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**Peacox – Persuasive Advisor for CO2-reducing cross-modal trip planning**

*Project Reference: 288466*

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## D.2.2

# Requirements Document

FLU

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## Executive Summary

The first part of this deliverable focuses on the identification of factors that are directly connected to travel planning. When it comes to criteria that play an important role in respect to the choice of transportation modes, different decision factors are relevant. There exist three different categories: purpose-rational decision factors, social-emotional decision factors and weighting factors. Within the questionnaires the participants mentioned all of the factors, but the purpose-rational decision factors were stated as the most important one. This category includes travel time, travel costs or comfort, while travel time was seen as the most important criteria.

Another investigation aspect was the correlation between route length and the chosen transportation mode. The participants of the User Experience Night, which took place in Vienna, mentioned that public transport is mainly used in case on average distances (1-5km) but becomes more and more important on longer trips (5km – 9,9km). In combination with the results of our online questionnaire, the participants stated that real-time public transportation information is an important feature for the application. The Peacox prototype could help to further strengthen the position of public transportation in trial cities Dublin and Vienna, by providing real-time public transportation information within the Peacox prototype.

The second part deals with the identification of factors that are indirectly connected to travel planning. The most relevant barriers towards eco-friendly travelling are the following factors: comfort as well as the given flexibility by owning a car. The Peacox prototype will spotlight the advantages using a more sustainable transportation mode, using a persuasive presentation approach and individual emission modelling. From the user perspective the ecological information on the individual transportation mode was not very relevant, but the comparison of the individual transportation modes in different categories, also including also the ecological information, was stated as very interesting for the potential user. Therefore,

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this could be a possible approach on how to make users aware of their travel behaviour resulting in a possible change towards more sustainable transportation modes.

Regarding the provided POI (Points of Interest) information, the research result showed that location as well as context-based information would be useful to include within the Peacox prototype. The context-based information can be covered through user profiles including personalisation, preferences and privacy settings, recommendation model as well as trip mode detection. With these features it would be possible to present POI information to the user that are relevant in this specific situation, including location and time.

The third part of this deliverable was the collection of specific user requirements in respect to the Peacox prototype. On one hand, these requirements are collected through focus groups and online questionnaire. On the other hand the user requirements for the Peacox prototype were gathered through functional requirements as well as user scenarios. The main findings are shown below:

- The user expects clear information about routing within a journey planner (route duration, route length, map, costs and weather information)
- Information about POIs (supermarkets, ATMs, events), ticket fares and weather were stated as very important, whereas ecological information is clarified as less important. The participants from User Experience Night stated that they rather were interested in comparison of different transportation modes based on different categories (cost, time, ecological information etc.) than having only ecological information provided for each trip.
- The setting options within the Peacox application that are available for every transportation mode were very well accepted by the user and should be implemented within the application. With this feature, it would be also possible to learn about the users behavior at the initial stage and provide input for the recommendation model and further improvements.
- The POIs could be presented in a map and there could be also a setting option in which the shown POIs could be adjusted (cinema, shops, education, parks etc.). With

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this feature it would be also possible to learn about the user preferences at the initial stage and provide input for the recommendation model and further improvements.

- The user should have the possibility to search for start and destination locations over a list or network plan and also set the date and time of the journey. Furthermore it would be useful if the user could save routes as favorites and that routes are automatically saved in the history. Within the application the user should get information about real-time public transportation information as well as disruptions.
- It would be furthermore profitable to enable a routing function to a POI in the users proximity. In addition to that, the user should have the possibility to add additional intermediate stops on his route (via route function).
- The online questionnaire provided results regarding the important Peacox prototype features and possible additional features. Real-time public transport information, route travel time information as well as real-time traffic information was stated as important for unfamiliar and familiar trips. Options to view previous routes, weekly/monthly trip costs and emissions were mentioned as possible additional features for the Peacox prototype.
- As result of the online questionnaire it was stated that there is very little demand for turn-by-turn navigation systems. This would indicate that for the majority of trips instructions shown on a map or written directions might suffice.

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## 1. Introduction

### 1.1 Background

The objective of the second work package 2.3 is to analyse and specify the requirements for the Peacox project from all relevant perspectives. In the first two tasks the focus is on potential Peacox users as well as the situations in which they can use the application. The third task focuses on the identification of user requirements for the Peacox prototype. The result of the third task should be a detailed description of the user requirements and expectations for the Peacox prototype. The third task is an important basis for further steps in the specification of the Peacox prototype, including possible functions of the application as well as the interface design, including the persuasive presentation approach.

The purpose of the Peacox prototype is to offer mobile applications that enable the users to easily plan and organize their trip (by foot, bike, public transport, motorcycle, car, and by use of car-pooling). To convince and stimulate the users in behaving more environmentally friendly on their travelling activities, Peacox will enrich trip planning and information systems with innovative approaches and features, like personalised travel recommendations, automated trip purpose identification, individual emission modelling as well as exposure modelling, eco-friendly driving models, and persuasive presentation approaches.

### 1.2 Scope of the deliverable

This deliverable includes *Task 2.3 User Requirements*, which is basically based on the previous two tasks (*Task 2.1 Identification and characterization of user groups* and *Task 2.2 Situational/Context Analyses*).

The identified user requirements are based on results gained from a mixed set of research methods. A comprehensive literature research was done, followed by several questionnaire studies. Finally, an online questionnaire study was done in order to collect user requirements for the Peacox prototype. Based on several research methods it was possible

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to gain a deeper understanding of user requirements in respect to the Peacock prototype. The outcomes of the deliverable will provide input for further specification and development of the Peacock prototype. This deliverable will especially influence the following deliverables:

- D5.1 Persuasive Strategies Report
- D5.2. Guidelines for designing persuasive strategies within the mobility context
- D5.4.1 Detailed Design persuasive eco-feedback strategies - Version 1

### 1.3 Methodology

The methodological basis for this deliverable are several studies from the past years as well as results of a User Experience Night in April 2012 and data from an online questionnaire survey.

The so-called *Rapid Service Investigation* is a tool that is often used by Fluidtime. Using Rapid Service Investigation, the target audience is placed at the centre of the process and a detailed customer consultation takes place. For the Rapid Service Investigation, open as well as closed questions were used for the questionnaire. The participants were chosen randomly and a verbal interview took place. With this direct, qualitative survey it is possible to find out what potential users like, what they don't like and their suggestions for improvements as well as their ideas. Two Rapid Service Investigations were considered within this deliverable. The first one took place in 2009 and the second one was done in 2011. In both Rapid Service Investigations the number of participants was 16, involving women and men (age class: 18 – 50). Within these two questionnaires general aspect in respect to transportation mode choice were collected (Fluidtime, 2009) (Fluidtime, 2011).

Secondly, the so-called *User Experience Night* was organized (end of April 2012) in order to collect user requirements for the Peacock prototype. There were 10 qualitative interviews carried out with participants aged between 18 and 35 years. The User Experience Night is an analysis tool developed by Fluidtime to test new concepts, software and design solutions in requirement and development phase. The aim is to collect user requirements, optimise existing services and further development through discussion with users, analysis of

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expectations and allowing interaction with the new developments. This generates valuable information that can then be used to further user experience (Fluidtime, 2012).

In March/April 2012 researchers from Trinity College Dublin undertook a questionnaire survey with the purpose of identifying user requirements for a personal travel device/smartphone application. The online questionnaire was distributed using the web based survey application *surveymonkey.com*. 457 responses were received with a completion rate of 91%. The purpose of the questionnaire was to identify further user requirements for the Peacock prototype (Trinity College Dublin, 2012).

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## 2. Identification of factors directly connected to travel planning

Within this chapter four factors relevant for travel planning were identified and discussed. The first two factors deal with criteria and behaviour patterns important for transportation mode choice. For the third factor, a use case scenario was presented to the participants of a Rapid Service Investigation from 2011 in order to find out if there is a willingness to change the mode of transportation during the trip. The last factor deals with user information that enables him to make informed decision. Here, general requirements as well as specific requirements (e.g.: expected route parameters) were considered.

### 2.1 Criteria for transportation mode choice

Several scientific papers deal with the identification of the factors that influence the decision regarding travel mode choice.

As already stated in the deliverable *D2.1 Description of user groups and travelling context*, according to the report EKoM from 2009 there exist different factors that are relevant for travel mode choice (Kuratorium für Verkehrssicherheit - KfV, 2010):

- Purpose-rational decision factors: user-friendliness, travel time, travel costs, comfort, availability, accessibility and reliability.
- Social-emotional decision factors: habits, autonomy, status, experience, privacy, freedom from stress, safety and environmental awareness.

- Weighting factors by the moderator variables: mobility type, trip purposes and time pressure.

These mentioned factors were also identified by various questionnaire studies. Fluidtime did a Rapid Service Investigation in Year 2009 in order to collect which criteria are relevant when it comes to transportation mode choice. Overall 16 people participated at this qualitative survey and the criteria that played an important role for the users are shown in the figure 2.1 (Fluidtime, 2009).

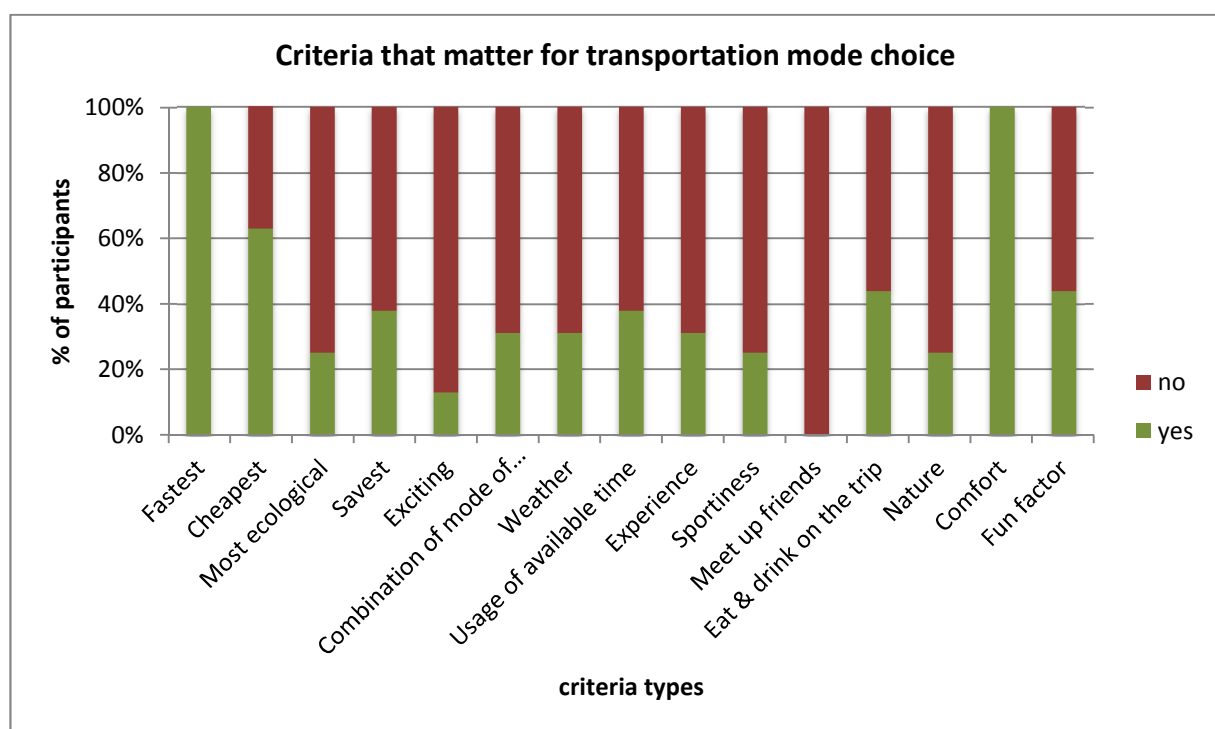


Figure 2.1: Criteria that matter for transportation mode choice

An additional Rapid Service Investigation was also done in 2011 and ten interviewees cited speed, time, costs and missing alternatives as main aspects for their choice of transportation mode. In some cases, due to the lack of a connection to public transport, the car is the only available solution (Fluidtime, 2011).

At the User Experience Night in April 2012, the test persons were asked: *“How important are following factors for your choice of transportation mode?”*

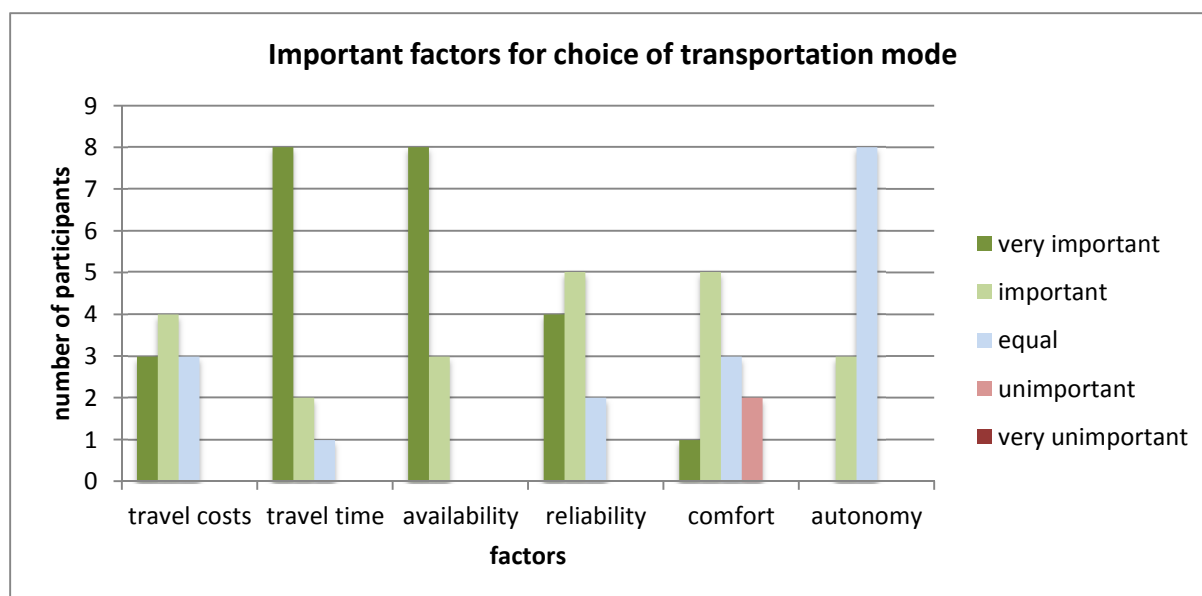


Figure 2.2: Important factors for choice of transportation mode

To determine the factors that are the most important ones, the interviewees named travel time and availability as the most important factors for travel mode choice. Reliability, comfort and travel costs were less important while autonomy was seen as quite unimportant. None of the listed factors was seen as very unimportant. Therefore one can say that all factors are important for transportation mode choice and should be considered. Travel costs, time and availability remain the most important factors (Fluidtime, 2012).

