User Needs and Expectations for Future Traveling Services in Buses

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Abstract

Cities worldwide face the need to reduce the usage of private cars and the emissions. Desirability of public transportation and its services is thus of major importance. When developing novel services for public transportation, it is crucial to consider the user – the traveler – perspective. We present results of a qualitative study of user needs and expectations of future traveling services, with the focus on the bus and its potential associated services. We interviewed ten students living in Finland who had a broad range of experiences of public transportation in various parts of the world. Our findings reveal topics that can be used as a basis of digital services that support or enrich the traveling experience. The results provide insights for the design of services for future buses, including the user needs at the bus stop, the bus itself and external functionalities that could be linked to the bus ride.

Author Keywords

User experience; public transportation; bus, electric bus; travel experience; interviews; sustainability.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

Urban mobility is considered as one of the most significant societal challenges for the future as the need for transportation will raise, resulting increase in emissions, noise and enhanced infrastructures [10, 12]. Thus the role of public transportation and its services is becoming more central than ever. In order to make a shift from private cars to public transportation, services need to be developed so that it is seen as a more desirable option for the wide audience. To this end, individuals have been targeted with information and education campaigns to raise awareness and change attitudes [9]. In order to gain larger popularity, transport providers and planners should also be designing for better travel experiences [1].

In this paper we describe a qualitative interview study in which we investigated how people experience the bus transportation in Finland, and what they expect of services in buses. This study is a part of a larger research project called Living Lab Bus, in which one of the aims is to develop interactive services for electric buses. By traveling services, we mean digital services that can support or enrich the bus ride and the associated activities before and after it. This study focuses on investigating the needs and expectations for the future traveling services of buses (Figure 1).

Related work

Public transportation is a unique representation of urban space where the individuals come together with diverse socio-economic backgrounds at regular frequencies for extended periods of time [2]. Thus the context of public transportation has broad potential for the application of digital services such as location-based services through the use of, for example, travelers' mobile devices [2].

When considering reducing the carbon emissions, new technological innovations advancing sustainability are needed to find replacements for the traditional alternatives, such as fuel. The context of our research project – the electric bus – is tackling the environmental issues. Not only the electric bus may expand the traffic planning towards more ecological future, but it is also a cost-efficient and customer-friendly alternative, which is well suitable for cities [5].

Carreira, et al. revealed the potential of supplementary services when adding value to the passengers' travelling experience [1]. People's traveling behavior is changing simultaneously with the mix of transport modes and the offered services [10]. Transportation is no longer only moving from an origin to a destination but it is a way for the users to encounter different service channels; such as off-board services, on-board entertainment or information before, during or after the trip [1]. Carreira et al. pointed out that "Passengers also looked for other services, usually based on new technologies that could enhance their experience during the overall trip" (ibid).

Pine and Gilmore stated that the experiences that companies create will matter the most as goods and services become commoditized [8]. Thus designing for good user or customer experience does not only concern products but also services, and hence is crucial factor for the organizations to consider. In the context of public transportation, the travel experience is the result of the holistic view of the transportation service [1], including the different experience components

Figure 1. Travel experience consists of both the user experience of the bus and the experience of the associated services.

[11]: the customers' affective, cognitive, physical and social responses to the service. In order to understand the needs in different travel settings, the service providers need to familiarize themselves with the travel experience and its forming factors [7].

The topic of experience-driven service development in the electric bus context, or buses in general has been studied relatively little. Lillandt and Ilves studied how gamification can be used to promote the use of electric busses, as a part of project ElectriCity in Gothenburg (http://www.goteborgelectricity.se/en) that aims to generate sustainable future with open innovation solutions in the context of electric buses [6]. The study found that the public transportation users should be inspired to act while having fun with a public transportation application [6]. Kuys et al. conducted industrial design led innovation through a human-centered design approach for electric bus system in Kuala Lumpur [4]. The project focused on the broader human and behavioral issues for integrated and networked bus and shelter solutions.

We conducted the present study in order to gain deeper and broader understanding of the context of the bus, within the context of electric bus development, and the needs and expectations for the related future traveling services.

Data collection and analysis
A study using semi-structured interviews was carried out in order to gain insights of the current user experience of buses in Finland, as well as of the expectations to the electric bus. Ten international students living in Finland were recruited for the interviews to gain feedback of users of different public transportation systems from metropolitan cities worldwide. Seven interview sessions (four individual and three pair interviews) were organized, 1-1,5h each. Interviews were audio recorded. The data from the interviews was transcribed and the transcriptions were further divided to 703 short notes with meaningful participant statements. To draw out common themes from the data we used affinity diagramming [3] in the analysis.

Findings
The data was thematically grouped bottom up into 108 "insight statements" (henceforth called *insights*) derived from the short notes. Then, these insights were grouped to 23 subthemes and finally, to six main themes. Two of the themes, *Navigation* and *Payment*, were left out of the scope this paper, since they have been studied extensively before and thus lack novelty considering our study. The findings of the four main themes are presented in the following sections: *Expectations to the electric bus*, *Needs at the bus stop*, *Activities in the bus*, and *Traveling experience* and its two subthemes.

Expectations to Electric Bus
This theme includes insights of the context of the *electric* bus – participant's needs and expectations and the current knowledge of it. The subthemes found relevant were *The look of the electric bus* with insights such as "It should be visible that the bus runs with electricity" and "The interior should be different". People had *Worries regarding electric busses* with insights like "I worry that the battery runs out" and "I worry about the environmental aspects of the battery". Additionally, *More information of electric busses is needed* with insights such as "I would like to know

where the energy comes from" and "I would like to get more information of electric busses".

