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European Smart Mobility Planner (MyWay): Frontend design and first evaluation results

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Abstract:

MyWay is an integrated platform, the European Smart Mobility Resource Manager, which facilitates an holistic view of sustainable mobility, combining all sorts of transport services and automatically handling transactions related to their usage into a seamless point-to-point mobility service. It also provide travel suggestions that are better optimized to the users egocentric perspective, and that of society as a whole. The platform has been tested in three 'living labs' in Barcelona and Catalonia region, Berlin and Trikala. Insights from the design and the results of trials will be reported in the following paragraphs.

Keywords:

Multimodal trip planning, sustainable transport, personalised transport

Introduction

MyWay arises from the need of develop an integrated platform which places the user at the centre of mobility and facilitates a holistic view of sustainable mobility, combining all sorts of transport services and automatically handling transactions related to their usage into a seamless point-to-point mobility service.

This European Smart Mobility Resource Manager aims to provide the traveller with the tools and mobility resources according to its profile and preferences. This had led to the design of a platform which combines different means of transport taking into account user preferences for journey planning but also that adds extra capabilities like booking and general transport information to the traveller.

MyWay has been developed and tested in three "living labs", Berlin, Trikala and Catalonia, two cities and a whole region. Berlin represents the large and densely populated urban municipality with high variety of means of transport, Trikala has been used as an example of a smaller city with a population

76,000 and fewer transport options and Catalonia represents the high complexity of integrate transport for an entire region, either with high and low dense municipalities.

MyWay is expected to boost travellers' usage of cleaner mobility services by enabling the consideration of all available resources and their appropriate allocation to journey plans.

This will therefore enhance the attractiveness, comfort and efficiency of transport networks and minimize GHG emissions encouraging the users to switch to more sustainable mobility choices and behavior.

Android app architecture and design details

Smartphone devices are one of the curernt enablers for applications that optimize mobility patterns by taking advantage of the tremendous advance in computing. Journey planning remains an everyday aspect that could benefit from such smartphone apps; a large amount of applications currently provides trip recommendations, i.e manners of reaching a user-defined destination. However, many aspects have not been fully exploited; personalization of journey recommendations, use of multimodal transports are only few of examples towards better user experience and sustainability in the transport of humans. The introduction of such aspects to Smartphone applications is a task, requiring intuitive design and user interaction flow in order to make them acceptable and usable from commuters. Entity/Screen relationship diagrams [1] are heavily used in, user interaction design in order to guide the development process and lead to optimum user experience [2]. The following diagram was designed for the development of the European Smart Mobility Application Android and Ios front-ends. In this case, an ecosystem of features are created around the main map screen. The functionality has been listed below, along with representative images demonstrating visual design aspects of the app.
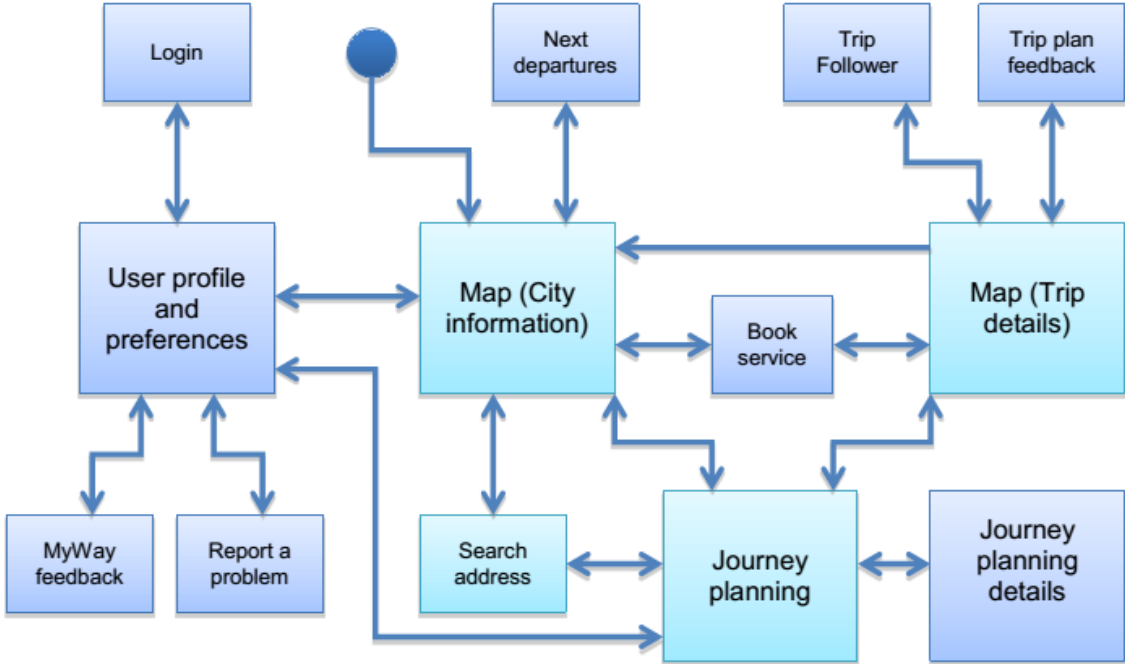