## 2.2 Behavioral patterns for the choice of transportation mode

The Rapid Service Investigation from 2009 had additionally the purpose to collect the behavioural patterns for the choice of transport mode. The following factors were mentioned (Fluidtime, 2009):

- Ecological factors: the majority of the participants are not influenced by ecological factors while driving with a car.
- Laziness: the majority of the participants prefer driving by car to their destination. The car is considered more comfortable than taking public transport.

- 
- Speed: the majority of the participants prefer the fastest way from start to destination. While having his working place close to the residence walking would be the fastest way – commuters would take their own car.
  - Comfort: the level of comfort in his or her own car is considered higher than the level of comfort on the bike or public transport.
  - Costs: Mainly on longer trips, costs play a decisive role for the interviewees. In urban areas, costs for parking must be considered as well. For older participants transport costs are decreasingly essential while comfort, speed and flexibility become more important. Car owner often claim public transport services to be more expensive without benefits or spoils.
  - Flexibility: For the majority of the participants flexibility and independence is crucial for their choice of the right transportation mode. E.g. public transport services stop during the night.
  - Weather: The majority of the participants go out for a walk or bicycle while the sun is shining. However during the winter they prefer taking the car or public transport services.

## 2.3 Willingness to change the mode of transportation

Within the Rapid Service Investigation from 2011, a use case was presented to the participants in order to raise the willingness of the participants to change the mode of transportation during the trip (Fluidtime, 2011).

*Use case: Change mode of transportation from car to P+R because of traffic jam (Fluidtime, 2011)*

You are driving with a car on a highway and want to get into the city. On the highway there is a traffic jam. The application informs you about the traffic jam and makes you aware that you can drive to P+R and switch to public transport in order to reach your destination in time. Would you be ready to leave your car and continue your ride with public transport?

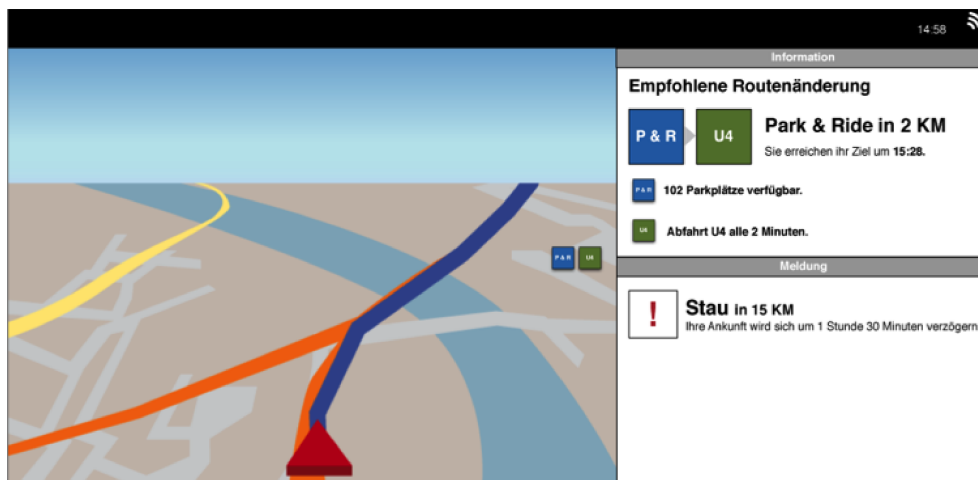


Figure 2.3: Use case - change mode of transportation during the trip

The result was that in general there is the willingness to change the transportation mode in this situation (11 of 16 people) (Fluidtime, 2011).

Additionally, it was asked what information is needed to convince people in order to change their mode of transportation from car to e.g. Park+Ride. Most of the interviewees mentioned that the amount of time saved is most important for them – *“How much time do I save when I take the metro instead of the car?”* In addition to that, costs were an important factor. Finally, for the user it would be also sufficient to get information about the procedure for buying a ticket (Fluidtime, 2011).

## 2.4 Information needs for the user in order to make informed decisions

The Rapid Service Investigation from 2009 provided also results in terms of representation of the route on the display. The participants listed following points (Fluidtime, 2009):

- Story: none of the participants would like the routing data to be packed in a story for reasons of clarity and comprehensibility
- Data: all participants prefer a clear presentation of the routing information
- Life-Quality-Index (LQ-index): none of the participants would use an LQ-index. A neutral and simple presentation of the data would be sufficient. In addition, the LQ-index wouldn't have any impact on the choice of transport mode

From the user perspective, it was mentioned that it would be useful to have following route parameters in the routing application (Fluidtime, 2009):.

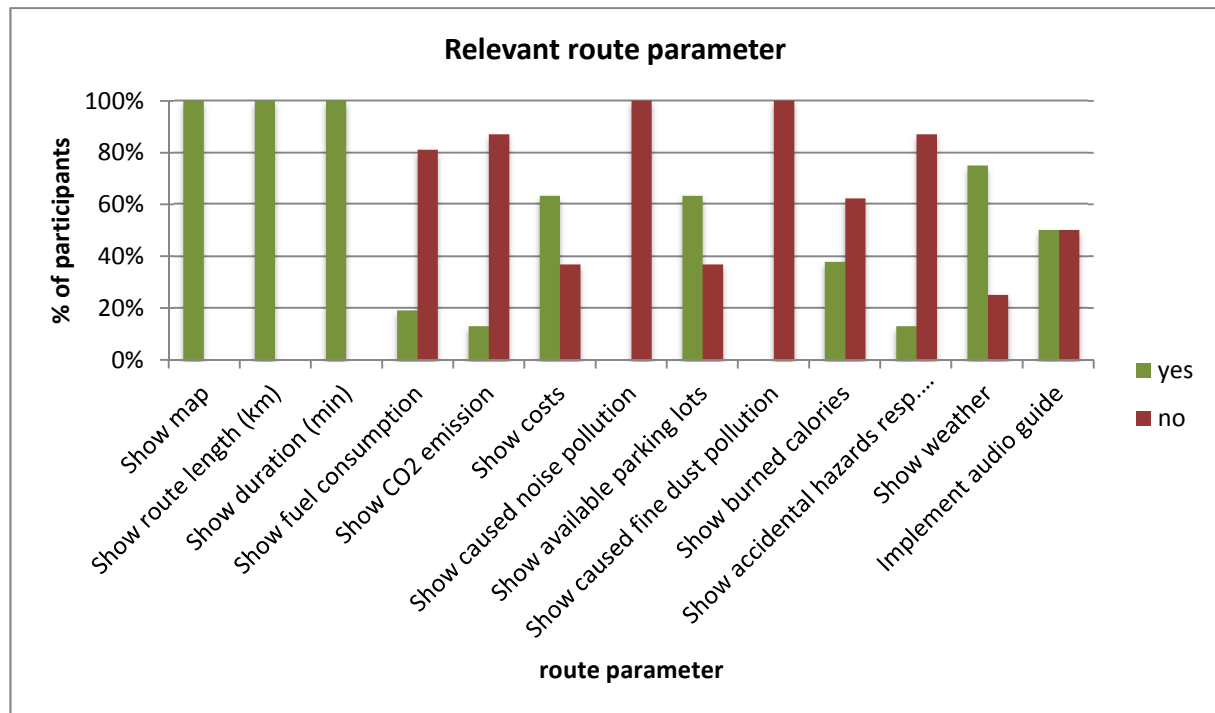


Figure 2.4: Relevant route parameter

In addition to that, the results on terms of service usage were also collected. The majority of the interviewees would use a service given that its free, fast handling of the app and the battery consumption wouldn't be high. Also more than half of the interviewees said that they would be influenced in their choice of transportation mode (Fluidtime, 2009).

At the User Experience Night from 2012, the participants were asked: *"Before you start your trip, what information do you acquire?"* (Fluidtime, 2012)

The most important factors for the interviewees are - travel time and – availability of means of transportation followed by the factors timetables, costs and connections. The environmental impact was considered as the most unimportant information. Information acquisition is still self-oriented and time and money play the most important role. There is still a lack of suitable customer information about the impact their behaviour has on the

environment. The Peacock prototype should close this gap and make people more sensitive about that matter (Fluidtime, 2012).

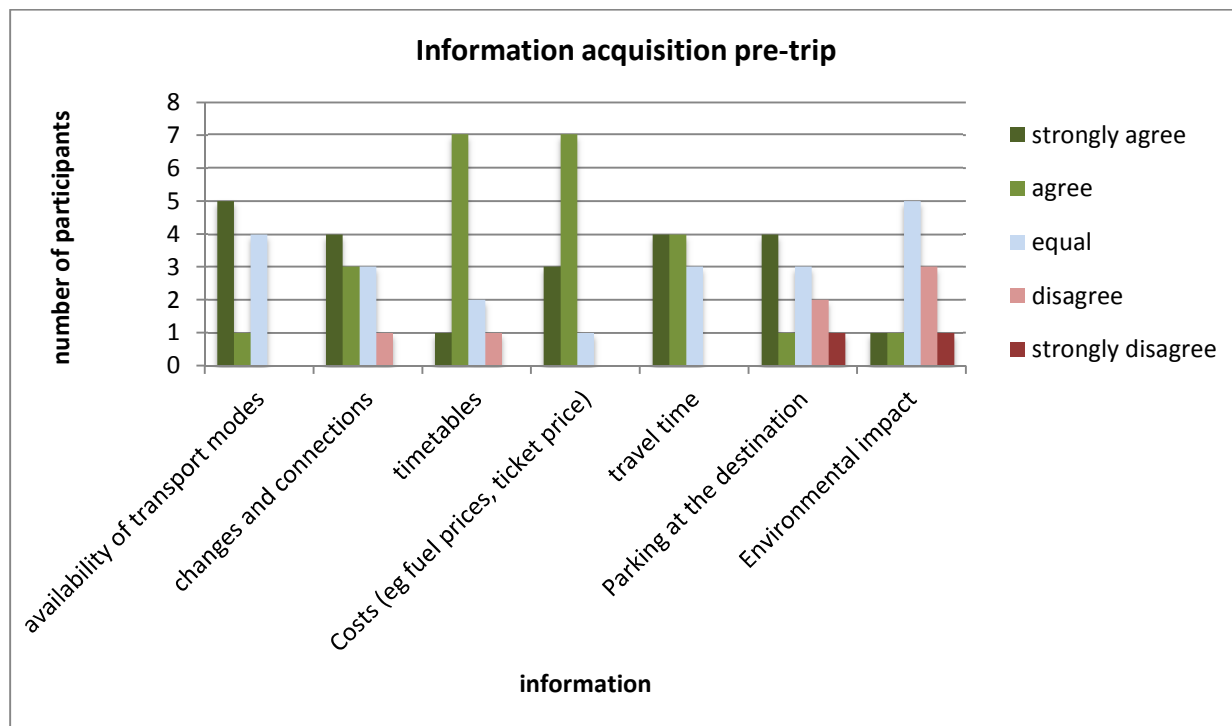


Figure 2.5: Information acquisition pre-trip

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### 3. Identification of factors indirectly connected to travel planning

Within the first part of the chapter the behavior barriers for eco-friendly travelling were identified based on comprehensive literature research. The second part covers the analysis of information that provides additional value for users on move. This included on one hand information of relevant Point of Interests and on other hand information connected to user health (physical exercise and ecological information).

#### 3.1 Behavior barriers in respect to eco-friendly travelling

Many projects and scientific papers deal with the identification of barriers in respect to eco-friendly travelling and investigation of motivations for behavioural change towards more sustainable mobility.

In order to identify the barriers it should be distinguished between different forms of travel activities (daily and touristic) with regard to distance and frequency of trips. For daily travel decisions a variety of socio-psychological variables are important. Hence, the habitual character of daily mobility is seen to be a major constraint in order to change towards more sustainable transportation mode. Attitudes towards certain modes of transport, the individual importance of environmental beliefs and moral norms play additionally an important role in relation to travel behaviour. Further barriers for changes in daily travel are concerns about convenience and flexibility, personal limitations (like health and physiological problems) and different perceptions of relevant conditions (like weather or topography) (Prillwitz & Barr, 2009).

(Anable, 2005) provided a comprehensive study to identify different types of drivers, their constraints for behavioural changes and motivations to change to more sustainable transportation modes. Based on the analysis of 600 interviews six groups of drivers (four car owning and two non-car owning) were identified.

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| Driver Types               | Willingness and constraints to change to more sustainable transport modes                                                                                                                                                                                                                                                                        |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hard drivers               | Show no intention to change their behaviour combined with strong constraints to other transport modes (strong car dependencies, no moral imperative, strong social and behavioural norms).                                                                                                                                                       |
| Complacent car addicts     | Travel behaviour change is hard to accomplish for this group. The change strongly depends on the quality of the public transport system. Additionally, this group also has strong barriers for a shift towards alternative modes, lack of moral imperative and information about other transport modes and their costs.                          |
| Malcontented motorists     | In comparison to other groups, this type is more open to change their behaviour. The motivational factors include a good quality of public transports as well as congestion and moral obligation to reduce the car usage. On the other hand, psychological attachment to the car and perceived controls are the constraints for possible change. |
| Aspiring environmentalists | There is a high probability that this group changes its travel behaviour since their motivation is led by a high moral norm and positive attitudes towards public transport. The constraints for this group could be a lack of information about other transportation modes.                                                                     |

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|                    |                                                                                                                                                                                           |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Car-less crusaders | The motivation of this group to use more sustainable transport modes is the high normal norm as well as a positive attitudes towards public transport combined with a dislike of the car. |
| Reluctant riders   | This group uses travel alternatives as they don't own a car, have moderate moral obligations to reduce car use and some positive views on public transport.                               |

**Table 3.1: Different driver types vs. Willingness and constraints towards more sustainable transport modes**

Our conclusion is, that psychological attachment to the car, moral norm as well as measures of environmental concern can provide insights in mode choice behaviour.

(Steg & Gifford, 2005) draw attention to two important constraints in respect to travel behaviour change. The first constraint is the overall impression that the comfort would decrease and the second constraint is that travel behaviour change is associated with additional effort. The attractiveness of car driving is based on many factors e.g. comfort, privacy, independence, flexibility, perceived safety and privacy. The mentioned factors lead to car dependencies and reluctance to change the travel behaviour.

Prillwitz and Barr mentioned the short-term perspective of individual users and the long-term perspective of the society, creating a social dilemma. For an individual driver, it would be convenient to continue the driving, but from the society perspective the increasing negative effects from traffic and the general need to change to a more sustainable transport mode requires a massive reduction of car use. In addition to that, willingness to change the behaviour is still confronted with the indefiniteness about the possibility that other user also follow (Prillwitz & Barr, 2009).

Within EKoM report (2010), accomplished by KfV, a remove barriers matrix was developed providing an overview over all determinants for a transportation mode choice that could be interpreted as barriers. Furthermore, this matrix lists potential ways (information and symbolic message) how to overcome this barriers (Kuratorium für Verkehrssicherheit - KfV, 2010).

