

Development of a catalog describing and classifying mobility services in the NEMo project

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1. Introduction

More and more people are leaving the countryside and moving to the cities. Public life follows them there, which means that institutions such as hospitals or workplaces are located in the city. The change in the number of people living in rural areas is changing the transport infrastructure. Initially, fewer and fewer mobility offers are being used in rural areas. In addition, departure times are reduced to a few journeys. This change has conflicting effects for people. Since they must continue to reach the public institutions, they have a greater need for mobility. To do this justice, they must either use their private cars or the existing mobility offers. However, not all residents have a car and the mobility offer is inflexible and limited. [1]

The NEMo project - Sustainable fulfilment of mobility needs in rural areas - tries to tackle this problem [2]. The project is supported by the universities of Oldenburg, Lüneburg and Braunschweig. Within the project, the negative effects of migration are considered and solutions are generated to facilitate people's mobility situation. They are developing new mobility services. A mobility service is understood as a service in which people or goods travel from one place to another by means of vehicles [3]. These new mobility services are designed to be sustainable, protect the environment and fulfil a social aspect. In addition, existing mobility services are being combined in order to provide people with better connections.[4]

However, it is difficult to keep track of the variety of mobility services and to compare them in different contexts. For this reason, this paper will present an approach for creating a catalog to describe and classify mobility services. The purpose of this catalog is to provide a basis for communication among the members of the project as well as with the people in the countryside. Two aspects must be taken into account for this approach: People in rural areas must understand and want to use new and combined mobility services. In addition, there is already an existing traffic infrastructure and a technical implementation of various aspects. [4]

This basis is important because people need to accept new combinations and mobility services and integrate them into their lifestyles [4]. The catalog also serves as a tool and orientation for the development of new mobility services.

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First, the basics used are explained in Chapter 2. These contain the explanation of the division within the catalog on the basis of a classification, which is explained in Chapter 2.1. In addition, the content structure of a mobility service is presented in chapter 2.2. Based on this, the implementation is explained in the form of a template in Chapter 2.3. Chapter 3 presents these basics using the *BahnFahrenRB* mobility service as an example.

2. Methods

In this chapter it is emphasized, from which components the catalog consists. The external structure, the internal structure and the type of description are explained. The catalog is thus based on existing results of the project participants and extends them by structural elements. In addition, it is explained what advantage the division into these modules has.

2.1 Classification

This chapter explains the classification of mobility services into standard mobility services, novel mobility services and innovative mobility services. Such a classification helps to find a mobility service quickly in the catalog. It also makes it easier to see whether different mobility services can be meaningfully integrated into NEMo and combined for people.

Standard mobility services: have been on the market for a long time and are therefore considered established. They are often provided by large transport companies. In addition, users find them well-known and easy to use, as they already know them well and have used them more often for various reasons. Usually the use is also connected with a few steps and can be used without technical support. There is also no forced conversation between the provider and the user in this category. [1]

Novel mobility services: are currently very popular and are also mostly provided by private companies. They advertise with special offers on the Internet and are in constant change. In addition, they try to develop and expand as much as possible by taking over other similar mobility services. Young people in particular use these mobility services because they have often developed with the Internet and are therefore of particular interest to this group. In most cases, this class of mobility services requires a higher level of communication. [1]

Innovative mobility services: named and explained by Jantje Halberstadt. They combine imitative basic services with innovative approaches. This means that behaviour is copied and imitated either by other mobility services or in nature. However, it is modified or expanded to create innovative added value. This class is distinguished above all by its particularly social and ecological character, as the business models try to support themselves. [5]

2.2 Taxonomy

This chapter explains how to split up the content of a mobility service. For this purpose, a taxonomy was developed that separates the levels of business model, business processes, IT services and components. The NEMo suitability level is added to the catalog. This division of content allows a holistic and complete understanding of a mobility service. This is useful to talk to people in rural areas and to adapt new combinations with them and to check whether new mobility services can be meaningfully integrated. In addition, this classification ensures comparability of content. [5]

Business model: represents the idea of a mobility services and describes the main facts. [5]

Business processes: describe the activities that a user must perform in order to use the mobility service.[5]

IT-Services: describe how a component should work and which functionality it should get. [6]

Components: describe the technical implementation of the functionality of the IT services. [6]

2.3 Template

This chapter explains how the content is described and which sorts of descriptions are used.