Figure 1 MyWay Screen relationship diagram

Login

The login screen aims at introducing the user to the MyWay frontend application by giving him the possibility to enter his MyWay credentials in order to login into a personalized MyWay session. Personalization affects most aspects of MyWay session as it enables: the suggestion of customized journey suggestions, the collection of user traces and theautomatic booking of services.The following image depicts login as implemented in MyWay.

Map (city information)

In the Map screen the user can do most of the Journey planning actions such as setting his trip start and destination points, through the map user interface or the dedicated text fields. On the map, the user can see his current position on the map, explore other locations on it or view city information (transport stops & parking, weather). Additionally, a quick button access links the user to the profile and preferences screen in order to enable personalized journey planning. Some of the main available functionalities are the possibility to see the next departures for a public transport, ask for availability or booking of a mobility service.
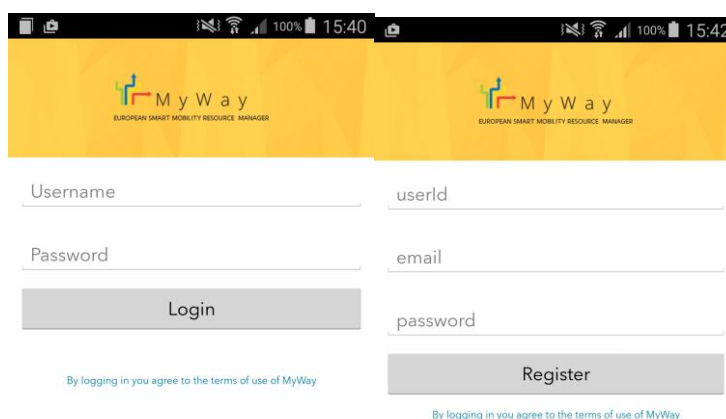

Figure 2 MyWay login and registration screen

Map (trip details)

When a plan is selected in the journey planning screen it is showed in the map with the trip details for all the trip legs. This screen allows the user to activate the trip follower (for the selected trip), send a feedback about the proposed plan and view an extensive set of additional details regarding the selected plan in text
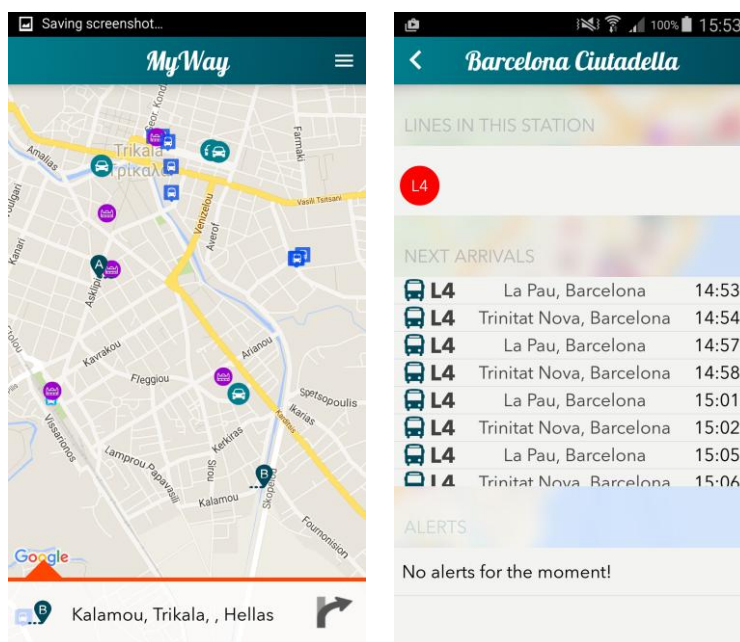
Figure 3 MyWay city information and bus stop details