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| Barriers       | Main aspects                                                                                                         | Concrete information                                     | Symbolic message                 |
|----------------|----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------|
| Usability      | Complicated usage (ticketing systems, connections, poor bike trail conditions)                                       | Information about tickets, departure times               | “Public transport is easy”       |
| Travel time    | Objective information can counteract wrong assumptions about travel times                                            | Travel time information                                  | “Public transport is fast”       |
| Travel costs   | Costs for the usage of cars is often underrated and overrated for public transport                                   | Travel costs information                                 | “Public transport is cheap”      |
| Travel comfort | Car manufactures invest a lot in high comfort passenger cells. Enough seats in public transport should be available. | Information about seating facilities and occupancy rates | “public transport is convenient” |

|               |                                                                                                                                                 |                                                                                               |                                                         |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|---------------------------------------------------------|
| Conveyance    | Cars are good for transportation, depending on trip purpose. Carriage of bicycles should be provided                                            | Information about bike carriage, wheelchair locations, buggies                                |                                                         |
| Availability  | If car access is provided, its availability is unbeatable. Optimization and frequency of connections can make public transport more attractive. | Departure, arrival and travel time                                                            | "Public transport is ubiquitous"                        |
| Accessibility | Park+Ride improve access to public transport. Public transport should be barrier-free                                                           | Information about stations, P+R facilities, information about barrier-free stops and vehicles | "public transport is available and usable for everyone" |
| Reliability   | Car is rated more reliable than public transport                                                                                                | Real-time information about delays – with explanation                                         | "Public transport is reliable"                          |
| Autonomy      | Freedom, independence, flexibility are highly associated with cars                                                                              | Information about connection between means of travel increase the autonomy                    | "Public transport makes you independent"                |
| Status        | A car is the ideal status object - Business class In public transport services                                                                  | Information about services in business class                                                  | Message that aims at status                             |

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|                         |                                                                                                                                                           |                                                                                   |                                       |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------|
| Experience              | Driving a car is highly associated with experience.                                                                                                       | Information about health, sports                                                  | “stay healthy, use public transports” |
| Privacy                 | Car provides privacy – which doesn’t exist in public transport                                                                                            | Information about occupancy rate                                                  | “public transport is spacy”           |
| Stress-free             | Public transport provides potential for stress-free travel                                                                                                |                                                                                   | “relax”                               |
| Safety                  | In public transport, the safety feeling is less marked, especially because of harassment and criminality. Public transport is rated more safe for traffic | Information about video surveillance, crime statistics, risk of traffic accidents | “Feel safe in public transport”       |
| Environmental awareness | The higher the environmental awareness, the higher the intention not to use the car                                                                       | Information about environmentalism compared to car usage                          | “protect the environment”             |

**Table 3.2: Barriers and the respective countermeasures (Kuratorium für Verkehrssicherheit - KfV, 2010)**

The following barriers were determined on the User Experience Night from 2012. The users were asked, which of the following factors speak for the car usage and which for the usage of environmental-friendly means of transport. The majority of the users stated the travel costs as the main factor for using environmental-friendly means of transport while autonomy and travel time are the decisive factors for car use. Availability, status and experience are stated even (Fluidtime, 2012).

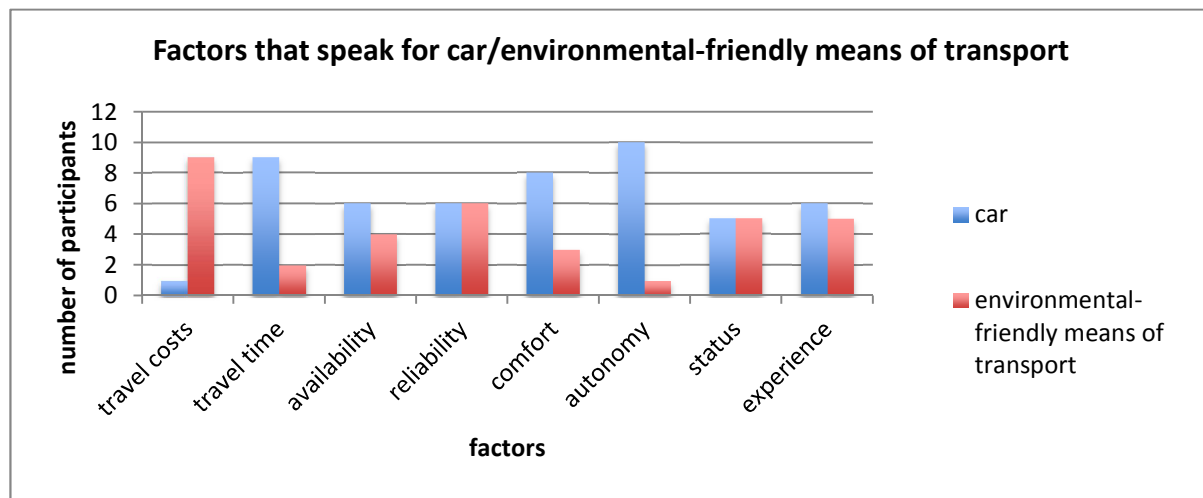


Figure 3.1: Factors that speak for car/environmental-friendly means of transport

## 3.2 Information that provide additional value for the users on move

Within this chapter, information that provides additional value for the user on move will be discussed including. First, POI information will be discussed in more detail. Afterwards, information that is connected to user health (physical aspect, ecological information) will be described.

### 3.2.1 Point Of Interest information

Nowadays, mobile devices are increasingly used for location-related tasks on the move. With the help of location based service the user can send search requests and find answer to the following questions: *"Where can I find the next Chinese restaurant", or "Where is the nearest pharmacy?"*

In particular, the exploration of urban surroundings by pedestrians for specific Points Of Interest (POI) is starting to become an everyday activity for a growing user population. A tourist is more interested in general information about sights. Citizens are increasingly accessing and contributing dynamic and individual information, such as reviews and recommendations (Baldauf, Fröhlich, Masuch, & Grechenig, 2011).

Additionally, the results from the User Experience Night show that the citizens are also interested in general POI information (supermarkets, ATMs, events). Five of ten participants agree on fact that this information would be interesting to have while you are on the mode and one participant strongly agreed on that (see Figure 5.1) (Fluidtime, 2012).

The POIs are in general presented on a map including the POI information. The POIs as well as their information can vary from map to maps, as well as the icons of how the information is presented in the map view. In general, colourful bitmap icons are used to represent interesting objects on the map. There exist also practical guidelines for screen map graphics that can be considered within the design of mobile maps. These guidelines recommend that mobile maps should be simple and highly generalized, should be based on cartographic principles, rendered fast, graphically concise, attractive, crisp, and legible. In addition to that, the content should be flexible and should be dynamically updated and linked to other information (Kuo-Wei, Kai Chen, & Kai Chen, 2005).

In order to understand the relevance of POI and their presentations, it is necessary to go into deeper understanding of mobile user activities as well as their mobile usage context and situation. While the user is on the move information related to his current location plays an important role. Reichenbacher presented the elementary mobile actions with a reference to geo-information including the following: locating, navigating, searching, identifying, and checking. Checking also involves time, since it refers to the state of entities or events (Reichenbacher, Adaptive Methods for Mobile Cartography, 2003).

|            |                                               | user actions |            |           |             |          |
|------------|-----------------------------------------------|--------------|------------|-----------|-------------|----------|
|            |                                               | locating     | navigating | searching | identifying | checking |
| user goals | getting orientation                           | ✓            |            |           | ✓           | ✓        |
|            | finding objects or persons                    | ✓            |            | ✓         |             |          |
|            | finding the shortest way                      |              | ✓          |           |             |          |
|            | getting information about an object           |              |            |           | ✓           |          |
|            | getting an overview of the closer surrounding | ✓            |            |           | ✓           | ✓        |
|            | being informed about the state of objects     |              |            |           | ✓           | ✓        |
|            | being informed about events                   |              |            |           |             | ✓        |
|            |                                               |              |            |           |             |          |

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**Figure 3.2: User action vs. user goals (Reichenbacher, Adaptive Methods for Mobile Cartography, 2003)**

Another important aspect of human activities is the fact that they are always embedded in a context. This context is shaping the activities and vice-versa. This is also the reason why the location-based information, where the user becomes only information related to his current position, is not sufficient. It would be useful to shift from local based service to context-based information, which is geared to the need of the current usage situation. In other words, the goal of context-based information is to know the user activity context and to take it into account for system behaviour (Reichenbacher, Adaptive Methods for Mobile Cartography, 2003).

Dey (2000) provided a basic definition of context: *Context is any information that can be used to characterize the situation of an entity. An entity is a person, place, or object that is considered relevant to the interaction between a user and an application, including the user and applications themselves.*

Reichenbacher understands context as the more general concept including more specific elements. The most important context dimensions are location, time, user, activity, information and system. Situation as the core of context is a function of location and time. Situation is here understood in the original sense of being situated, i.e. placed in a spatio-temporal reference system which determines the context at hand (Reichenbacher, Adaptive Methods for Mobile Cartography, 2003).

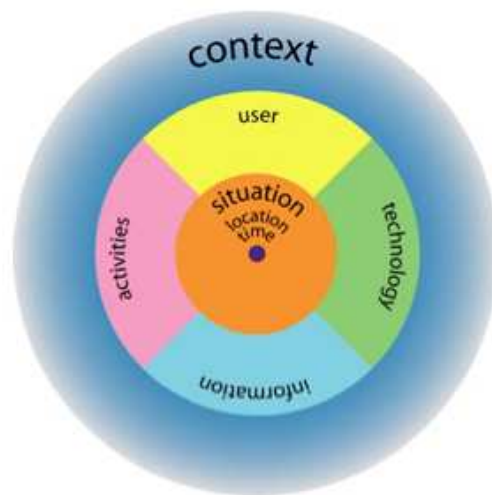


Figure 3.3: Elements of usage context (Reichenbacher, Adaptive Methods for Mobile Cartography, 2003)

Consequently, in a mobile usage context the presented geographic information must be relevant to the context of use, i.e. to the current location at the current time, to the user, to the activity or task at hand, to the question/topic or request, and to the infrastructure available and co-located geospatial objects. In short a mobile map should satisfy the users contextual information needs. (Reichenbacher, THE IMPORTANCE OF BEING RELEVANT, 2005)

In context of the Peacox prototype, it could be summarized that it would be useful to have location and context based information. The context-based information can be covered through user profiles including personalisation, preferences and privacy settings, recommendation model as well as trip mode detection. With these functions, it would be possible to present POI information that are relevant for the user in this specific situation and context, time and place.

### 3.2.2 Estimation of the physical exercise aspect

Several studies have shown significant benefits that derive from the regular and daily practice of physical exercise. Walking is the primary option to increase physical activity in sedentary populations (Morris & Hardman, 1997). Even moderate or low levels of physical activity performed regularly can reduce the risk of coronary heart disease, diabetes, stroke and other chronic diseases. Additionally, it reduces the costs related to health care,

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contributing to greater autonomy and independence of people, especially at advanced ages. On the other hand, walking allows a greater interaction between people, as they socialize during these trips, especially in comparison to private car travel.

According to Ribero and Mendes (2011), the implementation of short-term travels on foot or by bicycle can bring socio-economic, environmental and health benefits, which are evidenced mainly in the reduction of air pollutant emissions and in the congestion of urban road networks.

In summary it can be said, therefore, that the Peacox application should offer environmental and health-related information that will help to make the mobility needs environmentally and health friendly.

Despite the fact that none of the test persons considered information about physical aspects as useful (see Figure 5.1), Peacox should provide relevant information. A possible solution of how this information can be provided to the user can be seen in Table 4.1.

In summary it can be said, therefore, that the Peacox application should offer environmental and health-related information that will help to make the mobility needs environmentally and health friendly.

### **3.2.3 Information relevant to exposure to environmental pollutants**

Everyday mobility behaviour conceals the danger for the environment (e.g.: particular and gaseous emissions), health (e.g.: accidents, noise) and is often accompanied with psychological stress (e.g.: overcrowding, congestion, unexpected delays).

As one can see in Figure 5.1, the test persons from the User Experience Night considered factors like noise (8/10) or exposure to environmental pollutants (5/10) as unimportant. Additionally, it was mentioned that such information could be more interesting, if the individual transport modes were compared with each other.

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## 4. Identification of Peacox user requirements from the user viewpoint

Within this chapter, the user requirements regarding the Peacox application are identified by looking, from the user viewpoint, at the functions that should be integrated in the

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application. These functional requirements are on one hand derived from the defined user scenarios and on the other hand the result of longstanding knowledge and experience in respect to the user expectations regarding the functions that are included within a mobile passenger information service.

## 4.1 User Scenarios

The following scenarios provide an overview of how the Peacox system could work in a realistic application context.

### *User Scenario 1: Multi-modal travelling*

Matti is a father of two four and six years old children. He works as a graphic designer in a small company. When he is at work his children are in kindergarten, five minutes away from his place of work. Every day he picks them up at three in the afternoon and then they go home by using the tram. Matti has the Peacox application on his smartphone and has previously used this application to decide how he can go home from kindergarten with two children the most eco-friendly. As he is travelling with his children he additionally asked the system about the way with the fewest emission exposure. The recommendation is to use the tram and then go five minutes per feet. Furthermore the system automatically excluded travelling modes that are not suitable for little children (like the citybike). During travelling the system automatically detects his travel mode and visualizes this. Mattis children like this feature very much. On his way home today his wife called him and asks him to get something at the supermarket. He switched on his Peacox application and it automatically detects where he is, and additionally that he is in a tram (automatically transport mode detection). He types in <supermarket> and the system recommends him possibilities to go to a supermarket integrating different kinds of transport modes. Those possibilities are ranked by eco-friendliness and are enriched with information about time, money, and exposure level. Peacox application recommends to exit the tram and walk about five minutes to the next supermarket. The system navigated them by using a map to the target point.

