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Smart Mobility Services and Senior Citizens

- A Framework for Co-creation and Analysing User Needs

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Abstract

New digital mobility innovations such as Mobility as a Service (MaaS) are being developed in Europe and worldwide. The common nominator for these services is that all transport modes can be planned, accessed and paid for from a smart phone application. However, the design and development of these services are usually done with young, tech savvy users in mind. This paper studies how to improve the design of these services for senior citizens and how to engage seniors in co-creation. The results show that the seniors value the idea of Mobility as a Service concept for simplifying and combining the travel purchasing process. Nonetheless, the senior citizens should be provided smart mobility solutions that increase their quality of life, applying the user requirements for senior citizens that make the solutions easier to use.

Keywords: Smart mobility services, senior citizens, co-creation

1. Introduction

The new smart mobility solutions, such as Mobility as a Service (MaaS) are providing a novel user-centred mobility paradigm. Travellers can save time and expenses and get better service experience with the integrated platform. [1] Travellers can use an applications like Whim! or Kyyti to plan and pay different modes of transportation such as taxi, bus, tram, rental bike and car in the city and while travelling with their smart phones. With smart mobility service, users can get the transport services that they need, with one ticket and fare or pay a monthly fee. This new form of travelling can offer a competitive option for private cars and can be an important step towards lessening the need to own a car in the household. According to the MaaS vision, the use of transportation services will increase and spending on privately owned cars will diminish in the future cities. [1] In addition to moving people, in the next stages of the smart mobility solution, MaaS, will enable the creation of new service platform and ecosystem that move packages, goods and cargo in a tailorable manner. [1] This kind of new delivery systems could include various industries such as food, groceries, newspaper and mail delivery and would be especially useful in the daily life of senior citizens by providing help with

daily tasks. Having said that, the smart mobility solutions are changing freedom to move and lifestyles of younger, tech savvy users, but they may have less impact on the quality of life and freedom of moving of senior citizens, unless the design process also recognizes the needs and considerations of senior people in using such services. However, to be inclusive, these services need also adapt to the needs and preferences of senior citizens as the percentage of elderly people is ever increasing in the industrialized world. [3]

Moreover, in Europe and world-wide with the rapid population ageing that is occurring, there is increasing interest in concepts that can assist senior citizens' mobility and living at home with wellbeing. [4] As a way to keep the persons self-determination, privacy needs to be considered in relation to the benefits of ICT tools providing benefits for increased safety and being more active and mobile. [4]

This paper studies, how to improve the design and accessibility of smart mobility services in order to provide quality services for senior citizens, in other words, for people over 60. In addition, the paper explicates and presents some methods how to include senior citizens in the development of smart mobility services using co-creation approach.

The rest of this paper is structured as follows: Section 2 presents the background and current situation of smart phone usage by senior citizens. Section 3 proposes a user requirement framework for smart mobility services from the literature. Section 4 introduces the co-creation approach applied with senior citizens in this research. Section 5 presents the results from the co-creation study. The Section 6 presents conclusions and following steps of the study.

2. Senior citizens and use of smart phones

As a group, senior citizens, i.e. citizens over 60-years old, started to use the mobile phones somewhat later than younger age groups. In the beginning senior citizens perceived the mobile phone as 'summer cabin phone', which meant that it was used only in special circumstances. The mobile phone was acquired as a safety tool for outdoor activities. Furthermore, seniors didn't perceive constant accessibility and online presence as important as younger age groups. [5] Usually young people have been considered as pioneers of using new smart phone solutions and technologies while seniors are following few steps behind or positioning themselves as laggards or non-users in the adoption process. However, the significance of the mobile communication and use of mobile services has increased and become more diverse also among senior citizens in recent years.