Journey planning

Once the user has selected the start and destination addresses of his journey he can push the journey customization button that is displayed on the map screen in order to further customize his trip. In the customization menu the user can set the starting time of his journey, adapt the origin and destination of his trip, swap origin and destination and select other preferences that are exclusively applicable to the selected journey. Moreover in this screen multiple trip recommendations appear along with an indicative classification oftrips with respect to parameters such as duration, comfort , eco-friendliness in terms of carbon footprint and total calories to be burned during the journey.

Journey planning details

The journey planning details screen, appears once the user pushes a button indicating additional customization of journey options. MyWay adopts three main categories; trip planning optimization criterion, preferences regarding walking distance and public transportation and finally a collection of considerations that may require special attention. (travel with babies,/pets, reduced mobility, luggage). The afore mentioned preferences are volatile and have to be set by the user only when deviations from the usual travel patterns are required.

User profile and preferences

In the user profile and preferences screen the user can set their preferences about trip constraints, language, selected region or visible elements. These preferences represent permanent transport attributes that should be taken into consideration each time a commuter plans his journey.
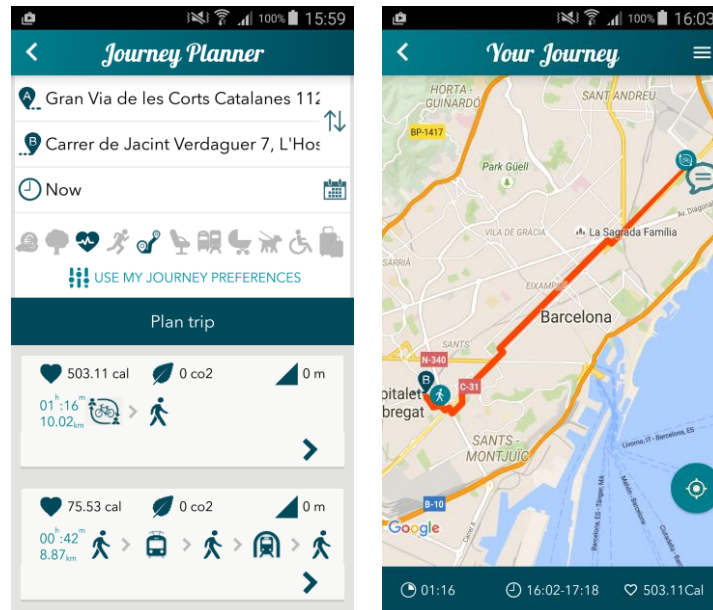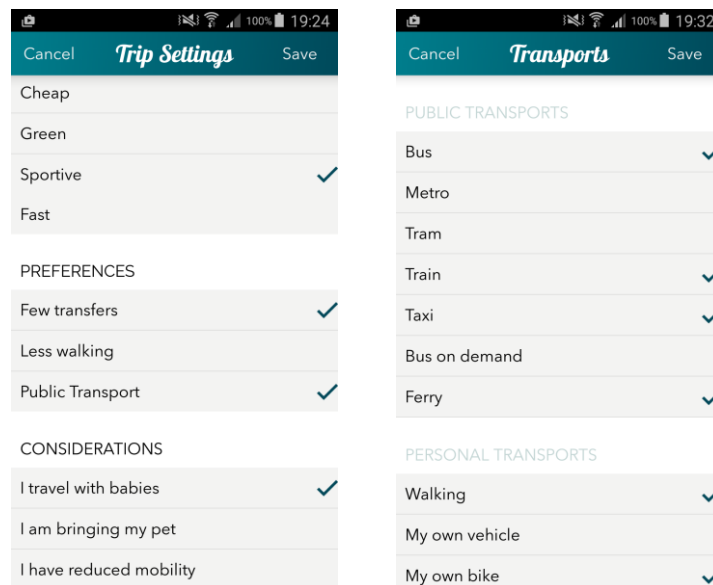
Figure 4 MyWay Journey planning and trip details screen

Figure 5 MyWay trip preferences and favourite transports screen

Booking

For all bookable elements a dedicated form is showed to allow the user to book the service across MyWay.