Business model: At the first level of the business model is represented by a business model canvas, which are the main components of the mobility service. The business model Canvas is supplemented by the NEMo-specific attributes to include a get a complete picture of the mobility service. It is an ordered, textual description. It is therefore a static description. Facts are described that stand on their own. [7]

Business Processes: The following level of business processes is described by the number of activity diagrams necessary to cover all identified activities. Processes of activities are displayed at this level. It is therefore a description of dynamics. Such diagrams are easy to read and thus a good basis for discussion. In addition, the transition to technical implementation can be made by coloring. The basis are the application diagrams, which provide an overview of all necessary activity diagrams. [7]

IT-Services: SENSEI diagrams are used at the level of IT services. For this approach, the Service Orchestration Language is used in SENSEI diagrams, which Jan Jelschen published in his dissertation. Dynamic sequences of IT services are considered. From these diagrams, a catalog of necessary IT services for complete implementation can be created. [6]

Components: Components are represented in component diagrams. They are easy to read and to understand the structure of the technical work complex. [6]

3. Catalog

In this chapter, the use of the methods described is shown as an example. The mobility service *BahnFahrenRB* is used for this purpose. This mobility service is a standard mobility service and

cannot be further disassembled. This entry is not complete for space reasons, but shows how the types of description interact. *BahnFahrenRB* describes the classic train ride with the regional train. The business model has been dispensed with for reasons of simplicity and space.

3.1 NEMo-Suitability

Economical: The mobility service has existed for many years and is therefore economically stable. New attractive offers are constantly being introduced in order to be able to generate new customers again and again. The ticket prices are very good for day trips. In addition, many weekly and monthly tickets are offered at good conditions.

Ecological: The emissions per capita are reduced by the large number of passengers. In addition, the general output is less harmful to the environment.

Social: The social aspect is promoted by the fact that you can buy joint tickets. There are already platforms on which people agree to travel more cheaply together with a ticket. The tickets are also offered so that children can travel free of charge.

NEMo area: DB Regio's network is primarily designed for stops in rural areas. This mobility service is therefore very well suited for rural areas, as most people want to get to the nearest town. However, people usually do not reach places much further away. This would require the use of other mobility services.

3.2 Business Processes

If a customer wishes to use the *BahnFahrenRB* mobility service, he must buy at least one ticket and use the train. In addition, the customer can optionally rate the trip. The sequence of activities is predefined.

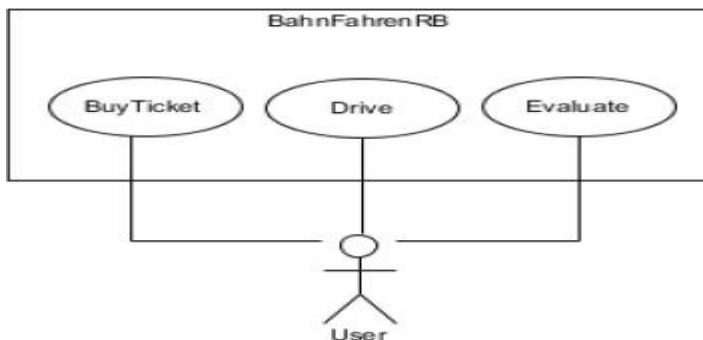


Figure 1: Use Case BahnFahrenRB

The business process of “Evaluate” is presented as an example, which can be seen in Figure 3.

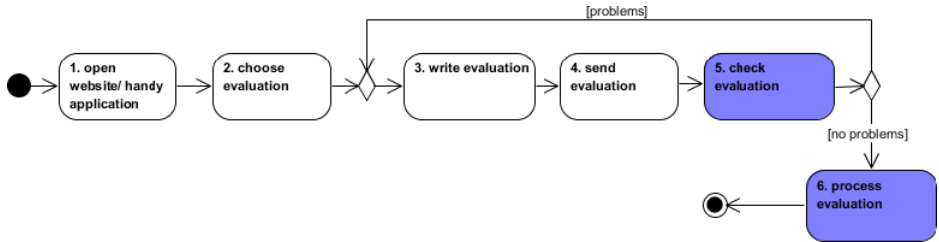


Figure 2: Activity Diagram of Evaluate for BahnFahrenRB

1, 2: First, the website or mobile application must be opened to post a review. To do this, you must select the Valuate option.

3,4,5: The evaluation must be written and sent by the person to be checked. It is checked for completeness. Only when everything is complete, the process continues.

6: After the positive check, the evaluation is processed and brought into a storable format and stored.

3.3 IT-Services



Figure 3: SENSEI Diagram BahnFahrenRB

CheckData: The user enters data about the rating. This data is checked to ensure that all necessary fields are filled in. A corresponding result is then turned.

Process: The evaluation by the user is then processed and brought into a storable format.

3.4 Components (without full diagram)

The component that can be assigned to the it-service "Evaluate" is the *CheckInformationPresenter*: Receives the input data of the customer as input parameters. After each entry, the data entered is checked and the display updated. The component reacts to input.

4. Conclusion

This paper presented an approach to develop a catalog of mobility services. This catalog will be integrated into the NEMo project and used as a basis for internal and external discussion. To this end, mobility services are divided into standard mobility services, novel mobility services and innovative mobility services. In terms of content, a taxonomy is used to distinguish between business models, business processes, it services and components. These were shown in this paper using the *BahnFahrenRB* mobility service as an example. The catalog is intended to provide support within the project in order to ease the workload for the participants through redundancy. The aim of the project is to support people in rural areas through new and combined mobility services.

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