In 2015, 69% of 16-89-year olds used smart phones in Finland. In 2016, 53% of the 55-64-year olds have been using Internet with their mobile phones outside of their home and working places. In 2017, 77 % of Finnish people have smart phone on their personal use and the mobile phone is the most popular device for using the web. [6] These statistics are pretty similar compared for any other industrialised countries. For instance in the US, the share of Americans that own smartphones was

77% in 2017. 74% of Americans aged 50-64 years own a smart phone and 42% of over 65 years olds have a smartphone in their use. [7] According to Official Statistics Finland, smart phone use has become more diverse among all age groups. For no exception to this, senior citizens are also using the smart phones and tablets for a wide range of services such as banking services, TV and social media. [6] This means that the old image of seniors, who use the mobile phone only for calling and more infrequently for texting, is no longer valid. The seniors of today also use and are interested in a wide variety of services that add value and improve their quality of life.
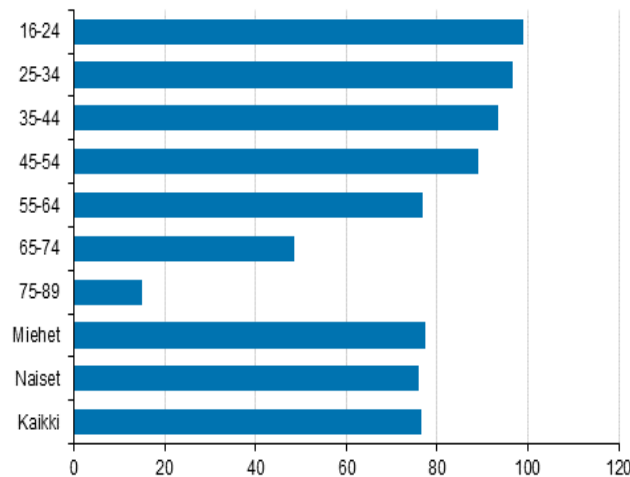

Figure 1: Smart phone in use 2017, % of age group in Finland. (Source: Official Statistics Finland)

Earlier, senior citizens often learned many smart phone and Internet skills from their children and grandchildren. Moreover, the seniors' age group also has its own innovators and pioneers, who have an important social role in their circle of friends in spreading new smart applications and their uses. The senior innovators do this kind of "Mobile and ICT consulting" as volunteer work, teaching the use of devices and services for other elderly people. Seniors' ICT associations, such as ENTER ry (entersenior.fi), have networks of tutors and peer counsellors to guide in new smart applications and devices usage. [5]

As the population ages, the need for different services in the society, especially for independent living, mobility and leisure time, as well as wellbeing and health, is naturally increasing. At the same time, seniors constitute increasing number of the users of commercial and public services. Understanding the needs of older adults is more important than ever, and meeting these needs will represent major market opportunity also for smart mobility services on international 'silver markets'. In the future, however, there shall be a substantial number of ageing people who are wealthier and more independent and whose needs as consumers are much diverse and not only related to illnesses or

disabilities. At the same time, of course, product preferences are colored by the consideration of decreasing cognitive and physical capacities, which can't also be ignored in the design of future services. More likely, active seniors of the large age cohort, will turn their attention to products and services, which advance their own well-being and increase their quality of life. [8]

3. User needs for mobile services and applications by senior citizens

The user requirements for smart phones and mobile devices for senior citizens have been studied recently as many commercial solution providers have become aware of the importance of senior market. [9] As people age, there are several physical and cognitive factors that may affect the use of smart phone solutions. However, the user requirements for senior people have been often ignored in actual service. [10] For instance, for elderly people, the visual aids are important and the font sizes need often to be increased in order to be able to read text. In addition, there are limitations how to use colours and especially blue-green tones should be avoided for visually impaired users. Several studies suggest the use of voice interfaces, which are convenient for older people without limited hearing.

Some studies suggest that animations and blinking boxes should be avoided for seniors. Kurniawan has noted for instance that seniors are often using the mobile phones as memory aids, using alarms and reminders. [11] Also conversational AI, i.e. chatbots, text or voice based, could be offered to provide good customer experience and instant and exact feedback for seniors' questions and queries.

