Bus Travel Experience – in the Crossroads of Service and Experience Design

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Abstract
To enhance the bus travel experience and design enticing digital services for public transportation, passengers' needs and expectations should be considered. Bus is an interesting service context to study, since it contains services both in the physical realm, i.e. the actual transportation system, and in the digital sphere, i.e. the digital services in the bus, bus stops and on the passengers' mobile devices. Thus, both user experience (UX) of the digital services and the broader service design context need to be addressed in the development process. In this paper, we present our studies on Bus Travel Experience and the design tools developed to support the design of digital traveling services. We conclude by reflecting on the tools and their conveying knowhow on both UX and service design regarding bus travel context.

Author Keywords
Public transportation; bus; travel experience; user experience; service design; design tools.

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

Figure 1. Interior of a hybrid intra-city bus.

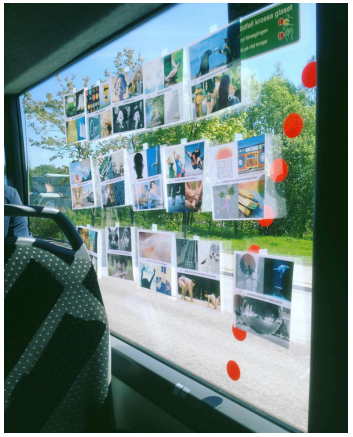

Figure 2. Context Cards were utilized in the Idea generating workshops.

Introduction

Cities worldwide are facing the need to decrease the usage of private cars as a way to reduce emissions. Therefore, the role of public transportation and other mobility services are becoming ever more important. To make public transportation modes more desirable, it is important to design for pleasurable travel experience. Intra-city bus transportation has broad potential for utilization of novel digital services and technology solutions beyond travel information.

In order to understand what kind of traveling services would enhance passengers' travel experience, we have conducted four types of qualitative studies: in-depth interviews, idea generating workshops, in-depth ideation workshops, and a bus travel diary study inspired by the cultural probe. By *travel experience* we mean the subjective experience a person has when using the transportation system and the associated traveling services. By *traveling services,* we refer to *digital services that can support or enrich the travel and the associated activities.* As a part of these studies we have utilized and simultaneously developed different design tools that consist of Bus passenger personas, a card-based design tool Context Cards, and Passenger journey map.

The context of our studies is a three-year research project, Living Lab Bus (LLB), where researchers together with a variety of companies aim to develop a digital service ecosystem around the modern electric buses. One outcome of the LLB project is a developer portal that invites software developers to design and test digital services. The portal provides the developers with sensor data that can be utilized in the software development. Our task in the LLB project has been to collect insights and gain broad understanding of passengers' needs and expectations, as well as, to understand the elements of travel experience. The goal of our studies is to turn our gained understanding and knowledge into visual design tools and provide the user insights to the software developers along with the sensor data.

In our studies on bus travel experience and traveling services (see Figure 2), we have explored the passengers' needs and experiences regarding intra-city bus travel activities. Throughout the studies, we have stumbled upon the challenge of defining the concept of travel experience: how is it in relation to, on one hand, user experience and the more holistic view of service design, and on the other hand to travel behavior, trip satisfaction and existing studies on travel experience.

In this paper, we discuss and describe our work on bus travel experience and digital traveling services, and its relation to service design and (user) experience design. We reflect on the methodological choices we have taken when gaining understanding on how the digital services should be designed in order to improve bus travel experience, while taking into account the broader service context of bus transportation system.

Crossroads of Experience and Service Design

Our interest and reflection regarding the intersection of the different fields – HCI and experience design, and service design is mostly visible in the definition of the concept of bus travel experience. We observe the two fields based on their definition and usage of the term user experience (UX). In this section, we first briefly explore the varying definitions of User Experience and follow that with our definition and understanding of

Travel Experience in the context of intra-city bus transportation.

The field of user experience (UX) focuses on studying and evaluating the experiences that people have through the use of a system, and designing better products or services that could enhance the user experience. UX is a term widely utilized in many fields, and therefore has a different meaning depending on the context. The term is often used as a synonym for customer experience, interaction design, usability, user interface design, and web design [8]. It can also be used as an umbrella term covering all of the above-mentioned design fields (ibid).

