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Designing an activity application for people with cognitive disabilities

What should be considered when designing a UI for people with cognitive disabilities?

Master's thesis in Computer science and engineering

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Cover: Mockup of the prototype (Google Pixel 6 mockups)

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Abstract

This master thesis project treats the topic of user interface and user experience design, developed for people with cognitive impairment. The project has been carried out at the request of the non-profit association Grunden in Göteborg. Grunden has requested a user study and prototype of a smartphone application interface for an application that is to promote independence in everyday life for the target group. The application will be used by the target group to find activities to attend, and thereby increasing their opportunity to be independent and to take charge of their own everyday life.

The research question of this project is: What should be considered when designing a UI for people with cognitive disability? To answer this question, a literature study was firstly conducted. From this study, general accessibility guidelines were found along with methods and knowledge about how to best work with this particular target group. After the literature study, initial interviews were held at Grunden with several people of the target group. Following these interviews, a thematic analysis was made to pinpoint themes and important aspects found in the interviews. Some questions arose after the analysis, and more interviews were held to answer them. The questions were rather specific and regarded the expected and desired functionality of the application. All data gathered up to this point was compiled in to a requirement specification.

Using the requirements specification, an initial prototype of the application was made using Figma. This prototype was then tested with several people of the target group. Any issues or opinions expressed by or seen in the target group during the tests was then remedied or adapted in the prototype. The project continued this way for approximately seven weeks, creating many iterations of the prototype. During some tests, a specific function was tested, and other tests treated the prototype as a whole.

During tests and interviews, it became increasingly clear what works better in terms of UI design for this target group. Some important factors include using simple language, follow WCAG or corresponding accessibility guidelines, make navigation sequential and avoid giving to much information on a single page.

For future work, it is recommended that researchers or designers evaluate the concept with more people of the target group, preferably people outside of the association

Grunden, since all of the interviewees and testers have been members of Grunden.

Keywords: user experience design, user interface design, accessibility, engineering, project, thesis.

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Johanna Janebäck, Ella Jonsson, Gothenburg, June 2022

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1
Introduction

This project is carried out at the request of the association Grunden and their members. The association Grunden strive to make life better for people living with cognitive or intellectual disabilities. Currently, a project with the purpose to make life easier for people with cognitive disabilities, called Leva Livet is in progress. The aim of this project is to make communication, social events and contexts easier. To achieve this, Grunden has requested a user study and prototype of a smartphone application interface for an application that is to promote independence in everyday life for the target group. The application should facilitate making new social connections, share and create social events and make members of Grunden feel included in the community.

1.1 Research question

This project will aim towards increasing knowledge within the accessible design field. It will contribute to research by providing guidelines for creating a smartphone application based on dialogue and testing with the user group. These guidelines will be used in this project to design a prototype of a smartphone application with the aim to promote independence and autonomy among people with cognitive disability. Trough this application, an example of how guidelines and recommendations can be practically implemented is provided. This leads to the research question:

What should be considered when designing an activity application UI for people with cognitive disability?

1.2 Deliverables

The project is expected to result in a compilation of requirements that will be used as a base for designing a prototype for a smartphone application. Guided by this list of requirements an interactive, high fidelity prototype will be designed.

1.3 Stakeholders

The stakeholders of this project is primarily the association Grunden and their members. Grunden is an non-partisan association, striving to make life better and more

fair to people with cognitive disabilities. Others with cognitive disabilities outside the Grunden community, could also benefit from this project and possibly find new connections trough the application.

Secondary stakeholders of the project would be close family and friends of Grunden members, that wish to to take part of information available trough the application. These stakeholders may not be immediately affected by the project, but indirectly through a family member or friend.

The financiers of the Project Leva Livet is the Swedish Inheritance Fund. They do not actively engage in the project process but have an interest in seeing the project results.

1.4 Scope

The time frame of the project is 20 weeks, working full time at 40 hours a week. Development of the application will be towards smartphone devices. In ethnographic studies and evaluations, members of the Grunden association will be consulted, thereby creating a limitation of the diversity of people participating in the study.

2
Background

The domain of the project is application development of a communication and information platform for a user group with cognitive disabilities. The project is carried out at the request of the Grunden association located in Gothenburg, Sweden. To qualify as a member of Grunden or to be a board member the person applying is required to have a cognitive disability. Grunden wishes to increase the possibilities of autonomy for their members, facilitate social activities and encourage a sense of community. Grunden aims to achieve this with a smartphone application that is accessible to members of all levels of function.

The proposed goal of the application is to serve as a community platform that will follow the Web Content Accessibility Guidelines. This recommendation compiles information from experts regarding digital accessibility and comes in three levels, A, AA and AAA, where the ambition level increases. These guidelines are produced for web design and therefore not entirely applicable for this project. The aim is to make the application accessible for the target group and use these guidelines as inspiration. The European standard EN301549 recommends fulfilling at least requirements for level AA when designing web pages and web applications [1]. The specific functions of the application are yet to be decided. The project has a strong link to the design for all approach and will focus on researching and developing an inclusive user interface design.

Feeling included in society is crucial for people with cognitive disabilities to achieve physical and psychological well being [2]. Eklund and Toppar [2] also mention that young adults with cognitive disabilities often experience loneliness, which can be due to a lack of social relations outside the family as well as of recreational activities.

Social exclusion includes several factors such as political, economic and cultural exclusion [3]. These are aspects that are likely to affect disabled individuals, creating difficulty in everyday life. Some examples of impact from these factors are: unequal opportunities, denial of rights, not being treated with respect or acceptance and lack of access to economical assets. According to Appelton-Dyer and Field [3], creating technological support and accessible tools to be used by a community, helps decrease the social exclusion of disabled individuals, improving several factors of life such as decreased stigma, improved self-confidence, personal safety and security as well as increasing understanding and knowledge within society.

A common approach when developing tools for accessibility is to focus on devel-

oping designs that minimize the gravity or the impact of the person in question's disability [4]. Another approach suggested by Hofmann et al. is to develop and adapt designs to suit a larger audience with different level of function. A disability can also give a strong sense of identity and a disabled person's experience should not be valued less then the experience of a non-disabled person [4]. Hofmann et al. [4] states three key problem areas that they urge accessibility researchers to take special heed of; abelism, oversimplification of disabilities and to not undervalue the importance of the social connections, support systems and relationships of the person with a disability.

2.1 Related work

The following chapter treats related work within the domain.

2.1.1 DigiJag

DigiJag is an educational and social platform accessible for people with moderate intellectual disabilities [5]. The aim of this project was to find key functions and the user needs for this type of platform. Syropoulos [5] claims that today's Massive Open Online Courses lack in accessibility for people with intellectual disabilities. MOOC's are meant to provide online learning material, but due not being accessibly adapted and not having involved the users in the design process, there is a lot of room for improvement.

This project was done with the participatory design approach where all stakeholders were involved in the project. The methods they used were amongst others, focus groups with experts, interviews with the user group, cognitive and barrier walkthroughs as well as a heuristic evaluation.

The study highlight the importance of involving the user group when designing for people with an intellectual disability. Some important key features they found were related to amongst others, metaphors, navigation, responsiveness, personal profile and social interaction.

2.1.2 SymbolChat

Symbol chat is a customizable software application that utilizes picture based instant messaging and is aimed towards people with intellectual disabilities, [6]. It allows the user and their support personnel to customize the input and output method to suit the needs of the user, for example touch screen, keyboard, mouse and speech input, as well as, speech, text and symbol output. They found that text-to-speech was an important function, both to support the user's short-term memory but also to help learning new symbols. The symbols used are Picture Communication Symbols (PCSs) by DynaVox Mayer-Johnson LLC.

The project used a participatory design approach while collaborating with experts

in the field of special needs care. For evaluation they had interview questions, close ended as well as open ended, where the caregivers were present to help formulating the questions in a suitable way. A smileyometer was also used, which is a Likert scale but with a scale of smiley faces instead of numbers. They had four dis-agree/agree questions and had a scale of smileys on separate cardboard pieces.

The concluded results was that proper tools, such as symbols, and customizability can improve the communication experience for people living with cognitive disabilities.

2.1.3 :prose

:prose is an AAC (Augmentative and alternative communication) application that uses gesture to speech instead of visual symbols [7]. It helps non verbal and communication challenged students in America to communicate and provides a new inclusive learning experience.

The user creates a profile in the application and can then personalize phrases, spoken dialect and text colour. To use phrases, the user draws a shape with their finger on the touch display, the application will then identify the gesture and read the phrase aloud as well as display it in text.

2.1.4 Passalen

A similar project was developed in Gothenburg by the non-profit organization Passalen that is called "Jag vill va med" meaning "I want to join" in Swedish. It aims to create inclusive spare time activities for youths and young adults with cognitive disabilities. The organization provides several activities such as sailing, sports, singing and more for their members [8].

In their application you can as a member of Passalen, create an account where you fill in your personal information and for example if use a wheelchair or have an assistant. You can also chose in what city you want to participate in activities. In the application the user scrolls through different activities that show, what, where and when they take place, and if you press the activity you can read more information. The user can sign up to an activity both when scrolling, and when reading more. Under the tab "mina sidor" meaning, my pages, the user can see their booked activities, and if they are confirmed [9].

3
Theory

The following chapter will treat theory regarding cognitive disabilities, how to design for the user group and what Augmentative and alternative communication is.

3.1 Cognitive disability

The World Health Organization, WHO, defines intellectual disability as follows:

"Intellectual disability means a significantly reduced ability to understand new or complex information and to learn and apply new skills (impaired intelligence). This results in a reduced ability to cope independently (impaired social functioning), and begins before adulthood, with a lasting effect on development." [10].

According to Gluck [11], experts divide cognitive disabilities into four categories, which are mild, moderate, severe and profound. It can involve impairments affecting for instance reading, language, motor skills, auditory and visual processing. The categories are based on skill and development in several different areas, such as IQ, ability to learn practical life skills, social abilities, motor skills and function in daily life to name a few.

Although there are many different diagnoses and classifications on the neurodivergent or cognitive disability spectrum, some argue that these are not helpful when creating support for this group of people. One of those who argue that research should instead treat this group as a spectrum where no individual has the same needs or wants, is professor Trevor Parmenter [12, p.303] at Sydney university. In Parmenter's article on this subject, he states a quote by Ivan Brown:

"Although it is sometimes useful for us to describe them as groups for various positive purposes, they are not distinct groups of people at all; rather they are individuals who each add one piece to the mosaic that illustrates the rich, interesting diversity that is characteristic of the human condition."

Since disabled individuals runs a greater risk of social exclusion than the non-disabled, it is important to avoid designs that can be perceived as stigmatising [3]. A study by Nilsson and Rybing [13] highlight the importance of associations such as Grunden, that by bringing people in similar living situations together, help decrease stigma and increase knowledge and understanding between disabled and

non-disabled people.

3.2 UX and UI design for cognitive disability

To make navigation and usability intuitive for people with cognitive disabilities, there are several factors that need to be considered in the design. To use already established standards is one way of making the user interface (UI) comprehensible and to facilitate usage. This could for example be done by using standard icons, terms and symbols that are already familiar to the users. In addition to this, using standard colors, fonts and text decoration is often useful when navigating a UI [14].

In addition to using familiar and easily recognisable elements, facilitating navigation is another important factor. Using breadcrumb trails trough out the UI allows the user to backtrack their steps and to make orientation easier [15]. Breadcrumb trails is also a way to facilitate focusing on a task and to avoid mistakes since it can help users restore their context and even undo mistakes. Using clear visual cues along with headings and an unambiguous layout with boundaries and sections is another way of facilitating navigation for this user group. When providing several different kinds of elements, such as symbols, icons and text for example, it makes understanding the content easier. This is because the user is offered several different ways of understanding the content and can make associations and conclusions in a faster and easier way [14].

The content that the application contain should be clearly structured using text in short sentences with simple words, divided into blocks that are easy to overview. It is not unlikely that some users have memory issues and therefore, the design should not rely on the user to remember long passwords or other memory dependent features. Should a user need support, it is important that reaching out is easy, preferably to human support staff. Using assistive technology is common among people with cognitive disability, therefore it is important for the application to allow for any personalization or add-ons that the users may need. [14].

As described by both W3C [16] and Cooper et al. [15], user mistakes should not risk having dire consequences. Errors should be easy to correct and one way to do this is to make actions reversible and in an intuitive way. Not overwhelming the users with too much data and to ask only for what the application need is another way of preventing user mistakes.

Boskin [17] writes about a six-step mobile app accessibility checklist. The first step is about adapting the content on the screen to the screen size. One aspect to consider is to minimize the amount of content to avoid the need to zoom in and out on the screen. He also mentions that for example form fields should be placed under rather than beside the label.

The touch target is also an important aspect to consider for all people. A large touch target can be beneficial for people with visual impairments, physical impair-

ments and people in a hurry. Boskin [17] suggests that the touch target should be at least 9x9 mm. The placement of interactive elements should also be considered easy to access regardless of how a person holds their phone.

Regarding gestures and interaction it is important to have ample feedback and avoid using complicated gestures such as multiple finger taps. Cooper et al. [15] and Boskin [17] mention that it needs to be possible for the user to easily undo and go back from unintended actions and accidental clicking.

Consistence is key when it comes to layouts and making the user feel in control when performing tasks. The order of elements should be the same regardless of screen size and resolution. If for example the navigation bar has three pages, the order of the pages should be the same when in a drop down list on for example a mobile phone [17].

Regarding data entry, Boskin [17] mentions that typing text is a slow method and should be replaced with for example auto-fill, radio buttons, select menus and check boxes.

