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Planning Smart Social Distancing - Mobile Application Concept Design and Evaluation

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Abstract. The COVID-19 crisis has caused social distancing practices to be part of everyday life. We present the concept and user interface design of a smart phone application that enables planning daily schedules in a manner which seeks to optimise the social distancing. We present the application UI design and its evaluation in two focus groups (n = 8). The findings highlight the need for and positive attitude towards a mobile application that supports avoiding crowds during and after the pandemic time.

Keywords: Covid-19 · Social distancing · Mobile application · Calendar · Location based services

1 Introduction

In spring 2020, the world faced the global Covid-19 pandemic. Society had to adapt to restrictions, including social distancing practices. The pandemic caused lock-downs and mobility restrictions, bringing a shift to home offices [7], and causing many practical challenges for everyday life in families [2]. The social distancing measures to stem the pandemic included both government set restrictions, as well as voluntary recommendations. Mobile applications, such as Crowdless or Mind the Gap, have been adopted as a tool for helping people to keep safe while conducting their mandatory everyday mobility and interactions with people, and to minimise the social encounters with people exposed to Covid-19 [1,4]. Mobile tracing applications have been introduced in several countries, and their nationwide use has been promoted in order to prevent Covid-19 from spreading.

We introduce a mobile application concept and user interface (UI) design that aims to help people to avoid crowded places during pandemic outbreaks. The design target is to support people to conduct their daily activities whilst minimising the probability to become exposed to, or transmit, the disease. We organized a user study with two focus groups to evaluate the application concept and to discuss the ideas of mobile app supported social distancing. Whereas prior

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art has evaluated an asocial hiking app for avoid people on a hiking route [6], we address the UI design and concept of supporting social distancing in everyday mobility.

2 Social Distancing Mobile App Concept

The Smart Social Distancing mobile app concept supports users to foresee possible crowded places on a map, and plan how to schedule and navigate from one place to another more safely, Fig. 1. The design process started from defining the main functions, exploring different information visualization techniques, studying existing applications, and then proceeding to drafting the UI design flows, wireframes, and finally the UI graphics.

The features in Fig. 1 present the main functions of the Smart Social Distancing (SSD) mobile app concept. A heatmap function shows the crowded areas on a city map. The user can plan a daily schedule by adding calendar events. Figure 1-right illustrates the application menu. Route recommendations create an optimized route to navigate by avoiding crowds, and the 3D map shows the hotspot map in 3D. In addition, the user can search how crowded a specific place is. Risk notifications give the user warnings about, e.g., which of the frequently visited places are crowded during the day.

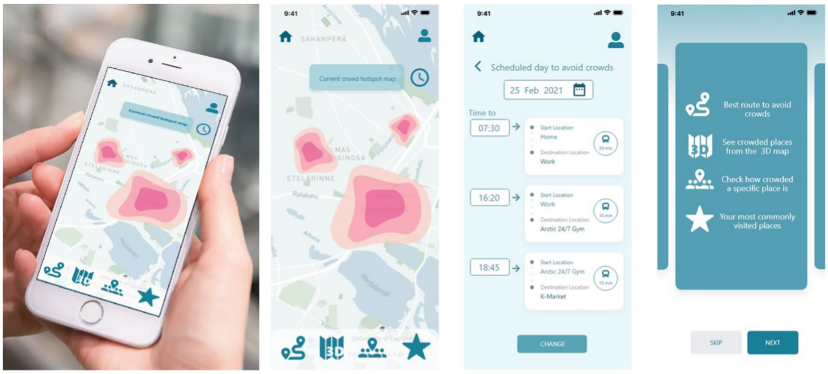

Fig. 1. The Smart Social Distancing application concept main functions.

3 Focus Group Study

3.1 Set-Up of the Study

To study user perceptions of social distancing and evaluate the SSD mobile app concept, two of the focus groups sessions were organized. Each focus group included three female and one male participant (total n = 8), age between 20 and 45 (mean 28) years. Each focus group session lasted for one hour. The focus group session had three main sections with specific questions. First, the participants

were asked what kind of applications they have been using to prevent themselves being in crowded places now during the time of Covid-19, and what other means they had applied to maintain physical distance to other people. The answers were collected using post-it notes. First, the participants got to see and try out the prototype. After that they received a paper questionnaire, where each of the eight main application functions were rated on a scale from 1 (not useful) to 7 (most useful). After this, the participants reflected, using post-it notes, which features they liked most, which ones the least, and how they would use the application after the pandemic time. Finally, the participants answered questions relating to their anticipated future behavioural changes after the pandemic. Also here, post-it notes were used to support the discussion.

3.2 Findings

The participants had been using applications such as video calls, food ordering, sending messages, social media tools, and generally tools to help them to take care of everyday practicalities remotely. However, they had not used applications where the main use case was to avoid crowds. Such applications are hardly available to Finnish users in particular. Therefore, participants had used other ways to avoid crowds, such as planning to run errands outside of the assumed crowded hours, or checking peak times from Google search. They had to come up with new rhythms for their day while trying to avoid crowds.

As the most useful feature of the application, the participants perceived the hotspot map, where the red color illustrated how crowded a place was, see Fig. 1. This feature was voted to the most useful by 62,5% of the participants in the evaluation questionnaire, and it also gained the most comments with the post-it notes. After the hotspot map, the most liked functions were the risk notifications, how to avoid crowds by scheduling the day, and the ability to see the busiest hours of different places.

When ideating how they would use the application after the pandemic, the answers focused mostly on avoiding crowds and rush hours. Recognizing the most visited places was also suggested, as well as organizing Pokémon Go type games, which would include moving from one place to another. As a long term behavior change, participants estimated generally a bigger desire to avoid crowds, even after the pandemic. Altogether, the Smart Social Distancing application was seen to have potential. A mobile app to support social distancing while planning everyday tasks requiring mobility was embraced.

4 Discussion

In our work, we have presented a mobile application concept and UI design for a Smart Social Distancing application to support avoiding crowds while conducting normal everyday mobility, and evaluated it with focus groups. The participants found the concept of Smart Social Distancing mobile app useful, and especially seeing the crowded areas with one glance on a map was embraced. Even though Koronavilkku, a Finnish government supported app for notifying if the user had

been exposed to Covid-19, is widely used, an application which would generally guide avoiding crowds is not, to the best of our knowledge, available in Fin-land. The participants were not using any specific mobile apps to guide them for social distancing, although they generally used tools that supported remote operations, such as ordering food. Prior art has introduced different concepts of that relate to avoiding crowds, and utilizing context information [3] has gained a strong foothold in application design. Recognizing crowd density and move-ment patterns in urban events has been addressed by prior art [8], as well as automatically adjusting navigation to avoid traffic jams [5].

Considering their behavior after the pandemic, most of the participants answered that they would continue to use the proposed mobile application to avoid crowds. This may indicate that the pandemic time has caused a permanent change in social behavior, and that life routines adopted during pandemic might actually remain in people's everyday lives. This would be an interesting topic for future research.

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