### *User Scenario 2: Ecological friendly driving behaviour*

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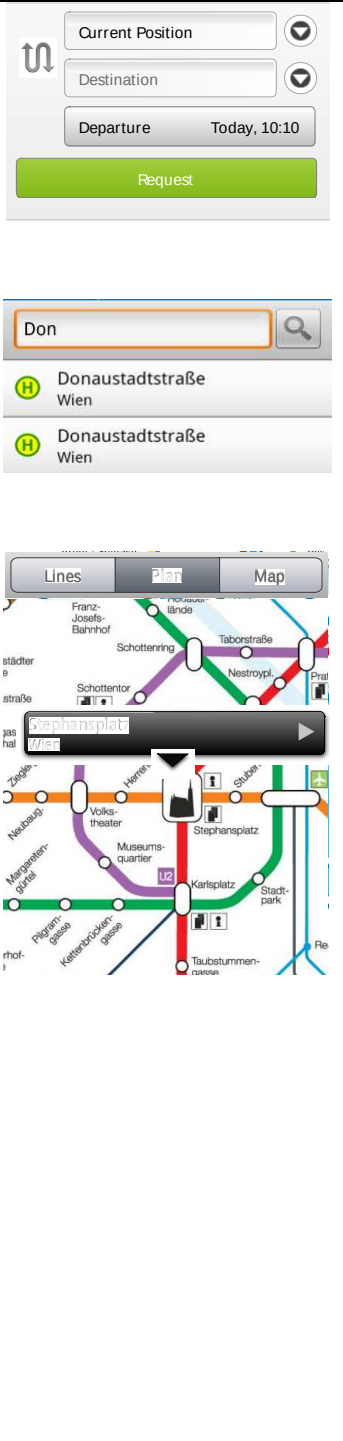
Linn is division director in a multicorporate enterprise, which has several establishments in the outskirts of Vienna. Consequently she has to drive a lot during her daily working activity to talk with locally people and check if everything is in order. Linn is a person who is very ecological sensible and tries to reduce emission within most areas of her life. She tried to get a hybrid car as company vehicle but unfortunately this doesn't work. So Linn downloaded the Peacox application for her smartphone and uses it as navigation system. This system recommends the ecological friendliest routes to her target goal by calculating her emission footprint. Linn also uses the web-based Peacox system, which gives detailed information about her driving behaviour. So Linn can compare her emissions in driving with the day, week or month before. The system also tells her how much emission she has saved by her driving style in contrast to a non eco-friendly driving behaviour. Linn also uses the smartphone application of the system so she can get information before, during and after her travelling activities through the navigation system, a webpage or her smartphone application.

The presented user scenarios build the basis for the functional requirements for the Peacox prototype that are described in the next chapter.

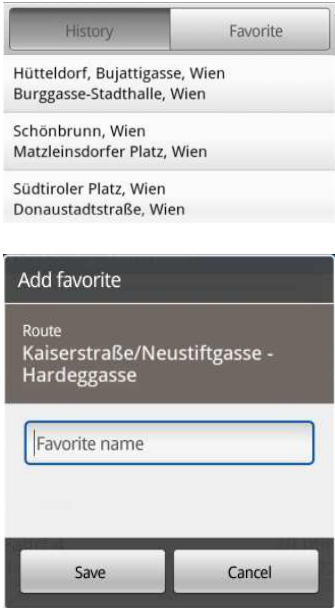
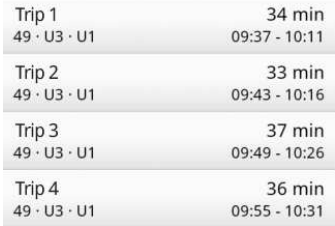
## 4.2 Functional requirements for the Peacox application

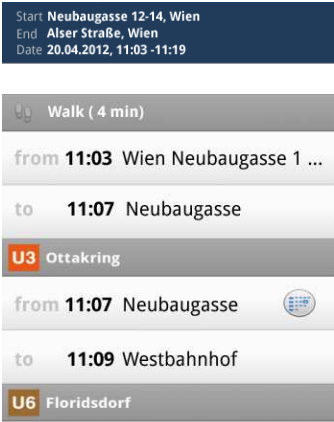
The next table provides an overview of the recommended functional requirements of the Peacox prototype. On one hand, the functional requirements will be described in detail and on the other hand possible visual realization will be shown.

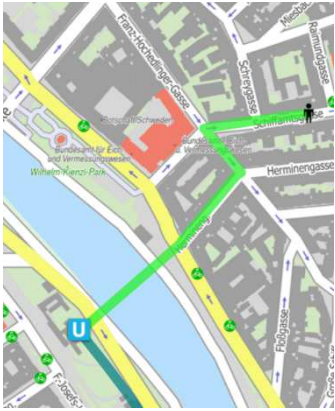
| Functional Requirements | Functional Requirements Description | Example Images |
|-------------------------|-------------------------------------|----------------|
|-------------------------|-------------------------------------|----------------|

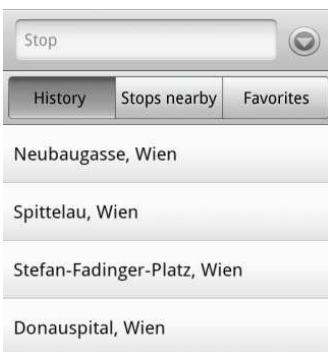
|                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                      |
|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <p>Start-/Destination search</p> <p>Relevance:<br/>pre-trip<br/>on-trip</p> | <p>The user should have the option to search for the starting and destination point of the journey. The user should be able to choose the current position as starting point. Furthermore, it would be useful if the search results would be suggested already during typing.</p> <p>It would be also reasonable to present the results in form of a list. Every entry could contain the following information: Icons depending on the type (stop, address, POI), name and location. From the user perspective, it would be helpful that after the user taps a specific list entry, this entry would be chosen either as start or as destination.</p> <p>Additionally, it is recommended that the user can choose a start/destination over a list or over a network plan. After start and destination are chosen, the user should have the possibility to send a routing request.</p> |  |
|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|

|                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                      |
|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <p>Date and time</p> <p>Relevance:<br/>pre-trip<br/>on-trip</p>                  | <p>The user should be able to set date and time for either departure or arrival. The current date and time should be predefined and used as default values.</p> <p>The system should inform the user if the entered date and time lie in the past.</p>                                                                                                                                                                                                                                                                                                                                                             |   |
| <p>Routing options</p> <p>Relevance:<br/>pre-trip<br/>on-trip<br/>after-trip</p> | <p>To present the user with the best results according to his preferences it would be meaningful to give the user the possibility to configure the routing options. One possibility could be to choose which travel modes the user would like to have included in the routing results. Additionally, the count of maximum stops for a journey and maximum footway time could be defined or it would be possible to select the gait velocity etc. The user should be able to save those preferences for future queries and the system should provide the functionality to reset the settings to default values.</p> |  |

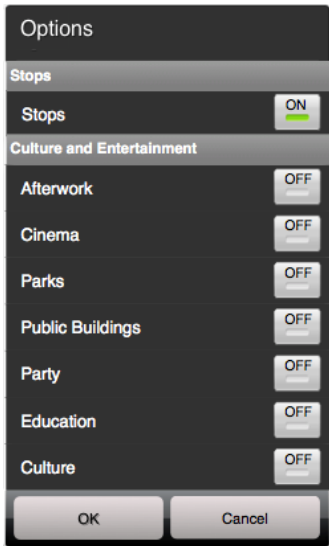
|                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                       |
|-----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| <p>History and favourites</p> <p>Relevance:<br/>pre-trip<br/>on-trip<br/>after-trip</p> | <p>To avoid unnecessary typing the users should be able to access past and regular queries through a list.</p> <p>All sent routing requests should be automatically saved in a history list. Furthermore, it would be very useful for the users to be able to save regular journeys as favourites in order to access them in the future through a single screen interaction.</p>           |    |
| <p>Routing result</p> <p>Relevance:<br/>pre-trip<br/>on-trip</p>                        | <p>In order to be able to compare and choose to most interesting result the user should be provided with the following information: the used transport modes, the line information in case of public transportation, the journey duration and the departure/arrival time. In case of individual transportation as bikes or afoot the journey distance is also of interest to the user.</p> |  |

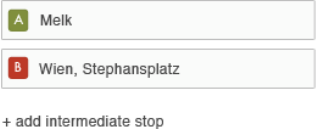
|                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Route Detail (detailed description of the chosen route)</p> <p>Relevance:<br/>pre-trip<br/>on-trip</p> | <p>The user should be able to choose a route and access detailed information. A well-arranged presentation of the information is of high importance to support the user on his journey.</p> <p>The user should be able to view a summary of his searched route including departure and destination.</p> <p>The route information should be divided into different route segments for each transport mode. Each route segment should be clearly identifiable. A detailed itinerary for each segment should be made available for the user including following information:</p> <ul style="list-style-type: none"> <li>• Transport mode type including visual representation (symbols)</li> <li>• Departure or destination stop for public transport segments including line number and direction</li> <li>• A turn-by-turn description for a foot segments</li> </ul> |  <p>Start Neubaugasse 12-14, Wien<br/>End Alser Straße, Wien<br/>Date 20.04.2012, 11:03 -11:19</p> <p>Walk ( 4 min)</p> <p>from 11:03 Wien Neubaugasse 1 ...</p> <p>to 11:07 Neubaugasse</p> <p>U3 Ottakring</p> <p>from 11:07 Neubaugasse</p> <p>to 11:09 Westbahnhof</p> <p>U6 Floridsdorf</p> |
|-----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                      |
|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <p>Map detail</p> <p>Relevance:<br/>pre-trip<br/>on-trip</p>            | <p>It would be useful for the user to be able to view the footway or the bicycle path also on the map in order to view the route information in relation to other known places and areas.</p>                                                                                                                                                                                                                                                                                                                                                                      |   |
| <p>Real-time information</p> <p>Relevance:<br/>pre-trip<br/>on-trip</p> | <p>To make good decisions for a certain route the user should have the possibility to search for stops and receive real-time information on arriving times. To avoid unnecessary typing it would be helpful for the user if the search results would be suggested already during typing. Every list entry could contain following information: Type-icon, name and location.</p> <p>Additionally, it is recommended that the user can choose a specific stop over a list or over a network plan and then receives real-time information for the specific stop.</p> |  |

|                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                     |
|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <p>History and favourites and surroundings</p> <p>Relevance:</p> <p>pre-trip</p> <p>on-trip</p> <p>after-trip</p> | <p>To avoid unnecessary typing the users should be able to access past and regular queries through a list.</p> <p>All viewed stops should be automatically saved in a history list. Furthermore, it would be very useful for the users to be able to save certain stops as favourites in order to access them in the future through a single screen interaction.</p> <p>Additionally it would be useful for the user to make the nearest stops easily available through a list.</p> |  |
|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|

|                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                     |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <p>Real-time information in detail</p> <p>Relevance:<br/>pre-trip<br/>on-trip</p> | <p>By choosing a stop the user should be able to access real-time arrival information for each line.</p> <p>Each line should be clearly identifiable. This detailed information should include following information:</p> <ul style="list-style-type: none"> <li>• Transport mode type including visual representation (symbols)</li> <li>• Line number and direction</li> <li>• Arrival time(s)</li> <li>• Information on disturbances</li> </ul> |  |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|

|                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                          |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Surrounding area</p> <p>Relevance:<br/>pre-trip<br/>on-trip</p> | <p>For the user it is of most interest to explore his surrounding area. The presentation of surrounding points of interest would support the user in this regard. Different categories of POIs could be presented in a map, visually distinguishable through different symbols. Additional information about each POI could be made available for the user.</p> <p>To enhance personalization the user profile and preferences could be considered for filtering irrelevant POI categories.</p> |   |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                                                    |                                                                                                                                                                                                                                                                                                               |                                                                                       |
|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| <p>Routing to a POI in the vicinity</p> <p>Relevance:<br/>pre-trip<br/>on-trip</p> | <p>To support the user in finding the most convenient POI out of a group of POIs (“supermarket in neighbourhood”) a search functionality would be helpful. After being presented a list of possible results the user would be able to choose and view the routing information to the desired destination.</p> |    |
| <p>VIA Route</p> <p>Relevance:<br/>pre-trip<br/>on-trip</p>                        | <p>By being able to set a via point on his route the user could define a more complex routing situation. He would be able to make an intermediate stop and still access detailed information for the whole route in one query.</p>                                                                            |   |
| <p>Disturbances</p> <p>Relevance:<br/>pre-trip<br/>on-trip</p>                     | <p>Information on disturbances along favourite routes would help the user to choose a different route with less delay.</p>                                                                                                                                                                                    |  |