Color contrast is especially important when designing for mobile applications since they can be used outdoors in daylight. According to the guidelines 1.4.3 Contrast (Minimum) Level AA by W3C [16] the contrast ratio for text and images should be at least 4.5:1.

Cooper et al. [15] Also mentions 10 guidelines for accessible design that will be taken into account:

- Leverage OS accessibility tools and guidelines.
- Don't override user-selected system settings.
- Enable standard keyboard access methods.
- Incorporate display options for those with limited vision.
- Provide visual-only and audible-only output.
- Don't flash, flicker, or blink visual elements.
- Use simple, clear, brief language.
- Use response times that support all users.
- Keep layouts and task flows consistent.
- Provide text equivalents for visual elements.

3.3 Augmentative and alternative communication

Communication is key for all people in many contexts such as education, personal life, self-determination and social engagement [18]. However, frictionless communication is not possible for everyone since not all can utilize oral speech in daily life when needed. To facilitate communication, AAC (Augmentative and alternative communication) solutions can be applied. The ultimate goal of AAC is to provide people with the ability to participate in a large variety of activities and engage in interactions.

AAC can be defined as "an area of clinical practice that addresses the needs of individuals with significant and complex communication disabilities characterized by impairments in speech-language production and/or comprehension, including spoken and written modes of communication" [18, p.4]. There is a wide range of alternatives for AAC, where there are both aided and unaided AAC. Aided AAC requires some form of technology or equipment, for example a mobile phone or communication boards. Unaided AAC does not require any equipment, for example gestures, body language, eye gaze and facial expression.

Communication facilitated by picture-based systems are a form of aided AAC which is based on symbols and other graphics. There are several symbol collections, such as Blisssymbols and Picture communication symbols [6].

Bliss is used by people with speech impairments or for language learning. Bliss characters can either be pictographs, when they look like their meaning, or ideographs where they represent ideas, for instance knowledge. The symbols can also be combined to create a new word or meaning [19].

PCS (picture communication symbols comes in four different variants, classic, thin line, high contrast and in context [20] . The symbols are good for both communicating and learning to write and read. They are more describing than bliss where they use colourful illustrations rather than abstract symbols.

4

Ethics

Due to the nature of the disabilities of the user group, it is of great importance to use clear communication. To avoid misunderstandings and confusion between designers and the user group, both parties must use communication methods and language that are as understandable and clear as possible. Another important factor is to interact with the user group with respect and empathy for their situations. The application should be constructed in a way to avoid making the users feel as if they are receiving different treatment or using an application that is stigmatizing.

To design for this user group, the user studies must include individuals from different backgrounds and with different levels of function in different areas. This is important to make the platform inclusive to everyone in the community. For the application to be as inclusive as possible, the user interface needs to be understandable and intuitive to its users. If it fails to be, it could cause frustration and sadness among the users, which is the opposite of the intended result. The number of participants required to represent all levels of function is hard to determine. Since this group of people have very diverse needs and level of function, it is hard to precisely decide a number of individuals needed to represent the entire target group. A certain level of knowledge and familiarity with the user group is needed to make sure no one is excluded.

It is of great importance to not generalize the user group based on personal prejudice (Ezeiza et al. 2008). People with cognitive disabilities are individuals with different needs and qualities and should therefore not be labeled based on their cognitive disability. When working with such a large and diverse user group, it is a challenge to make every individual feel included and appropriately represented.

Any collection of data, pictures or recorded material must have written consent from the persons appearing in the material. The participants must be informed of the way the material is intended to be used and in what contexts it may appear. The participants will also be informed about the time period of which the data will be stored, and who will have access to it before signing the contract. The data include video recordings, pictures and transcribed interviews. The raw data is at first hand for the students, but also supervisors at Grunden.

Another thing to consider is the safety of the users of the application and who will have access to it. With all online communication there is a risk of fraud. With an application that is for and created by a specific organization it can be perceived

as trustworthy by its members. Therefore it is of great importance to design the application to minimize the risk of unintended users.

5
Methodology

The Double Diamond is a framework as described by the Design Council [21]. This design process features two different phases, i.e diamonds, the first focusing on divergent thinking and the second on convergent thinking. The first diamond that promotes divergent thinking is about exploring the challenge in question and discovering the problem area trough for example observations and interviews with affected people. The insights and data that has been gathered from here is then defined to form a more specific problem statement or in this project, a specification of requirements.

At the second diamond, the design process focuses on giving answers to the problem statement or to create a design that satisfy the requirements specification. The last step of the second diamond is to deliver a design or a solution to the initial challenge. This solution is then to be tested and go through several iterations before the final design is presented.

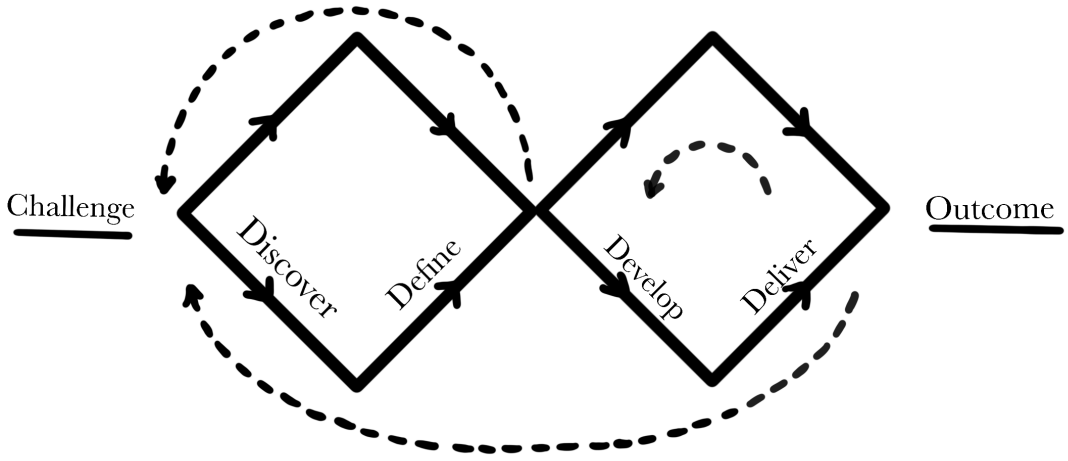


Figure 5.1: Double Diamond by Design council

To ensure an inclusive and accessible application, a participatory design approach will be used where users and stakeholders have an essential role in the project. According to Syropoulos [5] participatory design has deep roots in democracy and is about giving a voice to the users and to not only make them testers, but also decision makers. Since people with cognitive disabilities can have different experiences, needs and perspectives it is important to involve them when designing for accessibility, even if communication difficulties may arise.

5.1 Data collection

The projects design process is initiated with a data collection stage as part of the divergent phase of the double diamond. The aim of this phase is to gather quantitative and qualitative data to lay a foundation to the requirements specification and in methods used to develop it, as well as to provide knowledge and understanding in the field.

5.1.1 Observations

Observations are conducted to pinpoint issues that may be experienced during interaction with smartphones but also to observe user behavior and styles of interaction. Issues in interaction may display as compensating behavior or frustration, and therefore it is important to keep close watch if and where this this occurs as well as the particular reason [15].

Observations can be held parallel to interviews, user testing and other activities that involves users. The observation methods may vary from naturalistic, were the observers do not interact with the user but only acts as a background observer, to more structured observations were the observers asks the user questions during the observation [22]. During observations some form of documentation occurs, ranging from analog notes, to video or audio recording. The reason for video recording would be to later find interactions and behaviours that were not observed in real time. What would be recorded would be the users' hands interacting with the phone. The participants in all activities where documentation in the form of audio or video recording or picture taking occurs will be informed beforehand and asked to sign a contract asking to give consent and stating the details of the handling of this data and documentation.

In the Microsoft [23] toolkit for inclusive design, one method is the Interaction Diary. This method uses naturalistic observation were the observers gather at at the same place as participants, but stay in the background, taking notes and observing the discussions and and interactions that takes place. What distinguishes this method from other naturalistic observation methods is that the observers pay extra attention to any mismatches in human and human-technology interaction.

An example of a method for field studies are diary studies where the user is asked to keep a diary and write down their experience over time, [24]. It is a good method to

get a contextual understanding over time to understand habits and usage scenarios. A drawback with this method is the responsibility it puts on the user to remember to fill in the diary. Salazar [24] also mentions that this method is unlikely to provide as rich and detailed data as other observation methods can. Because of this other forms of observations are prioritized in this project.

5.1.2 Interviews

To pinpoint the vision and scope of the project, interviews with project stakeholders initiates the project. These are held in a semi-structured fashion, were questions range from wider to more specific details about the project [15]. The stakeholders participating in this interview are representatives from the Leva Livet project.

When investigating user needs and wants, interviews in combination with observations is held. The interviews is semi-structured or structured, depending on the nature of the interview topic and the sought type of results, quantitative or qualitative for example. All user interview aim to use simple and clear language, to accommodate the user group. Structured interviews have a clear plan and focus solely on predetermined questions in a specific order. These are used if specific questions need to be answered and is best suited if data needs to be compared between interview participants for example. Semi-structured interviews consists of prepared questions and a more loosely defined plan. Semi-structured interviews allows for room for adaption, flexibility and for the interview to be steered in a new direction if the need arise. To be adaptable and attentive towards the users, this is the most used form of interview [25].

Interviews are preferred over for example surveys in this project due to the broad varieties in level of function of the user group and the type of answers wanted. Interviews make it easy to ask supplementary questions to assure qualitative answers, which is difficult with a survey. An online based survey would also require the user to have, and be able to use a device such as computer, smart phone or tablet. A physical survey could be beneficial if a large set of quantitative data is desirable. However to assure that the questions are being as understandable as possible, and to simplify data entry, interviews are preferred.

In a method called Learn from the Experts by Microsoft [23], it is suggested to view the people with the disability in question as experts of the subject, when working inclusively. It is stated that persons who live with disabilities have an unmatched expertise which can advantageously be passed on to the designers through for example, interviews.

Human analogy is another method in the Microsoft inclusive toolkit[23]. When using this method, the main steps include brainstorming ideas for human occupations that in some way full fill the role of the technology being designed and then interviewing people withing these roles or occupations. The purpose of the interviews is to find out what makes these people good at what they do and thereby gain

perspective of what can be important in the product design.

Focus groups, also called group interviews, are a great way of collecting insights from different stakeholders, [26]. It is beneficial in this project to involve supervisors as well as users in a focus group to extract requirements from different points of view.

5.2 Requirements compilation and analysis

The data collected is be analysed and translated into requirements with the following methods. They aim is to understand the user group and their goals to have a solid foundation to base the first iteration prototype on.

5.2.1 Affinity diagram

To organize and analyze the data collected an affinity diagram can be used, also known as thematic analysis or K-J analysis [27]. This is done by dividing the data on separate post it notes or cards, and regrouping them one by one to find different themes. This exercise should be done in silence to not influence each other in the group. When all cards are divided a brainstorm session is performed to find suitable headings for the different themes [27].

5.2.2 Personas

Personas are derived from qualitative research and are "user models represented as specific, individual human beings" [15, p. 66]. What makes personas a useful tool is that they are personifications and focuses the empathy and design around the user's goals. They help designer to determine what a product should do, communicate with stakeholders, build consensus and commitment to the design and measure the design's effectiveness.
Cooper et al. [15] also mention the importance of expressing goals when creating a persona since the goals express the motivation for the user. You need to know why a person performs a task to improve or eliminate the task. They also mention the important distinction between user profile and persona. Persona is a more holistic model, while user profiles run the risk of being built on stereotypes and fictive details. These details are not as important when building a persona, they are only used to make the persona come to life.

The eight step overview of persona creation process mentioned by Cooper et al. [15] is:

- Group interview subject by role
- Identify behavioural variables
- Map interview subjects to behavioural variables
- Synthesize characteristics and define goals
- Check for redundancy and completeness
- Designate persona types

- Expand description of attributes and behaviour

5.2.3 Requirement definition

Cooper et al. [15] mentions a requirement definition process that can be used as a bridge between the data gathering and conceptualization.

Requirement definition process:
- Create problem and vision statement
- Explore and brainstorm
- Identify persona expectation
- Construct context scenarios
- Identify design requirements

Scenario construction is a common method in HCI. When constructing a context scenario the focus is of the requirements and not the interaction and is more story like, [15]. It handles questions like where the product is used, what the primary activities the persona does to meet her goals are, if the persona is interrupted and what the expected result is.

5.3 Conceptualization and Prototyping

The project features several prototypes, ranging from low to high fidelity. Early in the process, one usually start with a low fidelity prototype to facilitate making changes in the concept and to same time and other resources. One low fidelity example is paper prototyping, were sketches, clippings and text is used to construct a simple early iteration of the concept. Paper prototyping can also be used in combination with for example the wizard of oz method, allowing designers to make the low fidelity prototype appear functional without having to implement mechanic or digital functionality [26].

As the project progress, higher fidelity prototypes allows for more exact testing and evaluation since the prototype is closer to the finished product. A high fidelity prototype can be constructed using digital prototyping software such as Adobe XD or Figma. Using such software allows for realistic touch and feel, looks and interaction [26].

Prototyping may be used to test and evaluate the entirety of the user interface as well as parts of it and specific interactions.

5.4 Evaluation

The following methods is used iteratively to evaluate the different iterations of the concept. The majority of testing can be done with users while there are some methods that are conducted within the design group.