At the moment there is a good understanding of the different, mostly user experience related features, (see table 1) that improve the design of the user interfaces for smart phones and applications for senior citizens. However, these features are not always offered for ordinary consumers to customize easily on their devices and applications but are implemented only by hardware manufacturers. [10, 11] That being said, the future successful applications should offer also easily customizable features, so that the user is able to customize the service according to his or her own preferences and possible age related disabilities (see the Table 1). In fact, some studies suggest that touch based interfaces are not as intuitive to seniors as they are for younger people and they are not yet developed for their full potential to meet in special needs of older adults. [12]

- Increasing the font size when needed
- Simple text
- Memory aids; appointments, reminders,
- Features to minimise user errors; extra confirmation dialog
- Safety features, increased cyber privacy
- Colour—neutral displays for visual impaired users, avoid blue-green tones
- Graphics and colours only to display information
- No animations or moving texts
- Images for navigation
- The audio settings need to be set to a loud setting by default
- Buttons, icons and fonts of sufficient size should be used, while still providing the user with a clear overview
- Cost effective services
- Voice user interface availability, voice-directed services
- Chatbots for instant queries

Table1: The table combines, modifies and updates some features driven from the literature [9] [10] [11] to improve the design of smart mobile solutions for senior citizens.

When designing smart mobility solutions for senior people, it is also important to include seniors themselves to the process with appropriate participatory methods to inform the design of seniors' concerns and wishes and to better able to develop the solutions that meet the needs and provide added value for the users. [3] In the next Section, we will present our co-creation approach to involve seniors' insights and study user needs for new smart mobility solutions.

4. Co-creation approach

In principle, the participatory or co-creative approach, which engages citizens and other stakeholders, is beneficial in many ways. More attention is paid to making the development processes more participative and changing from a top-down and technology-driven access towards user-driven, accessible approach and participation. [13][14] Co-design has been defined as 'creative cooperation during design processes', and it pays special attention to users and customers and setting their experiences central. [13] [14] There are several methods to do co-creation such as interviews and workshops, which are commonly used to help designers interact face-to-face with users to include user perspective in idea generation and product development. Recently, online communities and internet-based toolkits have been used for collaborative co-design to reach larger groups of

participants. [15] [16] [17] [18] Co-creation benefits have been associated with improving processes of concept generation and decision-making and promoting cooperation and creativity. In addition, the co-design approach has an impact on improving users' satisfaction and building trust or loyalty over the long term. [13] Nonetheless, several studies show that users are doing a lot of beneficial product or service modification in many fields. [19]

There are several methods, tools and techniques for carrying out co-creation project with users. For instance digital engagement tools and online co-design tools can be used to co-produce innovations and use collective intelligence create smart solutions and provide new innovations. Easy to use, easily accessible applicable web solutions can be used for all citizen groups to service co-creation, yet the oldest age groups (people over 65) might not be easily reached with web based co-creation and participation tools [15]. Thus the face to face interviews, focus groups, workshops and participatory tools may be used to facilitate discussing and providing insights and support taking in consideration senior citizens' needs for smart mobility services. [3] In these co-creation workshops, different visual tools can be applied such as post-it clustering, storyboards, maps, photos and drawings, which help to discuss and build concepts together with researchers and participants (see Fig.2)
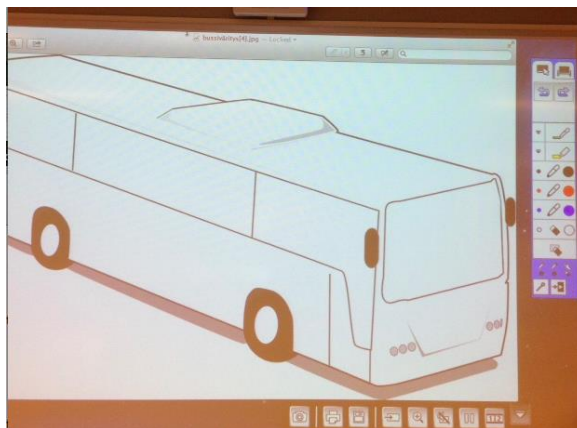

Fig.2. Interactive touch screen for sketching and co-creating smart mobility service concepts.

5.   Co-Creation Approach

To study seniors' insights for the development of smart mobility services and two main methods were used: 1. An Open Innovation, Owela web lab study and 2. A case study.