| <div>Ecological Information</div> <div>Relevance:</div> <div>pre-trip</div> <div>on-trip</div> <div>after-trip</div> | <div>The presentation of ecological information for each route would be additional information for the user. It could provide the interested user with detailed numbers on CO<sub>2</sub>, NO<sub>x</sub> and noise level. The comparison between the modalities would provide all users with basic information on the ecological impact of each modality.</div> | <div></div> <table><tr><th></th><th>Walking</th><th>Bicycling</th><th>Car</th><th>Scooter</th><th>Car</th></tr><tr><td>CO<sub>2</sub></td><td>0</td><td>0</td><td>0,3</td><td>2,0</td><td>5,1 kg</td></tr><tr><td>NO<sub>x</sub></td><td>0</td><td>0</td><td>25</td><td>50</td><td>100 pt</td></tr><tr><td>Noise</td><td>0</td><td>0</td><td>25</td><td>100</td><td>100 pt</td></tr><tr><td>Area</td><td>2,5</td><td>6,7</td><td>4,1</td><td>6,7</td><td>75,3 m<sup>2</sup></td></tr></table> |      | Walking | Bicycling           | Car | Scooter | Car | CO <sub>2</sub> | 0  | 0   | 0,3  | 2,0 | 5,1 kg  | NO <sub>x</sub> | 0    | 0     | 25   | 50   | 100 pt | Noise   | 0      | 0     | 25   | 100  | 100 pt | Area | 2,5  | 6,7  | 4,1  | 6,7  | 75,3 m <sup>2</sup> |
|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------|---------------------|-----|---------|-----|-----------------|----|-----|------|-----|---------|-----------------|------|-------|------|------|--------|---------|--------|-------|------|------|--------|------|------|------|------|------|---------------------|
|                                                                                                                      | Walking                                                                                                                                                                                                                                                                                                                                                          | Bicycling                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Car  | Scooter | Car                 |     |         |     |                 |    |     |      |     |         |                 |      |       |      |      |        |         |        |       |      |      |        |      |      |      |      |      |                     |
| CO <sub>2</sub>                                                                                                      | 0                                                                                                                                                                                                                                                                                                                                                                | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0,3  | 2,0     | 5,1 kg              |     |         |     |                 |    |     |      |     |         |                 |      |       |      |      |        |         |        |       |      |      |        |      |      |      |      |      |                     |
| NO <sub>x</sub>                                                                                                      | 0                                                                                                                                                                                                                                                                                                                                                                | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 25   | 50      | 100 pt              |     |         |     |                 |    |     |      |     |         |                 |      |       |      |      |        |         |        |       |      |      |        |      |      |      |      |      |                     |
| Noise                                                                                                                | 0                                                                                                                                                                                                                                                                                                                                                                | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 25   | 100     | 100 pt              |     |         |     |                 |    |     |      |     |         |                 |      |       |      |      |        |         |        |       |      |      |        |      |      |      |      |      |                     |
| Area                                                                                                                 | 2,5                                                                                                                                                                                                                                                                                                                                                              | 6,7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4,1  | 6,7     | 75,3 m <sup>2</sup> |     |         |     |                 |    |     |      |     |         |                 |      |       |      |      |        |         |        |       |      |      |        |      |      |      |      |      |                     |
| <div>Lifestyle information</div> <div>Relevance:</div> <div>pre-trip</div> <div>on-trip</div> <div>after-trip</div>  | <div>The attractiveness of routes could also be described through the comparison of the following factors: fitness, security, comfort and flexibility.</div>                                                                                                                                                                                                     | <div></div> <table><tr><th></th><th>Walking</th><th>Bicycling</th><th>Car</th><th>Scooter</th><th>Car</th></tr><tr><td>Fitness</td><td>25</td><td>50</td><td>12,5</td><td>75</td><td>100</td></tr><tr><td>Security</td><td>-5,2</td><td>-17,3</td><td>-0,5</td><td>-100</td><td>-11,8</td></tr><tr><td>Comfort</td><td>1074,5</td><td>481,3</td><td>80,6</td><td>41,7</td><td>30</td></tr><tr><td>Cost</td><td>14,1</td><td>55,6</td><td>70,7</td><td>85,9</td><td>100</td></tr></table>      |      | Walking | Bicycling           | Car | Scooter | Car | Fitness         | 25 | 50  | 12,5 | 75  | 100     | Security        | -5,2 | -17,3 | -0,5 | -100 | -11,8  | Comfort | 1074,5 | 481,3 | 80,6 | 41,7 | 30     | Cost | 14,1 | 55,6 | 70,7 | 85,9 | 100                 |
|                                                                                                                      | Walking                                                                                                                                                                                                                                                                                                                                                          | Bicycling                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Car  | Scooter | Car                 |     |         |     |                 |    |     |      |     |         |                 |      |       |      |      |        |         |        |       |      |      |        |      |      |      |      |      |                     |
| Fitness                                                                                                              | 25                                                                                                                                                                                                                                                                                                                                                               | 50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 12,5 | 75      | 100                 |     |         |     |                 |    |     |      |     |         |                 |      |       |      |      |        |         |        |       |      |      |        |      |      |      |      |      |                     |
| Security                                                                                                             | -5,2                                                                                                                                                                                                                                                                                                                                                             | -17,3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | -0,5 | -100    | -11,8               |     |         |     |                 |    |     |      |     |         |                 |      |       |      |      |        |         |        |       |      |      |        |      |      |      |      |      |                     |
| Comfort                                                                                                              | 1074,5                                                                                                                                                                                                                                                                                                                                                           | 481,3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 80,6 | 41,7    | 30                  |     |         |     |                 |    |     |      |     |         |                 |      |       |      |      |        |         |        |       |      |      |        |      |      |      |      |      |                     |
| Cost                                                                                                                 | 14,1                                                                                                                                                                                                                                                                                                                                                             | 55,6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 70,7 | 85,9    | 100                 |     |         |     |                 |    |     |      |     |         |                 |      |       |      |      |        |         |        |       |      |      |        |      |      |      |      |      |                     |
| <div>Travel Time and Costs</div> <div>Relevance:</div> <div>pre-trip</div> <div>on-trip</div> <div>after-trip</div>  | <div>Additionally it could be interesting for the user to compare routes using different modalities by following factors: travel time and costs.</div>                                                                                                                                                                                                           | <div></div> <table><tr><th></th><th>Walking</th><th>Bicycling</th><th>Car</th><th>Scooter</th><th>Car</th></tr><tr><td>Time (min/KM)</td><td>0</td><td>1,0</td><td>0</td><td>3,1</td><td>9,3 EUR</td></tr><tr><td>Cost (EUR)</td><td>0</td><td>0</td><td>1,8</td><td>0</td><td>0 EUR</td></tr></table>                                                                                                                                                                                        |      | Walking | Bicycling           | Car | Scooter | Car | Time (min/KM)   | 0  | 1,0 | 0    | 3,1 | 9,3 EUR | Cost (EUR)      | 0    | 0     | 1,8  | 0    | 0 EUR  |         |        |       |      |      |        |      |      |      |      |      |                     |
|                                                                                                                      | Walking                                                                                                                                                                                                                                                                                                                                                          | Bicycling                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Car  | Scooter | Car                 |     |         |     |                 |    |     |      |     |         |                 |      |       |      |      |        |         |        |       |      |      |        |      |      |      |      |      |                     |
| Time (min/KM)                                                                                                        | 0                                                                                                                                                                                                                                                                                                                                                                | 1,0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0    | 3,1     | 9,3 EUR             |     |         |     |                 |    |     |      |     |         |                 |      |       |      |      |        |         |        |       |      |      |        |      |      |      |      |      |                     |
| Cost (EUR)                                                                                                           | 0                                                                                                                                                                                                                                                                                                                                                                | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1,8  | 0       | 0 EUR               |     |         |     |                 |    |     |      |     |         |                 |      |       |      |      |        |         |        |       |      |      |        |      |      |      |      |      |                     |

|                                                                              |                                                                                                                                                                                                                                                                             |  |
|------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Ecological statistics<br><br>Relevance:<br>pre-trip<br>on-trip<br>after-trip | To keep track of his ecological impact it would be interesting for the user to view statistics about his travel behaviour and his choice of transportation modes. It would be interesting to have the possibility to view statistics for a certain day, week month or year. |  |
| Navigation<br><br>Relevance:<br>pre-trip<br>on-trip                          | A turn-by-turn navigation would support the user to reach his destination conveniently. This is of most interest if the user is not familiar with his planned route.                                                                                                        |  |

**Table 4.1: Functional requirements and show case images**

The descriptions and figures of the functional requirements shown above provide an overview of the most important features the Peacox prototype should contain. This includes these functions among others: route request, real-time information, map search and comparison between different modes of transportation. Furthermore, several setting options should be integrated.

---

## 5. Identification of Peacox user requirements collected through focus groups

Within this chapter the results of the focus group interviews, done at the User Experience Night from 2012, will be included. The results of this questionnaire will influence the further specification and development of the Peacox prototype.

### 5.1 Relevant information on-trip

To get an impression on how users deal with different information about POIs on the move, the following question was asked: *“Which information would be interesting for you to have*

*while you are on the move?”* Information about ticket fares (8/10), weather (7/10) and POIs (supermarkets, ATMs, events) (6/10) were stated more important than information about safety (3/10), environmental pollution (2/10) and noise (0/10) of the chosen mode of transport (Fluidtime, 2012).

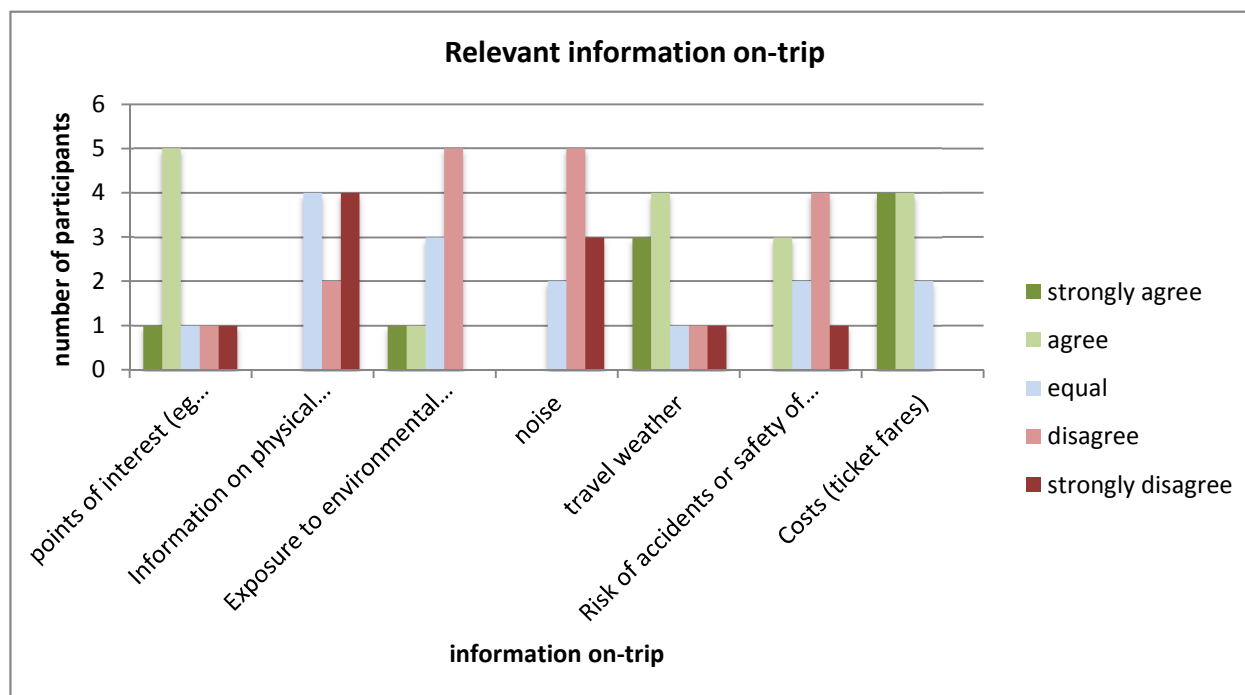


Figure 5.1: Relevant information on-trip

## 5.2 Relevance of ecological information within the mobile application

To get an impression on how people react on ecological information about their travel behaviour, the below listed screens were shown during the User Experience Night investigation. The test persons were asked whether on-trip information about their ecological footprint would change their mind in respect of their chosen transportation mode. The first screen (5.2) showed a list of possible modes of transportation with an ecology indicator (green leaves) for each modality. The second screen (5.3) showed the trip detail of the first route in the list. The “Ecology tab” on top of the screen showed the estimated CO<sub>2</sub> emission. Having clicked on this tab, the user would see Information (3) about

CO<sub>2</sub> emission, particulate matter, noise and required space for his selected route as well as a description. The minority of the interviewees (2/10) cited this information as useful respectively answered with yes. The majority were unsure (4/10) about it or found such information as not useful (4/10) (Fluidtime, 2012).

The implementation of such features should be worthwhile respectively placed more prominent in order to sensitize the user for more ecological consciousness.

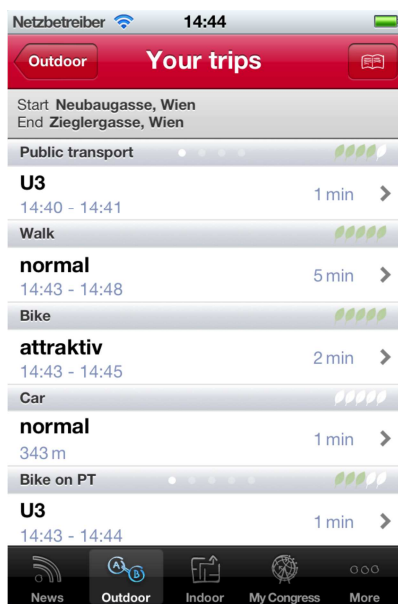


Figure 5.2 Trip list



Figure 5.3 Trip detail

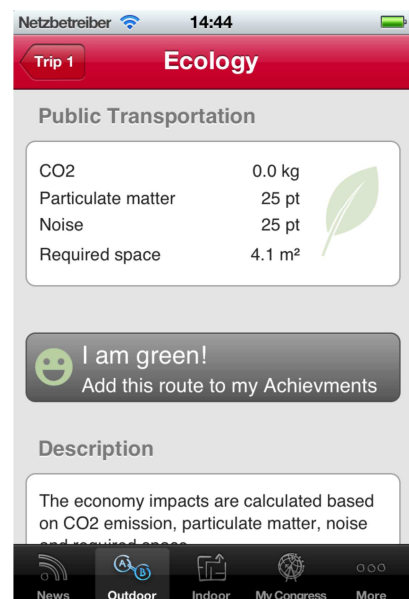


Figure 5.4 Ecology

In addition to that, the participants were asked if they would be interested in on-trip information about ecology in general. The majority (4/10 each) was declined or were unsure about that kind of information. Only two participants showed interest in that kind of information (Fluidtime, 2012).

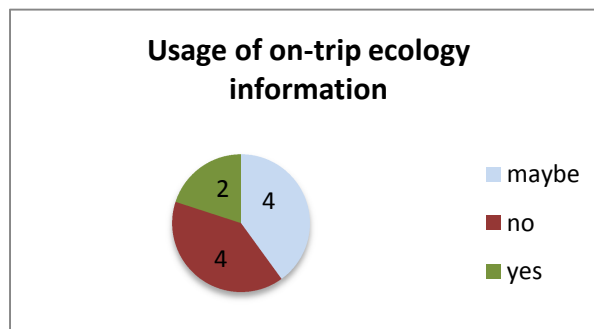


Figure 5.5: Usage of on-trip ecology information

### 5.3 Comparison of transportation modes

The next question focuses on the comparison between different modes of transportation. The test persons were asked whether a list of possible transportation modes for their route would have an impact on their choice. Half of the interviewees (5/10) answered with yes, while four test persons couldn't decide (Fluidtime, 2012).

In summary it can be said, therefore, that a comparison of the different means of transport would be useful to implement. Many people don't even know about the wide range of possible transportation modes (Fluidtime, 2012).

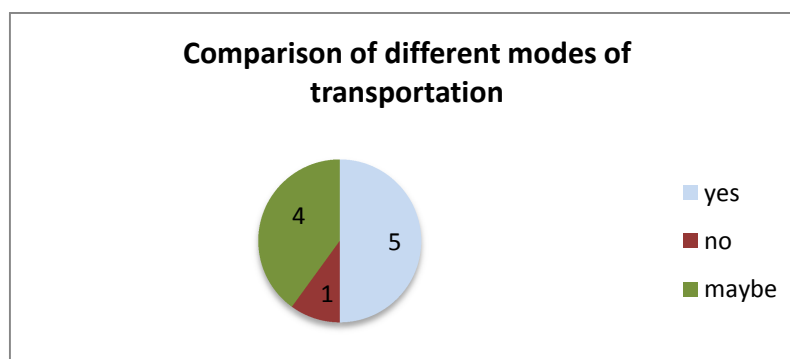


Figure 5.6: Comparison of different modes of transportation

Next, the test persons were asked, which of the following comparison screens they would prefer regarding the visual interface. The first screen (a) showed a table with text-based information about the different modes of transportation and the estimated time, costs, CO<sub>2</sub> emission and spent calories. A colour matrix supplemented screen b) in order to visualize good and bad values. Screen c) showed the information of the four aspects time, costs, CO<sub>2</sub>

emission and spent calories in a horizontal colour transition with modality icons. Vertical dyed bar charts were used in screen d) (Fluidtime, 2012).

The majority of the test persons (9/10) preferred the following option. It can be said that a combination of sets of icons and different colours would be more accepted than numbers and words in regard to the more intuitive user interface (Fluidtime, 2012).