Experience is a complex fabric of actions, feelings, and thoughts [2], whereas experiencing refers to an individual's range of perceptions, interpretations of the individual's perceptions, and the emotions that result during an encounter with a system [8]. According to the definition by ISO 9241-210 [7], UX includes users' emotions, beliefs, preferences, perceptions, physical and psychological responses, behaviours, and accomplishments that occur before, during and after use. The user experience definition by Hassenzahl and Tractinsky [3] lists the three elements: user's internal state, context (environment), and system – that effects the user experience.

In the field of human-computer interaction (HCI) the design focus is on creating a positive experience while using an individual system or user interface [10]. Service design, on the other hand, aims to improve the customer experience [13] by coordinating the varying channels delivering the services: through mobile and digital channels as well as in person [8]. Both the development and delivery of services take place around the users and their experiences, and thus the aim of service design *is to create customer- or human-centered solutions that make the service experience feel logical, desired, competitive and unique for the user* [8]. In conclusion, whereas HCI focuses usually on single system or user interface, service design takes wider perspective by considering the user's experience from all touchpoints of the service encounter. Similarly, Multi-touchpoint experience design [10], emphasizes the need to move from single product focus to multiple customer touchpoints and channels and their combined experiences.

Travel Experience

Carreira et al. [1], define travel experience in the context of public transportation as a holistic view of the transportation service, including the different experience components: the customer's affective, cognitive, physical and social responses to the service. Passengers' traveling behavior, impacting the travel experience changes with the mix of transport modes and the services offered in them [12]. In addition, trip satisfaction is affected by, not only the external trip factors, but also the passenger's internal factors [11]. Travel behavior is influenced by spatial, socio-economic and personality components (ibid). Carreira et al. [1], have defined bus travel experience factors, such as social environment, service interface, retail atmosphere, assortment, price and retail brand; and experience components (cognitive, sensorial and emotional responses) impacting the travel experience.

Bus Travel Experience Studies

During the past two years, we have conducted four types of qualitative studies: in-depth interviews, idea

Figure 3. Example of a Bus Passenger Persona.

Rachel Relaxed, 35-year-old worker and mother of small kids. For Rachel, bus journeys are private quality time when she is able to relax and have time for herself. She puts headphones on, presses play and zones out. Of course, this change when she has the kids with her. *Travels by bus:* Daily to work. *Uses mobile device:* When traveling alone and mostly for passive entertainment (music, audio books). *Needs related to bus journeys:* Avoiding noise, getting a seat, being on time, avoiding disruptive behaviour of fellow passengers.

generating workshops, in-depth ideation workshops, and a bus travel diary study – inspired by the cultural probe.

Preliminary Interview Study
A set of semi-structured interviews [2] was carried out to gain insights of the current travel experience of buses in Finland, as well as of the expectations to the electric bus. The participants consisted of ten students with international background currently living in Finland. The aim was to gain feedback and collect users' experiences of different public transportation systems from metropolitan cities worldwide.

Idea Generating Workshops
Three co-design workshops [5] were organized to collect ideas and insights regarding short distance bus travel and related services. The workshops participants consisted of 24 students, from varying backgrounds and nationalities. The workshop provided us with 182 traveling service ideas divided into 46 subthemes within six main themes.

In-depth Ideation Workshops
Three co-design workshops were organized to gain understanding of user group specific insights on travel experience and related service needs. The participants consisted of three user groups: high school students, retired people, and parents with small kids.

Bus Travel Diary Study
Three-week self-documenting period together with in-depth interviews were carried out in two major cities in Finland: Helsinki and Tampere. We had ten participants in each city, representing the wide variety of regular bus passengers. The goal was to gain deep insights on bus travel experience and passengers' mobile device usage. The study provided us with understanding of bus travel experience elements and how and what kind of services should be developed in the future to enhance the travel experience.

Design Tools for Bus Travel Experience

As a part of the above-mentioned studies, we have utilized and simultaneously developed different design tools that would help the ideation activities, but also could be utilized as a part of the LLB platform by the software developers when designing new digital services. These tools consist of Bus passenger personas, a card-based design tool Context Cards, and Passenger journey map.