Feedbacks

Feedback functionality has been introduced in the final prototype. Dedicated screens allow the user to report a problem or feedback about MyWay or about the trip plans.
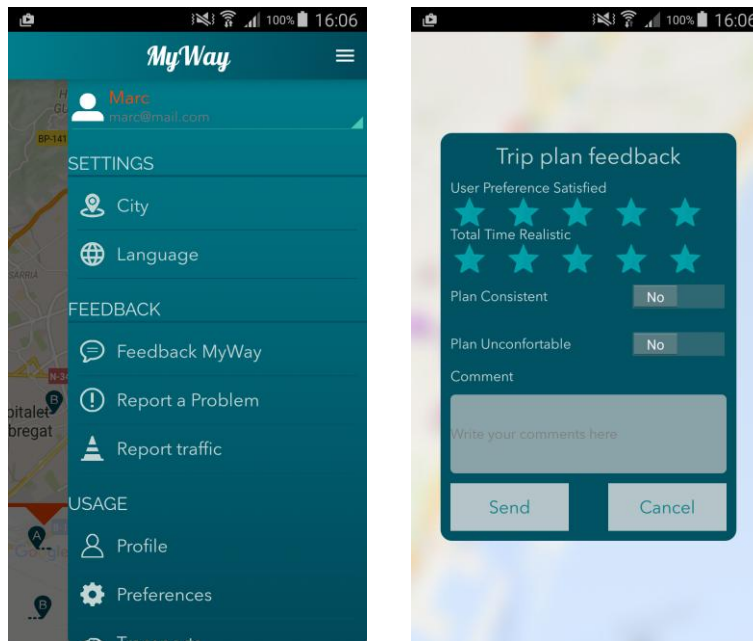
Figure 6 MyWay generic menu and trip feedback screen

User manager

The user manager subcomponent is responsible of managing the user profile and preferences. It is accessible to client application views through internal methods for the fetching and storing user profile and preferences. User profile and preferences related data is used by other modules such as the trip organizer in order to provide a personalized MyWay session.

Trip follower

The trip follower component is responsible of monitor the user on the trip planning and based on his location updates. It is accessible through a set of methods that are responsible of sending the users positions to the server, while he is in the process of performing a journey according to MyWay recommendations. Moreover as network connectivity may be lost due to reduced coverage, the internal API will handle temporary local storage of the user's position and transmission of stored data on network existence. The trip follower operation will be optimized in order to both enable, the collection of a sufficient number of location traces and the optimal use of the mobile device battery unit.

The local storage layer is used to save data that "lives" outside the lifecycle of the application such as user authentication credentials, MyWay backend server details, or as a buffer area for data that cannot be transmitted to the backend in case of communication failure. The following tables detail the storage schemas for each of the aforementioned categories of data, whereas storing technologies for each of the devices are custom to the respective IOS/Android technologies.The following information will be stored when needed

