

# THE SOULMATE SOLUTION: PROMOTION OF SAFE ELDERLY MOBILITY WITH THE HELP OF A NAVIGATION APP CREATED THROUGH PARTICIPATIVE DESIGN

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**Abstract.** Digital innovation, new forms of mobility and increasing pressure on our health systems create a variety of challenges for society, but also various opportunities for synergy and international cooperation between different research areas. Especially the mobility needs of an ageing population, which strives for prolonged independence, is a major concern to health care institutions as well as mobility providers. The research project SOULMATE, winner of the VCÖ mobility prize 2021 in the category "Design for all", addresses the promotion of elderly mobility in a rapidly transforming mobility landscape, with special focus on the issues of how digital solutions, like navigation applications, can support the active mobility and independence of seniors, while reducing the likeliness of accidents while travelling. The SOULMATE solution represents a digital safety net, which was developed by an international research consortium from Austria, the Netherlands and Belgium. Part of the SOULMATE solution is a navigation app with integrated SOS functionalities, which was developed in co-creation with senior citizens from different social groups. The main goal of the app is to accompany users on all their daily routes and provide a feeling of security while travelling. To investigate the acceptance and user-friendliness of the e-health tool, the functionalities, but also the perceptions of end-users towards such an app were evaluated in all three countries and serve as input for further research into digital navigation solutions.

**Keywords:** elderly mobility, mobility application, co-creation, citizen science

## 1 INTRODUCTION

The 21<sup>st</sup> century is dominated by various challenges in the environmental, economic and societal sphere, which create new solutions in the fields of mobility, but also raise the question of how to adapt to these solutions. A key segment of the population, which will become even more dominant in the next decades is the aging population and its specific needs in terms of technology, mobility support and health care. As it is predicted that by 2050, one in six citizens of the world will be over 65 years old, the societal implications of this development have to be carefully examined. [1] One aspect with major implications on quality of life and health, is the mobility of seniors which represents universal and basic need. [2] The

target group of seniors travels to different destinations based on that need, to socialize, shop for groceries or go to a doctor’s appointment. Most mobility activities also originate in the social sphere and influence the quality of life and mobility perception [3]. This fact is occasionally neglected in the analysis of mobility behaviour and the successful transition to new mobility, especially in connection with the needs of seniors. The crucial question of how elderly mobility can be supported in a fast-changing environment is relevant for society as well as organizations catering to the needs of the elderly. For this reason, an international team from Austria, the Netherlands and Belgium, focused on the creation of a digital safety net for active senior mobility. A consortium of mobility researchers, senior clubs, health care specialists and digital developers not only developed a new mobility app for navigation in co-creation with seniors in all three countries, but also integrated existing digital technology for mobility training into the solution. [5][6]

## 2 THE SOULMATE SOLUTION: CREATION OF A MOBILITY APP

With progressing age, daily chores and trips can become a struggle, as cognitive and physical challenges limit one’s personal ability to flexibly navigate through neighbourhoods. [2] Elderly people are especially confronted with mobility problems, which sometimes remain unnoticed. These challenges may turn into an obstacle to active mobility and the ability of seniors to care for themselves and live independently. [7] Digital support has, however, the potential of prolonging independence for senior citizens and help them navigate the world of modern mobility. As there is already a lot of strain on the health care systems in all project countries, digital solutions and cross-border cooperation have the potential of fostering substantial synergies.

### 2.1 METHODOLOGY: THE CO-CREATION PROCESS

To ensure SOULMATE’s end-user orientation and incorporate different views from seniors in all project countries, different co-creation methods were used as illustrated in figure 1.

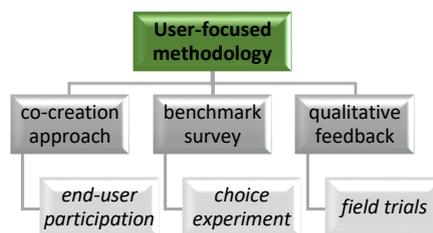


Figure 1. Overview of user-focused methodology

Firstly, the minimal viable product of the SOULMATE solution was researched with a co-creation approach in all three countries.

In several sessions, the end-users' needs and app design requirements were documented. The technical partners responsible for app development attended all sessions to understand the end-user requirements. At the end of this stage, the requirements the minimal viable product should contain, were finalized. [8] To complement the participative sessions, a benchmark survey and choice experiment were conducted. The survey targeted a broad group of elderly citizens considered potential users of SOULMATE, with the main objective of gathering information about the senior population's interest in e-health solutions. Additionally, a choice experiment introduced senior citizens to different variations of the application. The 3,728 choices made by participants supported the identification of relevant app functionalities and the willingness to pay for certain added functionalities. [8] The final stage focused on the qualitative feedback of end-users concerning the prototype app in two phases. Phase one focused on a "trip scenario": the planning of a route and using the app while on the route. The scenarios also included deviating from the planned route to handle the warning signs and SOS emergency function. Some team members acted as coaches to provide video call assistance and test the "care taker" view of the app. The second phase focused on the qualitative feedback concerning the journey and experience with the app. Overall, seven separate sessions with 30 elderly users were conducted in the project countries focusing on biking, going by public transport and walking to a destination with the app. Overall, the user-focused co-creation approach, yielded conclusive results for the development SOULMATE app and its successful launch on the European AAL market.

