USER EXPECTATIONS AND PREFERENCES FOR A SMARTPHONE APPLICATION TO SUPPORT PARATRANSIT RIDERS

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ABSTRACT

This paper reports the results of a study conducted to understand the demand, preference, and expectations for a smartphone application for paratransit reservations and services. Twenty-five paratransit riders with varied disabilities from a medium sized city in the northeastern United States participated in a survey study. The results indicate great interest in a smartphone app, and the data suggest features that need to be prioritized for an initial prototype.

INTRODUCTION

Paratransit is an on-demand passenger transportation service provided by public transit agencies as mandated by the ADA Title II. The most common problems in paratransit service reported by field experts, staff members and riders (National Council on Disability, 2005; Federal Transit Agency, 2002; Disability Rights Education & Defense Fund, 2010, Topic Guide 4: Telephone Hold Time; Participants of a local transit advisory meeting, personal communication, April 29, 2014) include:

- Callers placed on very long hold times by underpaid, rude dispatchers working in understaffed offices.
- Regular agency trip denials.
- Lack of provision to make changes in a reservation after office hours.
- Changes in schedule by the agency without notice to the rider that affect overall on-time performance.
- High volume of passenger no-shows and late cancellations.
- Vehicles arriving after scheduled pickup time.
- Uncertainty of ride duration.
- Poor quality control.
- Inaccurate or false reporting of service performance by contractors and subcontractors.

Technology currently used by paratransit agencies includes Automated Vehicle Locator systems (AVL), Mobile Data Terminals (MDTs), and Interactive Voice Response systems (IVR). AVLs allow the agency to monitor the location of paratransit vehicles in real time; IVR is used for trip scheduling and information; and MDTs are used to log arrivals and departures in real time. Trapeze, Inc. is a major technology provider of paratransit fleet management software suites. Trapeze software systems enable the service providers to manage late cancellations, no-shows and missed trips, send automated reminder calls for upcoming trips, provide online bookings, provide riders with a self-serve SMS and E-Mail based solution to make bookings around the clock and enable drivers or dispatchers to send outbound notifications ("Demand Response", n.d.). Although Trapeze and other similar technology companies provide software solutions to paratransit agencies, an accessible and personalized means to access information is still missing for the rider, particularly on mobile platforms like smartphones and tablets.

Smartphone applications are a popular alternative to the World Wide Web as a method for accessing resources. Time spent on mobile web dropped by 6% in one year from 2013-2014 (Khalaf, 2014). An average smartphone user in the US spends 88% of time on a mobile phone within an app and 12% in the web browser (Comscore, 2014). Further, using the web browser may also be more difficult for individuals with disabilities than an accessible app. In addition, apps have been shown to be a valuable tool for passengers on public transit (Daus & Mischel, 2014). For example, an app was launched in Chicago to locate wheelchair-accessible vehicles as a part of new dispatch program (Sierzputowski, 2013). Chicago also plans to release a smartphone app that connects riders with the closest available taxi in the city (Hilkevitch, 2014). New York City launched a program called the Accessible Dispatch Program (ADP) in 2012 (Daus & Mischel, 2014) to provide on-demand accessible taxi service which can be booked in multiple ways including a smartphone app ("Accessible Dispatch", n.d.). The ADP enabled wheelchair users to find accessible taxis in New York City more easily (TLC, 2013). A multitude of applications also exist for monitoring schedules and planning trips on the public fixed-route bus and metro/subway systems in most cities.

Despite the availability of these helpful applications for other forms of transportation, a similar application is missing for paratransit passengers. A smartphone app for paratransit riders could provide numerous benefits such as: reduced reservation wait time on the telephone, flexibility to make changes especially after office hours, improved verification of on-time performance data from customers and contractors, reduced false no-show records, reduced pick-up wait time, improved rider safety, reduced overall ride time with real-time GPS tracking of the van, reduced fuel consumption, reduced late cancellations, collection of unbiased data on service quality and driver performance.

PURPOSE

The purpose of this study was to gain a preliminary understanding of user expectations and preferences for a smartphone application to support paratransit riders. The information collected will be used to inform the design of an initial prototype of an app.

PROCEDURE

Twenty-five paratransit users over the age of 18 were recruited from several local sources in a medium sized city in the northeastern United States. Participants were asked about their experiences, positive and negative, with current paratransit reservation and trip services. Participants then completed a two-part questionnaire about a potential smartphone app for paratransit services. The first part determined the likelihood and reasons participants might use a smartphone application for paratransit. In addition, participants were asked to identify features they would desire in a paratransit app. The second part of the questionnaire asked participants to rate the importance of 26 specific features (Table 1) proposed for a paratransit app. The proposed features were determined based on an industry investigation of existing transit mobile apps, documented issues in paratransit service, personal interviews with industry experts, and first-hand observation of paratransit implementation. Each proposed feature was rated using a five-point Likert scale (1='not important at all'; 5='very important'). The features covered 6 categories: scheduling, payment, ride information and notifications, service quality, user no-shows and late cancellations, and emergency. Descriptive statistics were used to analyze the data collected including frequency distribution, mean ratings for each of the 26 features, and mean ratings for each of the six categories.

RESULTS

The sample included 10 males and 15 females. The mean age of the participants was 45 years. Over seventy five percent of the participants completed some college education or higher. The sample included people with a wide variety of disabilities, including cerebral palsy (n=10), vision impairment (n=7), degenerative neuromuscular disease (n=2), spinal cord injury (n=1), and other (n=4).