- The schema of the user's position that will consist of the GPS co-ordinates in addition to a timestamp that will associate position and time
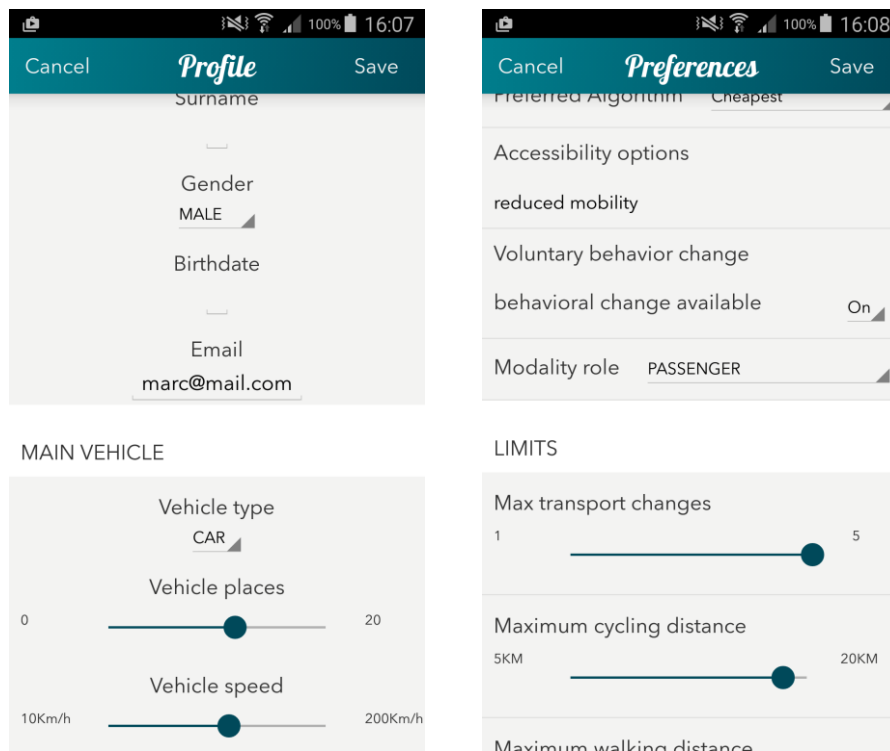
- User credential data
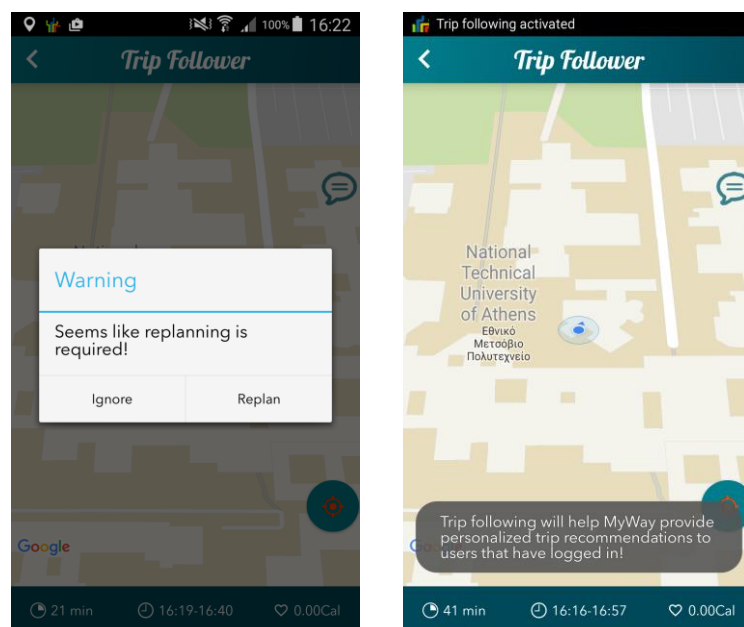

Figure 7 MyWay user profile and preferences screen

Figure 8 MyWay trip following screen

Statistics

Aggregated transport usage data are provided to users in order to enable monitoring of transport mode usage and the personal and environmental impact. Both daily and weekly graphs are available to the

user in order to increase awareness regarding actual transport patterns.
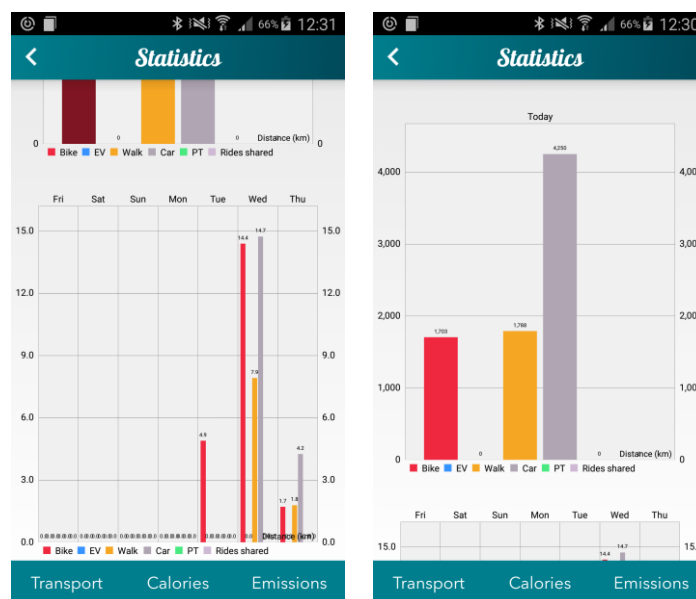

Figure 9 MyWay user statistics screen

Results from the first phase of testing.