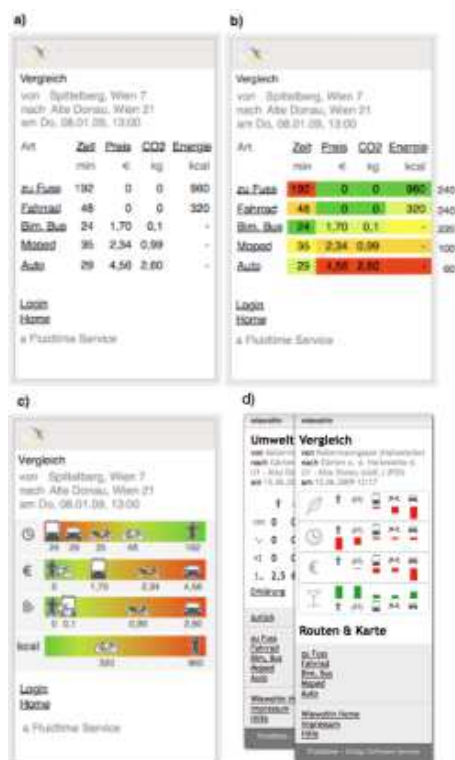


Figure 5.7: Comparison of four visual interfaces

In a next question the interviewees were asked about the importance of different travel factors or variables (Fluidtime, 2012).

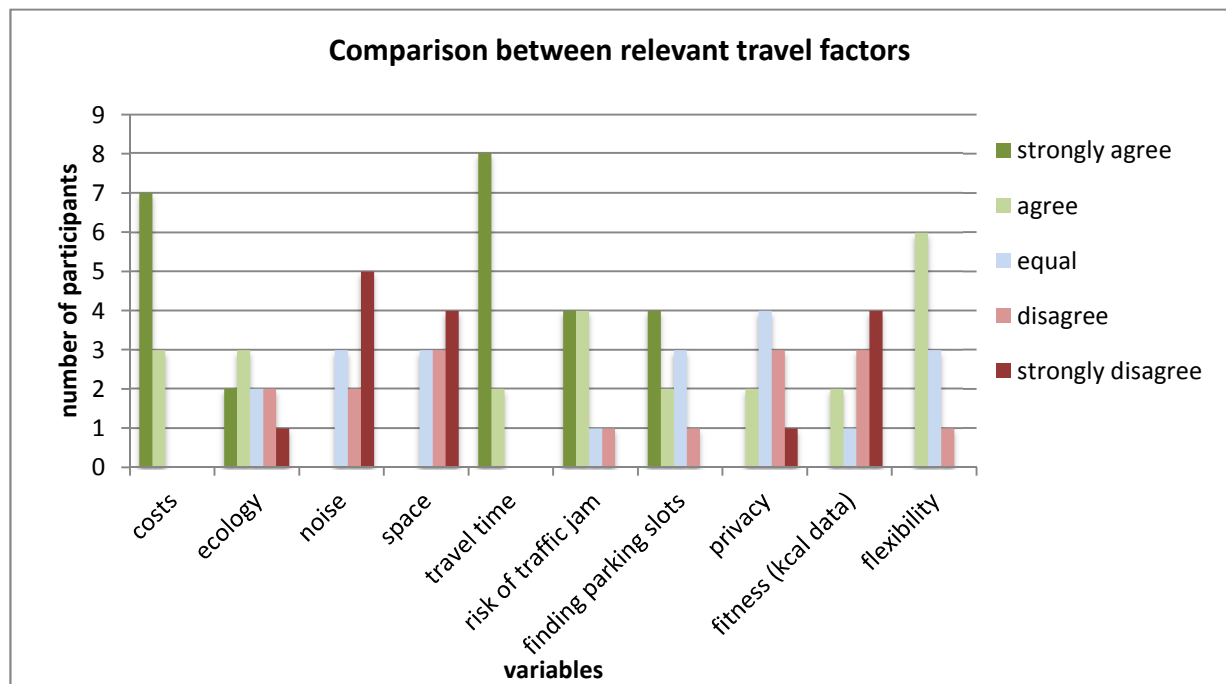


Figure 5.8: Comparison between relevant travel factors

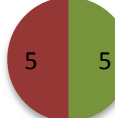
Test persons consider travel time and costs as most important factors followed by flexibility and information about traffic jams. Comfort factors like noise, available space and physical aspects (kcal data) are considered as less important. Similar to the information gathered, the users still focus on time and cost factors while environmental factors like noise and available space play a minor role (Fluidtime, 2012).

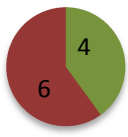
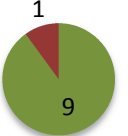
#### 5.4 Personal settings within the mobile application

The participants of the User Experience Night were asked which of the following options they would use on a mobile route planner in order to optimize their route. The options were categorized into public transport options that include pedestrian settings like walking speed and number of changeovers. Furthermore, options for car and bike were listed (Fluidtime, 2012).

In summary it can be said that an integration of the settings for a route planner tested above is useful. Above all, the settings for public transport are important for the test users.

Pedestrian settings are cited less important. All in all it can be said that settings that are related to speed are the most important ones (Fluidtime, 2012).

| Public transport                                                                                                                                           | "Which settings would you use on a mobile route planner?"                                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| <p>Route options</p> <p>fastest route ✓</p> <p>few changeovers</p> <p>short short wallways</p>                                                             |  <p>■ yes<br/>■ no</p>   |
| <p>Changeovers</p> <p>unlimited</p>                                                                                                                        |  <p>■ yes<br/>■ no</p>  |
| <p>mode of transport</p> <p>train ✓</p> <p>subway ✓</p> <p>tram ✓</p> <p>bus ✓</p> <p>regional bus ✓</p> <p>taxi ✓</p> <p>airport transport services ✓</p> |  <p>■ yes<br/>■ no</p> |
| <p>max. walking time</p> <p>15 min</p>                                                                                                                     |  <p>■ yes<br/>■ no</p> |

|                                                                            |                                                                                                                               |
|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| walking speed<br>slow<br>normal<br>fast ✓                                  |  <div> <div>yes</div> <div>no</div> </div>   |
| i want to<br>avoid stairways<br>avoid moving stairways<br>avoid escalators |  <div> <div>yes</div> <div>no</div> </div>   |
| Car                                                                        |                                                                                                                               |
| route choice<br>fastest route ✓<br>shortest route                          |  <div> <div>yes</div> <div>no</div> </div>  |
| speed<br>slow<br>normal ✓<br>fast                                          |  <div> <div>yes</div> <div>no</div> </div> |
| parking opportunities<br>at start ✓<br>at destination                      |  <div> <div>yes</div> <div>no</div> </div> |
| Bike                                                                       |                                                                                                                               |
| route choice<br>attractive<br>fast ✓<br>individual                         |  <div> <div>yes</div> <div>no</div> </div> |

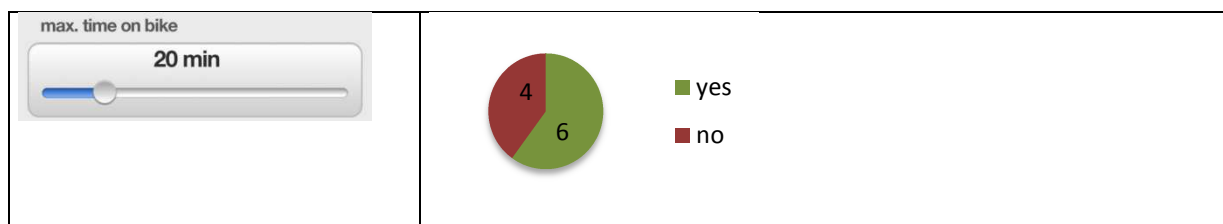


Table 5.1: Preferred setting within an mobile application

## 6. Identification of Peacox user requirements collected through online questionnaire

Within this chapter the results of the online questionnaire, done by Trinity College of Dublin in March/April 2012, will be included. The results of this questionnaire will influence the further specification and development of the Peacox prototype.

### 6.1 Application features

Section 1 of the survey asked respondents to choose the “*Most Useful*” and “*Least Useful*” features from a range of potential application features (Trinity College Dublin, 2012).

As demand for features may vary according to the nature of the trip being undertaken, respondents were asked to consider both: a trip that they were familiar with and one they were unfamiliar with, when making their selection (Trinity College Dublin, 2012).

For the purposes of displaying results “Most Useful” selections have been assigned positive values and “Least Useful” selections have been assigned negative values. Figure 6.1 shows that real-time public transport information is the most popular feature for familiar trips and

“Expected Travel Time Information” is the most popular feature for unfamiliar trips. Fig 6.3 provides a comparison of how the demand for each feature varies with respect to the trip type (Trinity College Dublin, 2012).

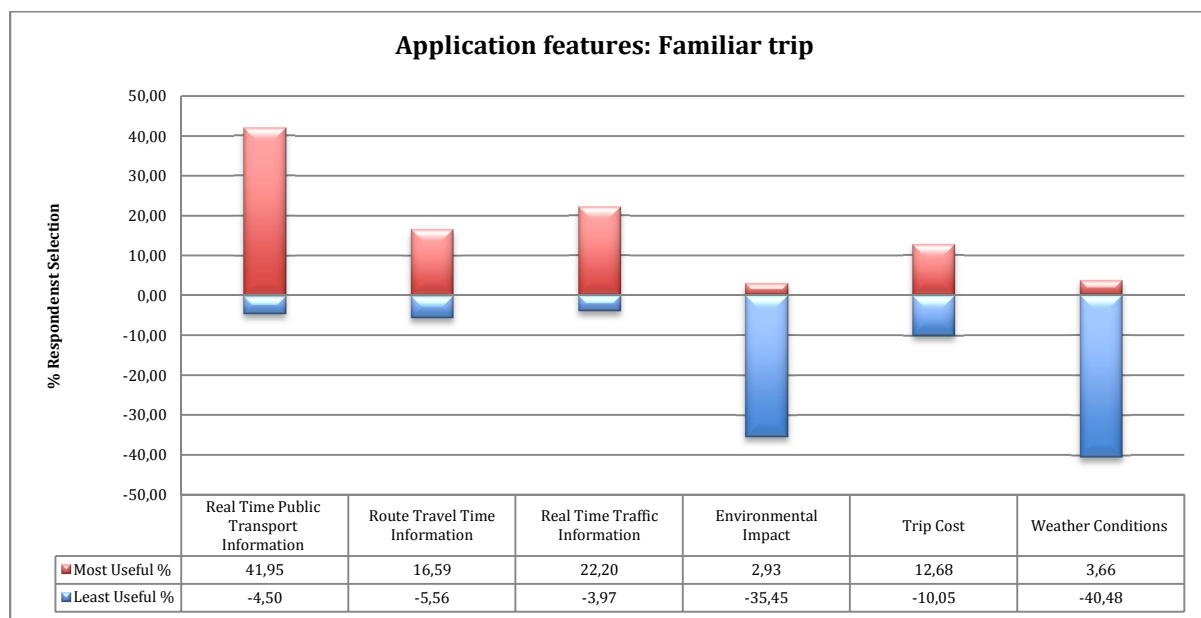


**Figure 6.1: Application features - Familiar trip**

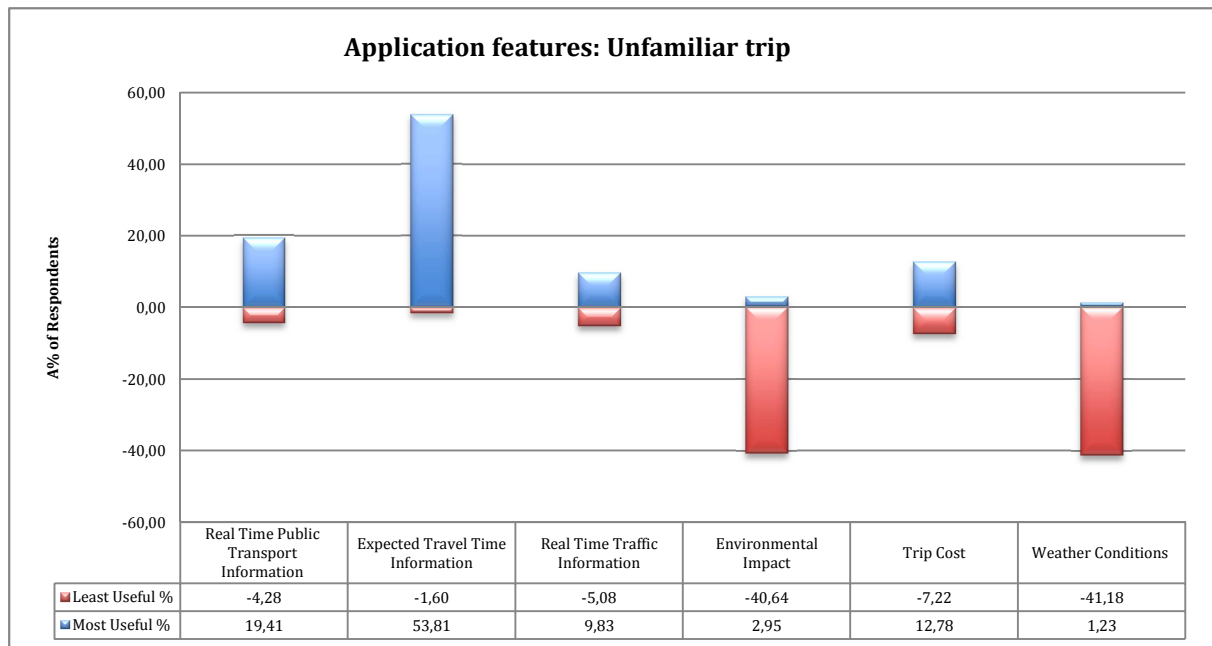


**Figure 6.2: Application features - Unfamiliar trip**

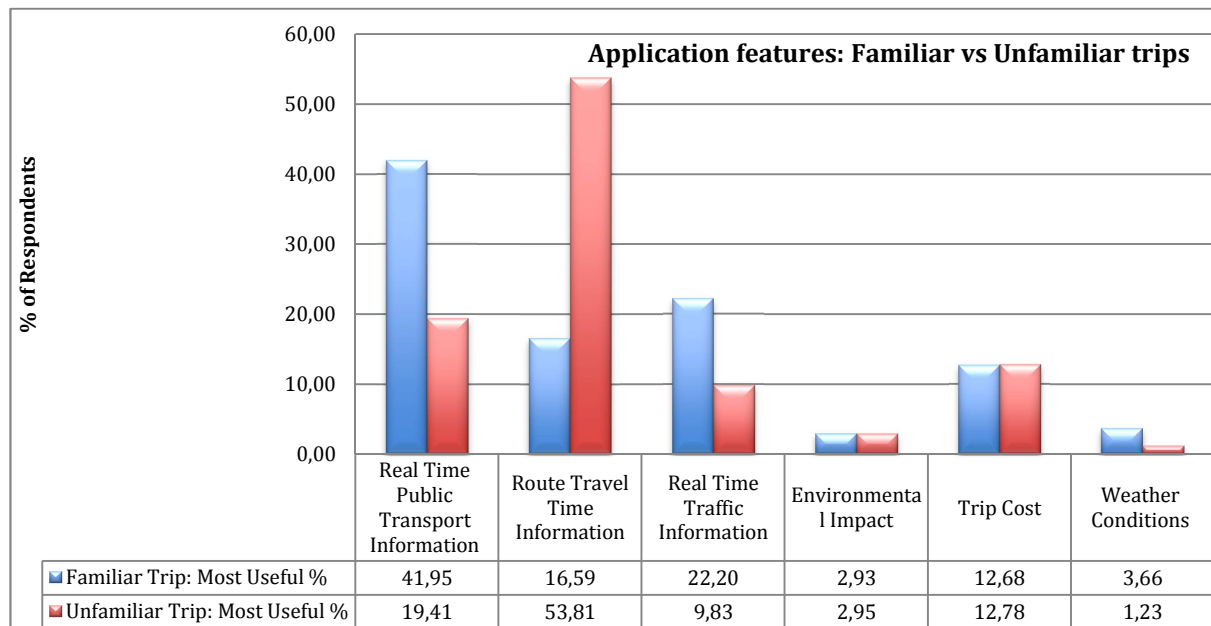


**Figure 6.3: Application features - Familiar vs Unfamiliar trips**

## 6.2 Additional features

The second section of the survey asked respondents to select the “Most Useful” and “Least Useful” features from a list of additional features that were not considered essential to provide full functionality of the device but which may improve its appeal. Fig. 6.4 displays the results concerning demand for additional features. The ability to view weekly or monthly costs and previously taken routes are the most in demand features while the ability to share routes on social media is clearly the least popular (Trinity College Dublin, 2012).