Participants stated that electric bus has some differentiating qualities from the traditional ones. Electric buses were seen to be more silent, stable and ecological. Participants emphasized that it is important to show the ecological values and the emissions that the electric bus saves. For example, a screen with a cumulative visualization could promote the green values of the bus. Participants seemed to be confused by the variety of electric bus types. More information should be provided to better communicate the unique values of battery-powered electric busses. Comments questioning the true eco friendliness of the electric buses were given, and thus it would be important to communicate the source of the electricity. *"I get annoyed when they sell it [electric bus] as super green, even though you can't tell where the energy is from. Could be from coal." (M 26y, Germany)*

Needs at the Bus Stop
This theme includes insights of the context of the bus stop. The subtheme *Design of the bus stop* included insights such as "There should be more space to place your bag" and "I rather wait inside". *Information provided by the bus stop* consisted of insights like "I find the maps at the bus stops confusing" and "I like the display that shows the next busses and when they come". The subtheme of *Activities and services that the bus stop could provide* has insights such as "I would like to have an outdoor gym at the bus stop" and "I would like to have music at the bus stop". *Activities at the bus stop that people do while they wait* includes insights like "I might walk to the next bus stop if I have to wait" and "I browse my phone".

Participants stated a clear need to improve bus stops by making them bigger and adding more seats and places to hang bags. Participants were generally happy with the condition of the bus stops but still preferred to wait inside since the structure of the bus stop does not protect you from wind or rain. *"I would like not to be cold. It is really uncomfortable to wait if it's windy or rainy."(F 24y, Finland)* and *"I rather prefer to wait inside than outside."(M 23y, Italy).* An important observation was that the bus stop should showcase the local area instead of advertisements. *"They could start displaying the nice things that you can do around the area."(F 28y, Costa Rica)*

Activities in the Bus
This theme includes insights of the activities that people have in the bus. The most revealing subthemes to our study were: *I use my phone* with insights such as "I browse Facebook or other social media" and "I listen to music". Furthermore, *(Un)Social aspects* included insights like "Commuting is my private quality time", "I don't want to be social" and "I like to observe other people". Participants stated a clear need to slow down during a busy day and have time for themselves. *"I often wish that there wouldn't be any familiar faces, because when I travel I'm not in that mood. There I kind of shut down." (F 25y, Finland).* Additionally, they wanted to do things that they otherwise would not have time to do. Many of the participants told that they use their smartphones for reading, browsing or listening to music. Some participants used the travelling time to educate themselves, for instance, to study languages when riding the bus. However, two participants stated that they have rules for themselves regarding mobile phone usage. *"I have a semi-rule: I try not to look at the screen of my phone."(F 28y, Costa Rica)*

Traveling Experience

Traveling experience consisted of three themes related to customer service, bus culture and interior and information design of the bus. Participants were generally pleased with the current traveling experiences with the local busses in Finland.

Customer Service theme includes insights of the social aspects of travelling and the impact of the customer service. The subthemes found most central for our study within this theme were *Communication with the bus driver* with insights such as "It's difficult to ask help or information when the bus driver doesn't speak English" and "I find it annoying when the drivers are rude and unfriendly". Participants found it hard to ask directions from the driver also because of the situation itself: *"There is also social pressure, when other travelers eyes are on you while you are talking to the driver - it is not easy." (F 28y, Iran)* Interesting note was that the participants felt a need to know who the drivers are. *"It feels that in Helsinki I don't really know who the drivers are. […] back home in São Paulo I did recognize the drivers, I knew who they were." (M 36y, Brazil).*

The bus culture had insights such as "I like when the passengers respect each other" and "I like the fact that people are equal in a bus". Participants noted that the Finnish bus drivers are allowed to listen to music of their own choice and thus they reveal something personal of themselves. *"Once I was stressed and I stepped into the bus and there was a famous Italian song - the song brought me good memories and made me smile. […] music is a way to connect with people even if you haven't talked with them." (M 23y, Italy)*

Interior and Information Design in the Bus theme includes insights dealing with the visual aspects of the bus that have an impact on the travelling experience. The subthemes within this theme were *The design of the bus*, with insights such as "I like the big windows, because then I can enjoy the scenery", "I like the look of the local busses, the design creates a positive image" and "I wish that public transportation would offer premium experience". Situations where participants chose taxi or private car instead of public means of transportation were described special with a feeling of luxury. *"Nobody wants to take public mean of transportation the night that you are going to opera house wearing fancy clothes."(M 23y, Italy).*

The information screens theme consisted of insights such as "I like when the screens show news and weather forecasts" and "I like when the screens show content that people have created". Generally, participants disliked advertisement and would rather see the information screens utilized i.e. showcasing local public events. *"I would like to reduce the amount of ads and add things that advertise events and things around the city or local area."(F 28y, Costa Rica).*

DISCUSSION

Our interview study revealed themes that can be used to inform the interaction design of digital traveling services, with a special emphasis on the electric bus. We could identify the following needs and expectations:

- ***Emphasizing the ecological choice.*** The electric bus and its information design could create awareness of sustainability.
- ***Informative and entertaining bus stops.*** Bus stops could provide more and dynamic information about the local surroundings and activities.

- ***Atmosphere of relaxation.*** The bus environment and its services could offer the atmosphere for relaxation and quietness.
- ***Subtle opportunities for social interaction.*** Means could be provided for getting to know people without distracting them, either other passengers or the driver.
- ***Feeling of luxury.*** The bus and the traveling services could offer something "extra" or surprising, not available elsewhere.

The study was limited in the number of participants, but the findings reveal themes that can be used in development of services. In our future work, we are planning to conduct participatory design workshops with the aim to create novel concepts for traveling services. We will furthermore utilize the special characteristics of the electric bus, such as the quietness of the bus, novel types of displays, and sensor-based data that can be collected during the bus ride.

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