The Phase 1 testing of the MyWay application took place in each of the three participating Living Labs in the period March to May 2015. Ninety eight people participated in this phase (57 from Catalonia, 34 from Berlin and 7 from Trikala). Users were asked to complete a background questionnaire as soon as they entered the experimental trials, a mid-term questionnaire after one month of using the application and a final questionnaire after the end of the Phase 1. The survey aimed to analyse the users' perceptions about the MyWay performance and its usability as well as their willingness to use it in the future. Some first results are shown below.

Users' perception of the MyWay response time compared to the response time of other planners is shown in Figure 10. Users tend to think that MyWay is "slower than other planners", both in the mid-term and final questionnaires. Still, in the final questionnaire there is a small increase in the number of those evaluating the MyWay system as "much quicker" and a small decrease of those evaluating it as "much slower" than other planners.

The users' opinions on whether MyWay suggestions are in accordance to their needs and expectations are shown in Figure 11. More than 45% of users evaluated the MyWay planner as of similar performance with other planners as regards its accordance to their needs and expectations in both questionnaires. Still, 2 users evaluate it as much more in accordance to their needs and expectations than other planners in the final questionnaire.
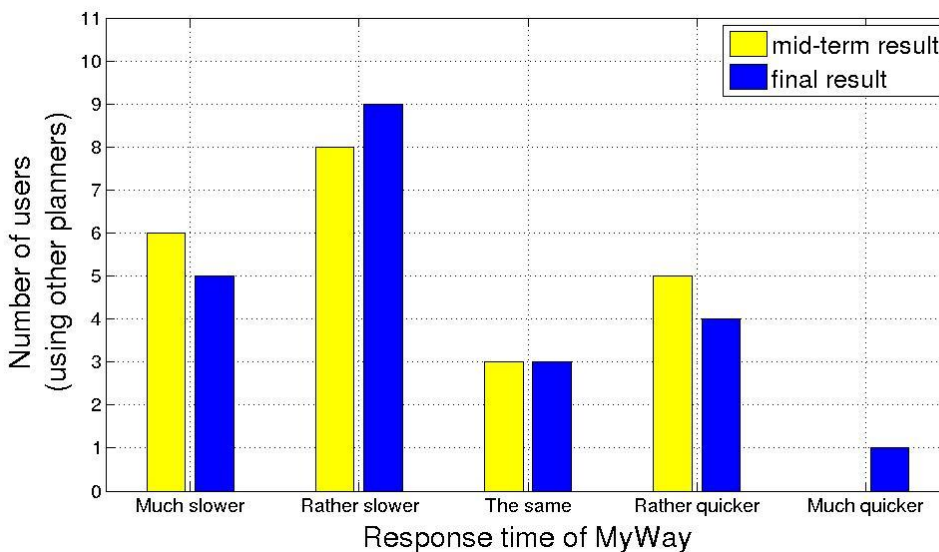
Figure 10   Responses to the question: "How do you evaluate the MyWay response time compared to other planners?
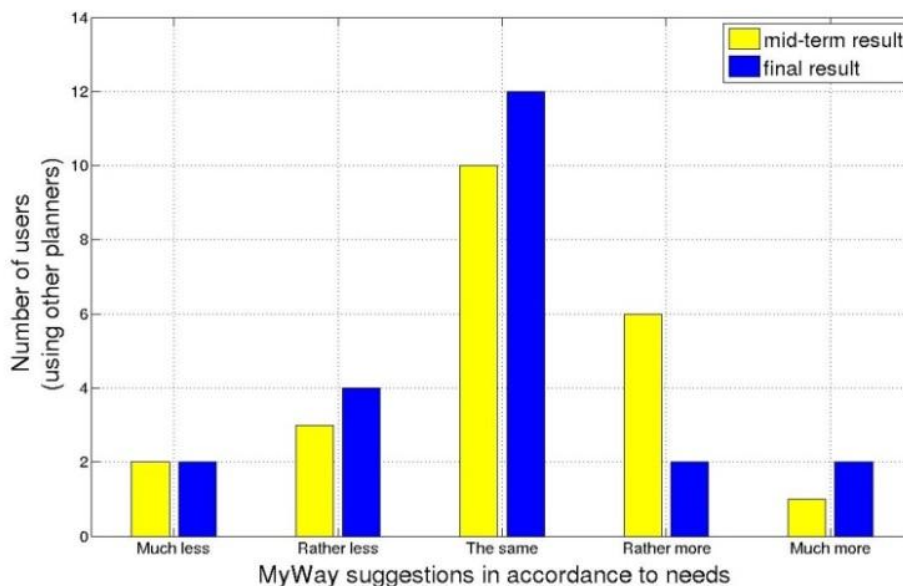