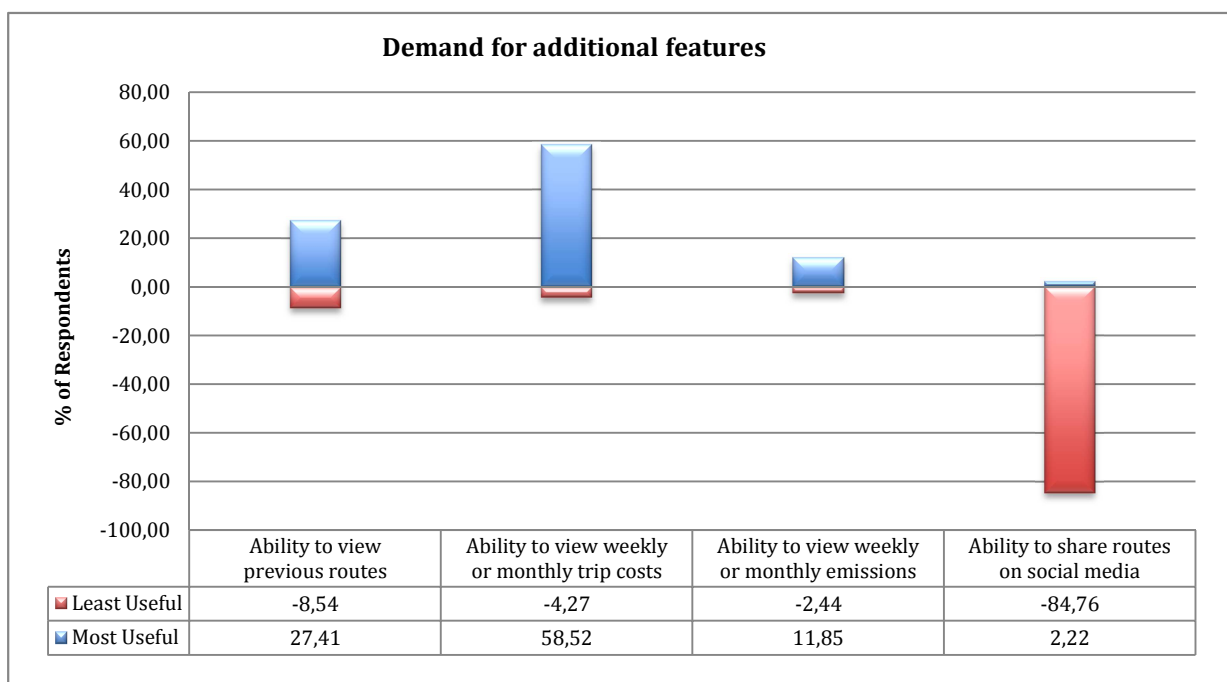


Figure 6.4: Demand for additional features

## 6.3 Turn-by-turn navigation

Respondents were asked to state when and where they would require turn-by-turn navigation systems (Trinity College Dublin, 2012).

Turn-by-turn means that the user gets detailed visual instructions for the selected route in addition to spoken commands. Turn-by-turn systems usually provide user with the

information whether to turn right or left, the street name and number and the distance to the next turn.

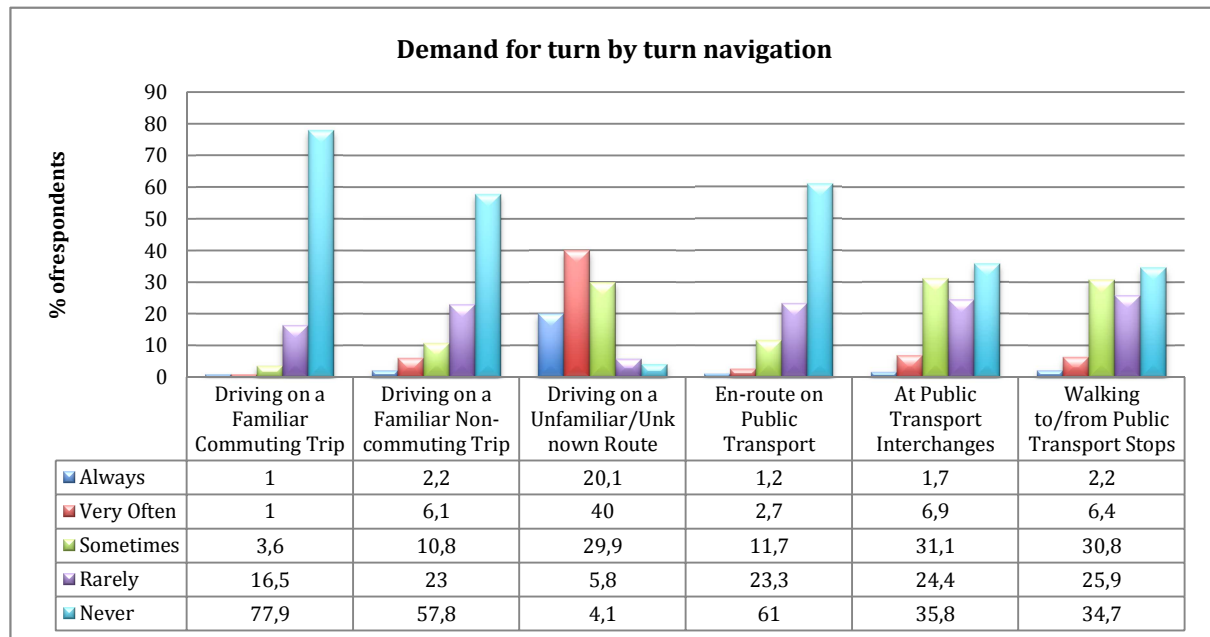


**Figure 6.5: Demand for turn-by-turn navigation**

It is evident from the figure above that there is very little demand for turn-by-turn navigation systems or for driving trips on an unfamiliar/unknown trip. This would indicate that instructions on a map or in written form may mostly be sufficient (Trinity College Dublin, 2012).

## 6.4 Reasons for deleting smartphone applications

Another important point is that individuals might not use the application on a long-term basis. To ensure the maximum uptake and usage of the application it is important not to replicate errors present within existing applications. Respondents were asked to select the most common reasons they have for deleting smartphone applications (Trinity College Dublin, 2012).

It was stated that the most common reason for deleting a smartphone application is that it didn't meet the purpose. The second reason was that the application was not regularly used (Trinity College Dublin, 2012).

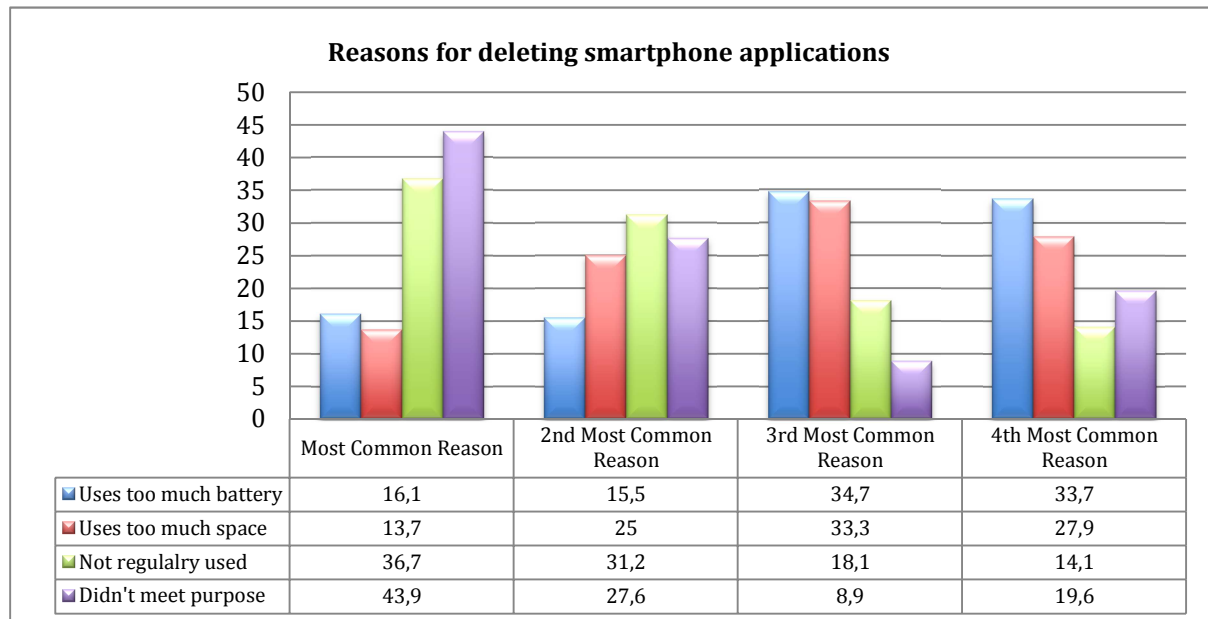


**Figure 6.6: Reasons for deleting smartphone applications**

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## 7. Summary of user requirements and conclusions for the Peacox prototype

The research and investigations provide the following implications for the Peacox prototype:

- The user expects clear information about routing within a journey planner (route duration, route length, map, costs and weather information)
- Information about POIs (supermarkets, ATMs, events), ticket fares and weather were stated as very important. Information about ecological issues is clarified as less important. The participants mentioned that ecological information about a single travel mode is less interesting than a comparison of different aspects of several transportation modes..
- The setting options within the Peacox application that are available for every transportation mode were very well accepted by the user and should be implemented within the application. With this feature, it would be also possible to learn about the users behavior at the initial stage and provide input for the recommendation model and further improvements.
- The POIs could be presented in a map to the users and there could be also a setting option. Relevant POIs could be adjusted (cinema, shops, education, parks etc.) With this feature, it would be also possible to learn about the user preferences at the initial stage and provide input for the recommendation model and further improvements.
- The user should have the possibility to search for start and destination over a list or plan and also set the date and time of the journey. Furthermore it would be useful if the user could save routes as favorites and save that routes automatically in history.

---

Within the application the user should get information about real-time public transportation information but also about the disturbances.

- It would be furthermore profitable to enable a routing to a POI in the vicinity of the user. The user could furthermore have the functionality to add an additional intermediate stop on his route (via route function).
- The online questionnaire provided also results regarding the important Peacox prototype features and possible additional feature. Real-time public transport information, route travel time information as well as real-time traffic information was stated as important for unfamiliar and familiar trips. Ability to view previous routes, weekly/monthly trip costs and emissions were mentioned as possible additional feature for the Peacox prototype.
- Within the online questionnaire it was stated that there is very little demand for turn-by-turn navigation systems. This would indicate that for the majority of trips instructions in the form of a map or written directions may suffice.

As conclusion it can be said, that there are different approaches how the user can be supported in order to travel ecological-friendly. Persuasive strategies represent an important part of this undertaking and will be investigated in the next stage of the project. The result of our investigations was, that the users are interested in comparison of different transportation modes and could be a possible way to make users aware about their travel behavior.

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## Annex A – User Experience Night questionnaire

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**Fluidtime**  
 Design Software Service



Our Reference  
 User Experience Night | Fragebogen

## 1. Fragebogen

### 1.1. Typischer Trip zur Arbeit/Schule/Universität

- Markieren Sie Verkehrsmittel und ggfs. Kombinationen mit einer Linie

• Alleine im Auto

• zu Fuß

|                   |             |               |             |           |
|-------------------|-------------|---------------|-------------|-----------|
| ++<br>sehr häufig | +<br>häufig | o<br>manchmal | -<br>selten | --<br>nie |
|-------------------|-------------|---------------|-------------|-----------|

| Modalitäten                                 | Häufigkeit |   |   |   |    |
|---------------------------------------------|------------|---|---|---|----|
| Alleine im Auto                             | ++         | + | o | - | -- |
| Mit mehreren Personen im Auto als Fahrer    | ++         | + | o | - | -- |
| Mit mehreren Personen im Auto als Beifahrer | ++         | + | o | - | -- |
| zu Fuß                                      | ++         | + | o | - | -- |
| Straßenbahn                                 | ++         | + | o | - | -- |
| Bus                                         | ++         | + | o | - | -- |
| U-bahn                                      | ++         | + | o | - | -- |
| S-bahn                                      | ++         | + | o | - | -- |
| Zug                                         | ++         | + | o | - | -- |
| Rad                                         | ++         | + | o | - | -- |
| Motorrad/Roller                             | ++         | + | o | - | -- |

User Experience Night | Fragebogen | 04.05.2012

I/10

• Alleine im Auto

• zu Fuß

### 1.2. Typische tägliche Besorgungen

- Markieren Sie Verkehrsmittel und ggfs. Kombinationen mit einer Linie

| Modalitäten                                 | Häufigkeit |   |   |   |    |
|---------------------------------------------|------------|---|---|---|----|
| Alleine im Auto                             | ++         | + | o | - | -- |
| Mit mehreren Personen im Auto als Fahrer    | ++         | + | o | - | -- |
| Mit mehreren Personen im Auto als Beifahrer | ++         | + | o | - | -- |
| zu Fuß                                      | ++         | + | o | - | -- |
| Straßenbahn                                 | ++         | + | o | - | -- |
| Bus                                         | ++         | + | o | - | -- |
| Ubahn                                       | ++         | + | o | - | -- |
| Sbahn                                       | ++         | + | o | - | -- |
| Zug                                         | ++         | + | o | - | -- |
| Rad                                         | ++         | + | o | - | -- |
| Motorrad/Roller                             | ++         | + | o | - | -- |