5.4.1 Designing a microinteraction

This is a method from Microsoft [23, p. 13] that aims to "to articulate each small detail in a sequence of interactions in order to find ways to make the interactions more inclusive". This is done by focusing on a specific issue with an existing prototype and outline a number of steps:

- Whether the sequence is user or system initiated
- How the user interacts with the trigger
- How the feedback begins
- How the user interacts with the feedback
- What happens immediately after the feedback is complete

5.4.2 Heuristic evaluation

A heuristic evaluation is made within the design team by going through a detailed prototype to check rules of thumb heuristics to measure the usability of the interface. These heuristics are Nilsen's 10 Usability Heuristics for User Interface Design [28].

- Visibility of system status
- Match between system and the real world
- User control and freedom
- Consistency and standards
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetic and minimalist design
- Help users recognize, diagnose, and recover from errors
- Help and documentation

A benefit with this evaluation is that it does not require involvement of users, which means it can be efficiently executed. This however, allows personal biases which is why it is potentially not worth considering depending on time constraints.

5.4.3 Usability testing

This method involves the participation of users, where they are asked to perform different tasks when using a prototype. The interaction is either observed and noted in real time or recorded on video for example. It can be combined with the think aloud method which is when the user speaks about their thoughts while performing a task to easier find deficiencies in the application. The observer should be ready to prompt and ask question to the user when needed [26].

Usability testing can be made controlled, which is usually performed in test labs. This can involve recording of quantitative data like time of completion or number of error per task. It can also be used to evaluate an interaction while recording facial expressions or logged swipes and keystrokes. The collection of this type of data is done controlled to decrees the risk of external variables affecting the evaluation.

Usability studies can also be made in a natural setting referred to field studies

by Maguire [26]. This test takes place in the users natural environment, like their home or workplace, or wherever the application is intended to be used. The goal is to make it as unobtrusive as possible to be able to see it being used naturally. A drawback is the difficulty to assume what results can be derived, and the trust it requires in the participant if they are the ones collecting the data. It might lead to loss of interesting information.

There are evaluation methods that require more time, such as the UX curve, where the user reports how their experience with a product changes over time, [29]. This, just like diary, relies on the users memory, which can give unreliable or incomplete data. It also requires more time than for example controlled and direct usability testing, which is scarce in this project.

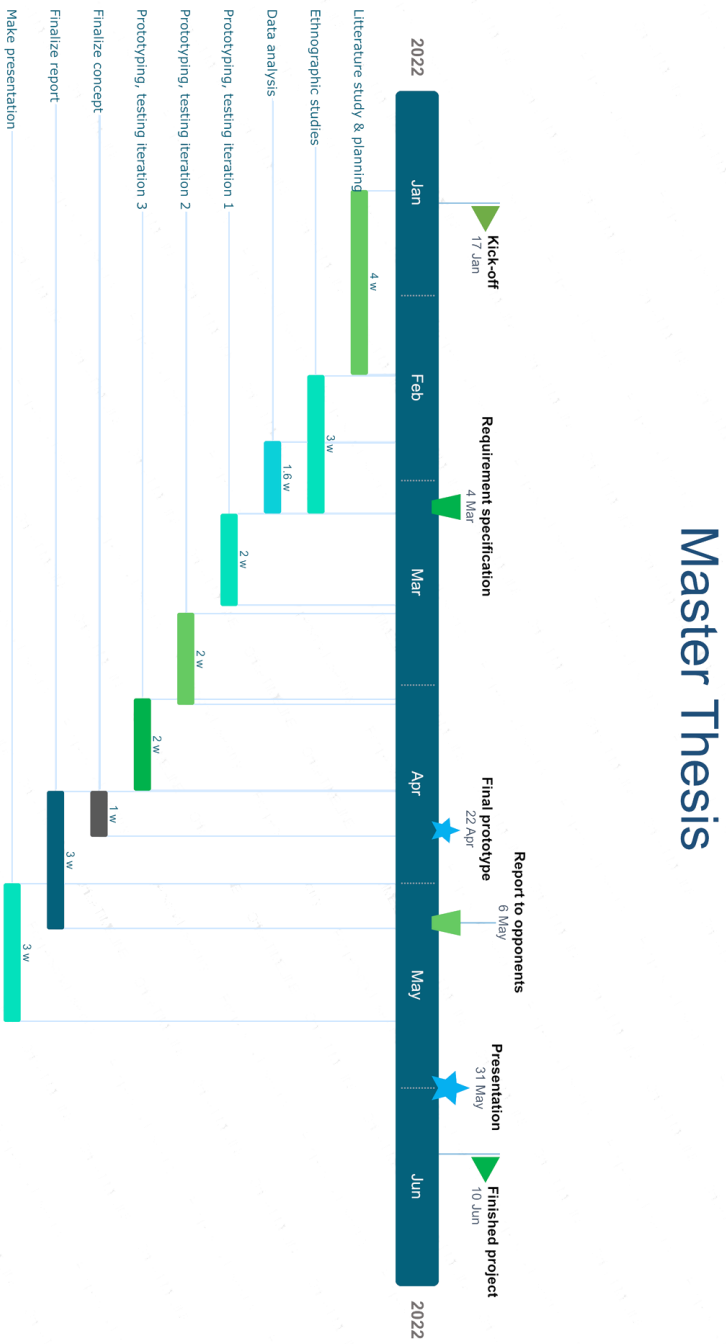
5.4.4 Smileyometer

The smileyometer is based on pictorial representations instead of numbers that are used in for example a Likert scale which can be more intuitive. What is useful with this method is that it is simple, fast and does not require writing or reading [30]. The method was made for and by children, but can also be applied when working with other user groups that has reading difficulties. It was for example used by Keskinen et al. [6] to evaluate with people with intellectual disabilities by asking agree/disagree questions and letting them answer with the smileys. This can be used if such questions are used and the participants can be helped by it.

6
Planning

In this chapter, the planning of the project will be presented using a Gantt-scheme as well as a text motivating the planing process.

6.1 Gantt-scheme



6.2 Planned process

The planning of the project is structured according to the Gantt-scheme provided above. The first four weeks of the project is spent conducting a literature study of the field of work as well as constructing a plan for the project. The main theme that is treated trough literature is how to design for and work with people with cognitive disabilities. Since members of the target group sometimes use utilities and may need certain accommodation, it is important to plan the project with this considered. It is important to choose methods for co-working and data collection that are easily understood and implemented with the target group. Therefore, the methods chosen for the data gathering phase are semi-structured interviews, observations and a focus group. The semi-structured way of conducting interviews and observations allows for adaptability and to lets interviewers dig deeper into a subject if the person being interviewed show interest in the area. This can provide valuable information but can often not be planned for in advance since the target group is so diverse. Using participatory design in this project allows the target group to voice their wishes, conditions and concerns regarding the application. This is highly valuable since their experiences are unique within the target group.

The results of the observations and interviews are then analysed using a thematic analysis to find connections and themes within the collected data. After conducting interviews and analysing the results, a requirements specification is composed. The aim is for this to be finished around seven weeks after the project start.

After the ethnographic studies and data analysis, a first ideation and prototyping iteration is made. This prototype is then tested with the user group to find out what works well and any issues the interface might have. The prototype is evaluated using heuristic evaluation. After receiving feedback from the target group and heuristic evaluation, the prototype can be adjusted to work better for the user group. This iteration is then followed by several new iterations and user tests with adjusted prototypes, until a final prototype has been reached. Most likely the prototype will increase in terms of fidelity along with the iterations. The user testing of the prototypes is important since it is not always easy to pinpoint exact wants and needs of the target group unless it is seen practically implanted. Seeing the interface being used by the target group is also a way to pinpoint any usability or design issues that needs to be remedied. They are also practical for pinpointing any aspects that might have been overlooked in the ethnographic studies and data analysis. To give the users an experience that is as realistic as possible, digital prototyping tools will be used to make the interface-prototype as recognizable and easily identified as possible. The interaction and prototyping phase is the larges part of the project time-wise at approximately six weeks.

After the final prototype iteration has been tested, some adjustments may are made and the prototype is finalized. After finishing the concept the project report and presentation are finalized.

7
Execution and Process

The following chapter describes how the project was executed and how designs decisions were made along the way.

7.1 Data gathering

The data gathering took place at Grunden Media Göteborg which is where the user group has their daily activities (daglig verksamhet). All interviews were held in Swedish, since that was the first language of all participants. For all data gathering approximately the same 15-20 participants were recruited based on availability and interest. The participants were of different levels of function, different ages (approximately 18-60) and had different needs. A few people participated for the majority of the tests while others only participated once. When doing holistic tests, new participants were recruited to receive a fresh perspective on the application.

7.1.1 Semi-structured interviews and observations

The individual interviews were conducted with eight participants in separate occasions over a span of six days. Each interview was approximately one hour long and the participants. In some interviews mentors from Grunden were present to facilitate communication and make the person being interviewed feel more comfortable. In all interviews, a predefined set of questions were asked, but since the nature of answers varied greatly between different interviewees, follow up questions needed to be individually adapted to each participant. Some interviewees would show more interest in a specific question and that allowed for followup questions on that topic. Some questions were harder to answer for some participants and were left with a very short answer such as yes of no. This could at times point to the question not being fully understood by the interviewee or that they lacked interest in the question subject. Individual adaptation were diligently implemented throughout all individual interviews. In the interviews in which a mentor participated, said mentor would often ask questions of their own.

All of the participants of the interviews had expressed a wish to be interviewed and an overall curiosity and will to engage in the project was seen among the target user group at Grunden. To ensure all participants had took part of information about the project and consented to participate, a contract was established between researchers and interview participants. For some participants, the contract was re-

viewed with a mentor at Grunden to allow participants to take the time they needed to process the information provided in the contract. See Appendix A for the contract.

In the data gathering interviews, questions regarding the participant's smartphone habits, scheduling practices and routines were asked. The participants were asked to explain and show on their phones, applications that they enjoy using and applications that they found bad or frustrating. Some participants did not find any particular applications better or worse and did therefore not show any applications on their phone. For the participants who chose to show their phones, interaction patterns and behaviours such as navigation, compensating behaviours and difficulties where filmed, observed and noted.

Following the questions regarding smartphone habits, were questions about the participant's free time and how they manage their scheduling. These questions were formulated as scenarios at first to make it easy for participants to familiarize with the question. Based of the answer of this question, followup questions were asked to further investigate how the participant plan, attend and find company for activities.

The results of the interviews varied greatly between interviewees. Some used only a small number of basic applications or programs such as telephone and text messages. Other interviewees were advanced smartphone users who used several apps frequently for different purposes. Some frequently used and well liked applications among the interviewees were Facebook, Messenger and Spotify. One pattern that was apparent after the interviews was that applications that has a clear and appealing purpose were often used by the target group. They could also be somewhat reluctant to downloading new apps to investigate whether it might be useful or not, but preferred to stick to the applications they knew.

Answers to the questions about free time activities varied within the interview group from several scheduled activities per week, to almost no activities apart from work. Most of the interviewees explained that they for most activities kept their appointments in their head and relayed on their memory for scheduling. For some events such as dentist's or doctor's appointments, some interviewees used the calendar application on their phone or relayed on receiving a text message reminder for the appointment.

Overall, many of the interviewed individuals expressed that they would like the application to facilitate finding new friends and people with similar interests. The interviewees that did not often participate in events in their spare time, sometimes expressed that they had difficulties finding activities and events that resonated with their interests.

The questions asked in the interview were the following:

- What are your thoughts about the fact that there is an app coming up?
- Do you use apps on your phone frequently?

- Is there any app you find difficult to use? What makes it difficult?
- What do you do on your spare time?
- How do you find activities?
- How do you keep track of your planned activities?
- Is there any activity you wish you did more of? Why do you think you do not do it as much as you would like?
- Is there anything else you want to mention about the coming application?

7.1.2 Group interview

The group interview had a total of 13 participants of which nine were members of the user group, and four were mentors. All participants as well as the moderator and secretary were placed sitting in a ring. Seven questions were prepared beforehand and asked by the moderator. Each participant got their chance to answer every question in the order they were sitting, and they were allowed to skip a question or leave the interview if they wanted. After one round of answers the conversation was open for anyone to express their thoughts. The interview took approximately one hour.

The questions/prompts asked were:

- What is the first thing you think about when we say "Grunden's new application" ?
- Name one function you would like the application to have.
- What is of highest importance regarding the application?
- How do you contact your friends?
- What would you like to use the application for?
- When would you like to use the application? (in what situation)?
- Name one good and one bad application.

Due to the fact participants were asked questions one at a time, the answers were at times similar. Some may have been inspired by other's answers and some might just have answered as the previous person due to lack of own opinions on the specific matter. The answers are seen as valuable regardless.

Generally, the answers regarding first thought of the application were about community, accessibility, adaptability, new friends and activities. One also mentioned the risk of it becoming another application on the phone that takes up memory space. Some important aspects and desired functions mentioned were being able to find activities, make new friends, chat, making it easy to use, making it safe, balance between functions and simplicity and being able to block people. Some also mentioned that a chat is not necessary since they use other forms of communication such as Messenger, text, call, e-mail and Discord. The majority of participants use Messenger which is a chat tool that has plenty of functionality like video call, phone call, being able to send documents, pictures and more. Most participants mentioned that they want to use the new application to find information about events. Some mentioned that they would like to use the new application to cure boredom, while others only want to use it when needed. When talking about good and bad ap-

plications, several social media platforms came up on the bad list due to hateful comments or content and the fact they sometimes are perceived as addicting. Many however, also mentioned that they like them and all their functionality.

7.1.3 Affinity diagram

The affinity diagram was conducted on the platform Miro. It compiled the data from the individual and group interviews. Interesting aspects from the interviews were highlighted and extracted to a post-it note on the Miro board. One post-it note at a time was then placed on the board. If one note had similar content as an existing note, it was placed near that one until every note was written and they formed themes.

