Designing of Digital Business Models for Barrier-Free Travel Assistance Services

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Abstract. Using public means of transport implies making travel arrangements. Passengers have to study route schedules and are required to obtain tickets. For these tasks (mobile) assistance services already enable travelers to comfortably compile their journeys online. The Be-In/Be-Out (BIBO) principle implements this consideration and enables hands-free interaction for all travelers automatically by obtaining the right to use public transport while boarding. The infrastructure in the vehicles detects the presence of passengers and initiates invoicing in the background. Besides the development of a prototypical BIBO system we designed a (digital) business model in order to commercialize the offered products and services. This paper presents the results of a structured business model design and validation process.

1 INTRODUCTION

In the course of a national research project within the research initiative "Mobility of the Future", funded by the Austrian Research Funding Agency FFG, a research team at Johannes Kepler University Linz has developed new paradigms and a technical system for obtaining tickets in public transport. The ambition was to simplify usage of public transport by implementing new ideas and technologic solutions. Users and their needs were put forward for designing innovative services that omit technology-focused interfaces and assist travelers seamlessly.

The approach for an appropriate (barrier-free) ticketing system is derived from the Be-In/Be-Out (BIBO) principle [1]. It enables people to implicitly obtain tickets simply by entering and leaving public means of transport. The infrastructure in busses and trains detects the passengers' presence and issues tickets while boarding (referring to the exact routes passengers have taken). Thus, people are able to interact with a technical system while continuing their natural behavior – no need to glimpse at displays, to press buttons or to follow instructions.

In addition to the technical solution an appropriate business model (business model scenarios) was developed by project partner evolaris. Due to the variety of stakeholders and the complexity of the business processes a structured approach of designing digital business models was applied. Based on the Business Model Canvas from Osterwalder/Pigneur [2] two generic business models for B2B and B2C usage were elaborated. Subsequently the Value Proposition Canvas [3] approach helped to reflect the fit of the product/service offer with the corresponding customer segments. A final SWOT analysis identified the robustness of the designed business models.

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2 BUSINESS MODEL INNOVATION

Generally speaking, the term "Business Model" refers to a description or model that represents a firm's logic to create, provide and capture value from and for its stakeholders [4]. By Business Model Innovation (BMI) we refer to the ways organizations establish or change their business logic from the moment that an idea is created, analyzed, tested and in the end adapted to form their business model [5] in parallel with technological, social, product or service innovation.

In order to design business models in a digital environment it is useful to distinguish the offering (product/service bundles) into four core categories [6]:

- Software functions
- Data – collected via sensors, actors or users
- Data sets/data files – aggregated data for developing value added services
- Hardware

3 BIBO GENERIC BUSINESS LOGIC

The legal prerequisites for BIBO systems are following: A contract between a transportation company and passenger may originate without active acknowledgement of the passenger, so the boarding process on its own may initiate ticketing. This will be realized via a smart phone application or alternatively via a simple object like a key fob [7] (equipped with transmission technology and a battery) that passengers keep in their pockets performing the same procedure.

The system currently in use consists of two parties: the passenger and the transport company. As shown in Figure 1, the bank enters as mediator. Passengers need to inform their bank if they want to use the BIBO system. The bank encodes their personal data and provides an encrypted key that authorizes passengers to use the new electronic ticket. For the transport companies, passengers are anonymous, represented by numbers in the system. Their movements via public transportation cannot be traced back to them personally. At the end of each month the

accrued costs are transferred to the bank, where the anonymous numbers are mapped and connected to real customers. As the bank receives no movement information, we have a clear separation of personal payment and dynamic location data. The bank simply bills passengers for their trips. Thus passengers are the only ones who know where and when they traveled and how much they paid. [8]

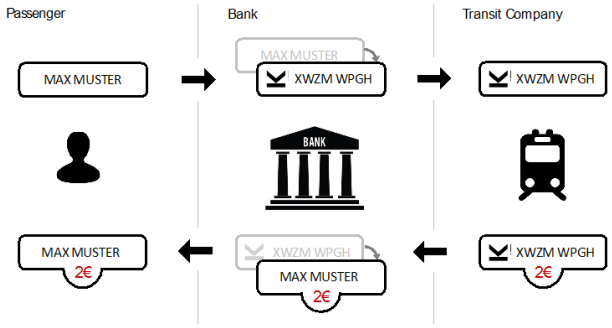

Figure 1. BIBO generic business logic

This principle is according to the model of Apple Pay[3] or Google Wallet[4], where the payment process is separated from the purchased goods. More and more payments in the United States follow this mechanism (or at least a similar version of it). Europe is supposed to broadly adopt anonymous payments in the next years, which creates the future basis for our accounting model.

4 BIBO BUSINESS MODEL SCENARIOS

In the course of several business model workshops a generic BIBO business model was established (B2B and B2C scenarios) by considering the following digital core offerings:

- Software functions: Smartphone application, web-backend, tracking function, payment function
- Data: collected via passengers and public transport vehicles
- Data sets/data files: Information graphics, reports
- Hardware: BLE (Bluetooth low energy) receiver, key fob

The B2B business model covers the perspective of a BIBO system provider (e.g. startup company). Customers are primarily public transport companies and public transport associations. The B2C model takes into account the view of a transport company with passengers as main customers. Figure 2 shows the BM represented in form of the Business Model Canvas [2].

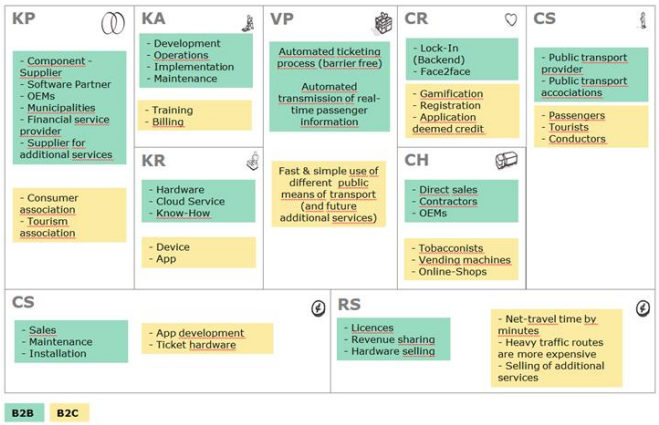

Figure 2. BIBO generic business model

Through the use of the Value Proposition Canvas [3] the "pain creators" and "pain relievers" of the proposed product/service bundle were evaluated and compared with the "pains" and "gains" of the respective target customer group. The evaluation had been conducted via UX (User Experience) tests with 16 test persons in order to get feedback about utility and usability. The majority of the test persons were students aged 21 to 30 (8 persons), 4 persons were between 31 and 40 and 2 persons each were either below 20 or above 40 years. We had a balanced sample of persons regarding their attitude in terms of public means of transport. The comparison results in an acceptable match of offer and customer needs. Moreover, the subsequently performed SWOT analysis revealed valuable information for the planned implementation of the business model.

5 CONCLUSION

The applied business model design approach by starting with the BM Canvas, evaluation via Value Proposition Canvas and final check with a SWOT analysis has proven to be appropriate. The split up into B2B and B2C business model scenarios lead to a reduced complexity and a better understanding for the customer groups. The UX testing has been proven to be a suitable method to match the offered product/service with the customer needs. It remains to be seen if a "smart city" or "smart region" will implement such a system in future in order to convince and attract more people to use public transportation.

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