• Alleine im Auto

• zu Fuß

### 1.3. Typischer Urlaubstrip/Freizeitausflug

- Markieren Sie Verkehrsmittel und ggfs. Kombinationen mit einer Linie

| Modalitäten                                 | Häufigkeit |   |   |   |    |
|---------------------------------------------|------------|---|---|---|----|
| Alleine im Auto                             | ++         | + | o | - | -- |
| Mit mehreren Personen im Auto als Fahrer    | ++         | + | o | - | -- |
| Mit mehreren Personen im Auto als Beifahrer | ++         | + | o | - | -- |
| zu Fuß                                      | ++         | + | o | - | -- |
| Straßenbahn                                 | ++         | + | o | - | -- |
| Bus                                         | ++         | + | o | - | -- |
| Ubahn                                       | ++         | + | o | - | -- |

**Date: 31. 03. 2012**

**Dissemination level:** (PU, PP, RE, CO): PU

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| Modalitäten     | Häufigkeit |   |   |   |    |
|-----------------|------------|---|---|---|----|
|                 | ++         | + | o | - | -- |
| Sbahn           | ++         | + | o | - | -- |
| Zug             | ++         | + | o | - | -- |
| Rad             | ++         | + | o | - | -- |
| Motorrad/Roller | ++         | + | o | - | -- |

1.4. Wie wirkt sich die Streckenlänge auf Ihre Verkehrsmittelwahl aus? Mit X markieren.

| Streckenlänge               | ...zu Fuß | ...Auto | ...ÖV | ...Rad |
|-----------------------------|-----------|---------|-------|--------|
| Kurze Strecken (50m-0,9km)  |           |         |       |        |
| Mittlere Strecken (1km-5km) |           |         |       |        |
| Lange Strecken (5km-9,9km)  |           |         |       |        |
| Weite Strecken (10km +)     |           |         |       |        |

1.5. Markieren Sie Gründe (mit X), die für das Autofahren bzw. umweltfreundliche Verkehrsmittel sprechen (Mehrfachauswahl möglich)

| Grund                            | Auto | Umweltfreundliche Verkehrsmittel |
|----------------------------------|------|----------------------------------|
| Reisekosten                      |      |                                  |
| Reisezeit                        |      |                                  |
| Verfügbarkeit und Zugänglichkeit |      |                                  |
| Zuverlässigkeit                  |      |                                  |
| Komfort                          |      |                                  |
| Autonomie                        |      |                                  |
| Status                           |      |                                  |
| Erlebnis                         |      |                                  |

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| Grund                            | Auto | Umweltfreundliche Verkehrsmittel |
|----------------------------------|------|----------------------------------|
| Reisekosten                      |      |                                  |
| Reisezeit                        |      |                                  |
| Verfügbarkeit und Zugänglichkeit |      |                                  |
| Zuverlässigkeit                  |      |                                  |
| Komfort                          |      |                                  |
| Autonomie                        |      |                                  |
| Status                           |      |                                  |
| Erlebnis                         |      |                                  |

**1.6. Wie wichtig sind folgende Faktoren für die Verkehrsmittelwahl?**

|                         |   |   |   |                        |
|-------------------------|---|---|---|------------------------|
| ++<br>starke Zustimmung | + | 0 | - | --<br>keine Zustimmung |
|-------------------------|---|---|---|------------------------|

| Grund                            | Zustimmung/keine Zustimmung |   |   |   |    |
|----------------------------------|-----------------------------|---|---|---|----|
| Reisekosten                      | ++                          | + | o | - | -- |
| Reisezeit                        | ++                          | + | o | - | -- |
| Verfügbarkeit und Zugänglichkeit | ++                          | + | o | - | -- |
| Zuverlässigkeit                  | ++                          | + | o | - | -- |
| Komfort                          | ++                          | + | o | - | -- |
| Autonomie                        | ++                          | + | o | - | -- |

| Information                               | Zustimmung/keine Zustimmung |   |   |   |    |
|-------------------------------------------|-----------------------------|---|---|---|----|
| Verfügbare Verkehrsmittel (Auto/ÖV/etc)   | ++                          | + | o | - | -- |
| Umstiege und Verbindungen                 | ++                          | + | o | - | -- |
| Fahrpläne                                 | ++                          | + | o | - | -- |
| Kosten (zB. Benzinpreis, Ticketpreis)     | ++                          | + | o | - | -- |
| Fahrtzeit                                 | ++                          | + | o | - | -- |
| Parkmöglichkeiten am Ziel                 | ++                          | + | o | - | -- |
| Umweltverträglichkeit des Verkehrsmittels | ++                          | + | o | - | -- |

**1.9. Welche Information wären für Sie während Ihrer Reise interessant?**

| Information                                                                               | Zustimmung/keine Zustimmung |   |   |   |    |
|-------------------------------------------------------------------------------------------|-----------------------------|---|---|---|----|
| Orte von Interesse entlang der Route (zB. Supermärkte, Museen, Bankomat, Veranstaltungen) | ++                          | + | o | - | -- |
| Informationen über körperliche Bewegung (zB Kalorienverbrauch, etc)                       | ++                          | + | o | - | -- |
| Belastung durch Umweltschadstoffe (zB. Feinstaub, CO2-Ausstoß)                            | ++                          | + | o | - | -- |
| Lärmbelästigung                                                                           | ++                          | + | o | - | -- |
| Reisewetter                                                                               | ++                          | + | o | - | -- |
| Unfallrisiko bzw. Sicherheit des Verkehrsmittels                                          | ++                          | + | o | - | -- |
| Kosten (Ticket Preise)                                                                    | ++                          | + | o | - | -- |

**1.10. Würden Sie es hilfreich finden, wenn die alle Modalitäten miteinander verglichen werden? Könnten diese Informationen Ihre Entscheidung über die gewählte Modalität beeinflussen?**

|    |      |           |
|----|------|-----------|
| ja | nein | eventuell |
|----|------|-----------|

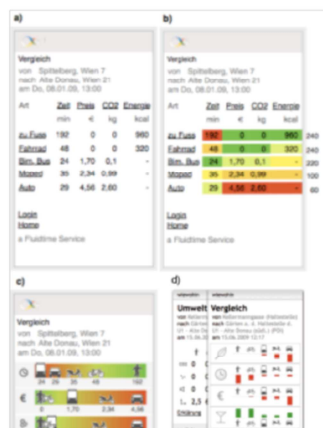
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1.11. Welche Vergleichsvariante würden Sie sinnvoll finden?



1.12. Welche Vergleichsvariablen wären für Sie wichtig?

|                         |   |   |   |                        |
|-------------------------|---|---|---|------------------------|
| ++<br>starke Zustimmung | + | 0 | - | --<br>keine Zustimmung |
|-------------------------|---|---|---|------------------------|

| Grund                | Zustimmung/keine Zustimmung |   |   |   |    |
|----------------------|-----------------------------|---|---|---|----|
| Kosten               | ++                          | + | o | - | -- |
| Ökologie             | ++                          | + | o | - | -- |
| Lärm Werte           | ++                          | + | o | - | -- |
| Platzbedarf          | ++                          | + | o | - | -- |
| Fahrzeit             | ++                          | + | o | - | -- |
| Staurisiko           | ++                          | + | o | - | -- |
| Parkplatzsuche       | ++                          | + | o | - | -- |
| Privatsphäre         | ++                          | + | o | - | -- |
| Fitness (kcal Werte) | ++                          | + | o | - | -- |
| Flexibilität         | ++                          | + | o | - | -- |

1.13. Würden Sie es hilfreich finden, wenn die Ökologie Informationen bei Ihrer Route sichtbar wären (siehe Darstellung unten). Könnten diese Informationen Ihre Entscheidung über die gewählte Modalität beeinflussen?

|    |      |           |
|----|------|-----------|
| ja | nein | eventuell |
|----|------|-----------|

Warum/Warum nicht?

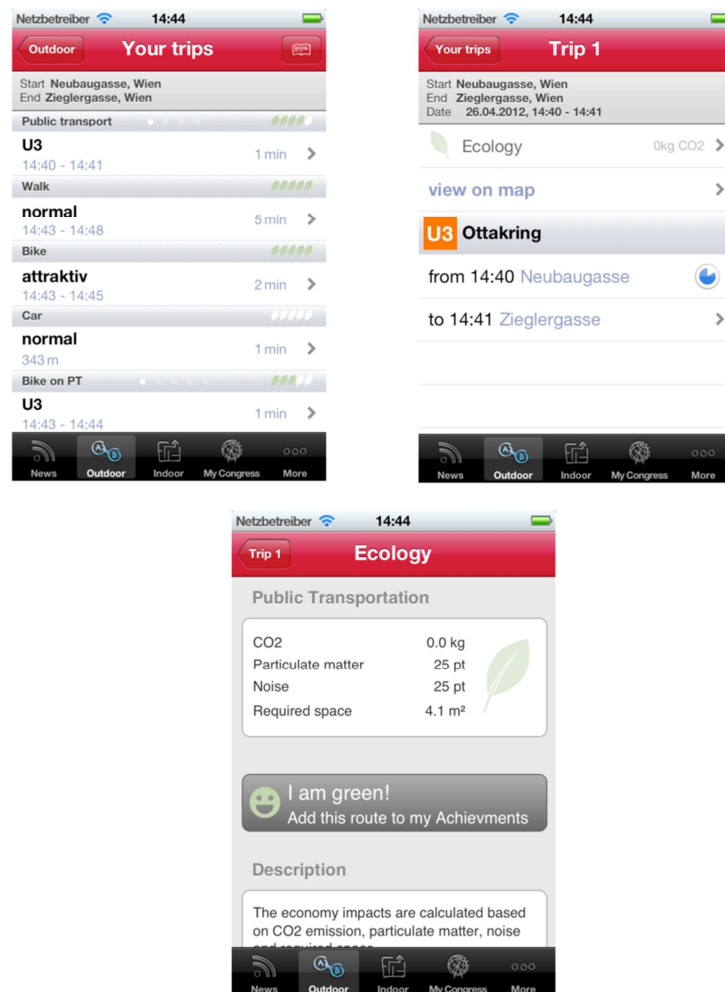
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1.14. Welche Einstellungsmöglichkeiten bei Routenplanern würden Sie nutzen?

| ÖV                                                                                                                                                                                                                                 | ja/nein |      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------|
| <div>Routenwahl</div> <div>schnellste Route ✓</div> <div>wenig umsteigen</div> <div>kurze Fußwege</div>                                                                                                                            | ja      | nein |
| <div>Umsteigen</div> <div>unbegrenzt</div>                                                                                                                                                                                         | ja      | nein |
| <div>Verkehrsmittel</div> <div>Eisenbahn, S-Bahn ✓</div> <div>U-Bahn ✓</div> <div>Straßenbahn ✓</div> <div>Stadtbus Wien ✓</div> <div>Regionalbus ✓</div> <div>Taxi AST-Rufbus, ASTAX ✓</div> <div>Flughafenschnellverkehr ✓</div> | ja      | nein |
| <div>maximale Fußwegzeit</div> <div>15 min</div> <div>Wie lange wollen Sie maximal zu Fuß gehen? Diese Einstellung gilt pro Teilstrecke innerhalb einer Fahrt, also z.B. für den Weg von Ihrem Standort zur Haltestelle.</div>     | ja      | nein |
| <div>Gehgeschwindigkeit</div> <div>langsam</div> <div>normal</div> <div>schnell ✓</div>                                                                                                                                            | ja      | nein |

| ÖV                                                                                                                                                                     | ja/nein |      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------|
| Ich möchte<br><input type="checkbox"/> keine Stiegen steigen<br><input type="checkbox"/> keine Rolltreppen benutzen<br><input type="checkbox"/> keine Aufzüge benutzen | ja      | nein |

| AUTO                                                                                                                                                                                                                                                   | Zustimmung/keine Zustimmung |      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|------|
| Routenwahl<br><input checked="" type="checkbox"/> schnellste Route<br><input type="checkbox"/> kürzeste Route<br>Geschwindigkeit<br><input type="checkbox"/> langsam<br><input checked="" type="checkbox"/> normal<br><input type="checkbox"/> schnell | ja                          | nein |
| Parkmöglichkeit<br><input checked="" type="checkbox"/> am Startort<br><input type="checkbox"/> am Zielort                                                                                                                                              | ja                          | nein |

| RAD                                                                                                                                                                                                        |    |      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|------|
| Routenwahl<br><input type="checkbox"/> attraktiv<br><input checked="" type="checkbox"/> schnell<br><input type="checkbox"/> individuell<br>maximale Fahrradfahrzeit<br><input type="text" value="20 min"/> | ja | nein |
|                                                                                                                                                                                                            | ja | nein |

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## Annex B – Online questionnaire



### ECONAV Smartphone App

Personal transport is one of the largest contributors to greenhouse gas emissions across the European Union. As part of the European Commission's Seventh Framework Programme, the ECONAV project aims at providing citizens with a personal navigation device, such as a smartphone application, which will allow individuals to see the carbon emissions associated with the various routes and modes available to them.

It is hoped that this device will provide citizens with the information they need to make well informed environmentally friendly travel decisions.

As part of the ECONAV project this survey focuses on identifying user requirements for the device, while also examining how individuals relate to carbon dioxide emissions and how these emissions can be made more relevant to people's everyday lives.

We really appreciate you taking the time to complete this survey and would welcome any feedback or suggestions that you wish to contribute.

If you wish to be entered in the draw for a €100 One4All shopping voucher, please leave your contact details in the section provided at the end of the survey

William Brazil



[Exit this survey](#)

## Application Features

As is common with many existing journey planning applications such as Google Maps, the user can select an origin and destination, and be presented with a number of different possible routes and modes such as driving, train, bus and Luas.

This application also aims to provide the user with real time information such as current traffic conditions and public transport waiting times as well as information on the carbon emissions related to each mode.

**1. Please rate how useful you would find the following potential features when using a navigation/journey planning smartphone application on a trip you are FAMILIAR with.**

**Only indicate which feature you feel would be the most useful and which would be the least useful**

|                                                                                               | Most Useful                      | Least Useful          |
|-----------------------------------------------------------------------------------------------|----------------------------------|-----------------------|
| Information on the cost of the trip (e.g. public transport fares or petrol consumed on route) | <input checked="" type="radio"/> | <input type="radio"/> |
| The environmental impact that one route or mode of transport has compared to another          | <input type="radio"/>            | <input type="radio"/> |
| Real Time Public Transport Information (Arrival times for DART, Bus or Luas)                  | <input checked="" type="radio"/> | <input type="radio"/> |
| Information on Current Traffic Conditions                                                     | <input type="radio"/>            | <input type="radio"/> |