The 12 themes found were, communication, good applications, bad applications, accessibility, features, functionality, safety, activities, keeping track of events, new friends, purpose and brand suggestions. With the help of these themes and the literature study, a first version of requirements could be extracted and prioritised. This list can be seen in Appendix B. The prioritisation was made by setting it as a requirement or a desire which was decided based on both the pre-study as well as a plausibility assessment.

7.1.4 Interviews regarding functionality

To further determine the users' wants and need in terms of functionality of the application, seven more, semi-structured, individual interviews were held in Swedish. The questions asked in these interviews were largely function oriented and overall more specific than questions asked in previous interviews. The purpose of these interviews was to complete some of the information received during the previous interviews, to help accurately pinpoint what functions the user group desire and why. The questions asked in these interviews were:

- What kind or categories of activities do you think you can find within the application?
- What do you think about giving everyone that use the app the possibility to create own events and invite people? Can you think of any pros or cons to this?
- Do you think that you personally would want to create your own activities or events using this application? Why? What kind of activity do you think you would create?
- Would you feel comfortable with the fact that everyone using the application could view and sign up for an activity created by you? Would you rather invite only people that you are friends with trough the application instead of everyone?
- Would you like the ability to chat within the application? Why? What would be the difference between using a chat function within this application com-

pared to other applications such as Facebook messenger for example? What do you think you would use this application to chat about?

- What do you think about the possibility of using a public forum for questions on each activity page?

All questions listed above have been translated and were at the time of the interviews asked in Swedish.

These interviews showed some differences between interviewees, especially in terms of social aspects and if they personally would be interested in creating their own events. Some were not interested at all and found the commitment and responsibility associated with creating or hosting events to be a deterrent. Some interviewees were excited by the idea of creating own events and knew instantly what kind of events they would want to create and host. Some people preferred to only attend events if they knew someone else who were attending, other were open to the idea to attend an event with one or more strangers, as long as they shared a mutual interest in said activity.

Some of the questions got answers that were more unanimous across the interviewees. Most participants agreed that it was a good idea for everyone to be able to create events, as long as a moderator reviews events before they are published, to make sure information seems correct and that descriptions and such are understandable. Some were careful to point out that they may need help to create an event and may not want to on their own.

When talking to some of the supervisors at Grunden regarding the functionality of creating own activities, some expressed concern over that fact that everyone would be able to create and market activities. Some said that this would probably not work and that it means exposing people to unnecessary risks that insufficient planning could bring. For example, what happens if an activity host gets sick, or something else unexpectedly goes wrong. Other supervisors argued that the application should promote independence and that trial and error would have a positive effect on the target group.

The chat function was also an aspect were the interviewees were overall unanimous. When first asked if they wanted the application to have chat functionality, most answered something along the lines of "Why not" or "Yes maybe", but when asked why they thought so and how it would be used differently than for example messenger, they changed their minds and actively preferred the application not having a chat function. They expressed that it might be hard to learn how to use a new chat and that the ones they already use works well for them and already fills the purpose. Most interviewees also agreed that a forum would be useful since they might need to ask questions about an event. The forum function was also popular since users interested in an application can look there first if they have a question, since someone else may already have asked about the subject.

7.2 Prototyping and testing

The ideation process started with brain writing and paper sketching to document and explore different ideas. The aim was mainly to test different structures and how the desired functions from the list of requirements could be applied.

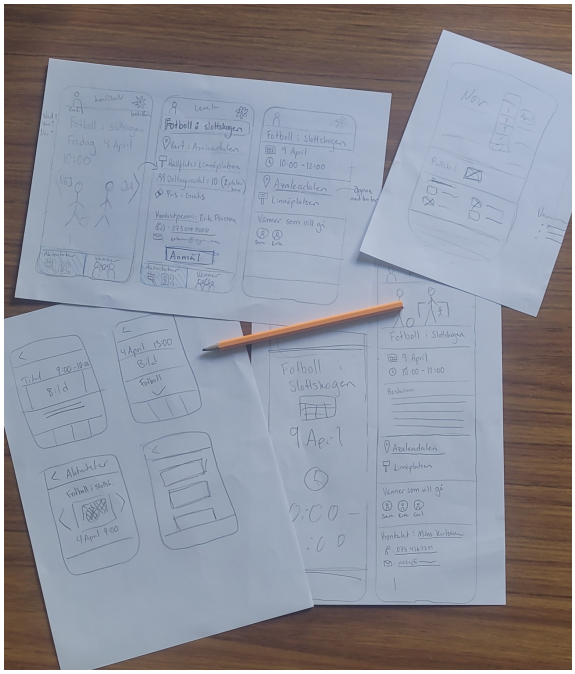


Figure 7.1: Some of the first sketches

To further develop the ideas, prototypes were made using Figma. The first focus in Figma was to explore how to view the activities and how the information could be provided. In this stage, it was also interesting to test different color combinations to assure that the design was accessible visually. This was done with websites such as colorsafe.co and the contrast checker at coolors.co to see if color combinations are according to the web content accessibility guidelines (WCAG). It was mainly made for the intention to work when testing with users at this stage, more testing with colours were made later in the process as well. In figure 7.2 some different versions of gray scale contrast test can be seen.

Figure 7.2: Different contrast of the navigation bar

For the navigation design, two versions were to be designed and tested, were the testers were asked to speak aloud of their thoughts and concerns regardning the application. One with a navigation bar at the bottom of the screen to make the navigation more open, and one more sequential, where the user does one thing at a time and goes deeper in the application structure for each step. See figure 7.3 and 7.4.

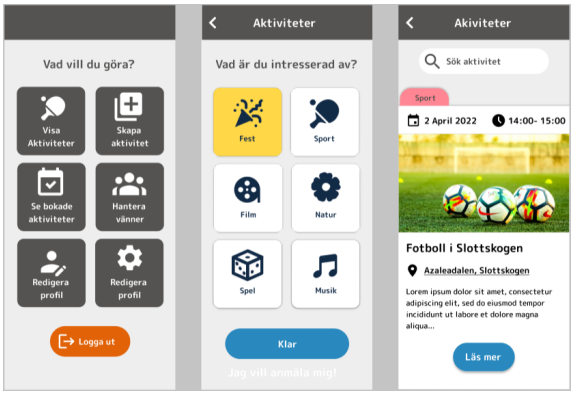


Figure 7.3: Sequential navigation

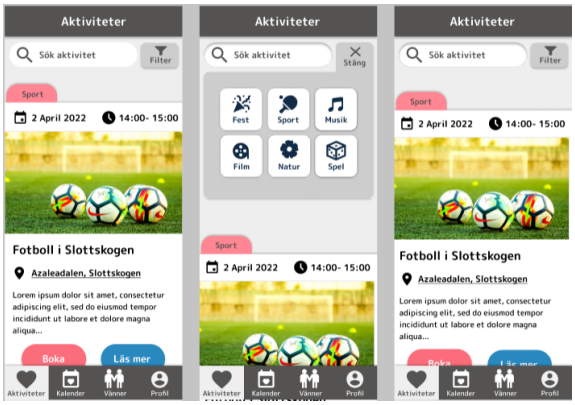


Figure 7.4: Open navigation

The colours for the filter function were also explored, see figure 7.5. It was decided to try making all categories different colors to be able to colour code the events based on category. It was also seen as beneficial to keep the buttons as large as possible while being able to see the majority of categories.

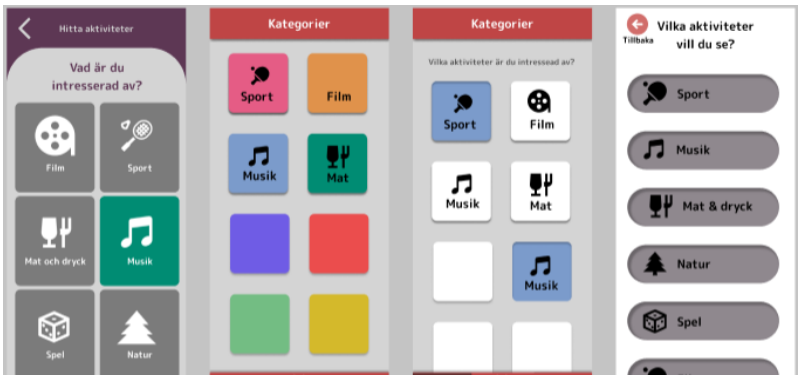


Figure 7.5: Different versions of the category filter

The next prototype step was to design how to create an event to suit the user group. It was decided to try to keep the form structured and have a few questions at a time to avoid overwhelming the user. A progress bar was added to the top to make the user know how many pages of the form there are left, see Fig 7.6.

Figure 7.6: Structure of the form for creating an event

7.2.1 Evaluation - navigation

The navigation evaluation was held with four people from the user group. The tests lasted for approximately 30 minutes each and were documented on film and notes on a computer. The video recording was of their hands and the phone to record how they interacted with the prototype. The aim was to see how well they understood the two versions of navigation, structured and open, and which was more intuitive. The prototypes were interactive to the degree that was needed for the test, and the participant tried them on one of the interviewer's phone, see 7.7. To balance the bias of with version that was tested first, the versions were put in different orders for every other participant.

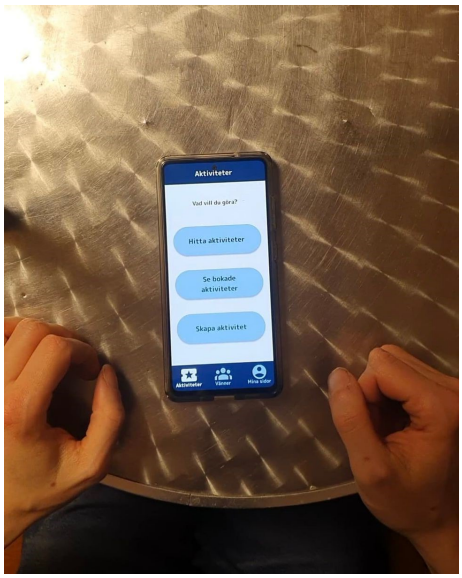


Figure 7.7: Evaluation of the navigation versions

During the test the user was asked to find certain information, for example what time the football is, or where the movie night-activity is held. They were also asked to book one activity to see how easy it was to find a speceific one. This was to see if the information was placed intuitively and how the participants would naturally navigate the interface.

The test was followed by a semi-structured interview that consisted of the following questions:

- What is your first impression of this version, was it easy or hard to use?
- Was there anything that could be improved?
- Was there anything you liked in particular?
- Other comments?

The test resulted in insights regarding several aspects of the prototype. Regarding navigation is was seen as both positive and negative to have the navigation bar. It can help people keep track of where they are while it also can be contributing to clutter for some. Seen from the observations and the interview, there were least problems when navigating the structured version.

The most important results were:

- The majority had a hard time finding the sign up button in both versions, especially the structured version since you had to view more before signing up.
- All of the participants had a hard time finding the filter function in the open navigation version. Some would therefore used the search bar instead of filter button to search for sport and film for example. The word filter was also confusing, category could be a better alternative.
- Time and date should be underneath the picture instead of above since some confused them with the event below.

- Some pages were missing pliancy hinting to scroll which made it hard for people to know they could scroll down on the page.
- For the open navigation it was possible to scroll down to see the next event even if you click on show more. This was confusing and it would be preferred to have the information on a separate page.
- It would be good if the title text of the event is clickable as well as the show more button since some participants tried to click on the title to read more.
- The top bar should be sticky so it is easy to navigate backwards when need.
- Avoid having a too strong red color that does not have a serious implication.

7.2.2 Evaluation- creating events

This test was conducted to evaluate the flow, usability and information provided when the users are creating an event using the application. During previous interviews, some concern regarding this part of the application was voiced by individuals of the target group. Some were worried they would not know or understand how to create an event if the opportunity would arise with the application. Many members of the target group expressed during interviews that they are interested in creating own events and would like to attend events created by other individuals of the user group. Creating a user interface that is easy to understand and follow is therefore very important to the user group, and was the most fundamental criteria for this part of the prototype. An easy to use interface could also minimize the risk of user errors or inaccuracies, making user created events more accessible.

The prototype use a sequential flow that was proven to be the most effective navigation method for the user group, in previous testing (see 7.2.1). The information needed to create an event was spread out across multiple pages, each with its own theme of questions, such as time, place and price. The number of questions the user need to answer on each page is thereby limited as to not overwhelm the user and too keep the structure clear and easy to understand.

A total of five tests were held, were the participants were asked to independently navigate the interface-prototype and create and event. The event itself along with it's information was predefined due to the limitations of the prototyping tool Figma. The event was called "A day by the sea".

The results of this evaluation showed that the participants found the UI easy to navigate and to understand. Several of the participants expressed that the process was quicker and easier than they had anticipated. A few details were hard to find for some participants, such as how to decide a time for the event, since they had to scroll down to find this option. One aspect that worked particularly well, was the progress bar at the top of the page, all participants understood it's function and could quickly state how many steps of the process were left before they were done.

7.2.3 Full prototype

With regards to the results from the navigation evaluation and the evaluation for creating an event, a full high fidelity prototype was created. In this prototype, other functions such as handling friends and seeing your profile, as well as settings were included.

Since the sequential navigation was working well during the test and was generally preferred it was decided to keep this structure. However, benefits of the navigation bar was also expressed. It could make it easier for people to keep track of where they are and faster navigate the interface. It was therefore decided to keep the navigation bar as well, but in combination with the sequential navigation whilst in a tab, see Figure 8.9.

Figure 7.8: Combination of navigation bar and sequential navigation

A new color scheme was also explored for this prototype. It was decided to use dark blue, light blue and white, since they are high contrast but natural colours without strong associations to them. Leva livets orange color was also tested, but there is a risk of the orange being too associated with warnings.