Figure 11 Responses to the question: Are the MyWay suggestions more in accordance to your needs and expectations than the suggestions by the other planners?

Figure 12 presents the users' evaluation of the potential benefit of having access to MyWay. The positive responses (large and very large benefit) reach cumulatively the level of 30% in the mid-term and they appear improved (by approximately 6.5%) in the final questionnaire.
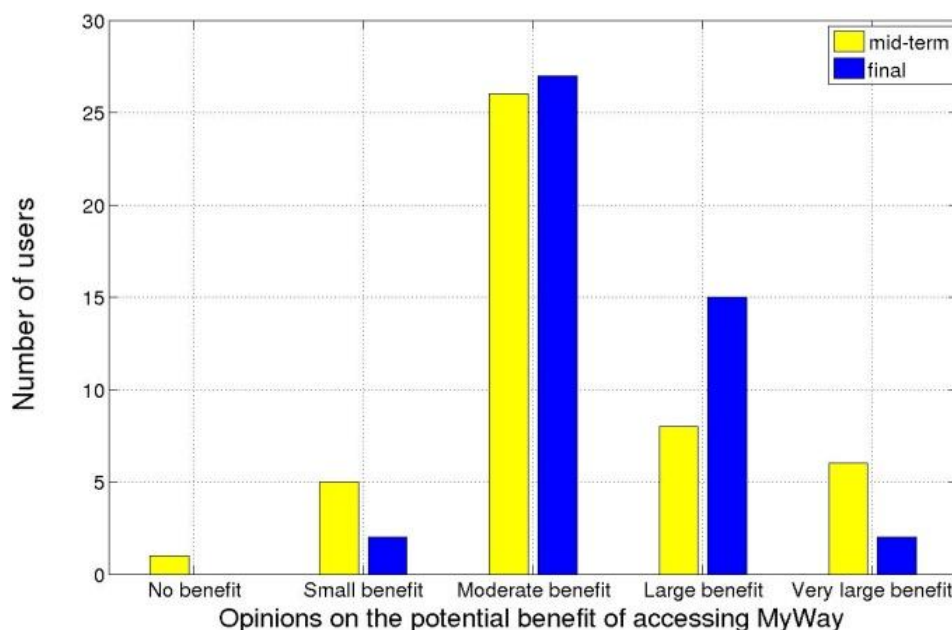
Figure 12   Responses to the question: "How do you judge the potential benefit of having access to MyWay?"

Conclusions

There are some positive findings from the first round of the evaluation of MyWay application. 30% of users in the mid-term and 36.5% in the final questionnaire think that they would benefit from having access to MyWay. This is encouraging as it is an indication of their willingness to use MyWay in the future. Also those who think that MyWay is more in accordance to their needs and expectations than other planners increase as the MyWay development becomes more mature, that is in the final questionnaire compared to the mid-term one. Again, this is an indication that the personalised proposals by MyWay are well-designed. One issue that has to be considered is the users' perceptions about the MyWay response time, which they perceive as rather slower than other planners. It should made explicit that MyWay is a meta-planner, combining information from multiple planners, therefore it provides enhanced functionality, this is why it may seem slower. In any case, its response time will always depend on the response time of the under-lying planner itself.

In any case, although the above findings are preliminary and have to be confirmed in the Phase 2 of evaluation, where the final MyWay application will be used, they are encouraging, as they may imply that MyWay is achieving its main objectives.

References

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