5.1   Open web lab

52 participants attended to discussions. The mean age of the participants was 60 years and 14 of them were over 60-years of old. Five of them replied that they have never used digital services related to public transport with their smart phones, while 19 of them have used them occasionally or are using

them regularly. The most used digital mobility service was the Journey Planner. The most commented topic in Owela was *New kinds of travel chains: MaaS – the mobility as a service concept,* which was welcomed by simplifying travel purchasing, that was seen as complicated and inflexible process at the moment. One participant commented and criticized the current ticketing system for public transport:

"Buying tickets will begin to be your own art form. In another vehicle, the driver sells tickets and the other does not. For an express bus you can buy number of different tickets in different channels with different cards or applications. Purchase of a daily ticket is different, i.e. a HSL travel card cannot be applied. Then there are number of different ticket machines and payment methods for different vehicles. Mobile applications start to become pretty usual and much more will come. Getting information quickly about how to buy a ticket cannot be done because the system is so full. From the perspective of the user, this should be simplified and harmonized, and for example, there should be automatic age limits for pension discounts."

Many senior citizens commented that they would be interested to use this kind smart mobility services, but this was not possible because their owned old mobile phone model so they suggested that these services should be not just for the phone, but should also be available to order on home computer to print out a barcode ticket for yourself. However, some seniors also noted that there are no other means of offering smart services than via smart phones that could compete with the convenience of personal phone:

"I am 69 years old and the last five years I have been an active bus user. It is difficult to imagine that no system could go beyond the development of smart phones and their potential. And it is also valuable to develop something to compete with the private car in the use comfort."

Some seniors also mentioned the development toward less cars in the city centre with shared journeys and vehicles as a desirable trend and wished more services to support this kind of development. However, participants mentioned that at the moment for instance it is difficult to compare prices for rented cars, as the prices need to be reviewed per page/player at a time and user needs to go very far ahead in the service to see the final price. All in all, a single smart mobility service would simplify travel planning and purchasing.

5.2 A case study

To study further and more in detail the user experience and expectations for smart mobility services a qualitative user experience case study was conducted. The case study methods included combination

of an interview and observations. In the interview we discussed the usage of the internet and smart phone, travelling and the concept and expectations for smart mobility services from the seniors' point of views, with Hilda, 80 years. In addition, we downloaded smart mobility apps Whim! and Kyyti to Hilda's phone. Hilda lives in her apartment in a new neighborhood in a big city in Finland. She travels abroad a couple of times a year and uses mainly bus or more rarely her own car inside the city. She uses internet daily. Hilda uses Internet to look for information for instance about travels, maps and prices and she downloads her bus card online. She uses the Journey Planner on her computer. She has bought recently a new smart phone with the limitless internet use and a new laptop computer. However, she prefers the computer for smart phone to use all services because: *"On the phone the texts are so small that there is not much inspiration. And also when you get older the fingers become stiff and it is harder to use the touch screen than it is for the younger ones."* Hilda has also got a mobile identification for bank services and payment on the mobile to but she hasn't yet used mobile phone for paying any services. She says about the mobile payment: *"I'm waiting for a restful time when I get try it. The situation must be good and calm.*" Hilda was able to download Whim! and Kyyti applications on her phone with some support. The main challenges for her were related to unnoticeability of some radio buttons or check marks. "*Sometimes it may depend on a very small matter that it is not possible to get something done online. At some corner there may be some tiny button that you can't even notice."* The visibility of these UI elements could be improved with stronger colors and clear design, which would help the services to meet the special needs of senior citizens.

6. Conclusions

Senior citizens of today are not similar smart phone and service users than this age group was approximately ten years ago: more and more seniors own smart phones, use them when they move outdoors and their use of mobile services is diversifying. Senior citizens may be also very different from their health, life style, consumption and ICT usage habits. Designing the services to meet seniors' special user needs would support seniors' use of these services in the daily life. Another question is, how to guide seniors to download and use these services. Seniors own associations have been successful in consulting the use of new technologies and applications. Many seniors have the smart phone at their use and would benefit of peer-to-peer counselling or some other calm and slow-paced learning context. This study also suggests to look beyond the most obvious and traditionally used methods to reach out older adults for research and co-creation. As the internet use is widespread among people over 60, open innovation and web lab discussion forums could be also considered as useful means to stimulate and facilitate co-creation among seniors.

Seniors value the easiness that comes with the smart mobility service as much as younger people. In addition the future smart delivery systems, which could include various industries such as food,

groceries, newspaper and mail delivery would have a lot of potential as offering services to improve senior citizens' quality of life.

7. Acknowledgement

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