Figure 7.9: Different color schemes

7.2.3.1 Activity tab

The activity feed was also updated based on the evaluation. The time and date was moved underneath the picture to keep all information at the same place. The expansion of the activity was removed since it was confusing when scrolling down to the next activity. Therefore it was decided to only have a read more button that leads the user to a new screen where they can see more information and book the activity. The book activity-button was made sticky to prevent the user from having to scroll all the way down the page to sign up, see Figure 7.10. In the list of activities, you can click the title of the text as well, to read more, since that was a desired interaction according to the observations.

Seeing booked activities can be done under the activity tab. It was decided to place both the user's created activities and the ones they are signed up for in this list, but divided as seen in Figure 7.11. For the user's own activities, they have the option to both view and to edit from this page.

Figure 7.10: Updated activity feed

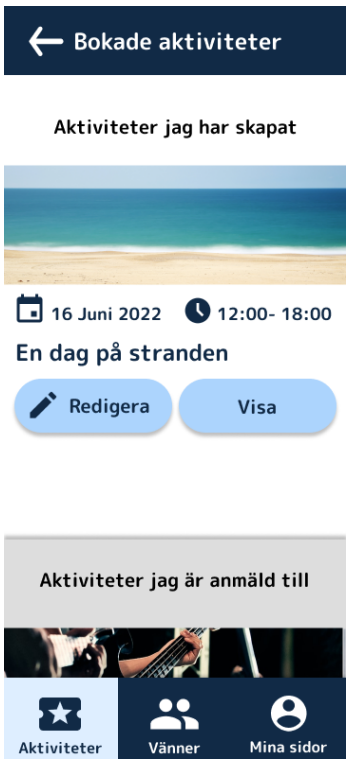


Figure 7.11: List of booked activities

When creating an activity some things were changed based on the test results. For example changing state switching buttons to radio buttons and moving up the time for the activity to to top of the page since it was missed in the test. Several screens were also spaced out more since some input prompts were hard to tell apart.

7.2.3.2 Friends tab

Under the friends tab, the user enter their list of friends directly, since options here are so limited. The only actions there are regarding friends are to add and remove friends since the only purpose for having friends is seeing who is attending what activity.

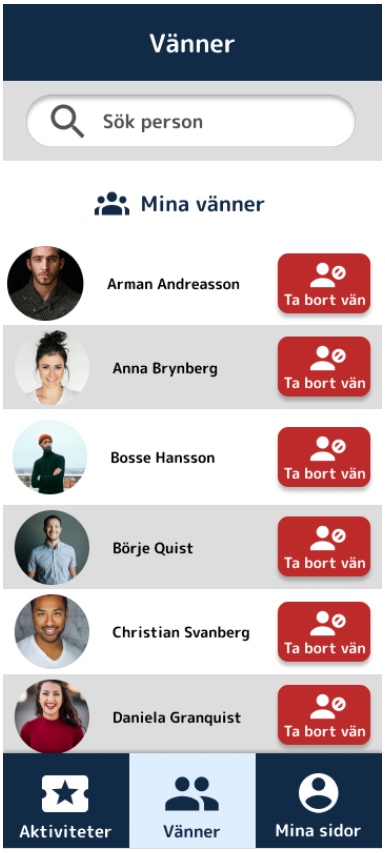


Figure 7.12: List of friends

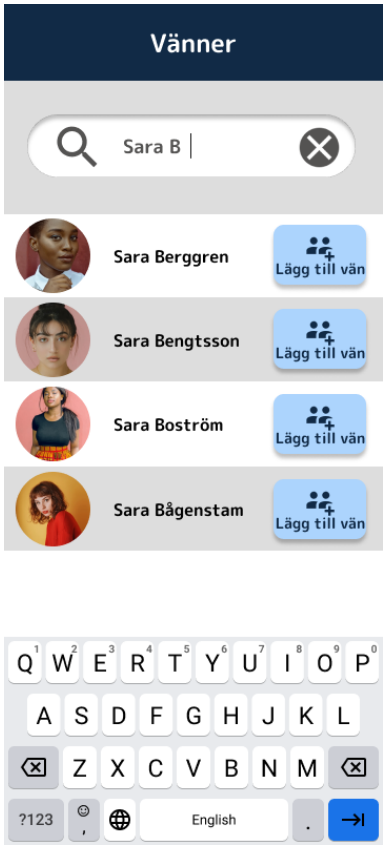


Figure 7.13: Add friend

7.2.3.3 My pages tab

Under the tab my pages, you are introduced to two options, view my pages and view my settings, in the form of large buttons, the same way as in the Activity tab. An explaining text was added to make it extra clear what the different buttons did, see Figure 7.14.

If you click the button view my information, you can change profile picture, phone number, address and other personal information such as if you have special needs, allergies and assistants. This information is sent to the organizer of an activity when

you sign up.
Under the settings button you find settings such as if you need visual interpretation, larger text size or another language. Safety settings can also be made, for example if you want other people to be able to add you as a friend and if they should see what activities you are attending. There is also a setting for only viewing activities that suit your needs, for example wheelchair accessible activities.

Figure 7.14: My pages including information and settings

7.2.4 Test of full prototype

The goal of this evaluation was to test the interface as a whole and to see if the interface was intuitive to the testers. To the greatest extent possible, the testers that had not seen the any previous iteration of the prototype were selected.

The prototype was tested with eight participants and each evaluation lasted for approximately 40 minutes. It was executed similarly as the previous tests. One project member acted host while the other observed and transcribed the interview in real time. The participants were asked to think aloud while performing tasks that were given by the host.

The tasks were:

- Find the activity "grilla korv på Brännö" and sign up for it
- Add Sara Boström as a friend
- Change your address
- Let others add you as a friend in the settings
- Create an activity
- Unfriend Bosse
- Remove the activity you created earlier
- Tell us what activities that you are signed up for
- Can you show how you would view a specific category of activities

After the tasks, some questions were asked, such as how do you think it was? Was anything hard? Was anything extra good? Other comments?

One interesting thing regarding the results of the test was that many participants used the navigation bar instead of the go back button to go back to the start of a tab. This is therefore a feature worth keeping.

Other interesting results were:

- It was hard to find booked activities
- The buttons for answering a comment in the questions and answers forum was hard to understand
- It must me more clear that you send a friend request and not just add a friend
- It would be good to fill in your age in your information in case there is an age limit for an activity
- It is good that you do not have to receive friend requests or be friends with people in the app
- The participants learned where things were located in the app after exploring it for a few minutes
- Some participants clicked the text when there was a checkbox, so making the text interactive as well would be preferred

7.2.5 First iteration of full prototype

Following the test of the full prototype, some changes in terms of usability and design were made. Since many of the participants in the full prototype test had a hard time finding the activities they had signed up for, a choice was made to instead dedicate a whole tab in the navigation bar to booked activities (Bokningar). This decision was also based on the fact that the friends-tab (Vänner) contained limited functionality and would probably not be used enough to justify having its' own tab. The friends-functionality was instead moved to the tab called My pages (Mina sidor). The My pages-tab was also renamed to the users' first name, and the icon was replaced by the users' profile picture. This change was made to make the function of the tab more intuitive and to make it easier for the user to understand that this is a page that refers to them personally. This was a concept that was hard to grasp for some people in the user group and using the words Profile or My pages did not seem to be clear enough. In this prototype the name William was used as an example.

Figure 7.15: The updated navigation bar.

Since the main function of the application is to browse activities, the navigation tab called Activities (Aktiviteter) was remade and simplified. The function was limited to only browsing and viewing available activities and signing up for them. If the user wanted to create an event, they would have to click on Booked activities (Bokningar) and then click the button labeled My activities (Mina aktiviteter). On this page, the user could view and edit activities they had created and create a new activity.

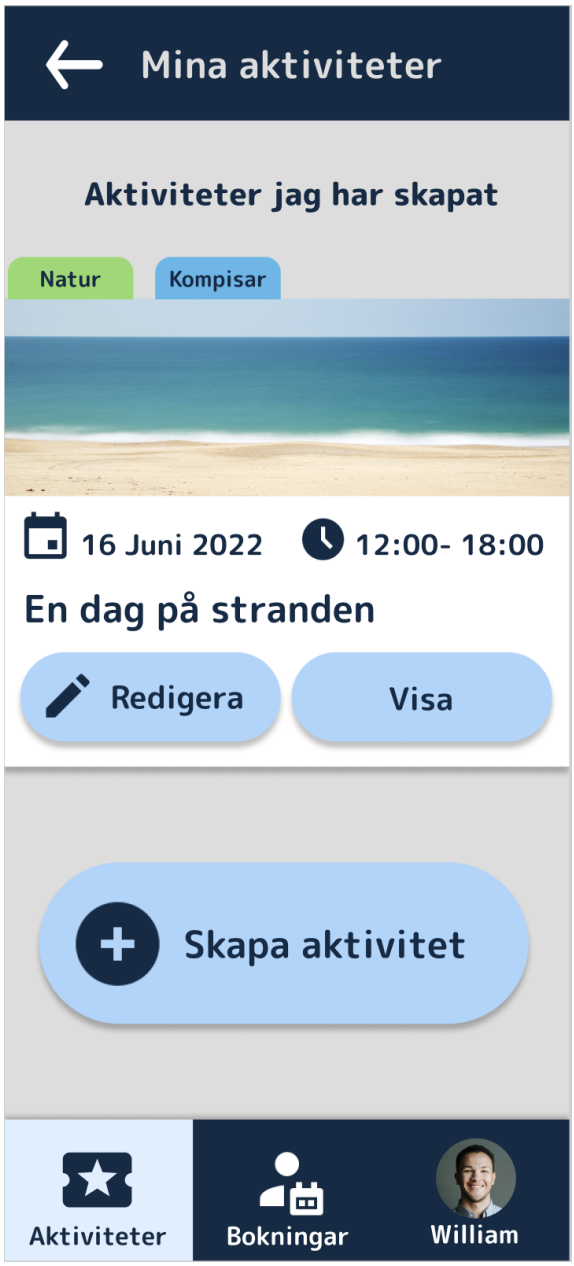


Figure 7.16: The My activities page.

Some smaller changes were made on a detail level, such as making the description of

an activity clickable when browsing activities, making it clear that a friend request has been sent after adding a new friend and an added box for optional information and comments on the My information page (Min information).

7.2.6 Test of first iteration of full prototype

The test was performed the same way as Test of full prototype (7.2.4), using the same structure and questions. The test was conducted with three people, of which one was a mentor with knowledge about interaction design. This test was conducted with the people that were willing to participate at the time.

The outcome of these tests were that participants more easily understood the meaning of the profile/my pages-tab, currently labeled William. The participants had some initial trouble finding the Friends functionality, but since they saw the button leading to the friends page once clicking the Profile/My pages tab, it did not take long before the testers found the page.

Some problems were encountered when asked to create an activity. The button leading to the page was too many clicks away and not intuitively placed under Booked activities (Bokningar). To find ones' booked activities were on the other hand much easier and more intuitive than before. None of the participants showed any sings of struggling or not understanding when asked to find this page.

7.2.7 Final iteration of full prototype

After the final test, some alterations were made. Most were detail oriented and focused on increasing cohesiveness throughout the interface. The most extensive adjustment made was moving the the button for creating activities to the Activities tab (Aktiviteter), giving the user an initial choice to either navigate to browse activities (Hitta aktiviteter) or to navigate to Activities I have created (Mina skapade aktiviteter), were the user can also create activities.

Figure 7.17: The new activities page.

Some of the more detail oriented adjustments were:

- Added a banner with the text Host (Arrangör) to activities created by the user.
- Rounded corners on the Sign up (Boka) button on activity pages for a more cohesive look.
- Added a text field were activity creators can give a reason why, if they choose to cancel an activity.
- Added option to share on SMS or Messenger after completing creating an activity.
- Added a Booked-banner (Bokad!) to activities the user have signed up for.

8

Results

This is a smartphone application that lets people with cognitive disabilities find and create activities. Through this application, the user group can become more independent and meet people with similar interests. The main function of the app is to show upcoming activities and let the user sign up for the activity. Every user has a profile in the app to ease the booking of activities by sending the information the host. You can also add friends in the application to be able to see what activities they are attending.

It was decided to use a light blue, dark blue, white and a more saturated light blue as well as a red for specific purposes for the colour scheme, see Figure 8.1. The reason why blue is chosen as a primary colour, is due to the fact it has no strong association and it has a calming effect, [31]. It is also easy to find well contrasting colours in the same hue.

Figure 8.1: Final colour scheme

To assure appropriate contrast and text size was used, the colour contrast checker by *Color Contrast Checker - Coolors* [32] was used which follows the Web Content Accessibility Guidelines (WCAG). The minimum ratio for normal text (14-18px) to meet level AAA is 7:1 and 4.5:1 for AA. The contrast score for the dark blue and light blue was 12.32:1 which is used for the navigation bar. The buttons are rounded and a saturated light blue with a deep blue text to create a cohesive interface. The buttons also has a slight shade underneath to increase the sense on pliancy. This

contrast has a ratio of 9.41:1. For removing a friend and cancel an activity, a red button with white text is used to signalize warning. The contrast ratio for this button is 5.95:1.

The font used is Rounded Mplus 1c Bold, due to its high readability and to give the application a friendly and inviting look and feel. 14px is the smallest font size used, which is used on small buttons and labels. For paragraphs size 16px is used, while large buttons and headings has size 24px, which is the largest font size used. These are the font sizes used for the setting of medium size text.

Icons are places on the majority of the buttons and in connection to other pieces of text. According to Cooper et al. [15] icons are beneficial for quick recognition. By combining text and icons, the user can make associations and conclusion in a faster and easier way [16].