The most commonly reported current issues in paratransit services included: IVR is frustrating and hard to use, cannot make reservations after office hours, long ride time and rude operators. When asked about features they would desire in a smart phone application, the most common participant responses were: bus tracking, expected time for arrival (ETA) information, make payments through charge card and review reservation info before confirming.

Twenty-two out of 25 participants (88%) said they were likely to use a paratransit smartphone app. One participant was neutral, and two said they were unlikely to use it because they did not have a smartphone. Table 1 shows the mean participant ratings for each of the 26 features from Part 2 of the survey. The highest rated features were: *review and confirm reservation*, and *make changes to a reservation*. The lowest rated feature was *make payments using a registered charge card (credit or debit)*. Figure 1 shows the mean importance rating of each of the 6 categories of features. *Scheduling* was highest rated category whereas *payment* was least rated category.

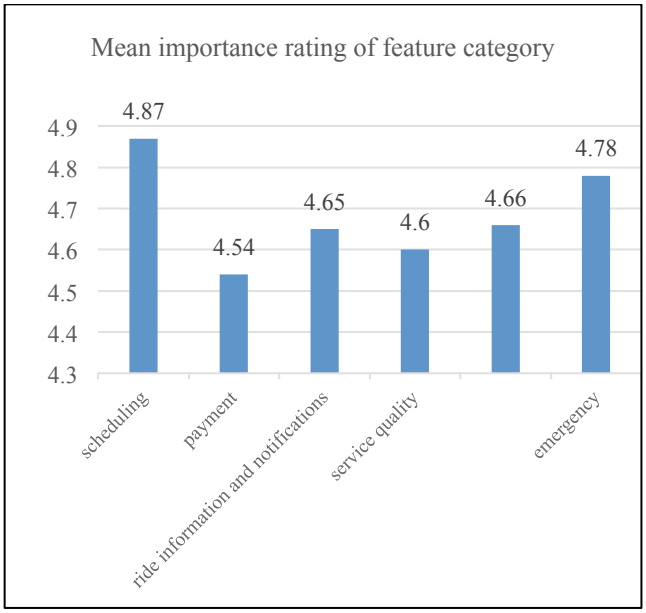

Figure 1: Mean importance rating of each category of features

DISCUSSION

Participants were enthusiastic about the potential of a smartphone app to improve the quality of their paratransit experience. Most participants in this study reported limited experience using other types of transportation-related smartphone applications, while those who used them reported difficulty in using them due to lack of accessibility. More than 60% of participants reported they do not currently use a smartphone at all. Despite these reports, 22 of the 25 participants (88%) reported they would likely use a paratransit app. Participants without a smartphone were willing to buy one or would look to use the application on other devices such as a tablet or the web, if this application existed

Each of the six categories and 25 of the 26 features had a mean rating of importance above 4.5. This demonstrates their general importance to the participants, while also indicating that future measurement of these features on a prototype may require more sensitive scales to differentiate participant priorities.

Table 1: Mean importance ratings for 26 proposed app features

Feature	Mean rating (out of 5)
Review and confirm reservation	5
Make changes to a reservation	5
View confirmed reservations	4.96
Enter destination location	4.92
Show availability of the service during the planned trip times	4.92
Cancel a reservation	4.92
Track the paratranist vehicle in real time and provide an ETA for pickup	4.92
Menu to select day and time of travel	4.88
Send GPS location along with the emergency text message	4.88
Connect to call center representative, if desired, without having to dial a number	4.84
Enter other pickup location through manual or voice input	4.8
Reserve a return trip automatically	4.8
Use phone's GPS to assign pick-up location based on user's location	4.76
Reminder for upcoming trips through text and email messages	4.72
Beacon which will use smartphone's screen and flashlight along with speaker to indicate driver of rider's presence	4.72
Paratransit Service quality feedback	4.68
Record no-shows and late cancellations	4.68
Make emergency call or text message without dialing	4.68
Suggest pick up time based on distance of the destination and availability of paratransit	4.64
Make payment with a pre-paid balance	4.64
Alerts about permitted number of user no-shows left to avoid suspension	4.6
Route progress and destination arrival notification to users	4.56
Share upcoming ride information and real-time travel status updates with relatives or caretaker and keep them updated	4.52
Send automatic notifications of your arrival to contact person at the destination	4.52
Driver rating	4.52
Make payments using a credit/debit card	4.44

Participants reported some challenges and identified additional features that would be desirable: Ride info (driver employee #, bus #, plate no. #, driver picture), voice-to-text converter for communication between driver and deaf passenger, live chat with paratransit customer care, arrival notification five minutes prior to bus arrival, emergency protocols in text, graphic and video format and service area map to check availability of service before proceeding with reservation.

This study had a small sample size of users from a small urban transit community. A larger sample size would increase the sensitivity of the importance ratings and provide further insight to the diverse needs of individuals in more urban, suburban, and rural communities.

FUTURE DIRECTIONS

Based on the findings of this study, a prototype will be developed using the features with mean rating of 4.5 and above. The prototype will be assessed and refined with usability testing, and further pilot testing will be conducted for a full scale application in collaboration with local transit agency. The app development will consider seamless integration of accessibility and function across different mobile devices. The design improvements made during these testing phases with a variety of user groups may be used to develop guidelines for universal design in smartphone application development.

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