## 2.2 INTERPRETATION OF RESULTS: THE SOULMATE APP

Apart from insights into mobility behaviour and perceptions of e-health products, one main results of the cross-border project, was the creation of the SOULMATE solution. Figure 2 summarizes app functionalities and visualizes the final app design. [8]

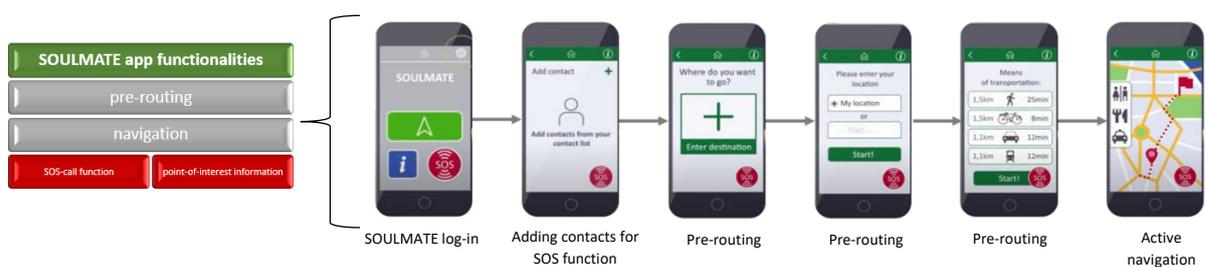


Figure 2. Functionalities and visualization of the SOULMATE app

SOULMATE includes an app that accompanies seniors on all routes and enables them to feel confident during their journeys. As confirmed in the benchmark survey, mobility motivates seniors to travel to different locations, with the most popular and frequent travel reasons exercise, shopping and excursions. The transportation modes used include walking, cycling and driving a car. To reflect this diversity, the app offers support for all those different modes

of transport. Several assistance features of the app, like an SOS-call function and real time navigation ensure safety of users during the journey.

Before going on the trip, in the pre-routing mode, users can define their route and choose their preferred mode of transportation. Each route option includes information concerning travel times and helps to determine "ease of travel". This service is achieved through the integration of public transport information from national information systems (e.g.: VAO Austria). During the routing, users are accompanied by active navigation with simple illustrations. As elderly travellers have different mobility needs, their interest in possible stops on the route is also reflected in the SOULMATE app. The choice experiment showed the most important app features was "finding facilities or points of interest". [8] Therefore, points of interest" (e.g.: toilets) are displayed on the way and provide an additional feeling of security. A crucial SOULMATE feature is the SOS-call function, with which help can be called in case of disorientation, insecurity or an accident. The SOS-button is visible in the app at all times and can be considered a classical extension of the emergency bracelets. [10] Once the elderly traveller presses the SOS-button, an automatic video call connects to a trusted person who can see the person's current location and the route the person is on. This functionality enables uncomplicated help, because not every uncertainty is automatically an emergency which requires the assistance of classical emergency service. Consequently, the functionality also helps to decrease elderly traveller's reluctance to call for help, as moments of disorientation are sometimes considered a stigma. [11] Finally, the SOULMATE app also engages with the user if the elderly traveller comes to a standstill on the planned route (current configuration: 30 seconds). The app proactively asks the traveller whether everything is alright and activates the SOS function, should the traveller not react to the question. Once the user has reached the planned destination, the app also recognizes the journey to have been ended successfully. A coach supervising the journey, also receives this information. The main aim of the app is to accompany the elderly person safely to the planned destination with a minimum of incidents.

Despite the illustrated functionalities of the SOULMATE app, the question remains whether senior citizens are likely to use such a digital offering. In the feedback survey, a majority of users (90 %) considered the app useful for calling help and sharing a location. Half of the participants considered the app useful for navigation. A key issue identified in the surveys was the lack of initial assistance and training when using apps. Generally, users confirmed that they preferred asking partners, children or friends for support, compared to a service desk. [9] These inputs indicate that a high level of personal support might be necessary for the successful implementation of the SOULMATE app as well as any other application catering to mobility needs of the elderly.

### 3 CONCLUSION

The SOULMATE project shows that there is increased interest in active senior mobility in different European countries to promote healthy aging as well as prolonged independence of the elderly. This interest does not only exist in the sphere of research or health tech organizations, but also in the cohort of elderly citizens itself. The possibility of staying healthy and actively mobile as possible is of great importance to senior citizens. Using digital solutions to support active mobility through navigation, but also an SOS-function was considered very useful and comfortable by end-users. Nevertheless, the surveys indicated that functionalities not considered important by the development team like, for instance, "finding places" is perceived as a motivation factor to use the application by end-users. This shows that further co-creation and an in-depth pilot phase are crucial for a successful launch of the application. In conclusion, the development of digital solutions for the elderly requires an international, joint effort by developers, specialist organizations and the target group itself to ensure the creation of a solution that is not only accepted, but also used by the elderly.

### 4 ACKNOWLEDGEMENT

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