All interactive areas has a minimum target area of 9x9 mm. The majority of buttons are however larger, which can especially be seen in the navigation bar since it is larger than the average applications' navigation bar.

8.1 Browse and view activities

The browsing of activities is done by scrolling down in a list. Users are met with a search bar, category filter and a text that says "Here you can find activities in chronological order for your location". According to Cooper et al. [15] vertical scrolling can be hinted by cutting off a piece of the bottom object. Therefore the first activity is cut in the middle by the bottom of the screen to provide a visual hint that scrolling is possible, see Figure 8.2.

To allow the user to search for specific categories or interest, a category filter can be opened by pressing a button at the top of the page. The filter options consist of large state-switching buttons that has the corresponding colour of the category tag on top of the activity in the activities list, see Figure 8.2. This is to create a stronger association to the categories.

Figure 8.2: List of activities and category filter

To keep the information of the activity simple and concise when browsing, it was decided to only include date, time, place and a short description of the activity. When clicking the button labeled Read more (Läs mer) the user is introduced to more information such as:

- A longer description of the activity
- Price and payment information about the activity
- Who this activity is aimed towards in terms of interests and personal conditions, as well as wheelchair accessibility
- Closest public transportation stop
- Contact information to the host of the activity
- How many people that are attending and the participant limit (if there is one)
- Which of your friends are attending

The reason for putting the list of friends attending in the activity page is to prevent stalking, which was an expressed concern during interviews. By not having the friends attending in the browsing list the user has to be interested enough themselves to press the Read more button. It was also expressed that it is important for some users, that the others attending activities has a genuine interest for it.

There is also a forum at the bottom of the page where people can ask questions and talk about the activity. The reason why this function was added was to act as a substitution for a chat. A traditional chat function was seen as redundant since all participants used other chat services. The interviews showed that the only need

for communication within the application would be about the activity regardless. If the user desires to send a private message or call the host they can do so by clicking the phone number or email. This will activate a dialogue box where the user can decide how to proceed, see Figure 8.3.

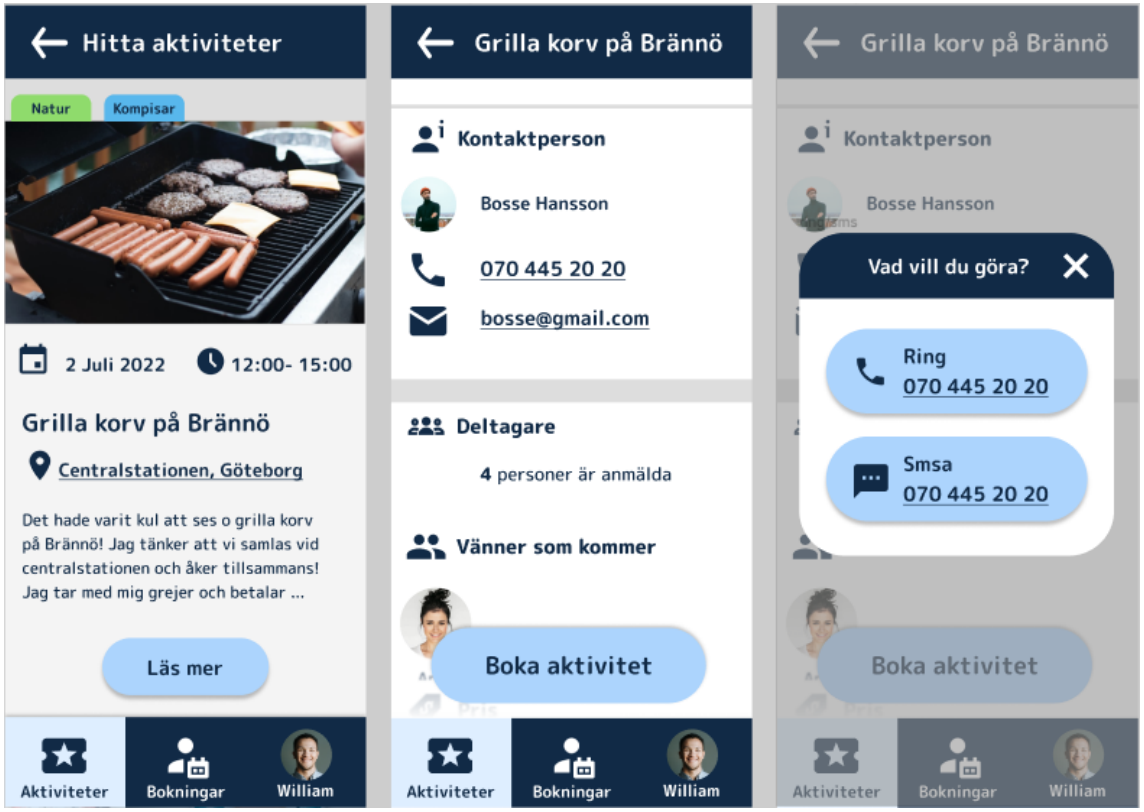


Figure 8.3: Viewing activities before and after clicking Read more (Läs mer).

To book an activity, the user presses the Book activity-button (Boka aktivitet) at the bottom of the page. The button stays on the same place when scrolling to make it visible and fast to find. This is a Cancel booking (Avboka aktivitet) when pressed. The user can thereby easily undo the action by pressing the button again. To make it clear that the activity is booked there is also a green tag added in the corner of the picture that says booked. This is shown both when browsing activities and in the activity page, see Figure 8.4.

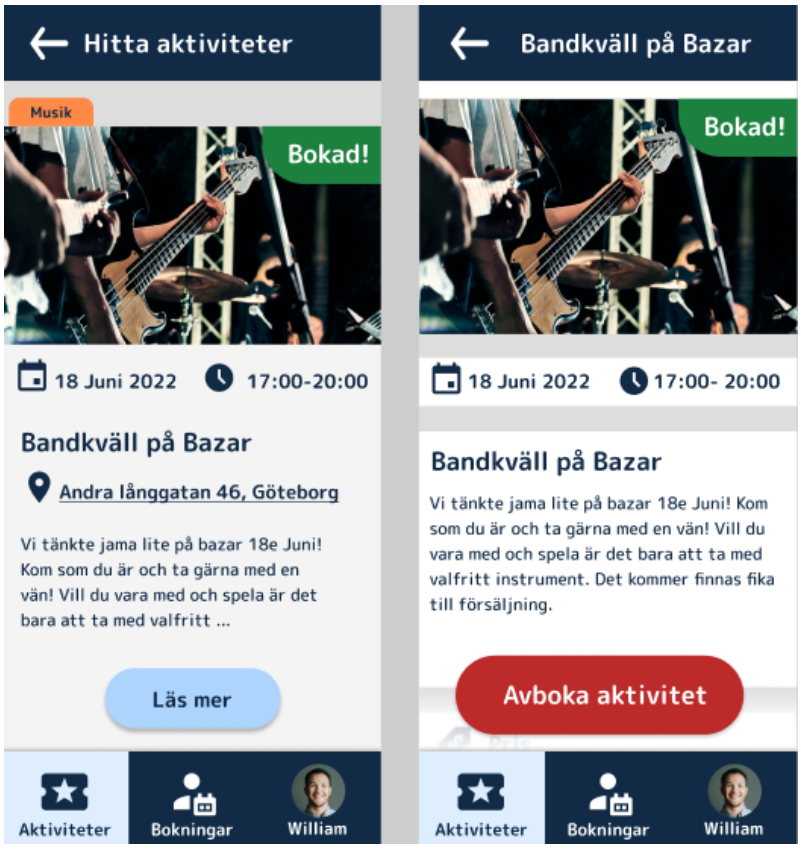


Figure 8.4: Booked activity

8.2 Creating activities

At the page called Activities I have created (Mina skapade aktiviteter), the user can view and edit activities created trough the application. The users also has the option to create a new activity. Trough the information and opinions gathered through interviews in this project, it was clear that most people in the target group were positive to the opportunity of creating own activities. On the other hand, some mentors at Grunden were sceptical to the idea and argued that it could be dangerous to let everyone create their own activities since there is risk of things not being planned or thought trough enough. This led to the the creation of two use cases, one more simplistic were the target group cannot create own activities, only browse, and a second one were the target group can both browse and create their own activities. The prototype shows the second use case, in which the target group can both browse and create activities, but if the application owners so decide, the function of creating activities could be disabled for all or some users.

Figure 8.5: The first pages of Create activity (Skapa aktivitet).

Upon creating an activity, the user is initially presented with a page that include an explanatory text, an instructional video on how to use the create activity-function and a button labeled Create activity (Skapa aktivitet). When proceeding to click the button, the user is asked to fill in information about:

- Activity title
- Select an appropriate picture, either from a default gallery or own upload
- Categories the activity fits under
- Date and time of the activity
- Activity address and closest bus or tram-stop
- A short description of the activity
- Who this activity is for and participant limit as well as wheelchair accessibility
- Last day to sign up for the activity
- Price and payment information about the activity
- How the activity creator (host) want to be contacted
- A summary of the activity that is about to be created, with a last confirmation step

These questions are divided on to different pages, to make the process more perspicuous and to feel less overwhelming to the user. At the user tests conducted previously, it was evident that a structured navigation was more intuitive and easier to navigate for the target group. Once all fields are filled in, the button labeled

Next step (Nästa steg) changes from grey to the default blue, to indicate pliancy. All fields of all pages are mandatory, with an exception for the closest bus or tram-stop question. This is because all questions included are essential, and nonessential questions have been avoided to keep the process and easy and as short as possible. On the top of each page, a progress bar is shown, to let the user know how many steps of the process was been completed and how many there are left. When the user is filling in a text field regarding address or closest bus or tram-stop, suggestions are supposed to be seen in connection to the text field.

8.3 See booked activities

The middle navigation tab is for viewing your booked activities. This function got its own tab to make it easy to find and keep track of your activities. The list is a simplified version of the list of all activities so more activities can be shown at a time while recognizing the structure. For the activities you have created there will be a light blue label that say Host (Arrangör) instead of a green Booked label as well as the option the edit the activity, see Figure 8.6

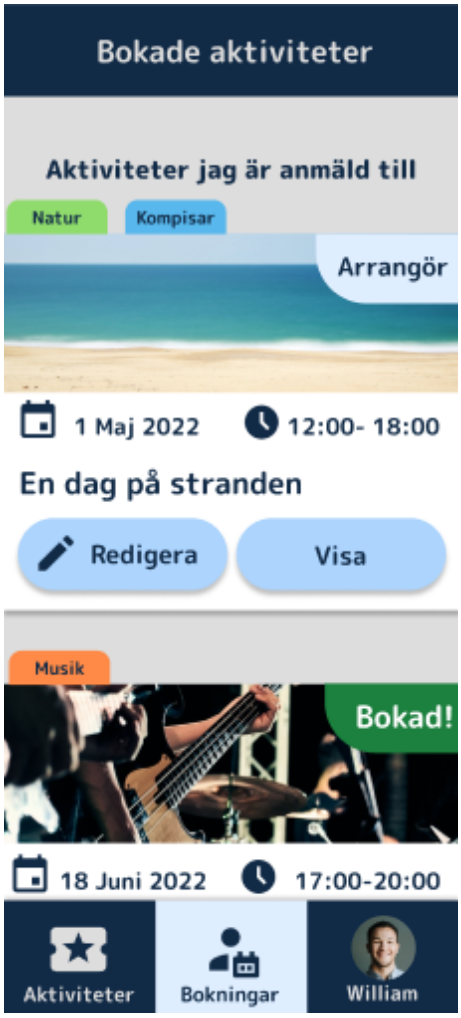


Figure 8.6: See your booked activities

8.4 My pages

This page serves as a collection page for all application functionality that is directly connected to the user, such as friends, settings and user information. These functions all play supporting roles in the application and will most likely not be used as often as functionality in tabs Activities (Aktiviteter) and Booked activities (Bokningar). The purpose of having this page is to provide a personalized experience in terms of accessibility, integrity and social experience.

Figure 8.7: The first screen of My pages.

8.4.1 My friends

The purpose of this function is for users to be able to see what activities friends are attending. The only user interaction this page provide is to search for people by name, add new friends, remove friends and accept or deny friend requests. The reason as to why functionality here is so limited, is because of what the user group have expressed during tests and interviews. A large portion of the target group have in some way expressed insecurity or concern regarding social interactions online and friend-functionality in different digital services and applications. A majority of the interviewees and testers also use Facebook, Messenger or Instagram and have expressed no need for any more social applications. Through Messenger, the target group also has a way of communicating digitally, and a lot of the interviewees and testers did not see a reason as to why this new application should have a chat function when they already have sufficient tools to communicate trough phone calls, text messages or Messenger. Some of the participants in the interviews and test also expressed that it had been troublesome for them to learn how to use Messenger and would prefer not having to learn a new chat-function.

The insecurity or concern the testers and interviewees did express were mostly regarding bad previous experiences from interaction with others digitally, or a concern that someone they sent a friend request to would feel forced into accepting their request. A reoccurring aspect among interviewees and tester was that they were very careful about respecting others online and also be given the same respect in return. This is another reason as why the friend-function has been kept as simple as it has. The entire friend-function is also optional to use, due to some interviewees expressing that they would prefer not to have friends in this application. Many others expressed that they would be more likely to use the application and sign up for activities if they knew someone else who was attending said activity. This resonates well with the overall aim of the Leva Livet-project and that is why the friends-functionality has been included, but in a limited way.

Due to the limited functionality and settings available to the users, a block function is not deemed necessary. Users have the option to easily unfriend someone, or to prohibit their friends from seeing their activity using settings. Users also have the option not to let others add them as a friend at all.