Bus Passenger Personas
Five bus passenger personas (see Figure 3 for example) were created to describe different types of regular bus passengers. The personas – Edward Enjoyer, Rachel Relaxed, Olivia Off-line, Isac Isolation and Emma Efficient – describe the habits and needs related to bus travel and mobile device usage, as well as the specific elements that impact their travel experience the most. The personas help service developers to understand the varying needs and habits people have regarding mobile usage while traveling.

Context Cards
Context Cards [6] (see Figure 4 for visual appearance) were created to communicate the insights of the bus context. The card deck consists of ten bus-specific cards that can be used when ideating new service concepts for public bus transportation context. The cards consist of themes like *Making the ecological values of Entertaining activities, Atmosphere of*

Figure 4. Visual representation of Context Cards. Confidence and the feeling of being in control, Luxurious and premium experience, and Economical thinking.

relaxation, Subtle opportunities for social interaction, and *Commercial services.*

Passenger Journey Map

We created a Passenger Journey Map to visualize the different actions, tasks and steps that the passenger needs to take in order to conduct bus trips within the public transportation system. The journey map starts from the action of making a decision to choose public transportation and a bus. Later the journey includes searching for the right route and bus line, finding the correct bus stop, conducting the journey and finally stepping out from the vehicle in your destination. Our aim was to communicate the bus transportation system user's journey to the designers, by visualizing the several different touchpoints (journey planners, payment etc.). This information can help the design of digital services in several phases where the user (passenger) is in need for travel related services.

Reflections on Designing for Bus Travel Experience

The studies conducted as a part of the Living Lab Bus project have provided us with a wide understanding of intra-city bus passengers' needs and expectations regarding traveling services and the holistic view of travel experience. Our goal has been to translate this knowledge into a visual and easily digestible format that could be implemented in the developer portal in the form of design tools.

In our studies, we have gained both holistic understanding of the intra-city bus travel and detailed insights of specific user groups' needs regarding traveling services and mobile device usage. Throughout this process, we have gathered knowledge on both the experience design of future traveling services, as well as service design insights regarding the broader service context of bus transportation system. While the Bus Passenger Personas and Context Cards focus more on the detailed experiences and needs – and thus have emphasis on the UXD side, the Passenger Journey Map communicates the more holistic viewpoint for service design. However, we believe that all the three tools convey insights for both fields. With the help of these tools and their insights, we believe software developers and transportation providers can design services that better serve the bus passengers needs, and thus improve the travel experience and attractiveness of public bus transportation.

We see intra-city bus travel experience as a combination of (user) experience and service design. However, travel experience – as any experience – is also impacted by passengers' internal factors that cannot be controlled by the public transportation service provider nor the digital service providers outside the transportation system. Service design approach is of course in the core of a good transportation provider customer experience. Still, the knowledge of, for example, the Passenger Journey Map can also help individual developers to design services that not only fulfil passengers' needs, but also contribute to the overall travel experience by complementing the transportation providers' existing services. The same goes with the UXD knowledge conveyed by Bus Passenger Personas and Context Cards: Even though they mostly focus on the digital services and mobile device usage, the tools can be utilized when designing the broader service experience in mind. Table 1 proposes ways in which the tools can

be used in UXD and service design.

	UX design	Service design
Bus Passenger Personas	Specific needs of different bus passengers that can be seen as opportunities for novel digital applications.	Communicates the holistic presentation of bus passengers Can also help uncover gaps or highlight new opportunities regarding the service functionality.
Context Cards	Inspiration for the ideation of new applications and the evaluation of existing ones.	Themes that can be utilized when considering the passengers' journey through public transportation services.
Passenger Journey Map	Providing context for the single application as a part of the larger whole of multi-touchpoint transportation services.	Visualises the multiple touchpoints that impact the passenger's service experience. Can be used to understand the current situation or when improving or re-designing the services.

Table 1: Applicability of the bus travel experience design tools

Based on our studies and insights gained while developing the design tools for the bus context we can conclude that the crossroads of user experience design and service design is a fruitful area of design knowledge. Both the detailed interaction needs and holistic understanding of the context and user tasks should be provided. These can be built into the same design tools but the various levels of detail need to be covered in versatile ways.

We will keep on developing the tools and evaluating them with different developer and designer groups, with the aim of improving user/customer experience of bus travel.

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