept testing to validate our design concept, followed by usability testing of the ride reservation website prototype. Since we envision this system to be most beneficial to those living in apartment communities, we recruited 10 participants who live in an apartment community or had recently lived in an apartment community. We created two paper prototypes: the first to elucidate the design concept (Figure 1) and the second to evaluate the usability of the website (Figure 2). A paper prototype was used because the disposability of paper encourages experimentation and speedy iteration [8]. At this point in the process, we did not emphasize the aesthetics of the design. We thus considered it best to use paper prototypes to explore, validate and foster constructive feedback from our participants.

Procedure
We asked each of the participants to complete a pre-test questionnaire to better understand their current grocery shopping habits and their commuting experiences to and from the grocery store. Further we explained the design concept using the concept sketch (Figure 1) and asked for feedback regarding it. This concept testing was followed by a usability evaluation of a low-fidelity paper prototype of the ride reservation website. We provided our participants with different scenario based tasks (such as schedule a ride, modify a ride, delete a ride) to test its usability. At the end, we asked our participants to rate the design concept on a Likert Scale.

Findings from concept testing
All of our test participants were pleased with our design concept and expressed their willingness to use it. Our concept testing revealed that providing trips to and from at least three grocery stores on weekends was a reasonable choice for all participants. All participants appreciated the design for connecting with other members in the community. Each participant valued direct access to the grocery store and the fact that the community van would be specially designed to accommodate their groceries comfortably. Participants appreciated the fact that the destinations and trip schedules would be customized according to the popular habits of the community members. They expressed that a customized schedule is pivotal for the success of this system.

Findings from usability testing
All participants could successfully schedule a ride, cancel a ride and modify a ride. They found the visualization extremely useful and easy to understand. They also found the idea of sharing useful information with community members appealing. One participant suggested that the electronic bulletin board present on the website should be designed to allow for sorting, filtering and searching of information based on store names, products, or community member names in order to make the information more easily accessible.

Design Recommendations
Even though people who own a vehicle expressed interest in utilizing this service instead of using their private vehicle, we realized that additional motivational incentives should be incorporated into the design to make it more appealing to them. The design should provide persuasive feedback that would encourage community members to make a sustainable transportation choice to commute to the grocery store.

Our concept testing revealed that 90% of the participants ranked sustainability insignificant when compared to their own convenience and safety. Thus, the design should illustrate to the user the environmental impact of their transportation choice on their well being.

Strategy

We believe that we have created a valuable service that will be very appealing to not only the apartment community residents but also apartment community owners. To validate the feasibility of our design concept, we conducted phone interviews with managers of two apartment communities that provide a van service to its residents for commuting to and from the campus. Both owners indicated that the transportation services are well utilized and are an attraction for future tenants. In addition, we conducted phone interview with a grocery store manager that provides van service to and from the grocery store for campus residents. He also stated that the service is successful and they are planning to expand to apartment complexes.

Our future work entails conducting additional user research in other communities to determine the viability of the implementation of the system in other areas of the United States. In addition, we are exploring different ways in which funding can be generated to allow for full implementation of the system in our local community.

Conclusion

We have designed a human-centered, sustainable, convenient, reliable and efficient service that was proven to be very appealing to users. Our concept strives to reduce greenhouse gas emissions, fuel consumption, and demand for road and parking infrastructure. It promotes conservation and renewal of green spaces and provides users one less reason to depend on private vehicles. Apart from incorporating the benefits of public transportation, our design concept also addresses the primary barriers to use of public transportation that we identified

through our research. As noted above, the barriers include the following: anxiety experienced due to uncertainty of arrival time of the bus which is elevated during severe weather; the experience of unnecessary additional travel time; no control over the schedule; and difficulty in transporting a sufficient amount of groceries. Our design holds great potential in not only promoting sustainable transportation, but also in fostering a sense of community. It supports sustainable food options like the farmers market and local cooperative grocery stores, and also a housing option (apartment community) that is more sustainable than suburban housing.

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