8.4.2 My information

To simplify the process of signing up for an activity and make it as fast and easy as possible, some information about the user is stored in the application. This information is only regarding subjects that would be useful for the activity host to know. The information regards name, age, contact information, address, in case of emergency contacts, allergy information, whether the person in question uses a wheelchair or has an assistant and an optional text for the user to fill in other information they want to share. This information is shared to the activity host automatically upon signing up for an activity. Next to each information row, there is an option to edit the information.

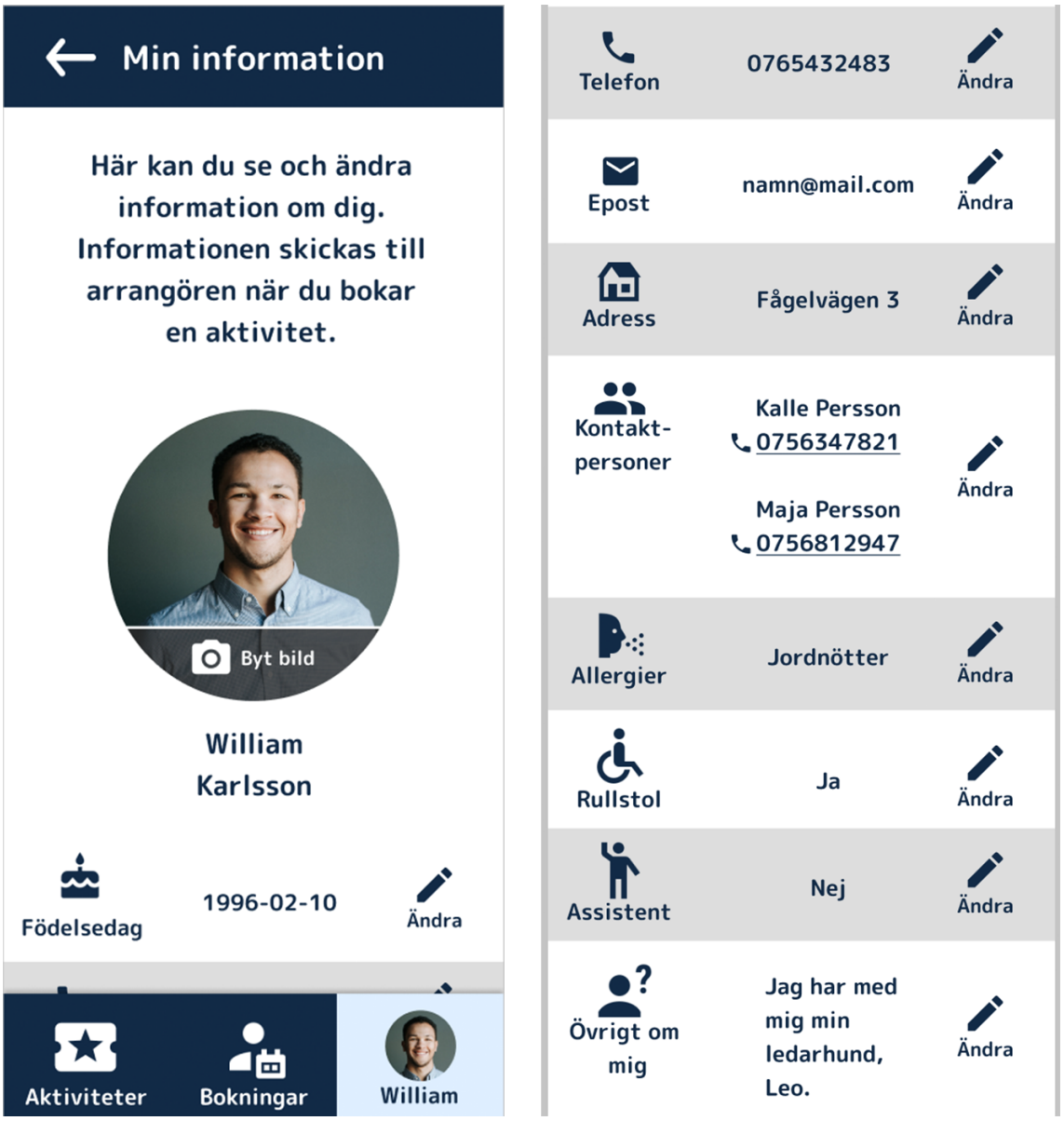


Figure 8.8: The My information screen (Min information).

8.4.3 Settings

Since the target group is very diverse and each individual has their unique needs and conditions, the settings have been selected to cater to the needs of as many as possible. At the same time, it is important not to overwhelm the users or give them options that are not straight forward or helpful. The first setting is whether to use visual interpretation of the interface. This setting is the very first so that it would be as easy as possible to find. Another accessibility setting is font size throughout the the application. Here, the user is able to choose between small, medium and large text. As seen in figure 8.10, other option uses radio buttons with a yes or no-text below. This is to make the state of the setting easily visible and easy to

change. During user testing, the yes or no-text was widely appreciated and testers aid that it was very helpful for them to understand the state of the setting.

For integrity reasons, the user is able to choose if they want to show what activities they are attending, to friends in the application. Users can also choose not to let others add them as a friend. The user can choose to show only activities that are accessible for them based on the information given in My information. If the user uses a wheelchair for example, the application will only show activities that are marked as wheelchair accessible. One setting that may or may not be included in the final product, is language. Several interviewees and tested suggested that the application should be available in different languages, but the need for a translated application has not been seen during tests and might be deemed to expensive when developing the final application.

Figure 8.9: The settings screen.

8.5 Aspects to consider when designing a similar application

After literature studies, user studies and testing the following aspects were found to be worth considering when designing a similar application.

General aspects regarding UI accessibility are:

- Use a contrast ratio for text and pictures of at least 4.5:1 to assure accessibility according to Boskin [17].
- Have a minimum touch target of at least 9x9 mm to facilitate interaction for people with impaired motor skills. This is suggested by Boskin [17] and was something that was confirmed in the conducted usability tests.
- Use standard icons and symbols to help with memory and recognition since people tend to link a specific symbol to an action of function.
- Use short and simple language to not confuse or overwhelm the user. This was noticed during usability tests as well as mentioned by Cooper et al. [15].

Other aspects that are more specific to this type of application are:

- Avoid using words that could be confused with something else, for example, use categories instead of filters since filter could be confused with photo filters. This was experienced during the testing.
- It is beneficial to minimize the amounts of choices the user has on each screen. Using sequential steps when performing a task helps not overwhelming the user with information and choices. Even if it is not conventional in interaction design to perform tasks in several steps it was seen as preferable during the tests.
- Having a navigation bar at the bottom with most important information and actions can help with keeping track of where you are in the interface. This is also something that is used for many other applications and is therefore easily recognizable.
- When showing information about an activity it is preferred to have all information at the same place, in this application that is under the photo. This was noted during the tests where the date and time was initially placed above the photo, but was confused with other activities.
- Buttons that should be easy to find, such as the book button, is advantageously sticky to always show when scrolling. When having in at the bottom of the page without it being sticky is was hard for people to find it.

- This user group was found to generally be more careful when it comes to online friendships and adding friends on social media of safety reasons. The safety and integrity aspect is therefore something to be considered when involving friends in a similar application.

- A chat function in this type of application is seen as redundant and can be replaced with a forum under each activity. Other applications are used for chatting with friends, and by adding this function in this app it would increase the complexity without increasing value.

- How much information and what information is shown at once should be considered. Only the most crucial information should be shown when browsing, that being for example: time, date, picture and a short description. This also corresponds to the suggestion by Boskin [17] of minimizing the amount of content on each screen.

For the full list of requirements, see appendix C. The requirements are weighted as desirable or requirement. A requirement means that it it highly central to the interface or application functionality and is important to implement in a finished product. Desired means that it is a good-to-have-feature and something that may be desired by many or all of the interviewees.

9

Discussion and future work

Of all members of Grunden in Gothenburg, roughly half were not interested in participating in interviews or tests. These people have thereby not had their voice heard in this project. Since this project is not only aimed towards members of Grunden, but all people in Gothenburg living with cognitive disability, it is likely that a lot of different voices and opinions have been lost. No interviews or tests have been held outside of Grunden due to not knowing how to reach out and not wishing to invade anyone's privacy. The time limitation has also been a contributing factor as to why tests and interviews has been exclusively held at Grunden. The aim was to test the prototype as thoroughly as possible trough interviewing and testing with as many people as possible. There were also many factors of the prototype to test and that lead to many different tests and interviews. When conducting tests and interviews at Grunden, the process of finding subjects was very fast and effective, thereby saving time to conduct the actual tests and interviews.

Roughly the same 15-20 people participated in the tests and interviews. Some participated several times while some only participated once. These were often social and active people who are able to independently use public transport or other means to get around. Of course, there were individual differences. Some interviewees were less willing to meet new people and preferred to socialize with others that they already knew. Others were excited about meeting new people and wanted to get to know as many new friends through the application as possible. This could potentially mean that people with disabilities that differ a lot from the interviewees' have not been represented in this project. Since some groups of people have not been interviewed, it is hard to determine what could have been overseen. Some people may have preferred the application design to look different and the usability to work in a different way. The consequences of this could be that the application is less usable for the people not represented in tests and interviews.

To involve more users and get the insights from people who did not wish to participate, other methods could have been considered. It might have been worth trying simple surveys to reach people outside of Grunden for example. This could however require assistance to make sure the questions are understood since we would not be there to provide explanations. The reason we had the group interview was to involve people who would not be comfortable with an individual interview. This could maybe have been used to a greater extent, even if there are some issues with this type of data gathering as well.

It can be argued that the level of function, diagnosis or specific impairments must be established to be able to assure that every individual's needs is being catered to.

However, since Grunden does not believe in defining people by their diagnosis, it is hard to tell the level of function and specific difficulties that were not explicitly expressed during the tests and interviews. A wide range of people with different needs participated in the tests, including people with impairments effecting visual processing, language, memory and reading abilities. The auditory processing ability among participants was not treated in this project due to difficulties testing. Even if the project were to discuss different diagnosis and consequences thereof, what is seen as much more important is practical testing and making sure the interface works with as many people as possible from the user group. This may depend much more on individual conditions rather than a generalised version of how people with a specific diagnosis may tend to be.

9.1 Evaluation of the design

When conducting usability studies with this user group it is of high importance to be as clear as possible to avoid misunderstandings. However, this was a difficult aspect since it required specific questions, which sometimes could result in them becoming leading and biased. Especially when conducting a semi-structured interview that is dependent on spontaneous followup questions and rephrasing of questions. In the initial interviews, it was quickly discovered that each interview needed to be adapted to each interviewee and what they felt comfortable and excited to speak about. This meant that each interview was different to ensure a result of each test or interview was as useful as possible as well as comfortable for the person being interviewed.

In the group interview, many valuable points were made and this was one of the methods that gave the most in terms of new insights and opinion quantity. Sometimes, the answer of one person could resemble the answer of the person before them. This did not occur too often to make results or insights seem invalid, but it was taken into consideration when compiling the data.

It was also seen as a potential source of errors that the prototype was pre-filled in with friends, name, activities etc. When creating an event for example, everything was pre-filled in, which meant the user only had to tap where they normally would to type for example. Sometimes the discussion was drawn more towards the pre-set examples than the actual interface. It might have been hard for the participants to distinguish what would need to be written by themselves and not since everything was automatic. This could potentially have affected the result of the evaluation. It was therefore hard to evaluate the creative part of coming up with an idea and think of a time and date for an activity as well as writing a description in the application.

9.2 Final prototype

The fact that the evaluation was challenging could mean that some helpful functionality could have been overlooked. For example, users may have benefited from a function that lets them pause a creation process, or save non complete activities, to come back and complete at another time. Due to time and prototyping tool limitations, it has not been realistic to evaluate every single aspect and possibility of the application.

The last version of the prototype is yet to be tested with the changes made after the last evaluation. By the last test, the prototype was visibly easy to use and no major problems in the interaction were found. Therefore, it was decided to implement some improvements to certain areas without further testing. The iterative nature of this project has lead to the prototype being tested at several times trough out the project. This leads us to believe that a large overall final test of this prototype should not be the highest priority at the last phase of this project, but rather an issue for future work.

9.3 Future work

Digijag is a platform that collects application adapted to the user group. The long term plan it to explore the possibilities of having this application on Digijag. Since this information came half-way into the project it was not prioritized to adapt the interface and functionality to suit their platform. Due to this, several functions and back-end matters are left for future work.

- How you gain participant information as a host. This depends on what hosts there will be, who are invited and if other channels are used for information distribution as well.

- Different administration roles and who can do what. A desire about having different administration roles in the application was expressed. This could mean that some people might be able to create activities while others can only view them. Some might have the role to provide login details while others work with accepting activities before they are published. This is something that needs more work however and depends on the back-end development possibilities.

- Other functions depending on back-end possibilities that needs to be considered are visual interpretation, automatic connection to calendar and how the user sets up an account. Regarding visual interpretation, all pictures should have a descriptive text.

- When using the app for the first time there should be some form of guide or walk-through to make it easier for users to get comfortable with the ap-

plication. This might be a suitable job for people at Grunden, providing an opportunity to thoroughly learn the application and later teach others how to use it.

- Make sure no unauthorized people can access the application for safety reasons.

- Add the ability to report inappropriate behavior in activity forums. Either as a user or as a moderator.

- The prototype needs to be adapted to both screen rotations, to ensure accessibility for as many people as possible.

- How and if activities can be shared outside the application and if this brings any risk to users.

Other than that, further evaluation with a large number of diverse people, preferably people outside of Grunden, as well as long term evaluations needs to be made. This needs to be done to evaluate how creating, and attending activities work in practice since there has been expressed safety concerns. For example who is responsible for an event and the people attending? What happens if the host does not show up? And other unforeseen situations that need specific measures.

During the interviews it was at one point suggested to be able too see past events. Due to the difficulty of testing this feature, as well as the risk of clutter, it was decided to not include it in the prototype. However, it is something that could be worth looking further into.

10
Conclusion

The research question was "what should be considered when designing an activity application UI for people with cognitive disability?". This question has been answered by doing literature studies, UX-research methods such as interviews and observations, as well as testing several prototypes with the user group. The condensed answer to the research question can be found in appendix C.

The requirements has laid foundation for a UI prototype of an activity application for people with cognitive disability. The requirements have been focused to what was seen to be useful and helpful to the user group during tests of the prototype. Some requirements were brought up during interviews and regards desirable functionality expressed by the user group.

The main functionality of the application is for users to easily find activities that cater to their interests, to make an independent and active lifestyle seem more appealing and achievable to the user group. This is in line with the aim of the project Leva Livet, which this project stems from.

Some of the most important design aspects to consider were:

- Use a contrast ratio for text and pictures of at least 4.5:1 to assure accessibility.
- Have a minimum touch target of at least 9x9 mm to facilitate interaction for people with impaired motor skills.
- Use standard icons and symbols to help with memory and recognition since people tend to link a specific symbol to an action of function.
- Use short and simple language to not confuse or overwhelm the user.
- When showing information about an activity it is preferred to have all information at the same place.
- This user group can generally be more careful when it comes to online friendships and adding friends on social media of safety reasons. The safety and integrity aspect is therefore something to be considered when involving friends in a similar application.
- How much information and what information is shown at once should be considered.
- Buttons that should be easy to find, such as the book button, is preferable to be sticky to always show when scrolling.

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A

Contract

Medgivande till att deltaga i forskning för apputveckling på Föreningen Grunden

Projektet går ut på att utveckla en prototyp för en mobilapplikation som ska användas av föreningen Grunden. Målet med applikationen är att ge Grundens medlemmar ett enkelt sätt att hitta aktiviteter och göra det lätt att umgås.

Vi gör intervjuer och tittar på hur du använder din mobiltelefon och de applikationer som du själv väljer att visa upp, för att ta reda på vad det finns för önskemål och behov kring den nya mobilapplikationen.

Information samlas in genom anteckningar och ibland med ljud och video under under intervjun. Vi kommer inte att publicera ditt riktiga namn.

Arbetet kommer att publiceras på Chalmers Tekniska Högskola och material från det kan komma att användas i forskning om människa-datorinteraktion.

Du kan när som helst avbryta intervjun och deltagandet i projektet. Informationen du har angivit blir då borttagen.

Samtycke till att delta i forskningsprojektet Applikation föreningen Grunden.

O Jag har läst och förstått den information om studien som anges ovan. Jag har fått möjlighet att ställa frågor och jag har fått dem besvarade. Jag får behålla en kopia av den skriftliga informationen.

O Jag samtycker till att delta i studien.

Plats och datum Underskrift och namnförtydligande

. . . . . .

Johanna Janebäck Ella Jonsson johjane@student.chalmers.se ellaj@student.chalmers.se

B

First list of requirements

Requirement	Priority (R / D)	Comment
See what events friends are going to	D	or not? Could lead to stalking?
Allow users to hide what events they are attending	D	If people can see what
Search bar	R	like Spotify. easy to understand and familiar to some users. search suggestions
Keep search for people and events separate	D	To avoid confusion when looking for a specific thing
Not having to learn the app?		
Notifications	R	reminders of activities that you are interested in or have booked
Notification settings	R	
Allow silent notifications settings	R	To avoid frustration if there are many notifications
find others with similar interests?		
View past events	D	to be able to backtrack. memory. Compare to previous events.
Be able to call a number by clicking on it in the app	R	Won't need to go back and forth the phone application, or remember numbers
Easy and intuitive explanations and information using a predefined structure.	R	in events info and other aspects of the app. Ev skriver inte vi infon?
Have a tooltip/ tutorial and be able to skip it	R	Get to know how the application works, for example the first time you use the app.
limit to relevant and interesting information.	R	not to overwhelm users. give relevant and necessary info.
pliancy hinting	R	

Show pictures and/or short film clips for the events	R	Make it clear and quick to overview
Show activities and events	R	calendar? Both gunden, grand bazaar and other events
show price information	R	
show place information	R	And vägbeskrivning
show contact information	R	
Show nearest bus stop	D	
Be able to choose several dates for the same event	D	For associations/admins
Create your own event	R	Good to plan with friends, might not work if a supervisor needs to be responsible. Needs to be moderated.
Only the creator of the event can edit	R	If you can create your own event.
Forum for people that are signed up for the event	D	This or chat, or both?
Have a chat function?	D	Can contact each other for an event, find people to
Simple chat function	D	No pictures, only to friends, not a primary chat.
Only be able to chat with your friends	D	To avoid strangers and oönskade messages
Only be able to send text, emojis and voicemail	R	Prevent people from sending unwanted pictures
Ability to create a profile	R	To be able to add friends, and automate your attendance status. If not logged in, the app is a simple activity calendar.
Ability to see activities without being logged in	R	
Safety		
Ability to block and unblock	R	

people		
Verify users	R	All users are within the target group or work with the target group. Make sure the person is the one they claim to be, personal invite? bank id?
Ability to report users for inappropriate behavior	R	to moderator.
Moderators to approve published activities	R	To avoid spam and inappropriate activities. also to make sure information is accurate
----------		
Make the app connect to the personal calendar automatically	R/D	Depending on developers
facilitate communication between actors		Consequence of having contact information
Be able to fill in what assistance you need in your profile	R	Filter?
Be able see in the event what accessibility prerequisites there are	R	Eg. wheelchair
Symbol representation and text	R	For example phone, mail, menu, friends etc. Emojis, pictogram etc etc?
Be able to see friend's personal events	-	To increase safety What if you want to invite more people than your friends?
Be able to set a participant limit	R	to not overflow a cafe for example, or invite people home.
Gather events from different actors	R	

Filter by activity and interests	D	
Mandatory information form when creating an event	R	

Accessibility requirements

Requirement	Grade	Comment
Large buttons/ touch target (9x9mm)	R	
Form fields under rather than beside the label	R	
No complicated gestures such as tap with two fingers	R	
Same order of elements regardless of screen size	R	
Be able to undo actions	R	
Text to speech	R	Familiar button
Provide text equivalents for visual elements	R	
Use standard icons/symbols	R	
Use autofill, checkboxes, select menus and radio buttons instead of text entry when possible	R	
Contrast ratio for text and images should be at least 4.5:1.	R	
Don’t use flickering or blinking elements	R	
Minimize content on the screen	R	
Use short, simple language	R	
Not overwhelm users with too much information	R	

Not rely too much on users memory	R	
Large font size, easy to read. Clear structure.	R	
Use easy short language	R	
Be able to change language	R	For people who don’t speak Swedish. It can however lead to confusion if you unintentionally change the language.
Allow for easy use without need for help from others	R	the app should promote independence
Clear descriptive name	R	
Include a clear description of the app’s purpose and intended user group	R	keep it simple. focus on a few functions

C

List of requirements

Requirement	Priority- Requirement/ Desire	Comment
See what activities friends are going to	D	To motivate users to attend activities.
Show what friends that are attending in the information page	D	To prevent stalking.
Allow users to hide what activities they are attending	D	For individual preference.
Search and filters		
Search bar	R	Easy to understand and familiar to some users. Search suggestions.
Keep search for people and activities separate	D	To avoid confusion when looking for a specific thing.
Filter by activity and interests	D	To simplify browsing.
Notifications		
Notifications	R	Reminders of activities that you are interested in or have booked
Notification settings	R	
Allow silent notifications settings	R	To avoid frustration if there are many notifications
Host gets a notification when someone writes in the forum	D	To not miss important questions
Get informed if someone removes an activity you are signed up for	R	Avoid misunderstandings
Other		
Be able to call a number by clicking on it in the app	R	Won't need to go back and forth the phone application or remember numbers
Easy and intuitive	R	In activities info and other

explanations and information using a predefined structure.		aspects of the app.
Have a tooltip/ tutorial and be able to skip it	D	Get to know how the application works, for example the first time you use the app.
Limit to relevant and interesting information.	R	Not to overwhelm users. give relevant and necessary info.
Pliancy hinting	R	E.g same colored nav. buttons
Create activity		
Create your own activity	D	Good to plan with friends, might not work if a supervisor needs to be responsible. Needs to be moderated.
The creator of an activity decides who can see it	R	So that people who only feel comfortable inviting friends can do so.
Only the creator of the activity can edit	R	If you can create your own activity.
Be able to choose several dates for the same activity	D	For associations/admins
Add picture	R	have a library of default images to choose from or add your own
Add description of picture	R	For people with eg. visual impairment
Have a set of pictures to choose from as well as upload your own when creating an activity	D	To make it easy for users to upload a photo.
Be able to delete an activity	R	If you regret creating it or cannot go for some reason
Be able to turn off the forum	D	In case it gets chaotic. Either the creator of the activity, or a moderator.

Chose how to receive bookings	D	eg. call, external website, send mail etc. It depends on the host.
Be able to set a participant limit	R	To not overflow a cafe for example, or invite people home.
Gather activities from different actors	R	Different associations can have their own accounts
See activities		
Show activities	R	Calendar? Both Gunden, grand bazaar, and other activities?
Show pictures for the activities	R	Make it easy and quick to overview the activity. Makes it easier to remember and distinguish from other activities.
Show price information	R	
Show place information	R	
Show nearest bus stop	D	
Show the host's contact information	R	Make it easy for people to know who is the owner and is responsible for the activity
Show the host's profile picture		So people can recognize you if they don't know you.
Make phone numbers and email addresses redirect links to phone/email app	R	To prevent the user from needing to copy number/address and manually switch between applications
Show a list of items that participants need/may want to bring to the activity	D	For example bathing suit, food or rainproof clothes
Show nearest bus/ public transport stop	D	

Be able to see in the activity what accessibility prerequisites there are (eg. symbols)	R	Eg. wheelchair
Write who the activity is suitable for	D	To make it easier to find an activity that can suit you. For example, people who can swim.
Forum in every activity (Only text)	R	To simplify discussion about the activity without needing to chat.
See how many spots are left, and/or limit and the current number of participants	R	
Autofill and give suggestions when filling in a text field	D	Simplify writing in text fields
Sign up for activity		
Host can choose what happens when the user press boka/anmäl. For example, redirect to the signup form on a separate website or to a phone number	D	To enable more flexibility. The user gets a warning dialogue that they will be redirected to another app.
By default, the app uses the data in the user's profile to send to the host when a user signs up for an activity.	D	To simplify booking
Profile (Backend dependent)		
Ability to create a profile	R	To be able to add friends and automate your attendance status. If not logged in, the app is a simple activity calendar.
Make the user fill in personal information	R	To simplify booking
Fill in full name	R	
Fill in address	R	To be able to get help to get home. project is aimed towards people in grupp/satellitbostad, this

		would make it easier to ensure safety and facilitate communication.
Fill in contact information	R	Phone number and email
Be able to add a photo	D	To make people recognize the user when at activities
Be able to fill in contact information to ICE/kontaktperson/anhörig	D	To have contact information to anhörig in case something happens during an activity.
Be able to fill in what assistance you need in your profile	R	
Safety		
Ability to unfriend people	R	To increase safety and prevent people from stalking
Verify users	R	All users are within the target group or work with the target group. Make sure the person is the one they claim to be, personal invite? Bank id? Freja? Get personal accounts from your association.
Ability to report users for inappropriate behavior in the forum	R	to a moderator.
Moderators to approve pending activities	R	To avoid spam and inappropriate activities. also to make sure information is accurate
----------		
Make the app connect to the personal calendar automatically	R/D	Depending on the developers.
Symbol representation and text	R	Icon for for example phone, mail, menu, friends etc. Emojis, pictograms etc?

Have a spell check	D	To make people more confident in creating activities on their own. Make sure the possibility exists. Could use the built-in spell-check of the operating system.
Be able to share public activities with friends	D	In-app or on messenger for example. To simplify invitations. Needs testing.

Accessibility requirements

Requirement	Grade	Comment
Large buttons/ touch target (9x9mm)	R	
Form fields under rather than beside the label	R	
No complicated gestures such as tap with two fingers	R	
Same order of elements regardless of screen size	R	For rescaling (backend)
Be able to undo actions	R	
Text to speech	R	Familiar button
Provide text equivalents for visual elements	R	
Use standard icons/symbols	R	Eg. google
Use autofill, checkboxes, select menus and radio buttons instead of text entry when possible	R	
Contrast ratio for text and images should be at least 4.5:1.	R	
Don’t use flickering or blinking elements	R	
Minimize content on the screen	R	

Use short, simple language	R	
Not overwhelm users with too much information	R	
Not rely too much on users' memory	R	Have several steps when creating activity for example.
Large font size, easy to read. Clear structure.	R	Text input 16px
Be able to change language	D	Would not harm but could be expensive. Maybe it works with automated translation?
Clear descriptive name	R	
Include a clear description of the app’s purpose and intended user group	D	Keep it simple. Focus on a few functions. If published in eg. google play.
Work for Android and IOS	R	
Make sure all icons have words in the backend for screen reading	R	For example phone icon
Where the user can make free inputs for numbers a number keyboard should be used	R	For example price. To reduce visual excise and prevent errors.